



United Nations
Economic and Social Commission for Western Asia (ESCWA)

**NATIONAL PROFILE FOR
THE INFORMATION SOCIETY IN BAHRAIN**

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NATIONAL PROFILE FOR THE INFORMATION SOCIETY IN BAHRAIN

The government of Bahrain has pursued a proactive strategy of economic diversification, including substantial emphasis on ICTs. These efforts have resulted in significant outcomes, giving the Kingdom of Bahrain a relatively high e-Government readiness rating of 0.5101. Bahrain ranked as the top in the latest UN E-Government Readiness Report 2004 and ranked 46th globally. Bahrain's overall Index Value of 0.532, according to the report, is higher than the World Average Index of 0.413. (Source: UN E-Government Readiness Report 2004) Bahrain has also embraced a diversification policy with regard to technology, choosing Linux as the foundation for its e-Government program. The current level of telecommunication services is one of the highest in the ESCWA region, helping to provide the infrastructure for future success. Economic liberalization and privatization initiatives are proceeding, bringing the benefits of increased competition and openness to the country.

1. *Policies and Strategies*

National information society policies and strategies

The Kingdom of Bahrain has launched an ambitious strategy to advance the information society and utilization of ICTs in the country. Their published vision statement expresses emphasis on delivering the "...highest standard of living and quality of life for citizens through comprehensive, accurate and timely information."²

Sectoral Plans for building the information society

In support of this vision, Bahrain has generated an e-Government Program³ detailing their strategy. This framework contains six main project priorities:

- National Smart Cards;
- Security Strategy;
- Business Systems;
- National Data Services;
- Government Data Network;
- Central Servers.

These projects are framed by a master plan, which details interdependencies, project milestones, and a plan for the future. Regular updates of project status are publicly available, rendering this e-Government initiative one of the most open and transparent in the ESCWA region.

Involvement of WSIS objectives

Bahrain is actively working towards the achievements and realization of the WSIS Objectives. Particular interest in elevating the level of ICT infiltration in the education is given to improve all levels of education. The De-Regulation of Telecommunication, high level of e-government services and high level of freedom to access information over various media are all strong indicators of Bahrain's Involvement. Finally, Bahrain various ICT NGO's and societies are actively involved in activities related to the realization and of the WSIS objective. In May 2005, Bahrain Hosted the Global ICT Summit. The Event was the first of its kind in the region and attracted international attention to the developments taking place in Bahrain.

¹ World Public Sector Report 2003, e-Government at the Crossroads, Department of Economic and Social Affairs. ST/ESA/PAD/SER.E/

² Mohammed A. al-Amer, Director General, Information Technology Sponsor, e-Government Program, Central Informations Organization. Kingdom of Bahrain e-Government Program.

³ Mohammed A. al-Amer, Director General, Information Technology Sponsor, e-Government Program, Central Informations Organization. Kingdom of Bahrain e-Government Program.

Progress towards fulfillment of national policies and strategies

In addition to its efforts in e-Government, the Kingdom of Bahrain has pursued a policy of economic diversification and promotion of commercial activity. To accomplish this goal the country has sought free trade agreements within the Gulf Coast Country region, and with other nations, including the United States.

In order to highlight employment creation, special economic incentives for small and medium-sized enterprises employing local nationals have been introduced:

- A subsidy of USD\$11,925 annually for a period of three years for each citizen employed in pioneering industries, USD\$7,950 for downstream industries, and USD\$2,650 for existing industries;
- 50% rebate on electricity fees for all industries;
- 100% of rental fees for land in Government industrial areas for the first five years;⁴
- 100% rebate of customs duties for all industries in an initial five-year period;
- 10-20% tariff protection for pioneering industries, subject to National Committee on Tariff Protection approval.⁵

Administrative control over telecommunication services is exercised by the Telecommunication Regulatory Authority (TRA) of Bahrain. This body has been responsible for overseeing the economic liberalization of the sector, including the coordination of licensure for new ISPs and cellular service providers. The national strategy is administered by the Central Information Organization (CIO), which coordinates the Government Data Network.

