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Maldives

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Overview

Like most other countries in Asia Pacific, the Maldives experienced some successes in the telecommunications sector, especially in terms of mobile coverage. At present it enjoys a 100 per cent geographical coverage and over 90 per cent telephone penetration. Mobile phones form a very basic foundation for communication for the communities in the 200 inhabited islands of the Maldives.

The importance of ICTs was seen especially after the tsunami of 26 December 2004. This was the worst disaster ever to hit the Maldives, an archipelago about a metre from sea-level. Waves of about 1–3 metres were reported all over the country. These waves destroyed the infrastructure and livelihood of affected islands. It was reported that 82 perished, about 12,000 people were displaced and 26 went missing and were presumed dead. Tourism, the largest contributor to GDP, suffered with the closing down of 19 of the 87 resorts in the country. The tsunami also affected a significant part of the telecommunications network, causing interruptions in all telecommunications services in a major part of the country. Telecom services in the Maldives run primarily on a microwave network, extending from the capital Malé towards the northern and southern parts of the country. During the tsunami, five major nodes of the network were badly damaged, disrupting communications to 13 of the country's 20 atolls. The radio equipment and shelters housing the equipment were also damaged beyond repair. The simultaneous failure of the main power on the islands added to the difficulties in maintaining communication services, even on islands where the damage to the main telecom equipment was not as severe as in the worst hit areas.

Total population	298,842 (2006)
GDP per capita (as of 2005)	USD 2,271 (USD 1 = MVR 12.75)
Key economic sectors	Tourism, Fishing
Fixed-line telephones per 100 inhabitants	11
Mobile phone subscribers per 100 inhabitants	91
Internet users per 100 inhabitants	25
Broadband subscribers per 100 inhabitants	2
Domain names registered under .mv	1,210

Notes: All indicators are based on 2006 year-end statistics, unless otherwise specified. Internet users are estimated by adding subscription customers and casual users (consisting of users of open access dial-up, users who share home or office connections, and cybercafé users).

With coordinated action by Telecommunications Authority Maldives (TAM) and the telecom company Dhiraagu, the telecom network and services were restored using available means and equipment. TAM, in collaboration with its operators and other international aid organizations, is now aiming to improve the resilience and diversity of the telecommunications network.

In August 2005, with the introduction of the second mobile phone operator, telecom services began to expand rapidly. Mobile technology is being used not only for voice communication but also for the Internet and as a substitute for fixed-line telephones. Once alien, the Internet is now a household term even in the outer islands. Under the e-government project, all government offices are being connected through a wide area network. This network will extend government service online to citizens. The e-government project will commence service during the last quarter of 2007.

Technology infrastructure

Like other developing countries, the Maldives is striving to catch up with modern technology and to adapt to the rapid changes in the ICT world. Since 2001, both government and the private sector have exerted significant efforts to develop the ICT sector and to strengthen related institutions in order to modernize the country. Specifically, the government of the Maldives adopted an accelerated ICT development policy when it launched its first Telecommunications Policy in 2001. The positive results of the development of telecommunications benefit all social strata.

Comprehensive communications services, including telephone on demand and ADSL broadband Internet, are now

available in Malé and the major population centres. These areas cover 13 of the 200 inhabited islands, corresponding to about 42 per cent of the population. All inhabited islands have access to fixed-line telephones and cellular telephone services are available throughout the country. Teledensity as of end 2006 was 11 per cent for fixed telephones and 89 per cent for mobile telephones.

Aside from ADSL, broadband Internet is available via cable TV networks (CATV) in Malé and a few other islands. Forty-five per cent of the population thus have access to broadband Internet services. In the islands that do not yet have broadband access, the Internet is accessed primarily via small telecentres

and through the use of mobile phones. The two cellular phone networks have EDGE technology countrywide.

The telecommunication backbone is a digital microwave network that runs from north to south, connecting all inhabited islands as well as industrial islands. Either fixed-line switches or remote local switches are installed in major population centres.

The current international gateway is established via satellite. However, plans are underway to connect the Maldives to the international optical submarine cable network. To this end, two submarine cable projects were undertaken in 2005 and were partly functional by the end of 2006. One of the cable projects

Connecting the Maldives to the international submarine cable network

Like most small countries, the Maldives has been relying on satellite technology to connect to the outside world. The main reason for resorting to this technology is the cost-effectiveness of satellite for the level of international tele-traffic that a small country like the Maldives generates.

