.hk

Hong Kong

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Total population	6.93 million[a] (mid-year 2007)
GDP per capita	USD 29,900[a] (2007)
Computers per 100 inhabitants	Financial services, trading and logistics, tourism, and producer and professional services[b]
Fixed-line telephones per 100 inhabitants	59.3[c] (September 2008)
Mobile phone subscribers per 100 inhabitants	160.8[c] (2008)
Internet users per 100 inhabitants	64.8[d] (age 10 and above)
Domain names registered under .hk	172,551[e] (2008)
Broadband subscribers per 100 inhabitants	27.9[c] (2008)
Internet international bandwidth	127,495.50[c] Mbps (September 2008)

(Sources: [a]HKTDC 2007; [b]Census and Statistics Department HKSAR 2005; [c]OFTA 2008; [d]Census and Statistics Department HKSAR 2007b; [e]HK Domain Name Registration Company, Inc.)

OVERVIEW AND TECHNOLOGY INFRASTRUCTURE

In 2007, the Economist Intelligence Unit ranked Hong Kong fourth in the world and first in the Asia Pacific region in e-readiness. As a result of market liberalization, Hong Kong offers the world's most affordable Internet connection and mobile phone service, according to a survey conducted by the International Telecommunication Union (ITU) in 2005. Hong Kong also ranked third in the world in the ITU's Information and Communication Technology (ICT) Opportunity Index, which measures the maturity of infrastructure, skills, and ICT utilization in society.

Indeed, all commercial and residential buildings in Hong Kong have a broadband connection. External telecommunication capacity reached 1.596 Gbps in June 2007. Mobile phone penetration rose to 139.8 percent in 2007, a great leap from 104 percent in 2003.

The Census and Statistics Department (2007) reports that 74.2 of Hong Kong's 2.3 million households have personal computers (PCs). Broadband household Internet penetration increased from 50 in 2003 to 74.8 in 2007. Not surprisingly, young people, especially those in the 10–14 age group, use computers the most: 98.8 percent reported using the Internet at least once in the 12 months before the survey. The disparity between genders is minimal: 98 percent of males versus 99 of females. Among primary and secondary school students, 96.7 had computers at home in 2007, of which 97.6 had access to the Internet. Utilization of ICT among senior citizens remains low: only 5.8 percent of those aged 65 and above reported having used the Internet in the 12 months prior to the survey. But there is a substantial difference between the two genders in the 65 and above age group: 86 percent of males versus only 3.2 percent of females. The disparity might be a reflection of the gender disparity in literacy in the older generation.

Computer users are likely to be more educated and economically more active. Only 21 percent of those without any schooling or who attained only primary education are computer users. In contrast, 75 percent and 96 percent of those who attained secondary and tertiary level of education, respectively, reported using computers. Computer users among those who are economically active increased from 59.5 percent in 2004 to 75.4 percent in 2007, an indication that the economy is demanding a more ICT-skilled workforce. In fact, Internet penetration in business increased from 47.5 percent in 2003 to 59.8 percent in 2007. Moreover, 59.3 percent of all establishments reported engaging in electronic transactions in 2007.

In a survey conducted in February 2006 by the University of Hong Kong, six disadvantaged groups were identified and investigated: single parents with at least one child aged below 18; adults aged 60 or above; children in households with income lower than half of the median household income; new arrivals; female homemakers whose highest level of education is primary school; and persons with disabilities and/or chronic illness. The report indicated that people with disabilities were the most far behind in ICT utilization and knowledge. Among the various types of disability, the hearing impaired scored the lowest. The report was well received by the government and a decision has been made to regularly update the indicators used in the study. A large-scale follow-up qualitative study has been launched to study barriers to ICT for various disadvantaged groups.

KEY INSTITUTIONS AND ORGANIZATIONS DEALING WITH ICT

The development of the local ICT sector is due to the efforts of several institutions and organizations in Hong Kong. Nine of them are introduced in this section.

The Commerce and Economic Development Bureau (http://www.cedb.gov.hk/) consists of the commerce, industry, and tourism branch; the Communications and Technology Branch; and the Office of the Government Chief Information Officer (OGCIO). The Commerce, Industry and Tourism Branch is responsible for policy regarding Hong Kong's external commercial relations, inward investment promotion, intellectual property protection, industry and business support, tourism, consumer protection, and competition. The Communications and Technology Branch is responsible for policy regarding broadcasting; film-related issues; the creative (including film) industry; development of telecommunications, innovation and technology; and control of obscene and indecent articles. It also oversees the operation of 10 executive arms: Invest Hong Kong, Intellectual Property Department, Trade and Industry Department, Hong Kong Observatory, Post Office, Innovation and Technology Commission, Television and Entertainment Licensing Authority, Radio Television Hong Kong, Office of the Telecommunications Authority, and the overseas Hong Kong Economic and Trade Offices.