2. Legal and Regulatory Frameworks

National Intellectual Property Rights, Privacy status and status of Freedom of Expression

While Bahrain has previously struggled with intellectual property issues, recent advancements in enforcement have brought about improvement in this area. Piracy of audio/visual materials has been greatly curtailed. However, challenges remain in the field of software piracy. A 2003 study by the Business Software Alliance found that 64% of installed software was illegally obtained, comprising a total loss of USD \$16 million⁶.

Telecom regulatory framework in the country

Bahrain has taken active measures to adopt a legal framework for the support of the Information Society by modernizing its legal system, protecting intellectual property rights, and adopting international conventions on trade and economy (see Table 1). Bahrain is a member of the World Trade Organization (January, 1995), Gulf Cooperation Council (May 1981), and the Greater Arab Free-Trade Area (February 1997). In addition to these multi-lateral trade agreements, the country has also pursued trade accords on an individual basis with other nations. The most recent example is the United States-Bahrain Free Trade Agreement (14 September 2004). This agreement, which was supported by the International Intellectual Property Alliance, contains several provisions increasing support for trade and intellectual property rights, and increased penalties for violations.

⁴ It should be noted that foreign companies are prohibited from purchasing land directly.

⁵ Arab Advisors Group, February, 2005, Bahrain Communications Projections Report.

⁶ <http://www.bsa.org/middleeast/>, 2003 Global Software Piracy.

Table 1. Adoption of international agreements in Bahrain

Legislation & Treaties	Mid 2004
World Trade Organization (WTO)	Yes (1995)
Paris Convention	Yes (1997)
TRIPS	Yes (1995)
National Legislations	
Copyright Law	1993
Trademark Law	1991
Patent Law	1977

Source: Bahrain Telecommunications Regulatory Authority.

Legislative Decree 48 of 2002 was issued on the 23rd of October 2002 to promulgate the Telecommunications Law and the establishment of the Telecommunications Regulatory Authority (TRA). With the purpose of liberalizing the telecommunications market in the country, the Telecommunication Law also defines the Role of the Ministry of Transportation as a policy-maker, and the TRA regulator.

Regulating the Internet

Persuant to Section 41 of the Legislative Decree No. 48 of 2002 and Decree No. 47 of 2003, the Bahrain Internet Exchange (BIX) was established as a "not-for-Profit" Organization. The role of BIX is to connect Internet Service Providers, in order to increase local traffic and content, as well as reduce the cost of purchasing international bandwidth. It is a policy to encourage investors to set-up ISPs and reduce the barriers of entry into the Bahraini market. As of may 2005, all websites operating in Bahrain must register with the country's Information Ministry under a new government mandate

Privacy and security laws and regulations for applications

No identifiable laws specific to privacy and security exists in Bahrain. However, almost all official and quasi-official internet sites directly related to Bahrain (Either with or without the country code .bh) have a disclaimer and privacy policy. The laws and regulation relating to the obligations of ISPs and Telecoms, do not clearly indicate the obligations of these groups to either protect the privacy of users or obligations to report certain personal information to governmental authorities as a standard practice. The constitution and General Laws of Bahrain do not deal with issues of privacy of personal information or security of personal information.

Other ICT-related laws and regulations

A number of regulations have been issued in Bahrain, mainly by the TRA. The most important of these regulations are (in chronological order):

- 30 April 2005: Access Regulation (regulation No.1 of 2005): Purpose: To provide a framework for access obligations and the requirements for the publication of a reference access offer by licensed operators that are declared to hold a dominant position in a relevant market;
- 8 November 2004: Mobile Phone Jammers Regulation (Regulation No. 4 of 2004): Purpose: Regulating the use of mobile phone jammers in the Kingdom of Bahrain;
- 28 September 2004: Telecommunications Mergers and Acquisitions Regulation (Regulation No. 3 of 2004): Purpose: To provide a framework for the treatment of mergers and acquisitions by the Telecommunications Regulatory Authority;
- 2 August 2004: Accounting Separation (Regulation No. 2 of 2004) Purpose: Sets out requirements for accounting separation by licensees;

- 14 June 2004: Carrier Pre-Selection (Regulation No. 1 of 2004): Purpose: To is to mandate the basis for the implementation of carrier pre-selection in Bahrain;
- 29 October 2003: Ownership Regulation Purpose: Defines certain parameters related to the ownership of telecommunications licensees.