Having submarine optical fibre connectivity instead of satellite has been a dream for the Maldivians for quite some time. While global submarine optical fibre cable networks like SE-ME-WE (South East Asia-Middle East-West Europe) have gone around the Maldives to offer opportunities to tap into them, the high cost of joining these cable consortiums prevented the country from reaping the technical benefits of optical fibre technology. When considering a cable system for Maldives, the typical argument is: Satellite is adequate for low traffic and the cost of a wide fibre bandwidth is neither required nor justified.

So, should the Maldives live with satellite forever? Recall the story of cars and roads. The typical argument against building extra roads is that for the number of cars that exist, the roads are enough. But consider what happens when new roads and highways are built: people who did not previously own cars, buy cars and existing cars are put to more use. Furthermore, types of vehicles that did not exist before, such as heavy freight trucks, start making use of the roads. In no time, the new highways are congested. And the cycle goes on. Can this analogy be applied to connecting the Maldives to an international fibre system? Satellite technology was sufficient in the past when voice telephony was the driver of international communications. Now, voice is no longer the major consumer of international bandwidth, and the bandwidth consumed by data applications such as the Internet has surpassed the bandwidth usage of voice.

In 2004, the Government of the Maldives took the initiative of revisiting the feasibility study for installing an international optical fibre system in the country. In 2005, the bold decision was made to connect the Maldives to the rest of the world using an optical fibre system. A consortium was established among the telecom service providers, Wataniya Telecom Maldives, Focus Infocom Maldives and Reliance Infocom of India, to proceed with connecting Maldives to a fibre system. The company established by the consortium, WARF Telecom International, brought the first fibre into the country in October 2006. It connects the Maldives to Falcon Network at a node in Trivandrum, India. A few days later, in early November, Dhiraagu brought in a cable connecting the Maldives to Colombo, Sri Lanka. As of this writing, work is underway to test both cables. The Dhiraagu cable was inaugurated in December 2006 and the WARF cable in March 2007.

To use the analogy of roads and cars once again, with the cables in place, the 'roads' are now established. Will traffic increase correspondingly? Voice and data traffic alone justify the costs. Equally important, industries that were not possible in the past, due to the limited connectivity are expected to develop. One example is call centres. Data-centric activities, such as data warehousing, is another potentially lucrative industry. Other sectors and industries not directly related to ICT are also expected to benefit from the optical fibre systems.

was undertaken by Dhiraagu while the other was undertaken by a company formed by the other telecom service providers. The cable systems are to become fully functional by the end of the first quarter of 2007, relieving the Maldives from the inherent limitations of satellite technology in the international gateway.

To reap the benefits of ICT, the government has embarked on a project to connect government institutions via a comprehensive computer network. This e-government project has two major components: developing the physical network, and building the applications that would run on the network. It is expected that citizens will start using e-government services by the last quarter of 2007.

Key ICT institutions

The Ministry of Transport and Communication is the line ministry responsible for policymaking with respect to ICT. Under the Ministry are two institutions directly involved with the ICT sector. One of these is TAM, which is responsible for the development and regulation of telecommunications. The second is the National Centre for Information Technology (NCIT), which looks after IT development and the establishment and operation of the government network.

Within the telecommunications sector, there are currently three licensed operators. The national telecom service provider Dhiraagu provides all telecommunication services, including mobile phone and Internet services. Focus Infocom is the second Internet service provider, while Wataniya Telecom Maldives provides mobile services as the second mobile telephone operator. Competition in the telecommunications sector is still in the early stages, with the new players working hard to gain a market share. Focus Infocom and Wataniya have become significant in the market, but Dhiraagu still has the largest share in the Internet and mobile services market.

Digital content initiatives

Like most developing countries, the Maldives lacks available local digital content. The National Centre for Linguistic and Historical Research (NCLHR) has attempted to develop digital content in the Maldivian language, Dhivehi. One of their initiatives is the compilation of the 'Basfoiy', a CD-ROM of Dhivehi words and some common phrases used in everyday communication. It is used in government offices where the administrative language is Dhivehi. It is also widely used in academic institutions by students studying the Dhivehi language.