The OGCIO (http://www.ogcio.gov.hk/) was set up on 1 July 2004 to provide leadership in ICT development within and outside the government. It provides a single focal point with responsibility for ICT policies and strategies, and the execution of information technology (IT) programs and measures under the Digital 21 Strategy, in addition to providing IT services and support within the government. The OGCIO is also accountable for the government's investment in ICT.

A high-level e-Government Steering Committee chaired by the Financial Secretary was established at the same time as the OGCIO to set the strategic direction of the e-government program and coordinate inter-agency implementation. While the OGCIO has major responsibility for implementing e-government strategy, the Committee provides sponsorship for the e-government program at the most senior level, which is essential to drive the related policy and business changes across the government.

The Office of the Telecommunications Authority (OFTA, http://www.ofta.gov.hk/) is the executive arm of the Telecommunications Authority. Its main duties are economic and technical regulation of telecommunications services, enforcement of fair competition in the telecommunications sector, and management of the radio frequency spectrum. The OFTA is also the official representative of the Hong Kong government in the ITU and in various global internet governance organizations such as the Internet Corporation for Assigned Names and Numbers (ICANN).

The Innovation and Technology Commission (http://www.itc.gov.hk/) works with other government departments, the industrial and business sectors, tertiary institutions, and industry support organizations to build a solid foundation for innovation and technology development and facilitate international trade through support for applied research and development (R&D) and technology ventures, provision of technological infrastructure, human capital formation, promotion of internationally accepted standards, and conformity assessment services. The Innovation and Technology Commission also operates the Innovation and Technology Fund (ITF) to finance projects that contribute to innovation and technology upgrading in industry. There are four programs under the Fund. The University-Industry Collaboration Program and the Small Entrepreneur Research Assistance Program are designed to stimulate private sector interest in R&D and to encourage technology start-up companies, respectively.

The government founded the Hong Kong Applied Science and Technology Research Institute Company Limited (ASTRI, http://www.astri.org/en/company.php) in 2001 to capture the promise of technological advances for Hong Kong through applied research. In April 2006, after the Innovation and Technology Commission launched the Hong Kong R&D Centre Initiative to promote applied R&D and facilitate technology transfer and commercialization under a new strategic framework for innovation and technology development, ASTRI was designated as the Hong Kong R&D Centre for Information and Communications Technologies (ICT R&D Centre) to perform leading-edge R&D for technology transfer to industry, develop technical professional, and act as a focal point bringing together industry and university R&D assets to enhance Hong Kong's technological competitiveness on a continuous basis. ASTRI builds teams of researchers who conduct world-class research and create real economic impact by transferring the intellectual property they develop in customer-focused ways to industry customers, continuously and in volume.

The Broadcasting Authority (http://www.hkba.hk/) is an independent statutory body whose role is to help broadcasters and industry players to operate in a fair, stable, and conducive environment; to ensure that the community has access to wide program choice and quality services that meet international standards; to assist the government of the Hong Kong Special Administrative Region (HKSAR) in the execution of its broadcasting policies; and to administer all relevant legislative requirements and licence conditions. The Broadcasting Authority

issues guidelines and codes of practice to enable broadcasters to have a better understanding of the community's expectations and how the regulatory framework operates. The contents of such guidelines and codes are arrived at through a process of open public and industry consultation. However, there are plans to merge the Telecommunication Authority and Broadcasting Authority into a Communication Authority in response to the convergence of telecommunications and broadcasting.

The Hong Kong Internet Registration Corporation Limited (HKIRC) is a non-profit and non-statutory corporation responsible for the administration of Internet domain names under the '.hk' country-code top level domain. HKIRC provides registration services through its subsidiary, Hong Kong Domain Name Registration Company Limited (HKDNR, https://www.hkdnr.hk/), for domain names ending with '.com.hk', '.org.hk', '.gov.hk', '.edu.hk', '.net.hk', '.idv.hk', and '.hk'.