3. ICT infrastructure

Telephone penetration

With a total population of 690,000 in 2003 and 628,900 telephone subscribers, Bahrain has one of the highest levels of telephone penetration (90.6%) in the ESCWA region. In the area of cellular penetration, estimates for 2004 show Bahrain at 92%⁷, the highest in the region. There are 107,000 PCs in the kingdom for a penetration rate of 15.9%⁸. Availability of traditional land-line connections has remained at a relatively stable 26% deployment rate for the period 1998-2003 (cumulative annual growth of ~0.5%). It should be noted that this high rate has been achieved through recent dramatic growth in the use of mobile connections. This sector has grown dramatically from 92,100 subscribers in 1998 to around 443 in 2003 thousand, indicating an annualized growth rate of 36.9%⁹. This all digital network is a substantial factor in the ICT profile of the country, as mobile connections account for 70.5% of total telephone subscribers in 2003¹⁰.

Table 2. Telecommunication Infrastructure in Bahrain

	2002	2003	2004
Fixed Lines subscribers	175,446	185,756	191,553
Mobile Lines subscribers	390,253	440,401	649,700
Pay Phones		1907	-
<i>Internet Subscribers</i>			
Dial-up		39,188	-
ADSL (Residential)		8576	14,051
ADSL (Business)		1161	1,854
Leased-Line		120	-
ISDN		227	1,792

Source: Batelco, Bahrain Government & Madar Research, ICT Use Index Report 2005.

Internet backbone

In an effort to improve the Internet infrastructure of Bahrain, Batelco has pursued a strategy of investment in the national network. This investment has enabled the country to acquire the necessary capacity in support the deployment of further services for its citizens.

ISPs and ASPs

On July 1, 2004, the TRA opened the Telecommunication market to competition. Immediate results have been mixed, with the benefits of competition being felt most strongly in the mobile telephony field. However, recent efforts at market diversification have begun to have an impact on other areas, such as ISP access. While licensure for new ISPs has been made easier under a government supported liberalization

⁷ Arab Advisors Group, Cellular Market Share Index, July 17th, 2005

⁸ ITU, 2005, <http://www.itu.int/ITU-D/ict/statistics/>

⁹ ITU, 2005, <http://www.itu.int/ITU-D/ict/statistics/>

¹⁰ITU, 2005 Cellular subscribers

drive, competition within the ISP realm remains somewhat limited. Since the liberalization initiative, four new ventures have launched services.

Access

A wide variety of telecommunications services are available to residential and business consumers, including DSL, ISDN, and leased-line options (among many other products)¹¹. As further example of the wide array of services available, it should be noted that Bahrain is the only EMC that has deployed the capacity for mobile videophone calls through a nationwide 3G network. In addition, Batelco provides WiFi coverage in ten locations with plans for installing further facilities in other parts of the country as described within the National Plan of Action. In addition to growth in wireless technologies, ADSL subscriptions have increased.

Batelco has pursued a regional presence as a telecommunications provider with a series of partnerships and joint ventures with other telecommunications providers in the region. These ventures include enterprises in Kuwait, Egypt and Jordan.

To increase the capacity of their telecommunications network, Bahrain has invested in a submarine cable system known as FALCON. This system will provide additional broadband capacity to facilitate improved services for residents and companies in the country. In addition, this system will provide further redundancy and more reliable access for telecommunication services.¹²

PC dissemination

The PC installed base is 145,000 at the end 2004 with a penetration rate of 20.48% (Madar Research ICT Use Index Report 2005)

4. ICT Capacity-building



Awareness and dissemination

Bahrain has emphasized the importance of developing local skill for the promotion of the Information Society. To accomplish this goal, computer labs have been deployed throughout the educational system. The national university provides training in ICT related majors. In addition, vocational training is available through institutions such as the Batelco Training Center, Bahrain Training Institute, and a local office of the India-based Birla Institute of Technology. Although it is a recent arrival on the scene, it is important to note the contribution of distance education programs through the Arab Open University, which reported 302 students for 2002/3¹³. Teacher training in technological areas is given further treatment in section 7 of this profile.

