



Taiwan

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Overview

Manufacturing and ICT equipment production remain Taiwan's key economic sectors, while the service sectors of finance, commerce and transportation are the largest employer.¹ Foreign exchange reserves stood at over US\$200 billion at the end of 2003, and economic growth for 2004 is forecasted at 4.5 percent.² The economy remains robust due in part to a policy of internationalisation and liberalisation.

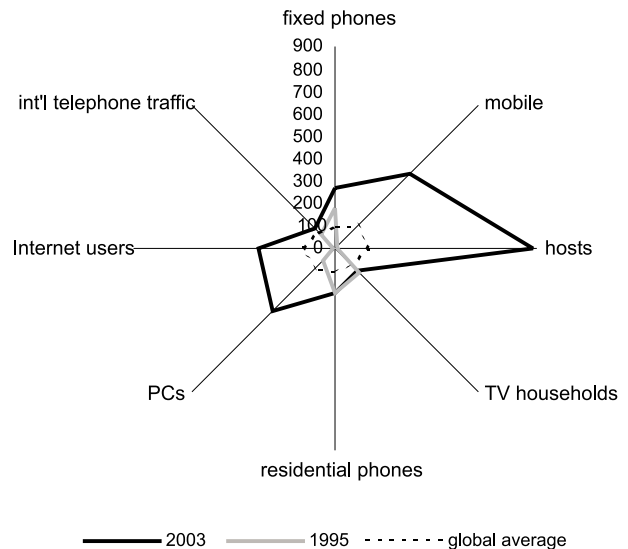
The government continues to implement the Challenge 2008 National Development Plan, popularly referred to as Challenge 2008, which covers the period 2002–2007. This strategic plan emphasizes such goals as strengthening international competitiveness, upgrading the quality of life and promoting sustainable development. It is designed around ten programmes and involves substantial investments in manpower, R&D and innovation, logistics networks and the living environment. It also aims to achieve significant political, financial and fiscal reforms. Progress has been made in the various programmes notwithstanding the economic downturn and the SARS outbreak in 2003.

Industries

Telecommunications

All sectors of the telecommunications market in Taiwan have been opened up for competition. Among them, mobile telecommunications services and international telephone services have become the most competitive. There are more than 400 companies competing in the telecommunications services sector. The competition has obviously worked as evident in the number of mobile phone subscribers soaring to 25 million by the end of 2003 bringing the penetration rate to 111 percent.

Taiwan was ranked ninth in the world and third in Asia by ITU's digital access index released in November 2003. The other countries in the top ten, which were almost exclusively European and Asian, were Sweden, Denmark, Iceland, South Korea, Norway, Netherlands, Hong Kong,



Source: *Monitoring the Digital Divide*. © Orbicom 2004

Finland and Canada. Taiwan also was rated first in the world for mobile phone penetration, fourth for broadband Internet penetration, and fifth for fixed telephone penetration.³

Chunghwa Telecom remains the largest operator in the market in terms of the number of subscribers, minutes of usage, and revenue. Taiwan Cellular had merged with TransAsia Telecommunications in May 2001, while Far EasTone Telecommunications and KG Telecoms, the third and fourth largest mobile operators, initiated merger negotiations in July 2003. The mobile phone market was served by eight operators before it was opened to competition. It has been transformed during the five years following liberalisation, and there are now one small and three large operators.

Progress of the three new fixed network telecommunications operators, which received their licences in 2000, has been hindered by the slow construction of "last mile" connections. Consequently, they have focused on international calls and corporate subscribers.

Internet and broadband

Telecommunications liberalisation has brought about rapid growth in Taiwan's online population and increased Internet usage by individuals and companies. According to survey findings of the Institute for Information Industry, Taiwan had a total Internet population of 8.8 million with a penetration rate of 39 percent in December 2003, an increase of 17 percent from that in December 1999. Another survey conducted by the institute in August 2003 showed that 57 percent of households were online, representing a 4 percent increase over the same month in 2002.