Another digital content project is the Digitization of Local Content Initiative of the Ministry of Transport and

Communication (formerly the Ministry of Communication, Science and Technology) and the United Nations Development Programme. Under this initiative, practical information, such as those in pamphlets, booklets and guidebooks, was collected and then digitized on a CD for distribution to island communities that lack easy access to this kind of information. Initially the project team collected content that is freely available from the organizations involved. Later the project team met with some key organizations, such as the Ministry of Health, Ministry of Fisheries and Agriculture and Ministry of Atolls, that contributed useful information in printed and electronic formats. Some information was also taken from the organizations' websites. One of the challenges for the project team was converting some printed material into a readable format that would then be browsable and searchable on the CD. The CD has been distributed to all atoll schools, atoll capitals, schools in Malé, and ministries, government departments and NGOs.

There has also been an increase in the content available on the Internet. Local newspapers have websites with content in English and Dhivehi. Their biggest audience are Maldivians studying or living abroad. The online newspapers are also finding an audience in islands where it is difficult to circulate the print version on a daily basis. Most government agencies and major private agencies have websites. The websites of resorts are accessed mostly by would-be tourists and resort guests. The Maldives Tourism Promotion Board also provides links to these websites. Government websites are accessed mostly by government employees and citizens living in Malé. However, some websites offering online services are also accessed by people living in the islands.

Another project that aims to provide local content especially to the island communities is called Digital Empowerment of Island Communities. The biggest component of this project is the establishment of two Web portals for the island communities. The original plan was to complete the project by early 2005. However, due to the change in government structure in mid-2005, project ownership was transferred from the former Ministry of Communication, Science and Technology to the National Centre for Information Technology, which caused delays in providing online services through the portals. The preliminary work on the portals has been completed, such as the system (hardware and software) and the training necessary for hosting the portals.

Online services

There has been a significant increase in online services in the Maldives since 2002. The private sector, especially the tourism

sector, took the initiative of developing online services when it started offering online booking for tourists. The telecommunications operators also provide online services to their customer base, such as downloading application forms and checking bills online. A favourite service among customers is the Web-based short message service (SMS) to mobile phones provided by Dhiraagu. Dhiraagu also provides directory inquiry services on its Web portal. Dhiraagu customers can use the directory service for name searches as well as for number searches (reverse directory). The latter is another customer favourite.

The health sector also provides basic online information to the public. The Ministry of Health offers information on nutrition, diseases and national health indicators on its website. The website also has e-books on baseline health studies that can be downloaded for free. The website of the Department of Public Health provides information on various diseases, food and safety, and maternal and child health care. IGM Hospital and ADK Hospital, the two major hospitals in Malé, also provide information on doctors' schedules and other services on their websites.

ADK Hospital is also the first hospital in the Maldives to offer telemedicine services to its patients. The hospital is affiliated with a foreign medical partner to which it sends medical records, such as medical investigations and laboratory reports, for a more accurate diagnosis. This way, the doctors at ADK Hospital can make well-informed decisions in treating their patients.

Other health-related public organizations that provide information online include the Maldives Nursing Council, the Board of Health Sciences and the National Thalassaemia Centre. Two major NGOs, the Society for Health Education and Care Society, also provide online information through their websites.

Most of the government websites give information on obtaining services. Almost all websites offer various forms that can be downloaded, filled in and mailed or faxed to the relevant organization. For example, people can download the passport application form from the Department of Immigration and Emigration website and report lost passports, which is a highly useful feature for Maldivians who are travelling. The Maldives Police Services has a similar feature on its website for reporting stolen or lost National Identification Cards and passports. The Ministry of Higher Education, Employment and Social Security website has information on scholarships, employment, expatriate employment, employment agencies, employer guidelines and employment contracts, as well as downloadable scholarship application forms.

The Ministry of Fisheries, Agriculture and Marine Resources publishes market prices for different species of fish and local

agricultural produce, as well as fish-catch by different fishing regions in the Maldives, which is important information for local fishermen. The Ministry of Planning and National Development publishes the *Statistical Yearbook* on its website. The Ministry of Construction and Public Infrastructure has an online database called Harbour Permit and Mooring Database, which can be used to obtain information about the types of permits given to vessels using the inner harbour of Malé and Villingili.