The Hong Kong Science and Technology Park (HKSTP, http://www.hkstp.org) offers a comprehensive range of services and facilities for companies at various stages of development, including quality infrastructure and support facilities for innovation and technology development, and consulting, training and research programs to foster partnership and collaboration between industry and universities/applied research institutes. The HKSTP consists of an InnoCentre, three industrial estates, the HK IC Development Support Centre, a Wireless Communication Test Laboratory, and a Photonics Development Support Centre. It also has three incubation programs to nurture start-ups, namely, the Business Incubation Program (Incu-Tech), Design Incubation Program, and Small Technology/Design Enterprise Program. On completion of the second phase of development, the size of the Science Park would be doubled to 225,000 square metres.

Cyberport (http://www.cyberport.com.hk/) is a USD 2 billion (HKD 15.8 billion) landmark project being developed on a 24-hectare site at Telegraph Bay in the southern district of Hong Kong Island. It comprises four office buildings, a five-star hotel, a retail entertainment complex, and a deluxe residential development. The aim is to create an interactive environment for a strategic cluster of about 100 IT companies and 10,000 IT professionals that would enhance Hong Kong's edge as a leading digital city. At present, a major challenge is the Cyberport's distance which translates to long travel times for employees. Most companies have to provide their own regular transportation for staff, which lowers flexibility in deploying working time. These logistical concerns have become hurdles to the entry of new tenants, and as the discount for early tenants has ended some companies have moved out from the site. An evaluation of the Cyberport's success cannot yet be made because financial reports are still not available in the public domain. Some commentators have expressed reservations about a 'big band approach' in building a 'Silicon Valley-like' concentration of ICT companies actually working in Hong Kong.

ICT INDUSTRIES

In 2006, imports of telecommunications equipment grew 16 percent with a value of HKD 111,301 million; computer hardware imports grew 41 percent with a value of HKD 268,290, and computer software imports grew 26.5 percent with a value of HKD 111,301 million. On the export side, telecommunications equipment and computer hardware recorded a 24 percent and 10.7 percent growth, respectively. The Trade Development Council reports that 77 percent of software and services are locally consumed, with the Hong Kong SAR government and its associated statutory bodies being the biggest group of consumers of services provided by the local ICT industry.

In 2006 about 64,000 professionals were employed in the software products and software services (SW) sectors and the information and communications services sectors. Forty-five percent of them (about 29,000) were engaged in software design and development. About 14,000 were employed in software applications and 15,000 in software related services. Software design is a high-end, high-profit domain of the industry.

R&D expenditure accounts for a small percentage of Gross Domestic Product (GDP) — 0.79 percent in 2005. Conceivably this has to do with the tendency of small business entities to invest in items that lead to an earlier cash return. Most of the 700 software product and software services companies in Hong Kong are small companies with a staff complement of 20 or fewer. About a third of these have subsidiaries in Mainland China in the form of wholly owned or joint ventures.

Rapid economic development makes Mainland China both a significant source of demand for technology and a growing supplier of ICT products. Needless to say, the growth rate and total volume of the software industry in Mainland China far exceeds that in Hong Kong. But there is a symbiotic relationship between Hong Kong and China in terms of ICT industry development. For instance, Hong Kong is strong in the area of project management and international trade. To strengthen Hong Kong's edge as a conduit to the Mainland market, the HKSAR government has established channels for cooperation with the relevant Mainland authorities and Guangdong Province in areas such as innovation, technological development, and information. A Memorandum of Cooperation was signed in June 2006 with the Shenzhen government to promote high-tech cooperation.

Meanwhile, the Hong Kong SAR government and the Central People's government agreed to further liberalize services and promote economic cooperation under the Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA).

Although the ICT industry is not included in any of the three phases of CEPA, in theory, the arrangement should create more business for ICT industry in Hong Kong. It will take time for positive results to become apparent and the implementation of CEPA requires a range of complementary arrangements, such as taxation rules and regulations, to maximize the benefit for local Hong Kong industries. Some commentators have a sceptical view of the concept of bridging the planned economy of Mainland China to the free market Hong Kong economy. Others believe that to benefit fully from the arrangement Hong Kong should have a more explicit and unified ICT Industry policy under which government support toward the development of the industry could be aligned with that in the Mainland.

KEY ICT POLICIES, THRUSTS, AND PROGRAMS

Several recent initiatives have had a major impact on ICT for development in Hong Kong.

The Digital 21 Strategy was introduced by the government in 1998 to set the vision for developing Hong Kong into a leading digital city. Through a vigorous consultation process with stakeholders and the general public, it has been updated thrice — in 2001, 2004, and 2008. From an industry angle, the document is important because it sets the direction and priorities for government intervention in ICT-related areas. From an ICT for development angle, it is even more important since a comprehensive ICT policy should be concerned not only with economic development but also with social development and the long-term sustainability of Hong Kong. A major change in the Digital 21 Strategy is increasing recognition of the social impact of digital technology. The replacement of the term 'digital divide' with the term 'digital inclusion' in recent versions reflects a change in paradigm, with social inclusion now considered as a significant element in the information society. The chief executive officer (CEO) of the Hong Kong Council of Social Services, a social worker, has been appointed to the Digital 21 Strategy Advisory Committee. Still, local civil society organizations continue to press for a better balance of economic development and social development in the Digital 21 Strategy. For example, the issues of Internet addiction and Internet abuse are still not part of the Strategy.