The number of broadband subscribers has seen rapid growth since 2001 when the government began promoting the service. The campaign led to the broadband subscriber base expanding from 262,800 at the end of 2000 to 3,043,300 in December 2003, an increase of 2.8 million subscribers. According to the same August 2003 survey, broadband users

comprised 35 percent of the total online population, while the ratio of broadband households to all online households was 73 percent as of mid-2003. The ratio of DSL users to the total broadband population climbed from 30 percent in December 2001 to 66 percent in 2003.

The Digital Taiwan programme, part of the Challenge 2008 plan, has set the goal of six million broadband subscribers by the end of 2007. The number of broadband subscribers is expected to continue increasing over the next few years. The target set for the end of 2004 was 3.8 million subscribers.

According to statistics provided by the Directorate General of Telecommunications (DGT),⁴ the total amount invested in the construction of broadband networks over six years, from 1998 to 2003, by fixed network and 3G operators exceeded NT\$300 billion (US\$9.1 billion). This huge investment has become one of the driving forces pushing for further revision of the telecommunications laws and regulations.

The number of broadband users is expected to jump when Taipei completes installing about 15,000–20,000 WiFi access points across the city by the end of 2005 to create what will be one of the world’s largest WiFi grids. Plans unveiled by Mayor Ma Ying-Jeou call for 50 percent of Taipei households to be covered by wireless networks by June 2005 and 90 percent by December 2005. The access points will be installed “everywhere”: in the 30 underground train stations and tunnels, on street lamps, traffic signs, and bridges, and on the walls and roofs of city-owned buildings. The WiFi project is part of the city administration’s plan to transform Taipei into an “intelligent metropolis” with broadband networks serving as the backbone of the public infrastructure. The project, dubbed “M-City”, will cost about US\$70 million to complete. Hewlett-Packard and Q-Ware Corp. are working with the Taipei city government on the project. Users will have to pay for the M-City WiFi service. The fee has not been published but may be fixed at US\$5–\$12 a month or at a rate that is significantly less than that of wired broadband services.

Online services

E-government

Taiwan ranks first in e-government according to the Fourth Annual Global E-Government Study conducted by the Taubman Center for Public Policy at Brown University. The study measured the e-government performance of 198 countries by evaluating government websites using criteria that included the availability of publications, databases and disability access, the level of privacy and security, and the number of online services.⁵

The Ministry of Finance in July 2003 launched an e-payment system to expedite payments in the government procurement process. The new system cuts the time needed

for processing payments to 1–3 minutes, instead of the 1–3 days required under the old manual system. Payments are wired directly to the suppliers’ bank accounts. Under the old system, the ministry had to reserve funds amounting to NT\$20–\$30 billion (US\$606–\$910 million) every working day for paying the suppliers of government procurement projects. The new system cuts the reserves required to about NT\$5 billion (US\$152 million).⁶

E-commerce and e-business

A survey conducted by the Institute for Information Industry from 9 August to 3 September 2002 investigated Internet penetration in businesses, the methods of connection, the use of email and websites, and the disparity in Internet usage between industries. It also studied which Internet functions were deemed most important to the companies and what benefits and obstacles they had experienced in using the Internet.⁷

The survey revealed that 61 percent of businesses in Taiwan had access to the Internet and that access had grown by 17.2 percent since 2001. The Internet penetration rate was highest among larger companies, while small businesses registered the highest growth in Internet access in 2002, expanding by 25 percent. Most businesses accessed the Internet by xDSL, followed by dial-up and leased lines. The number of businesses using broadband connections (xDSL and cable) increased to 70 percent.

The three most important functions of the Internet were messaging (82.8 percent), sourcing business information (74.7 percent), and providing online customer services (67.4 percent). The top three benefits of Internet use were perceived to be better communication with clients/suppliers (80.8 percent), improving work efficiency with clients/suppliers (79.8 percent), and improving work efficiency within the company (79.5 percent). Most businesses connected to the Internet were very concerned about the three issues of online security, Internet infrastructure, and network externality. The top three factors that restricted enterprises from accessing the Internet were the threat of virus/hacking (78.5 percent), unstable connection (69.7 percent), and trading partners not having Internet access (64.6 percent).

