

.bn

Brunei

Darussalam

Yong Chee Tuan

| | |
|----------------------------------------------|---------------------------------------|
| Population | 390,000 |
| GDP | USD 12,945 million (USD 1 = BND 1.53) |
| Key economic sectors | Oil and gas |
| Computers per 100 inhabitants | 20 |
| Fixed-line telephones per 100 inhabitants | 20.4 |
| Mobile phone subscribers per 100 inhabitants | 114 |
| Internet users per 100 inhabitants | 51.16 |
| Domain names registered under .bn | No data |
| Broadband subscribers per 100 inhabitants | 3.18 |
| Internet domestic bandwidth | 512 Kbps |
| Internet international bandwidth | 633 Mbps |

(Sources: Authority for Info-communications Technology Industry of Brunei Darussalam 2008; Department of Economic Planning and Development 2008a)

OVERVIEW

A population of less than half-a-million living in an area of 5,765 square kilometres makes Brunei Darussalam one of the least densely populated nations in the Asia Pacific region. The 2006 Gross Domestic Product (GDP) per capita was BND 47,987 (USD 33,094: USD1 = BND 1.45). More than 54.3 percent of the population is between 20 and 54 years old, which contributes to a high workforce participation rate of 71 percent. However, despite the high standard of living (high GDP per capita, low inflation and poverty rate) enjoyed by the people of Brunei Darussalam, the current unemployment rate stands at 4 percent and it is growing faster than the population growth rate of 3.5 percent which in turn is growing faster than the GDP.

Its stable socio-economic situation and geo-political position have allowed the country to effectively play a prominent role in the Southeast Asian, Asia Pacific, and other regional communities. Since becoming fully independent in 1984,¹ Brunei Darussalam has maintained a strong relationship with the United Kingdom and it is one of the pivotal links between the European Union (EU) and Association of Southeast Asian Nations (ASEAN), and among the Commonwealth states. An active member country of the Organisation of Islamic Conference (OIC), it is expanding its networking relationships with all of the Islamic countries, particularly in the Middle East. The historical trade relationship with China, which dates back to 1417 with the arrival of Admiral Cheng Ho, also remains strong.

Diversifying the oil- and gas-dependent economy and ensuring a sustainable high standard of living are the main foci of the nation's long-term development plan defined as Wawasan Brunei 2035. The aims are to transform Brunei Darussalam by

2035 into a nation widely recognized for the accomplishments of its educated and highly skilled people as measured by the highest international standards, a standard of living that would put the country among the top 10 nations in the world, and a dynamic and a sustainable economy with a per capita income ranking among the top 10 countries in the world.

The government will focus on integrating e-government programs to enable the provision of high quality online customer services, enhancing local small and medium enterprises (SMEs) through e-business, and building human and institutional capacity in ICT applications. This amounts to an allocation of BND 1,145.7 million (USD 790 million), or 12.1 percent of the total budget, for ICT development under the National Development Plan (NDP) 2007–2012.

Prior to this injection of funding for ICT, the 8th National Development Plan 2001–2006 pushed for the introduction of an e-government program with a budget of BND 850 million (USD 586 million). This first wave of e-government development was basically more about enhancing information technology and information services (IT/IS) in government agencies than enabling online transactions. During this first wave the Prime Minister's Office (PMO) successfully rolled out a unified email system based on Lotus Notes with a suite of collaboration features to all its agencies and departments. However, due to the decentralization of e-government planning and implementation, other ministries and government agencies have adopted their preferred common office environment platforms, email systems, and information systems. The Ministry of Finance and Ministry of Education adopted Microsoft Exchange while the Universiti

Brunei Darussalam (UBD) continued to upgrade its Sun Mail, leaving other ministries to decide whether they would ride on the PMO’s system. Similarly, different ministries use portal and content management systems that have different architecture and operating platforms. Besides a number of technical uncertainties, the lack of harmonization of policies and standards is one of the growing concerns about the future integration of applications and services in the country.