The current edition of the Strategy reiterates government's continuous commitment to investments in e-government, R&D and innovation; championing digital inclusion; facilitating cross-boundary technological cooperation; and effective regulation of relevant ICT sub-sectors. The 2008 edition includes a plan to fur-ther improve e-government services and turn Hong Kong into a wireless city through a combination of government investment and market forces. It also outlines specific plans and targets in IT in education and programs to help students from low-income families (see 'Computer Recycling Scheme').

As part of its goal to make broadband Internet access available to every citizen, the government plans to install Wireless Fidelity (WiFi) facilities at about 350 government premises frequented by the public, such as public libraries, Public Enquiry Service Centres, sports centres, cultural and recreational centres, job centres, community halls, large parks, and government joint-user buildings. The WiFi facilities will be phased in over 20 months. As of August 2008, 130 government premises were connected; the rest will be connected by mid-2009. There will be two wireless channels: citizens can choose either the open wireless channel for general Internet browsing or the encrypted wireless channel for transmitting data or performing transactions that require further security protection. At the same time, government facilities in public streets (such as lamp poles) are being made available for operators to set up hotspots and base stations at nominal rents (GovHK 2007).

Through a major donation from a local ICT vendor, the Housing Authority has been able to set up about 1,000 WiFi access points in 120 public rental housing estates, covering about 80 percent of the public rental housing estates where a third of the Hong Kong population resides. From January 2008 onwards, tenants have been able to access the Internet free of charge at the ground floor lift lobbies and the adjoining outdoor areas from 6 am to 11 pm daily, using pre-registered unique user identity cards (IDs) and log-ins. The Housing Authority also provides basic communal facilities such as power supply, cable ducts, and conduits at the designated areas. However, as reflected in some online discussion groups, since lift lobbies and other such common areas are not designed for such a purpose, it is a challenge to maximize the benefits of this initiative.

The Hong Kong Qualifications Framework (QF) was introduced by the Education and Manpower Bureau (EMB) in 2004 to foster lifelong learning. To this end, the EMB has assisted various industries in setting up their Industry Training Advisory Committees (ITAC), which are tasked with developing Specification of Competency Standards (SCS) for the concerned industry. The ICT ITAC, which includes major stakeholders in the industry and which was formed in July 2005, developed the first SCS for the SW sector. This will be followed by SCS for the Information and Communications Services sector. The SCS for ICT industries comprises task-based competency standards benchmarked to skills required to perform different job functions of the industry, including industry-specific knowledge, professional skills, and soft skills. It reflects industry perception of needs and areas for best practice, as well as core

Computer Recycling Scheme (CRS) for Students from Low-income Families

There are said to be around 40,000 school-age children with no computer at home. Access to computers and the Internet at home is considered necessary for children to enjoy the full benefits of all e-education programs. Thus, the education bureau of the HKSAR government acquired support from the legislative council for a computer recycling program whereby used computers are refurbished for reuse by low-income families with children in primary and secondary school. Non-government organizations (NGOs) with experience in this area were called upon to do the refurbishing, with the help of volunteers. The recycled computers are installed with some basic application software and anti-virus program and bundled with a one-year warranty and one-year free Internet connection. In addition, parents in the recipient families are required to attend IT training sessions offered by NGOs for them to learn about proper management of the computer and security issues.

An evaluation by the Hong Kong University Social Work and Social Administration Department indicates that the program has benefited around 10,000 families and although there are a few logistical difficulties, in general recipient families and the community at large welcome the program. Nearly three-quarters (73.3) of the parents/guardians interviewed found the CRS to be good or very good, and almost all (94.7) of them recommended the continuation of the project. Regarding the major objective of using computers at home to facilitate learning, there has been no overall change in the academic performance of student recipients noted so far. However, the students reported better performance in English than those in the comparison group who have yet to receive the CRS computers. An improvement in the social life at school of the CRS participants was likewise reported.

(Source: Education Bureau HKSAR 2007a; Hong Kong Council of Social Service 2008)

requirements for employability, with a view to the industry's future development. Moreover, the ICT SCS is supposed to provide a vocational competency benchmark for training, for use by both training providers and employees.