ICT and ICT-related industries

In 2004, a concept paper to develop the key initiatives that need to be undertaken to facilitate the development of what was then called 'The Maldives IT Village' was drafted. The National Centre for Information Technology (NCIT) decided to pursue the concept further and develop the IT industry to help diversify the economic base, which in turn would attract foreign IT companies to invest in the country. It is hoped that the IT industry will generate employment opportunities, especially for the youth (NCIT 2006).

NCIT states the objectives of the IT Industry Plan as follows:

1. To achieve significant growth in terms of employment and financial turnover;
2. To be export-focused and make a positive contribution to trade performance;
3. To underpin innovation and growth in other key industry sectors;
4. To foster a reasonable number of small, dynamic and rapidly growing firms able to work alone as well as in strategic alliances; and
5. To attract and land one or two key technology multinational companies to act as anchor tenants.

The ICT industry in the Maldives consists of computer hardware and software dealers, software developers, Web developers and network solution providers. A number of vendors are selling hardware and software. One of the factors contributing to the bigger presence of hardware vendors could be the low duty (only 5 per cent) levied on imported computer hardware and consumer electronics equipment.

Despite the many software vendors, the number of software developers is relatively low. One of the reasons for this could be the lack of expertise to provide continuous support for software applications. Because there is a lack of local personnel trained in software development, software companies often have to recruit staff from neighbouring countries like India and Sri Lanka.

A mobile payment and banking system in the Maldives

The Maldives Monetary Authority, the country's Central Bank, is planning to introduce a 'Mobile Telephone Payments and Banking System'. The system will be available in the whole country and all mobile phone companies and banks will participate. This is achievable because more than 95 per cent of the Maldives receives mobile telephone service and mobile telephone ownership is close to 90 per cent.

There will be two components to the system:

- (a) an Electronic Funds Transfer Exchange, which would be both a software platform and a physical business unit to provide a clearing system for payments (similar to a cheque clearing system), answer customer queries, maintain the software, and sign up and maintain banking agents; and
- (b) a network of banking agents comprised of shops and similar entities around the country to operate as cash handling points.

Initially, the Exchange would be housed as a separate department at the Maldives Monetary Authority. Later it will be spun off as a separate legal entity owned by banks, mobile telephone companies and the public.

Implementation of the system would require an extensive awareness campaign and education of the users and banking agents. It would also require proper legislation to ensure that customer rights are protected. The mobile telephone companies already have the technological capability to provide the service with minimum investments.

This technology has been tested in many countries, including Indonesia, the Philippines and South Africa. With this system, anyone in any part of the country can open a bank account, subscribe to a mobile phone, and buy insurance; settle utility bills; pay for groceries, cinema tickets, taxi fares, and café bills; repay loans; pay government license fees, taxes, and other fees; pay salaries and make welfare payments and accept deposits. In sum, the mobile phone becomes an electronic wallet—a wallet that would not lose the funds in it even if the mobile phone is lost or damaged.

According to the Maldives Monetary Authority, the technology would save costs associated with printing and supplying cash, free up resources currently used by banks to deliver banking services, automate the banking and clearing system, reduce the transaction costs of banking and payments settlements, deliver banking services to the whole country, increase national savings, and revolutionize the financial industry. The system is also expected to contribute to national efforts to create a knowledge workforce. It is hoped that with the introduction of the e-payment gateway through the e-government project, more e-commerce services will be introduced in the Maldives.

However, as the number of institutes and training centres offering computer courses have increased, there might be enough human capital to sustain a software industry in the future. The few software developers in the market have been quite successful in developing software for the hospitality industry. They have even managed to market the software to other countries. Point-of-sale systems and hospitality management software for tourist resorts are the most commonly developed software in the Maldives.

There are also a few network solution providers integrating hardware, software and services. The widespread use of mobile services has given rise to a boom in mobile phone shops within the last three years. The shops not only sell the latest mobile phones and gadgets, but also provide comprehensive after-sales service.