Despite the strong emphasis on building ICT capacity in government agencies, a detailed blueprint or roadmap for ICT development is not yet being defined. ICT players are making headway in marketing their new solutions, setting up local offices, and recruiting foreign IT professionals to begin providing specialist courses. Many of the local vendors are securing partnerships, distributorships, and/or arrangements with overseas counterparts before marketing these products/services to government agencies, academic institutions, and several private sector organizations.

Government spending on ICT devices and accessories is increasing. This is indicated by the frequency and magnitude of government invitations to tender quotations for ICT-related items. Major items are normally bundled into e-government projects. Many of these second phase e-government projects will be issued for tender only by the end of 2009.

ICT usage in multinational companies (MNCs) and SMEs is not very encouraging. Many MNCs tend to adopt international products and services instead of acquiring the services of local vendors. The adoption of ICT in SMEs, on the other hand, is mainly limited to email systems and productivity applications. In contrast, household and individual spending on ICT devices, including notebooks and mobile telephones, is expanding rapidly as illustrated by the growing number of personal computer (PC) consumer fairs and exhibitions held annually. Household spending on cars, mobile phones, consumer electronic goods, and ICT devices (in order of preference) does not appear to be affected by the marginal increase in food prices. Note that the petrol price remains constant as it is being heavily subsidized by the government. In addition, there are other benefits enjoyed by citizens and residents, such as no personal income tax and zero import tax on computers.

TECHNOLOGY INFRASTRUCTURE

Worldwide Interoperability for Microwave Access (WiMAX) zones called wave@Brunei were recently installed in Bandar Seri Begawan, the capital. But they have received a lukewarm reception from the growing number of Internet users in the country. These WiFi zones which provide prepaid broadband

Internet services are available mostly in shopping centres, student hostels, and commercial and residential areas. But the cost of BND 5 (USD 3.5) per 83 minutes seems like a high premium to pay for broadband Internet access, which many restaurants are providing their patrons free of charge. The rate appears to be more suitable for hotel guests rather than students. Connecting to the Internet at many traditional and modern restaurants while enjoying the restaurant fare, is a growing trend among young people.

The consumer sale of notebooks has exceeded the consumer sale of desktops by at least 5:1 as reported by Concept, one of the largest PC vendors in the country. The popular screen sizes of notebooks are between 12 and 14 inches while the slow-moving items are the larger screen sizes, which could be an indication of the relative mobility of the notebook-using population.

Domestic Internet subscriptions are mostly for the ADSL system called e-Speed offered by TelBru. The subscription rate of BND 68 (USD 47) per month for a 512 Kbps Internet connection is one of the most expensive ADSL subscriptions in the region. Large organizations such as the Brunei Shell Petroleum Sdn Bhd, Royal Brunei Airlines, and the Hong Kong and Shanghai Banking Corporation (HSBC) have joint leased lines from the two Internet service providers (ISPs), namely, TelBru and DST Sdn Bhd. These are state-owned corporations, which means that free market competition is unlikely to happen between the two. There is little incentive for them to engage in a price war and no pressure to lower prices from the Authority for Information Technology Industry (AiTi), the regulator.

In April 2008, b-Mobile (a joint venture between TelBru and QAF Sdn Bhd) launched a 3.5G Internet service branded as ZOOM! This broadband connection using W-CDMA technology has download speeds that can reach up to 3.6 Mbps. The promotion rate is USD 55 for unlimited local usage. Similarly, in May 2008, DST Sdn Bhd launched its 3.5G Internet service called Go! Broadband carrying a maximum speed of 7.2 Mbps.

In 2006, work commenced on establishing the EG-Bandwidth, a private network linking all government agencies to their respective data centres and to the central data centre called the EG Centre. However, despite the availability of funding and pressure from government agencies, the network has remained unfinished. One convenient reason for the delay was the change in the consolidation of ministerial data centres that were deemed ‘overdesigned’. However, strictly speaking, the underlying reasons for the delay in the implementation of e-government-related projects are insufficient institutional capacity, lack of skilled project coordinators, and variations in the appreciation and understanding of e-government project requirements and outcomes.