Email was used by an average 85 percent of all companies that were online. This rate decreased with the size of the company, from 97.3 percent among large enterprises to 78.7 percent among small businesses. Among those using email, 40 percent used it to ask clients for price quotations and over 30 percent used it to place orders.

Only an average of 36 percent of companies that were online had set up their own websites. Again, this rate was affected by the size of the company, ranging from 74.2 percent of large enterprises to 26.2 of small businesses having websites. The proportion of businesses having websites was highest in the finance, insurance and real estate industry (53.4 percent), followed by the service industry (40.3 percent) and

manufacturing (40.1 percent). Among these websites, 28.8 percent allowed customers to order online and 12.0 percent allowed suppliers to take orders online.

Key national initiatives

Development of IPv6 networks

Statistics compiled by the Asia Pacific Network Information Centre (APNIC) show that IPv4 addresses are being rapidly assigned. The six major national Internet registries in the Asia-Pacific region reported a 50 percent increase in the use of address space in 2003. Out of the total four billion IP addresses once available, only less than two billion remain for distribution. Some Internet experts predict that there will be a shortage of IP addresses in five to ten years because of the rising number of Internet users and the emergence of 3G mobile communications. The shortage will have a significant impact on the future development of the Internet.⁸

In Taiwan, the present IPv4 platform may no longer meet the future development needs of the Internet, especially in view of the rapid development of broadband networks and wireless communications. The government is actively promoting the development of IPv6 to address this challenge. Numerous organisations, including the Taiwan Academic Network, Academia Sinica, the National Center for High Performance Computing of the National Science Council, the Computer and Communications Research Laboratories of the Industrial Technology Research Institute, HiNet, Chunghwa Telecom Laboratories, the Taiwan Network Information Center (TWNIC), and the National Information and Communication Initiative Committee (NICI), have initiated efforts to develop and promote IPv6. NICI set up the IPv6 Steering Committee in October 2001 comprising representatives from the government, TWNIC, academic and research organisations, telecommunications companies and ISPs. The committee implemented a national IPv6 deployment and promotion project to effectively foster the development and application of the new protocol integrating the resources of industries, the government, schools and research institutes. The IPv6 project is being carried out in three phases over six years, beginning with the launch of an experimental network.

In addition, TWNIC took the lead in proposing the establishment of an IPv6 task force for the Asia-Pacific region. The task force was established in February 2004 with Taiwan as one of the major founding members. According to TWNIC, the number of IPv6 addresses released to Taiwan reached class 13 (unit:/32) by the end of 2003. This number places Taiwan in the tenth place worldwide and third in the Asia-Pacific region.⁹

Digitisation of radio and television broadcasting

Digital television and radio broadcasting technologies not only improve the quality of audio and video transmissions but also enable the more efficient and effective use of spectrum resources. Moreover, they make it possible for broadcasters to provide diversified services and multimedia content to meet the different preferences of consumers. The government has been working intensely to speed up the digitisation of radio and television broadcasting as well as upgrade the technologies employed by allied industries.¹⁰

Trial radio broadcasting using digital audio transmission technology was approved in 2000. The European Eureka-147 transmission system proposed by the local broadcasters was deployed to ensure that the experiment was consistent with the principle of technological neutrality that they had adopted. DGT then drafted a plan for trial broadcasting with five VHF band III channels (174–240 MHz), and 19 radio stations were selected to participate in the trial. Apart from these five experimental channels, DGT plans to include another four channels. These nine channels will eventually be used for broadcasting digital radio programmes. The authorities had issued 27 construction permits and 23 station licences for the trial by the end of 2003.

For television broadcasting, the government had set the target of having terrestrial stations begin digital broadcasting by December 2001 under a time frame approved in November 1997. It also made it clear that analogue channels would be closed when the digital television penetration rate exceeded 85 percent. The five terrestrial television stations in Taiwan responded quickly and began to deliver trial digital signals in mid-2000.

The European transmission system recommended by the broadcasters was adopted because it is better suited to Taiwan's geographic environment and business model, since it offers the characteristics of mobile reception, better indoor reception, the capacity of a single-frequency network to improve coverage, and superior ability to resist multi-path interference.