Computers in schools

The Ministry of Education has applied information and communication technology (ICT) in the teaching process in the primary education. Initially this project was applied in 8 primary school since 2001/2002 but during the 2002/2003 period it was expanded to 47 primary schools for boys and girls. In 20 schools computer laboratories have been equipped with computers, computer teachers and technicians in each school. The number of PCs in Bahrain Schools exceeded 7,500, were are available for all students at all

¹¹ www.batelco.com.bh

¹² <http://www.flagtelecom.com/network/falcon.html>

¹³ <http://www.bahrain.gov.bh/english/index.asp>

stages. Every School in Bahrain has at least 3 Computers connected with the Internet (Ministry of Education, 2003) with the aim of reaching 12 connected PCs for each school.

In 2001, The Ministry of Education put forward an ICT Plan, and in collaboration with UNESCO, the Bahrain Government formed a National Taskforce headed by H.E. the Minister of Education as a focal point to implement the recommendations of UNESCO. One of the most important outcomes is the King Hamad's Schools of the Future Project. The aim of the project is to invest in the developments of ICT in the educational field to elevate the standards of education. The first phase of the project will provide 11 schools with advanced ICT infrastructure and with the Cooperation of Batelco, the schools will be linked together. In addition, the project aims to establish an educational portal to provide e-learning services.

Vocational training

Most notable in the field of Vocational training is the Shaikh Khalifa Bin Salman Technology Institute which was inaugurated in 2003/2004, aiming at providing advance-developed training programs for industrial secondary teachers and students in various technical fields. The Institute also provides courses for all the social groups in order to improve technical standards. Use and spread of PC's in vocational training is high as it adheres to the highest international standards.

University education

The University of Bahrain has boosted its use of the Internet from mere dissemination of information to a two-way communication. Students can select their courses, and apply for admission and registration using online forms – but the university's bilingual (Arabic, English) website has yet to offer online payment facility for courses. The university, however, is planning further ICT development and Internet integration to bring more of the learning and administrative processes online, such as e-courses that the university is currently developing.

The University of Bahrain boasts more than 35 computer laboratories and over 1,000 computers distributed throughout the university. Its two campuses (Isa Town and Al-Sukair) are linked via a 128K leased line with another 128K line connecting the Al-Sukair campus to the Internet. All buildings in each campus are linked via a 128K line using a star topology. An Ethernet network running TCP/IP and IPX, called UOB, interconnects the central computer configuration. It consists of 35 servers running Novell NetWare, Windows NT and Unix.

The Arab Open University (AOU) is another significant factor in the digital migration of education in Bahrain since it is based on distance learning. AOU students use the Internet as the main channel for accessing teaching material and assignments, as well as for interacting with instructors and holding discussions with their classmates. The university is headquartered in Kuwait, but it is building a “virtual campus” in Bahrain, which started to accept distance learners in four initial study areas as of October 2002. Source: Madar Research Group e-learning Report 2005.

Research, Development and Innovation in ICTs

Very little information is available on local efforts at innovation in the ICT sector. However, R&D in the industrial sector of Bahrain has achieved considerable advancements. An outstanding example is the Aluminum Bahrain (ALBA) company, one of the biggest Aluminum producers in the world, which has created a center of green innovation and the winner of the ICC/UNEP Millennium Business Award for Environmental Achievement. The Center is considered to be one of the most technologically advanced Environmental R&D facilities in the world. Notwithstanding, given the market size and maturity, it is likely that very little research in the computer science field is occurring outside the academic context. It is important to note that innovative solutions to technological problems are envisioned and implemented in Bahrain. The achievements of the country in e-Government and Arabic Content stand as examples in this area.

5. Building the ICT sector

ICT firms

In order to encourage growth in this field, the government has utilized ICTs to adopt a fast-track service for streamlining the regulatory and bureaucratic challenges for entrepreneurship. As part of this initiative, the Commerce Ministry has launched a one-stop-shop for business services. Relevant ministry approvals, licenses and permits can be obtained in an environment which stresses customer service. The increases in efficiency provided by their e-Government initiative, the amount of time needed to secure government approval have been greatly reduced. Furthermore, relevant fees can be paid on line at any time. Government facilitation.