Decision-making on changes in business processes or workflow is weakened by failure to empower project managers who

are often considered to be responsible merely for technical installation of the information systems. Delay begins even at the planning stage where there are difficulties in capturing user requirements and translating them into tender documents. During implementation, confirmation of requirements, adjustment of technical variations, and getting users to sign off on deliverables are unusually time-consuming and not at par with international best practice.

In contrast, the telecommunication industry is more active and updated. In 2006, the number of mobile subscribers was 74 percent of the population. This was a remarkable increase from the 34 percent penetration rate at the end of 2001. As of March 2007, according to the AiTi, the mobile telephone penetration rate had reached 114 percent. The two operators are the same as the ISPs, with DST providing GSM services to more than 80 percent of the market and TelBru offering third generation (3G) mobile network services.

KEY INSTITUTIONS AND ORGANIZATIONS DEALING WITH ICT

The recent restructuring of the e-government initiative has shifted the secretariat role from the Department of IT and State Store (ITSSD) of the Ministry of Finance (MoF) to a newly formed unit called the e-Government Agency under the PMO. The AiTi plays the role of e-Government Technical Advisory Body (EGTAB). The traditionally heavy involvement of the ITSSD in the centralized procurement of IT-related products and e-government development has begun to change to reflect the strategic directions of the MoF. The ITSSD's role is now reduced to that of State Store and meeting the MoF's IT needs.

In addition to the role of the government chief information officer (CIO), the permanent secretary of the PMO acts as the joint secretary of the e-Government Leadership Forum (EGTL) chaired by the PMO Deputy Minister. This structural adjustment helps to facilitate the government's business process reengineering — that is, the establishment and endorsement of e-government related policies can now be streamlined and managed at a higher level. The downside is the awkward relationship between the PMO and the AiTi, which reports directly to the Minister of Communications except in the coordination of the EGTAB.

Increasingly, the EGTAB is being tasked to look into a number of new and existing e-government issues, including institutional capacity-building, IT human resource development, and approaches to project implementation. The body has brought in expertise from the private sector and overseas agencies to cope with its rapidly growing functions and roles.

The AiTi is also tasked with the promotion of the country's ICT industry. It is currently engaged in a number of research and consultancy projects with the aim of improving ICT development among local SMEs.

Meanwhile, the chair of the Brunei IT Council remains the Minister of Communications who oversees the national development of IT. In 2007, the Ministry of Communications formulated a new strategic vision: 'towards a sophisticated society and excellence in communications'. The vision emphasizes the importance of information technologies and the capacity to effectively utilize and develop IT in the new economy. The Ministry has also pledged to introduce measures for the development of the ICT industry and the enhancement of local SMEs. The Ministry manages the National ICT Award competitions, and provides funds to winners to participate in the Asia Pacific ICT Award (APICTA) competitions held annually in rotation in Asia Pacific participating countries.

The Infocom Federation of Brunei was officially formed in 2007 to act as the platform for IT vendors to collaborate and interact, and to provide a single voice on relevant ICT issues. Another new organization in the ICT industry is the Brunei Economic Development Board (BEDB), which is the de facto focal point for attracting foreign direct investment and championing economic diversification projects such as the Methanol Plans and Pulau Muara Project. The BEDB currently manages the IT incubation centre called i-Centre, the first of its kind in the country. To date, the BEDB has attracted more than a dozen local 'incubatees' to rent office space at the i-Centre.

Last but not least, the Ministry of Education (MoE) plays an important role in the development of the ICT industry. It has the largest consumption of IT among all of the government ministries. In late 2007, the MoE launched a new 21st century education system to reflect changes in modern education, including integration of ICT in the curriculum. The e-education initiative that was started in 2002 under the 8th National Development Plan will be expanded to provide more ICT resources, digital content, and training for teachers to ensure greater adoption of ICT.