To support adoption of ICT in different business sectors, an incentive program has been designed offering financial assistance for companies, especially small and medium enterprises (SMEs), to embark on e-commerce, explore new markets, and strengthen their competitiveness. In cooperation with industry organizations and associations, the government is providing funding for implementing ICT platforms relevant to certain sectors. Currently the following sectors are covered: trade, beauty service, watches and clocks, medical and health, and social services. For example, in the social service sector a knowledge management portal for social service practitioners is being developed.

The Hong Kong Wireless Development Centre (HKWDC) is a flagship project of the Hong Kong Wireless Technology Industry Association (WTIA) with support from the government's Innovation and Technology Fund, quasi-government organizations, and all parties in the wireless industry. The 300 square metre space known as Cyberport includes well-equipped software development suites and a spacious product display area. The HKWDC aims to provide end-to-end infrastructural support (from information, consultancy, development, deployment, to product dissemination) for mobile and wireless application development in Hong Kong. There is a unique multi-operator and multi-vendor platform with connectivity to the wireless network, including Global System for Mobile communications (GSM), General Packet Radio Service (GPRS), 802.11, Enhanced Data Rate for GSM Evolution (EDGE), and third generation (3G). Some developers are using the facilities to develop and test their applications across different operators and devices, significantly reducing their costs and development time.

The ICT Awards (http://www.hkictawards.hk/) recognizes innovation and best practice in the ICT industry. The award categories are Best Digital Inclusion, Best Business, Best Digital Entertainment, Best Innovation and Research, Best Lifestyle, Best Public Service Application, and Best Ubiquitous Networking. Each award category is organized by an industry-related organization. In 2007, Pacific Century Cyber Works (PCCW), the biggest Internet service provider (ISP) in Hong Kong, had its 3G Infotainment winning both the Best Ubiquitous Networking Award and the 'Award of the Year' for its affordability and impact on society. For just one monthly tariff, PCCW's 3G customers can be connected to an unlimited flow of audio and visual media content.

The Digital Solidarity Fund (DSF, http://www.dsf.org.hk) is a demonstration of tripartite cooperation (between the government, the business sector, and civil society) in promoting digital inclusion. The fund is managed by a multi-stakeholder committee chaired by an independent person. It supports a wide

range of digital inclusion programs in the community, including matching senior citizens who want to learn computer skills with youngsters who can act as tutors, as well as computer training classes for people with special needs such as the hearing impaired. As of March 2008, the DSF had given USD 600,000 to 29 community projects benefiting 147,000 citizens.

LEGAL AND REGULATORY ENVIRONMENT FOR ICT DEVELOPMENT

The Electronic Transactions Ordinance enacted in 2000 provides the legal framework for the conduct of e-business and recognition of digital signatures for secure electronic transactions. The list of available authentication and encryption tools is growing. For example, the Hong Kong smart identity card for all citizens contains a digitalized reserved personal identification number that can be set and changed only by the card owner. The optional storage of a recognized digital certificate is a further means of authentication. But while the public key infrastructure is available to safeguard e-commerce transactions, the user-friendliness and portability of digital certificate services are still a concern to many.

The Privacy Commissioner for Personal Data is currently reviewing the Personal Data (Privacy) Ordinance enacted in 1995. Since different components of a personal data record might require different security treatments, the protection of data privacy has become a demanding and complicated task. It is thus also important to promote respect for privacy among developers, and corporate social responsibility in the business sector in general, in addition to the provision of a legal framework.

In 2005, a 38-year-old man was sentenced to serve three months in jail for violating Hong Kong's Copyright Ordinance by distributing illegal copies of three motion pictures without authorization via a peer-to-peer (P2P) network forum. This was the world's first case in which criminal charges were filed against a user of BitTorrent technology. The Copyright Ordinance, which was enacted in 2001, was amended in July 2007 to strengthen copyright protection and make the copyright exemption regime more flexible. Major changes include new civil and criminal provisions against circumvention of technological measures for copyright protection. At the public consultation prior to the amendment, the need for balance between strengthening copyright protection and safeguarding users' needs for fair and reasonable use of copyright works was expressed.

Meanwhile, a community initiative to form Creative Commons (CC) Hong Kong is underway.