This business-friendly attitude has resulted in effectively stimulating commercial growth. According to the Ministry of Commerce¹⁴, the economy as a whole saw 4,597 new business incorporated in 2003, compared with 3,553 in 2002. This increase represents 29% growth.

Fostering competition is also a national priority to stimulate economic growth. Previously, the national telecommunications carrier, Batleco, held a monopoly over telecommunications services. However, a deliberate campaign to introduce private-sector competition has started to show results. A recent analysis of the cellular market reveals that MTC-Vodafone currently holds 15.6%¹⁵ market share. This arrangement has delivered benefits such as lower tariffs and an advanced 3G communications network for the citizens of Bahrain.

6. Applications in Government Establishments

Computerization of public administration

Bahrain's efforts to integrate ICTs into its public administration infrastructure have yielded significant results. Initially installed in 1996, the Government Data Network project has provided the necessary physical communications infrastructure to support the e-Government plans in the country. This network, which has been consistently upgraded and modernized, current links government agencies through an advanced network of Gigabit Ethernet, WiFi, infra-red laser, and microwave technologies.

7. Digitization of Information

National Smart Card System

A pivotal component of the Bahrain E-Government Strategy is a national smart card system that would allow every citizen to transact with government agencies and other business establishments electronically. A tender has been made in the third quarter of 2003 and the government hopes to have the system in place sometime in 2005, before parliamentary elections which are scheduled for 2006.

According to Bahraini officials, the planned smart photo ID card will include a 64-kilobyte microchip that carries the card holder's name, address and national identification number. Digital fingerprints, driver's license, passport, medical, financial and educational data will all be encoded in the chip. The multi-function card will also enable users to pay bills, withdraw cash, transfer money, check their balances and conduct Internet transactions with a swipe of the card, and use the same card to vote in municipal and parliamentary elections.

Interestingly, Bahrain's smart card project is backed by a successful real-life experience in the use of barcode cards. A series of dry-runs for using plastic cards in a political exercise took place during Bahrain's parliamentary referendum in February 2001 and the elections in October 2002. Back then, a resident's

¹⁴ <http://www.commerce.gov.bh/NR/rdonlyres/942114E2-18B1-47EB-B948-8AA48DD47FEA/0/EconomicData.pdf>

¹⁵ <http://www.researchandmarkets.com/reports/301718/301718.htm>

Central Population Registration (CPR) number was incorporated into a card with encrypted computerized information about the user in the form of a two-dimensional barcode. The CPR card allowed its holder to swipe it at polling stations for instant identity verification.

Ministry of Commerce and Industry

With a two-way communication infrastructure and online payment facility, the Ministry of Commerce and Industry's website (www.commerce.gov.bh) is currently one of the first websites providing online delivery of government services such as commercial registration and its renewal. The website's One Stop Shop for Business feature allows business owners to renew, update, amend or cancel their commercial licenses online.

Ministry of Interior

The Directorate of Traffic and General Directorate of Immigration and Passports, which are run by the Ministry of Interior, are developing applications where online services for traffic and visa processing could be made available. There is also a plan to link all the police stations with a wireless voice and data network, which will be connected to the GDN via a gateway. (Source: Madar Research Group E-Government Report 2005).

e-government plans

Building on this foundation, the government is actively pursuing automation and modernization initiatives improve efficiency, attract direct foreign investment, and establish Bahrain as a center of ICT excellence¹⁶. As part of this strategy, the government has placed emphasis on promoting open-source methodologies. Through a public private partnership, these technologies are being used to form the backbone of the Government Data Network¹⁷. In addition, initiatives are underway to incorporate Linux into the curricula in the national university.

This effort to deploy e-Government services has brought expanded functionality to the people of Bahrain. Obtaining licenses and approvals has been expedited, as well as facilitation of electronic payments of fees. Information on processes such as customs clearance is also available on line. Processing times for government functions has also been reduced by the greater efficiency made possible through the integration of the diverse information systems under the e-Government initiative.

A further example of these benefits can be seen in the wide variety of features available on the national web page, including a one of the best statistical reporting functionalities in the ESCWA region. On this site, data is organized by year, theme and sector for ease of use. Information available on this site is of excellent quality in terms of both depth and diversity, covering economic data, meteorological records, vital statistics, and other sectors.