ICT AND ICT-RELATED INDUSTRIES

Since the deployment of the e-government initiative in 2001, the ICT industry has been expanded vertically and horizontally. There are two major groups of ICT vendors in the country: one group focuses on the sale of hardware, accessories, and software packages to the general public and private sector organizations, and the other group focuses on e-government projects. The second group consists of companies who see themselves as being more like system integrators, bundling solutions from overseas partners and consolidating them to suit local use. Many of these

local integrators are involved in front-runner project management services and ‘project funding’.

Generally, the ICT sector contribution to GDP is less than 2 percent. The current statistics system combines ‘transport’ and ‘communication’ under one category and the major items under the category are transport-related activities. The private sector’s contribution to the ICT industry is mainly in finance/banking and engineering. The country’s banks are actively updating their infrastructure and services to compete with HSBC, the head of the pack, for the provision of online services. The construction industry, which contributes around 7 percent of GDP, also plays an important role in the use of ICT, as most architects, consultants, designers, and contractors are using modern ICT applications to assist their operations.

KEY ICT POLICIES, THRUSTS, AND PROGRAMS

In 2007, the Public Works Department of the Ministry of Development successfully implemented an Integrated Document Production System (IDPS) in all of its design offices to provide architects, engineers, and quantity surveyors with a common platform called the REVIT (a suite of AutoCad products). The system enables all digital drawings and documents to be shared, managed, and stored in a central server. These design drawings and tender document are then released through an online tender collection and submission module, and the contractors can collect and submit the tender documents online. In effect, this e-government project does not only transform internal operations but also pushes the private sector (consultant and contractor communities) to actively use modern ICT applications.

In another key initiative, all schools are being connected with at least a 512 Kbps leased line Internet connectivity. The connectivity will become fully operational by September 2009. In addition, every primary school is equipped with a computer lab that can house more than 25 desktop computers. The main aim of building a strong ICT infrastructure in schools is to meet the needs of the new National Education System for the 21st century (SPN21), which seeks to develop in students the skills and mindsets relevant to the knowledge economy. Communications and digital literacy skills are considered as the main components of the new skills. Parallel to the establishment of ICT infrastructure, the MoE has also rolled out a digital library system providing a single portal to access a number of electronic educational resources. The digitization of local content, such as reports, exam papers, theses, manuscripts, cultural content, and books, is carried out continuously as the information becomes available. Digital content can now be easily accessed, archived, and managed using modern technologies. Slowly but surely

the teaching and learning communities will adopt and make advances in the new digital approaches to learning.

LEGAL AND REGULATORY ENVIRONMENT FOR ICT DEVELOPMENT

Brunei Darussalam has a stable, fair, and just legal system that is conducive to ICT development. The legal system is based on English common law with an independent judiciary, a body of written common law judgements and statutes, and legislation enacted by the Sultan and Yang Di-Pertuan of Brunei Darussalam. The Attorney-General’s Chamber has assigned a team of dedicated lawyers to assist in developing and vetting e-government contracts. They have adopted several best practices in IT implementation and are replacing clauses that are not favourable to both sides with win-win arrangements. The Attorney-General’s Chamber now allows greater flexibility in the waiver of liquidated damages and extension of time due to unforeseen delay or inaction/indecision on the part of clients. The new contracts also reflect the differences in ‘foreground’ and ‘background’ intellectual properties to signify the client’s rights to own the foreground intellectual properties but not the background IP as sold by the vendor. Another important change is the removal of the retention money levied at 10–20 percent of every milestone payment made to the vendor and released upon the end of the maintenance period (normally 3–4 years).

Brunei Darussalam recognizes IP rights and strictly enforces the Trade Marks Act 2000 together with the Orders on Patents, Copyright, Industrial Designs, and Layout Designs of Integrated Circuits. In December 2000, the Electronic Transactions Order 2000 came into effect. Its main purpose is to promote public confidence in the integrity and reliability of electronic records and electronic commerce, and to foster the development of electronic commerce through the use of electronic signatures to lend authenticity and integrity to correspondence in any electronic medium.