The five television stations implemented a biennial plan for broadcasting digital television programmes to all regions for 2001–2002 with the construction of seven digital transmitting stations. Four transmitters located in the western region began transmission in May 2002. Another three transmitting stations, located in the eastern region, began operating in April 2003 effectively expanding the coverage of the terrestrial digital television network to 80 percent of Taiwan.

Regulatory environment

Regulations to promote development of the telecommunications industry

The government set up a National Communications Commission Preparatory Initiative Committee in 2003 to prepare for the establishment of an independent National Communications Commission (NCC) to oversee the communications and broadcasting industries. Later in the same year, the Communications Basic Law was passed and the draft of the Enabling Act of the National Communications Commission was formally submitted to the Legislative Yuan (Parliament) for deliberation.

The Communications Basic Law stipulates fundamental principles for the development of the communications industries, setting the stage for the revision of current laws regulating the telecommunications, broadcasting and IT industries. The passage of the Communications Basic Law and the creation of NCC are expected to accelerate regulatory reform in the telecommunications and broadcasting sectors.

Meanwhile, DGT has implemented regulatory measures to eliminate obstacles standing in the way of network expansion. As a first step, it encouraged Chunghwa Telecom, the market leader, and other private fixed network operators to convene meetings to negotiate arrangements for leasing the local loop so as to speed up infrastructure construction. DGT continues to monitor the progress of the construction of private fixed networks and at the same time facilitate the building of national broadband networks.

Work on building local loops by the new fixed network operators has been hampered by restrictions imposed by local authorities. At the same time, disagreement on the fees and period of leases has been difficult to resolve between Chunghwa Telecom and the new operators. As a result, competition has not increased in the fixed network market and broadband tariffs have not fallen substantially. This has led the Executive Yuan (Cabinet) to request that DGT draft a construction plan for a national common duct for broadband telecommunications. The plan has been submitted to the Ministry of the Interior for consideration. It is estimated that NT\$30 billion (US\$910 million) will be needed for constructing the common duct, which is to be carried out from 2004 to 2008. The Construction and Planning Agency of the Ministry of the Interior will be responsible for executing the project, while the central government will contribute the funds after the necessary lease agreements have been collectively planned and concluded among local authorities, fixed network operators, cable television operators and mobile telecommunications operators. The duct will be leased to these various operators to stimulate fair competition.¹¹

Articles 38 and 38-1 of the Telecommunications Act were amended in May 2003 to respond to the new competitive environment of the industry. These new laws will regulate

the installation of telecommunications equipment in buildings and spaces allocated for this purpose as well as the maintenance and utilisation of such equipment and spaces.

NICI also initiated a plan for evaluating broadband network construction by local governments in June 2003. Formal evaluation began in early 2004. An evaluation index and statistics of network construction in different areas of Taiwan will be provided to show the outcome of efforts by each local government to promote the national policy on broadband as well as to encourage local governments to assist telecommunications operators with the construction of broadband networks.

Regulations governing number resources and portability

DGT revised the telecommunications network numbering plan in 2000 to keep pace with technological developments and to meet the need for building a diversified network. The plan was revised in October 2001 and again in June 2003 to reflect the evolution of the telecommunications environment and to maintain fair competition in the market.

Additionally, Article 20-1 of the Telecommunications Act was revised to allow for the better management of number resources. The revised article authorises DGT to formulate its overall plan for the management of telecommunications number resources and to collect number usage fees. DGT announced the revised telecommunications network numbering plan and the relevant regulations on numbering in September 2003.

DGT also passed regulations on number portability to enable subscribers to retain their existing telephone numbers when switching to another operator. The scope of number portability is confined to the same service category. The regulations require operators to adopt centralised databases to manage the data of ported subscribers in order to facilitate the operation of number portability. They also set out the principles that need to be complied with when the operators cut over ported subscribers. All fixed network operators and mobile operators are to form a management committee to collectively supervise the establishment, maintenance and management of the databases.