The Unsolicited Electronic Messages Ordinance was enacted in May 2007 to regulate the sending of commercial electronic messages that have a Hong Kong link. Senders of commercial electronic messages are now required to:

1. provide accurate sender information and an unsubscribe facility in a message;
2. honour recipients' unsubscribe requests;
3. not send messages to any telephone/fax numbers listed on a do-not-call register unless consent has been obtained from the registered user of the number;
4. not withhold calling line identification information when sending pre-recorded telephone calls and fax messages; and
5. not use a misleading subject heading when sending email messages.

Three do-not-call registers (i.e. for fax, short messages and pre-recorded telephone messages) started operating in December 2007 and January 2008. However, the Ordinance and the registers need to be publicized more as the registration is still quite low. A high-level task group has been formed in the government, with participation from user community and industry stakeholders, to monitor the implementation and enforcement of the Ordinance. Initial feedback from the e-marketing industry notes that the fee for using the do-not-call registers is too high.

Since 2005 there have been a few rounds of spectrum allocation and licencing of broadband wireless access services. Some testing licences have been given to academics for research purposes. The latest plan is to conduct the auction for the BWA licence in the fourth quarter of 2008.

DIGITAL CONTENT

Digital TV[1] is being offered by all pay TV operators in Hong Kong via the cable, satellite, and broadband network. As for terrestrial TV, in July 2004, the government announced the Implementation Framework for Digital Terrestrial TV (DTT). The two terrestrial TV broadcasters currently providing free content to the public are required to launch DTT by 2007 and achieve at least 75 percent coverage in 2008. Subject to further market and technical studies, the government aims to switch off analogue broadcasting in 2012 to stimulate digital switchover[2] (Commerce, Industry and Technology Bureau, HKSAR 2004). But while the community as a whole is expected to derive enormous benefits from the digital switchover, some are afraid that the switchover cost might be too high for disadvantaged groups.

Local broadcasting and telecommunications operators have indicated interest in rolling out mobile TV services.[3] A consultation exercise to firm up the implementation framework

was undertaken in April 2008 and the general expectation is that necessary legislation will follow. The OFTA aims to auction the relevant frequency spectrum in early 2009.

ONLINE SERVICES

According to the 2007 Hong Kong Information Society survey of the Census and Statistics Department, 11 percent of the establishments surveyed had ordered or purchased goods, services, or information through electronic means; 58.3 percent have received goods, services, or information through electronic means; and 1.8 percent had sold goods, services, or information through electronic means. The percentages were higher for the financing, insurance, real estate, and business services sector (4.1); the wholesale, retail, import and export trades, restaurants and hotels sector (2); and large establishments (7.3). The value of business receipts from selling goods, services, or information through electronic means was HKD 64.9 billion in 2006, representing 0.77 percent of total business receipts of all selected industry sectors. About 63 percent of the e-commerce business receipts were through a designated private network and 34 percent were through the Internet. It seems that e-business is not widely practiced in Hong Kong.

On the consumer side of e-business, a total of 5.5 million individuals, representing 97.3 percent of the population above 15, used the Octopus card to pay for transportation and 66.4 percent of the population used it to purchase goods and services in 2007. Cyber banking increased in popularity from 13.2 percent in 2006 to 16.8 percent in 2007, representing a user group of around one million. Purchasing/ordering goods and services online is still far from popular. However, there has been a noteworthy increase from 3.2 percent in 2006 to 4.2 percent in 2007.

The new government portal (www.gov.hk) was officially launched in August 2007 as the single entry point to online government information and services. The portal provides access to some 1,200 existing government electronic services and some new services. A major difference from the old portals (i.e. the government information portal and the electronic services delivery portal) is that the content is now organized based on user groups (e.g. residents, youth, non-residents, and business) and subject clusters (e.g. employment, environment) instead of departmental divisions. There is also a plan to enable bureaus and departments to upload geospatial information to augment online services and textual information. Gov.hk provides a wide range of services online, including eTax, searching for government jobs, voter registration, lodging pollution complaints, identity card renewal applications, and booking facilities.

Web 2.0 applications are being used to deliver government services to the Hong Kong public. For example, RSS feeds of government news (http://www.news.gov.hk/en/rssinstruction.htm) are being used, and citizens can make use of this site to keep abreast of government news. In another example, the Secretary of the Commerce and Economic Development Bureau created a blog (http://blog.digital21.gov.hk/en/en_index.php) about the Digital 21 Strategy during the period of consultation. The third example of a Web 2.0 application in governance is a social networking application on the Environment Protection Department website (https://wasteexchange.wastereduction.gov.hk/english/index.php) to encourage citizens to exchange second-hand items. The site supports the identification of items for recycling and enables interested users to exchange such items.