Other relevant cyber laws in Brunei Darussalam are:

1. The Broadcasting (Class Licence) Act 2001, which deals with the licencing of ISPs and content providers, and the liabilities of these providers.
2. The Internet Code of Practice Notification 2001, which recognizes the roles and responsibilities of users and providers.
3. The Computer Misuse Order 2000, which seeks to control abuses, intrusions, hacking, and attacks in connection with electronic devices and information.

DIGITAL CONTENT

The rapid proliferation of local blogs is a welcome indicator of a growing community with a greater awareness and appreciation of the digital world. The blogs often display high quality graphics, digital photographs, creative work and information about local and regional events. Almost all of the sites are written in English, with a few Malay phrases inserted here and there.

The news sites, such as Brudirect (www.brudirect.com), Brunei Times (www.bruneitimes.com), and Radio Television Brunei (www.rtb.gov.bn), are among the three most frequently visited sites. They provide up to date daily news and events in English. The Malay daily news is broadcast in both the government published weekly newspaper called the *Pelita Brunei* (www.brunet.bn/news/pelita) and *Media Permata* (www.brunei-online.com/mp). The first widely known local Chinese website established in 2006 is managed and owned by Adison Marketing Services (www.e-huawang.com).

Among the academic institutions the MoE is promoting e-learning and use of digital content. In 2006 the Curriculum Department under the MoE issued tenders for the digitization of curriculum content for maths, English, science, Malay, and computer subjects at the primary and secondary levels. The digitized curriculum would be introduced to all of the state schools in October 2008. More digitization projects are expected to be ‘issued for tender’ in early 2009.

ONLINE SERVICES

Many of the existing e-government projects are not yet aiming to provide immediate public online transactions. Instead they are designed to provide for mostly government-to-government (G2G) online transactions. The focus of these projects is laying out information systems and information technologies in government agencies. TAFIS, one of the most successful e-government projects, provides for online transactions across all treasury/financial offices in government agencies only. It has not yet reached out to government contractors or the public.

Some have criticized the narrow definition of the concept of e-government that is currently being implemented. However, these premature assessments of ‘failure’ could derail the implementation of e-government initiatives as agencies attempt to shift their main focus, sequence, and approach of implementation. A mad rush to provide online services may not work to the advantage of the public or consumers at large. The budget to cover the cost of providing these services may be better used for reducing bureaucratic operating procedures, shortening approval times, and lowering fees. These three factors are more

important measures of government modernization, which is sometimes incorrectly construed as the ability to engage in online transactions.

ICT-RELATED EDUCATION AND CAPACITY-BUILDING PROGRAMS

In 2003 the MoE introduced the International Computer Driving Licence (ICDL) program to all ICT teachers, staff, and IT project coordinators. Teachers and education personnel were strongly encouraged to acquire some demonstrable qualifications/skills in ICT while the project coordinators were all sponsored by the Ministry. There are more than seven business organizations accredited as ICDL Testing Centres. The Internet and Computing Core Certification (IC³) training is also gaining popularity among government agencies. The initial training program was a pilot project to assess the level of ICT competence among IT coordinators and selected teachers.

The new vision of the MoE is providing quality education toward a developed, peaceful, and prosperous nation. The mission is to provide holistic education for everyone to achieve their full potential. To achieve this vision and mission, the Ministry has defined teaching and learning excellence in terms of modern methodology, ICT tools, appropriate infrastructure, facilities, and benchmark processes. The quality of school education has also been defined in a broad sense to include student attainment of higher numeracy and literacy skills (including ICT skills), reduction in dropout rates, continuation into higher education, and greater monitoring and allocation of resources (including a decrease in the ratio of number of students per computer).