Enabling policies and programmes

ICT programmes in the Maldives are driven mostly by the Telecommunications Policy and the National IT Policy. Telecommunications Policy 2001–05 sought to reduce telecom charges, open up the telecommunications market, improve accessibility and strengthen the regulator. Most of its provisions and action plans were implemented. Telecommunications Policy 2006–10 places emphasis on providing telecom services with non-discriminatory charges to all islands, further developing the telecom infrastructure and providing broadband services. It also aims to make the regulatory authority an autonomous body with clearly defined powers. Telecommunications development is paramount, with special emphasis on providing extended

services using mobile communications technology (m-services). Competition will be stimulated further and new services are to be opened for competition during the policy’s tenure.

The National IT Policy has been on the drawing board for quite some time now. The project to formulate the National IT Policy was a collaborative effort between UNDP Maldives and the National Centre for Information Technology of the Ministry of Transport and Communication. The project ran into delays due to the unavailability of local consultants to work on the project as well as the change in government structure in July 2005, which dissolved the former Ministry of Communication, Science and Technology and transferred the communications functions to the newly formed Ministry of Transport and Communication.

Legal and regulatory environment for ICTs

Currently there is no comprehensive telecommunication law. The key legal instrument governing the telecommunications sector is Maldives Telecommunication Regulation 2003 issued under a Presidential decree. Work is underway to formulate an Act covering telecommunications services in the Maldives. The draft, which has been completed, will be submitted in the form of a bill to the Parliament of the Maldives.

There are likewise no specific cyber laws as yet. However, the new telecom policy being drafted for the period 2006–10 calls for controlling cyber crime and articulates the need for cyber laws. Their introduction is among the policy’s thrusts.

Open source initiatives

Open source software (OSS) is not very common in the general consumer market in the Maldives. The reason perhaps is the ready availability of proprietary software. However, the service providers use a number of applications and backend software based on open source systems. In ISP services, both Dhiraagu and Focus Infocom use Linux/UNIX-based applications.

Other than the ISPs, there are small groups and individuals working to promote open source applications. They carry out this activity mostly as a hobby when they have time. They occasionally produce small applications such as instant messaging in the local language and add-ons for existing applications. Given the right environment and facilities, these highly talented individuals could be motivated to produce high-quality applications comparable with pricey proprietary applications.

Capacity building and R&D

Within the last five years, there has been a major increase in the number of training centres and institutes offering ICT training courses. Some of these are locally developed while others are offered through international affiliations. The courses vary from basic computer skills to professional programs in networking and Web development. In 2005, the Faculty of Management and Computing of the Maldives College of Higher Education started offering degree programmes in IT.

As for research in ICT, there are currently few research activities within the ICT sector. However, there are efforts to promote R&D initiatives. Incubator facilities are being developed by the NCIT to help small players to establish themselves. The new telecom policy calls for the development of new services based on mobile technology. Actions under this policy include the establishment of a think tank to foster the development of modern and innovative applications using wireless and mobile technology. In establishing the think tank, which is expected to commence in 2007, it is important to create the right work environment so that free thinking and creativity is given the highest priority and bureaucratic and government formalities are avoided as much as possible. Appropriate remuneration should be given to members to sustain participation.

Challenges

As a small island developing state that is geographically dispersed with more than 1,900 islands, the Maldives faces numerous development challenges. One of the main challenges is the difference in population densities in different atolls and islands. While some islands have a population of more than 5,000 people, other islands have a population of fewer than 500 people. The government faces difficulties in replicating basic services, such as health and education, in these islands. The sparse population in these islands translates to lack of economies of scale for certain initiatives, which makes it extremely difficult to attract private parties to invest in these islands.

Not surprisingly, there are disparities between these islands and the capital Malé in terms of ICT use. Extending ICT services to these islands is often time-consuming and expensive. However, despite these difficulties, the Maldives boasts a 100 per cent geographical coverage of its telecommunications network. The network itself consists of different technologies, as one technology is not enough to provide a total solution to

these low-lying, flat islands scattered over an area of 90 square kilometres.

Telecom operators and government agencies like NCIT are working continuously to extend the ICT infrastructure to the outer islands. By the end of 2007 or sooner, the Maldives will be connected to the rest of the world by an optical fibre system. All of the atoll capitals will be connected via a network under the e-government project and the e-Government Service Platform will offer services online to the citizens of the Maldives.

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