ICT-RELATED EDUCATION AND CAPACITY-BUILDING PROGRAMS

The government published the first strategy document promoting information technology (IT) in education in November 1998 and an updated strategy document in July 2004. A third consultation is underway, with a consultation paper titled 'Right Technology at the Right Time for the Right Task'. The use of IT in education in Hong Kong aims to: *(i)* increase the efficiency and effectiveness of school administration; *(ii)* enhance the information literacy of students; and *(iii)* improve learning outcomes across the curriculum (Education Bureau, HKSAR 2007b).

The consultation paper currently being discussed specifies the following indicators of IT use in education in Hong Kong:

- All public sector schools have broadband connection to the Internet.
- The student-to-computer ratio is 6:1 in primary schools and 4:1 in secondary schools. This is comparable to the ratio of 5:1 in OECD countries which are more advanced in ICT integration in education, such as Australia, Canada, the United Kingdom, and the United States.
- Nearly 90 percent of primary school students and nearly 80 percent of secondary school students like to use computers to learn in class.
- Eighty-five percent of primary school students and 60 percent of secondary school students like to use computers to learn beyond school hours.
- School heads and teachers perceive ICT integration as a factor facilitating curriculum reform.
- Eighty-six percent of primary schoolteachers and 71 percent of secondary schoolteachers agree that use of IT can make teaching more effective.
- Sixty-two percent of primary schoolteachers and 52 percent of secondary schoolteachers are confident about selecting appropriate digital resources to teach.

- Over 50 percent of teachers frequently use IT in class.
- Sixty percent of parents endorse the use of IT for learning.
- Ninety-five percent of primary and secondary school students have access to computers at home, and 97 percent of them have access to the Internet at home.
- Ninety-nine percent of primary and secondary school students claim that they have knowledge of using computers.

To take IT in education forward, the government has proposed six actions:

1. Provide a depository of curriculum-based teaching modules with appropriate digital resources.
2. Continue to sharpen teachers' IT pedagogical skills.
3. Assist schools to draw up and implement school-based IT in education development plans.
4. Enable schools to maintain effective IT facilities.
5. Strengthen technical support to schools and teachers.
6. Raise parents' information literacy and assist them in guiding children to use IT at home.

Two principles underpin ICT integration efforts in Hong Kong. The first is the importance of teaching information literacy, which is the ability to source, select, evaluate, process, use, and articulate information to solve problems and generate knowledge, instead of just skill in how to use particular software or applications. The second principle is using ICT as one of many learning and teaching tools for all subjects instead of singling it out as a separate skill set to be acquired.

The Hong Kong Education City (HKEdCity) emanated from a Quality Education Fund project of a wholly-owned government subsidiary with the vision to build Hong Kong as a 'Learning City for the Learning Century' (see 'Hong Kong Education City').

OPEN SOURCE/CONTENT INITIATIVES

Since the Hong Kong government adopts a technology-neutral philosophy, use of open source software is advocated mainly by enthusiasts in the civil society sector. Although over the years the general public has learned more about open source applications, the general take up is still believed to be quite low. The Linux user group, among other initiatives, championed an open source wiki in 2007 to act as a repository of freeware and open source applications, and a resource library for GNU/Linux users and developers. Response to that wiki however is less active than expected.

The Hong Kong Productivity Council established a Hong Kong Open Source Software Centre (HKOSSC) in September 2007 to promote the adoption of open source software solutions and support the local software industry in tapping related business opportunities on the Mainland. The HKOSSC provides a range of services, including software posting, system testing, solution demonstration, proof-of-concept/pilot projects, technical support software certification, training, and research. The performance of the Centre is still unknown at this stage, but it is considered as the most organized move by any statutory body in Hong Kong in the promotion of the open source movement.

Hong Kong Education City

Hong Kong Education City (www.hkedcity.net) is the largest one-stop professional educational portal in Hong Kong incorporating information, resources, interactive communities, and online services.

HKEdCity is like an executive arm of the Education Bureau in promoting IT in education. Among its many initiatives, it operates a huge online repository of teaching resources tailored to fit the prescribed school curriculum. The resource library has over 10,000 high quality interactive teaching kits, films, animations, multimedia presentations, and the like, classified according to grade levels and subjects.

HKEdCity also promotes an e-learning platform featuring curriculum, games, creativity, communities, and tools designed to give children a happy learning experience. The student channel helps students in creative writing and project learning, and cultivates their information literacy and international vision.

HKEdCity is a popular website, with an average of four million daily page views. It has attracted 180,000 active users and the online resources are downloaded over seven million times in a year.

The biggest challenge faced by HKEdCity is to improve its teacher-friendliness and content relevance so that more teachers can use the content to enhance their teaching.