Research and development

Telecommunications technology centre

DGT is planning the establishment of a non-profit telecommunications technology centre under Challenge 2008. The centre will have the following goals:¹²

- To integrate the certification of telecommunications and information products in the private sector and establish a central telecommunications equipment certification centre.

- To provide an advanced experimental platform for multimedia applications and for the testing, application and exploitation of communication protocols.
- To promote forward-looking telecommunications research, technology transfer and collaboration, and the nurturing of telecommunications research expertise.
- To develop Taiwan's telecommunications sector as the leading industry building on the successes of the semiconductor and information industries.

The establishment of the telecommunications technology centre will be carried out over a number of phases between 2003 and 2006. The initial phase will see the establishment of three departments specialising in telecommunications, information and communication security, and broadcasting. DGT also established a preparatory office for the centre in August 2003, and it has selected Luchu Park in the Southern Taiwan Science-based Industrial Park as the permanent location of the centre.

IB3G project

The Executive Yuan announced in July 2003 the Integrated Beyond 3rd Generation (IB3G) project to integrate wireless LAN (WLAN) and mobile communications. The project will involve installing WLANs and integrating mobile networks to create an environment for broadband roaming on these networks and at the same time promote the development of related industries and services. To achieve this end, NICI has established a steering panel tasked with the responsibility of promoting the development of wireless broadband. An IB3G double network integration office has also been established under the supervision of the steering panel to coordinate the work of the Industrial Technology Research Institute and the Institute for Information Industry in promoting double network integration.

The IB3G office will combine the resources of industry, the government and the academia to make use of Taiwan's strengths in WLAN equipment and cellular phone manufacturing and services to develop ten cutting-edge technologies, applications or services for double network integration in two years. Achieving this will make Taiwan a global leader in integrated double network technologies and services in the long run.

Trends

Copyright is one of the controversial issues affecting Taiwan's ICT development. To address this issue, and to promote the free flow of ideas and the sharing of knowledge, Taiwan joined 23 other countries in launching a Creative Commons¹³ project in 2004. This initiative is headed in Taiwan by the Institute of Information Science at Academia Sinica. It hopes to herald a new era in which barriers that stifle innovation are removed, thereby boosting the growth

of Taiwan's digital content and multimedia industries and allied sectors.¹⁴

Creative Commons will play the role of an information clearinghouse for authors, musicians, filmmakers, software developers, programmers and other innovators. The movement emphasizes the idea of “some rights reserved” (as opposed to the traditional copyright licence model that emphasizes the idea of “all rights reserved”) on creative works and allowing open access to the public, and it provides several different model licence agreements for creators to choose from for their appropriate uses. In other words, it encourages placing works in the public domain for non-commercial uses. Books, movies, music, videos and photographic images labelled “CC” (for “Creative Commons”) will be attributed to the original creators and still be subject to conditions on non-commercial sharing, copying and dissemination.

The Creative Commons movement has spread rapidly since its inception. It points to an alternative path for the future of innovation. Participation in this international movement augurs well for the future development of ICT in Taiwan.

Notes

1. Government Information Office, <http://www.gio.gov.tw/taiwan-website>.
2. Ministry of Economic Affairs, Investment in Taiwan, <http://investintaiwan.nat.gov.tw/en/opp/finance.html>.
3. <http://www.itu.int>.
4. DGT annual reports, <http://www.dgt.gov.tw/english/About-dgt/publication.htm>.
5. <http://www.insidepolitics.org>.
6. <http://www.mof.gov>.
7. http://www.nici.nat.gov.tw/content/application/nici/english/guest-cnt-browse.php?cnt_id=209.
8. <http://www.apnic.net>.
9. <http://www.twnic.net>.
10. DGT Annual Report 2003, <http://www.dgt.gov.tw/english/About-dgt/publication.htm>.
11. Ibid.
12. Ibid.
13. Creative Commons (<http://creativecommons.org>) was started in 2002 by the US-based Free Software Foundation, with Stanford Law School professor Lawrence Lessig, Massachusetts Institute of Technology information science professor Hal Abelson, intellectual property law expert James Boyle and Japanese industrialist Joi Ito among the directors on its board.
14. <http://www.creativecommons.org.tw>.