All the three higher education institutions, namely, the Universiti Brunei Darussalam, Universiti Islam Sultan Sharif Ali, and Institute Technology Brunei, are reviewing and repackaging their degree programs to make them more relevant in the new economy. It is expected that many of the new programs will include ICT components. Meanwhile, the new injection of funding for science and technology from the National Development Plan to researchers and academics is reinforcing the importance of ICT. Several competency centres and ICT-related training funds are being considered by various government agencies to enhance the capacity to establish, implement, and maintain ICT projects.

Meanwhile, the Institute of Public Service continues to organize and conduct short courses on IT-related subjects such as security, programming, database, project management, and audit. Regrettably, the lack of monitoring and incentive mechanisms belittles the participants’ interest and commitment. The short training courses are generally not designed for any proficiency

or certification examinations. Participants who have completed the IT-related courses are not monitored to see whether the courses are appropriate to their current work. In addition, there are no financial incentives for civil servants to gain additional professional IT certificates.

In 2008, the MoE awarded a project on the deployment of e-learning systems in all of the higher education institutions ranging from GCE A-level schools to technical colleges and Universiti Brunei Darussalam (UBD). The project aims to create a blended learning environment and encourage the creative utilization of Web technologies to support teaching and learning. Each institution has a customized learning management system (LMS) that enables teachers/instructors to upload and share their content, and students to download the content using the Internet and participate in online forums. The LMS is based on Wizlearn 8.0, which has been successfully implemented at the National University of Singapore. A specially developed authoring tool called Ultranote is available for all lecturers to create simple content that is compliant with Sharable, Content Object Reference Model (SCORM) standards. In addition, an instructional design lab at the SEAMEO VOCTECH Centre serves as a specialist lab for teachers who wish to explore and develop more advanced digital learning content. Apart from numerous training sessions on using the LMS and instructional design, an instructional design portal is being launched to support this mass digital content development initiative.

However, not every e-education project in the country is turning out as planned. A case in point is the supply of interactive whiteboards to schools and higher education institutions. The main objectives of the project were to introduce interactive whiteboards and encourage teachers to make use of the new device to enhance classroom teaching. About one to three sets of whiteboards with multimedia projectors were delivered to every school in the country. In hindsight the project should have included desktops/notebooks and more training during the implementation and maintenance stages. Because it was the first time for many teachers to use interactive whiteboards in class, the adoption varied greatly among teachers and schools. Most of the teachers who attended the training did not train other teachers. Many opted not to use the interactive whiteboards ostensibly because: (i) the computers that were pulled from the lab are not properly set up; (ii) it is difficult to book the few whiteboards available in the school; (iii) there is a limited number of software packages to support the effective use of the interactive whiteboard; and (iv) it is easier to use only the multimedia projector, without the interactive whiteboard. Thus, the full impact or success of the project cannot be properly ascertained. Some education analysts suggest that the MoE should quickly activate Phase 2 of the

interactive whiteboards project to salvage the first phase and get the teachers to adopt the new technology in support of the envisioned learning environment.

OPEN SOURCE/OPEN CONTENT INITIATIVES

In early 2008, the AiTi launched the Google™ Android Development Project to encourage local developers to develop Android-based programs. A number of workshops have been organized by some academics from UBD to promote greater usage of open source applications. Open source initiatives are generally welcomed and encouraged by the government. However, there is no concerted effort to promote these initiatives, which are largely driven by a few researchers in the academic institutions.

ICT RESEARCH AND DEVELOPMENT

The establishment of the IT innovation/incubation centre (i-Centre) has continued to draw attention from international incubators interested in parking their technology in the country and from young local techno-entrepreneurs. Aside from the office rentals being among the cheapest in town, i-Centre occupants receive a lot of support from the management. There are no hard rules on the types of technology that can be developed so long as they are locally registered start-up companies. Research and development (R&D) projects at the i-Centre at present include RFID, mobile phone applications, portal content management system, e-learning content development, prepaid cards, and a health information system.