(Source: Hong Kong Education City 2008)

ICT RESEARCH AND DEVELOPMENT

ICT R&D in Hong Kong is spearheaded by ASTRI and has four technological domains: integrated circuit designs, communications technologies, enterprise and consumer electronics, and material and packaging technologies. Its research in the area of advanced wireless technology — the A8 WiFi Cellular Base Station, which won the Award of the Year in the HK ICT Award Scheme — is specially well-known. The A8 base station is deployed in outdoor environments to provide city-wide WiFi coverage. By making use of the smart antenna design and advanced signal processing algorithm, the base station can effectively provide 10 times the coverage of other WiFi base stations available in the market while minimizing the interference effect of other signals in the unlicenced frequency spectrum and requiring less than the required capital investment in wireless network infrastructure. The base station is currently being deployed in overseas markets, including the US and various Asia Pacific countries.

The 2007 Innovation and Research Award went to the Coal Mine Surveillance with Wireless Sensor Networks project of the University of Science and Technology. The research project deploys self-organized tiny sensors and powerful sensing and communication capabilities to construct an adaptive wireless sensor network system for underground surveillance in coal mines, including environment monitoring of oxygen, gas, water, and tunnel structure. The system is useful in Mainland China and other developing countries where underground mines are sites of life-threatening accidents.

CHALLENGES AND OPPORTUNITIES

That Web 2.0 technology has been gaining momentum in the last few years has opened up a wide range of opportunities in e-government, business, and the socio-political arena. The technology supports a loose and uncoordinated form of participation that seems to match very well the practical, individualistic, and non-committal traits of many. At the same time however, it can mobilize civic participation. Social and political actions, gatherings, and demonstrations are being organized online, via blogs, through Facebook, by email circulations, and the like. For example, in late 2007 a social movement initiated online for conserving a public pier that carries the collective memory of Hong Kong people caught the Hong Kong government unprepared. It also made the government realize that the traditional way of 'absorbing' public views via structured public consultation and the appointment-based advisory committee structure are no longer effective. ICT and Web 2.0 technology in particular can be harnessed as a tool in pursuing a more balanced social development agenda. The power of ICT in mobilizing civic participation in Hong Kong deserves much more research than it is now receiving. The big challenge to the government is how to take advantage of the interactive nature of Web 2.0 in its e-government initiatives.

As a free market where productivity and efficiency are highly appreciated, Hong Kong is quick to embrace new technology that results in convenience, operational improvement, and other tangible returns. While technology itself may be value-free, its adoption is highly value-laden. One example is a case in which hundreds of unauthorized nude photos of young celebrities were uploaded on the Internet. A few people have been arrested and charged. But a heated debate ensued online, followed by a demonstration of 1,000 people accusing the police of preferential treatment in over-reacting to the incident only because a celebrity was involved. The case pits those who champion the liberal nature of the Internet and those who believe that a certain level of morality needs to be upheld.

This difference of opinion will become more apparent in the near future as the government, under much pressure, has decided to conduct a public consultation in relation to the review of the Control of Obscene and Indecent Articles Ordinance enacted in 1987. Public opinion has it that the ordinance has failed to achieve its intention to protect the under-18 from the publication of obscene and indecent articles, as the ordinance was enacted at a time when the Internet was not yet popular. Human rights activists, however, are watchful of any move that might result in even the slightest gesture of ideological control.

How to strike a balance between traditional norms against obscenity on the one hand and freedom of expression of sexuality on the other is a big challenge. Hong Kong has to prove that it deserves to be called an information society by overcoming these ethical challenges through civilized, rational debate. In this regard, the Hong Kong Council of Social Service is organizing a roundtable discussion on 'Healthy Internet Movement' to tackle a wide range of Internet abuse issues, from child pornography to Internet addiction.

Equally challenging is striking a balance between users/consumers' need for freedom of access to information and copyright protection. The BitTorrent case is illustrative of the lack of understanding of intellectual property and how copyright should be reframed in cyberspace. It is also a reminder to content owners/producers in the entertainment industry to review their business model to make it fit the changing world.

NOTES

1. Digital TV improves reception, offers better picture and sound quality, yields higher spectrum efficiency, and enables new applications such as high-definition TV (HDTV), interactive TV, and datacasting services.
2. Digital switchover is the process where the terrestrial TV broadcasters launch DTT services and viewers equip themselves at their own costs with the necessary devices (e.g. set-top boxes or integrated TV sets) to receive DTT.
3. Mobile TV is a commercial video service for personal consumption on the move.

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