Government Portal

A bilingual Arabic-English e-government web portal (www.bahrain.gov.bh) is in place, allowing online submission of surveys and user feedback. The portal currently provides a few layers of Web pages and offers links to ministries' homepages. The process of integrating government departments into the portal is still at an early stage. (Source: Madar Research Group E-Government Report 2005).

Computerization of customs processing

The General Directorate of Customs and Ports is developing a web-based system in order to streamline its business processes and increase the quality of its [customer-facing] services. A bilingual website (www.bahraincustoms.gov.bh) is undergoing development and will integrate electronic payment of

¹⁶ <http://www.batelco.com.bh/preview.asp?ArticleId=493&mnu=23>

¹⁷ <http://www.pstm.net/article/index.php?articleid=255>

customs duties and taxes through online banking facilities (I-Net) and an electronic data interchange (EDI) system.

7. Applications in education

e-learning

According to Madar Research estimates the e-learning market in Bahrain was worth US\$3 million in 2004 which covers both the academic and corporate e-learning market. The major segment of the above market is for academic e-learning as the Ministry of Education is initiating major e-learning projects in the public education system of the country. With a Compounded Average Growth Rate (CAGR) of 25 percent the e-learning market is expected to reach \$9 million by the end of 2009.

Table 3. Bahrain E-Learning Market

2004 (Million, US\$)	2009 (Million, US\$)
3	9

Source: Madar Research

*Compound Average Growth Rate (2004 – 2009) of 25 percent

The delivery solutions accumulate to 42 percent (\$1.26 million) of the total e-learning market in Bahrain. As the government has initiated many programs to convert the present learning & teaching system to electronic system in the public schools, this channel would see higher spending for a few more years. Spending towards the content was \$0.84 million (28 percent) and services were \$0.9 million (30 percent) in 2004.

Table 4. E-Learning Spending in Bahrain (2004)

	Value (US\$ Million)
Delivery solutions	1.260
Content	0.840
Services	0.900
Total Market	3.00

Source: Madar Research, E-Learning Report 2005.

e-school projects

Computer labs and Internet connectivity are commonly available at the elementary and secondary levels within the Kingdom. For example, the complete secondary school system has been connected to the Internet through frame relay technology since 2002. However, in some cases, bandwidth is quite limited. It was not uncommon for an entire school to share a single 56k dial-up connection line.

Computer labs are widely available, but the ratio of computers to students serves as a hindrance to development of technological skills in the formal educational environment.

Table 5. Ratio of PCs to Students

Type/Level of School	Total No. of Students	No. of PCs	Ration PC:Student
Primary	63620	1755	1:36
Intermediate	30243	899	1:34
Secondary	26472	3623	1:07
Total	120335	6277	1:19

The University of Bahrain is committed to providing the modern educational options necessary to develop a workforce skilled in the use of ICTs. Bachelor's degrees are offered in the following specific technical areas:

- Computer Science and Engineering;
- Production Engineering;
- Electronics and Communication Engineering.

In addition, information technology issues are integrated into the curricula of business programs and other academic departments of the university. Evening programs and continuing education options are available.

In order to provide a thorough grounding in modern computational technologies, and to advance technological awareness, the university has devoted specific resources to the study of Linux, including training for professors, and a Linux cluster laboratory.

Hamad's Schools of the Future Project

Hamad's School's of the Future Projects is the new initiative taken by the Bahraini Government in the educational field. The project began in 2004/2005 to be completed by 2009/2010. The goal of the project includes - establishing of information society; developing the educational system and evaluating its products in the country; and building a knowledge based economy.

Steps to implement the project are:

- Establishing a website for the project;
- Disseminating information on the project in schools;
- Establishing a scientific documentary library for the project;
- Communicating with all media regarding this project.

The project will be executed in three phases – the first stage would involve connecting eleven secondary schools (five boys and six girls schools) with a speedy communication network via the central educational portal. With the project in place 11,000 students and 1,000 administrative and teaching staff would benefit in the first phase. The project would be monitored and evaluated by the Measurement and Evaluation Centre (to be established later) and UNESCO.