However, the absence of any commitment from government agencies to adopt the incubated products is clouding the future of technology incubation in the country. In general, the level of ICT-related R&D activities in Brunei Darussalam is at the infancy stage, and it requires more support from government agencies and the ICT industry.

One of the many successful e-education projects launched by the MoE is the Knowledge Management System project. It was awarded in mid-2006 to a local ICT vendor, Sprintville Technologies, in strategic partnership with Singapore-based Avant Werx Pte Ltd and Fujitsu Asia Pte Ltd. The knowledge management system is designed to cover four tracks, namely, ‘examinations tips’, ‘event management’, ‘crisis management’, and ‘ICT in education’. The first track is targeted toward a virtual tuition centre that will allow students to use the MoE portal to access tips given by communities of teachers for GCE O level examinations. The track coordinator, who is appointed by the ministry, has the authority to nominate team leaders for each

community of practice (teachers) to lead the creation of content for this track. The event management track works with a group of administrative staff who have been organizing events, to capture their knowledge of event management. The crisis management track serves as the authority for disseminating and sharing knowledge about health-related crises in schools, such as the hand, foot, and mouth disease, severe acute respiratory syndrome (SARS), and food poisoning. The ICT in education track provides a platform for teachers to share their experience in using ICT in classes across different disciplines.

One of the interesting outcomes of the knowledge management system project is the strong cooperation and willingness of majority of the nominated staff and teachers to contribute their knowledge through the workflow process defined in the project. The concept of knowledge generation from communities of practice is realized with the right coaching and an incentive-driven environment. The project also allows for the future expansion of knowledge tracks.

CONCLUSION

The challenges of developing a significant ICT industry in an economy that is heavily dependent on oil and gas can be daunting even if budgets are not much of an issue. Oil price fluctuations have more impact on the GDP than the growth of any new industry in the country. It is therefore difficult to convince policymakers and other stakeholders about the success of new non-oil-related initiatives. Moreover, before the final outcome of any new initiative becomes apparent, there are many premature assessments by different communities that oblige policymakers to change course. As mentioned, this has been the case with the first wave of e-government initiatives that has been prematurely and unfairly assessed as failures by certain communities. Several major structural and procedural changes have been implemented in response to the negative comments.

The second challenge for the second wave of e-government projects in Brunei Darussalam is the harmonization of technical standards and policies to allow data sharing, resource optimization, and consistency in business processes. Many government

CIOs like to think of information systems as being unique to their agencies and constituents. There is no incentive for them to collaborate and share expertise, strategically deploy resources across ministries, and enable data sharing.

The third challenge is to address the shortage of skilled human resources in government agencies to implement and operationalize the new systems. Institutional capacity in project management, change management, and realignment of stakeholder requirements needs to be developed quickly before the new and old projects settle into the system.

Finally, local SMEs and ICT vendors need to be promoted to make them commercially viable, innovative, and capable of creating high value added products, intellectual property, and services.

NOTE

1. Brunei Darussalam used to be a British Protectorate State.

BIBLIOGRAPHY

- Authority for Info-communications Technology Industry of Brunei Darussalam. (2008). *Brunei Darussalam ICT indicators 2008*. Bandar Seri Begawan: Authority for Info-communications Technology Industry of Brunei Darussalam.
- Department of Economic Planning and Development. (2007a). *Brunei Darussalam key indicators 2006*. Bandar Seri Begawan: Department of Economic Planning and Development.
- . (2007b). *Brunei Darussalam statistical yearbook 2006/2007*. Bandar Seri Begawan: Department of Economic Planning and Development.
- . (2008a). *Brunei Darussalam key indicators 2008*. Bandar Seri Begawan: Department of Economic Planning and Development.
- . (2008b). *Long term development plan, Wawasan 2035 and outlines of policies and strategic directions*. Bandar Seri Begawan: Department of Economic Planning and Development.
- Ministry of Development. (2001). *8th national development plan: 2001–2005, Brunei Darussalam*. Bandar Seri Begawan: Ministry of Development.