The implementation of an e-learning platform for Hamad's School of the Future Project was awarded to Integrated Technology Group (ITG), Jordan and IT solutions provider Apple Centre (division of Al Moayyed International Group) of Bahrain. The agreement between the Ministry of Education and the ITG involves setting up the e-learning platform, providing specialized teacher training and also developing e-content for the Bahraini curricula grades 1-12. The e-content will be implemented by JAID Productions (a media subsidiary of Integrated Technology Group).

The EduWave e-learning platform on LINUX was launched in January 2005 at Al Hedaya Al Khalifa Secondary school for boys in Muharraq. As mentioned in the earlier part of the report – in the first phase it would be launched in 11 secondary schools benefiting 11,000 students and 1,000 administrative and teaching staff. The final stages of the EduWave implementation will be concentrated on the intermediate and primary schools. (Source: Ministry of Education, Bahrain (www.education.gov.bh)).

Virtual universities

While the Kingdom of Bahrain does not host any locally initiated distance learning options, the strong telecommunications infrastructure makes courses of study such as those available at the Arab Open University an option for its citizens.

8. Applications in commerce and business

Extent and maturity of e-commerce and e-business applications

As part of the ICT strategy, the Kingdom of Bahrain has devoted substantial effort and resources to the development of a national banking infrastructure. These efforts have succeeded in developing a robust and growing banking sector serving national, global and regional customers. At present, banking services comprise approximately 17.5% of Bahrain's GDP¹⁸.

In addition to banking services, the government has aggressively pursued the creation of an enabling environment for business activity. The Chamber of Commerce website¹⁹, has won world-wide acclaim through the World Summit Award as one of the top five e-content portals. The World Summit Award recognizes outstanding creative accomplishments in fields within the context of the World Summit on the Information Society. From a functional perspective, the site offers a broad range of information and assistance, with over 50,000 company records, regulatory statistics, and legal information. It acts as a single portal for enabling commercial development within the kingdom. Usage of the site has grown substantially, from 462 hits in 2002, to over 12,000 hits in 2003²⁰.

With the motto "Boosting business, building Bahrain", the government has created a web portal²¹ to further facilitate the growth of commerce within the country. This site provides web hosting services, eMarketing solutions, email functionality to corporate clients. In addition, hardware and software products are also available.

Availability and quality of e-banking

Table 6. Banking Sector in Bahrain (End 2004)

Commercial Banks	24
Specialized Banks	2
Offshore Banks	51
Investment Banks	37
Representative Offices	29
Locally Incorporated	8
Branches of Foreign Banks	16

Source: Bahrain Monetary Agency

E-Banking

The infrastructure density of electronic banking in the tiny state of Bahrain is much more developed than in the country's GCC counterparts. Bahrain ranks third among GCC countries in terms of payment card density. Madar Research estimates the number of payment cards at 380,000 cards (debit and credit cards) by end 2003, with a density of 51.4 cards per 100 inhabitants. According to the Bahrain Monetary Agency 2003 Annual Report, the number of credit card holders stood at 126,889 in 2003, a rise of 8.9 percent over 2002. The number of merchant locations by end 2003 stood at 9,000, at a density of 12.2 percent per 1,000 inhabitants, the highest in the GCC. The total number of ATMs in the country stood at 170 ATMs, with a density of 2.3 ATMs per 10,000 inhabitants. This is the third highest density among GCC countries.

¹⁸ Spring 2004, Al-Tawasul

¹⁹ www.commerce.gov.bh

²⁰ Autumn 2004, AL Tawasul

²¹ <http://bahrain.bsolutions.com>

Emerging technological trends in the telecommunication sector have seen banks offering multiple 24 hour banking services in the form of phone and mobile phone banking. Currently three banks – Bank of Bahrain & Kuwait, National Bank of Bahrain and Shamil Bank – offer both phone and mobile phone banking services whereas Bahrain Islamic Bank offers only phone banking services.

Bahrain is the first country in the GCC to migrate all its banks from the old X.25 networking technology to the SWIFTNet IP based network. (*Source: Madar Research E-Banking Report 2004*).

Internet Banking

Bahrain's banking sector has witnessed a transformation in banking delivery channels, as banks increased their IT budgets to accommodate changing IT banking trends. However, Bahraini banks lag behind their GCC counterparts in terms of Internet banking facilities with only a few beginning to offer similar services.

Among locally incorporated banks, the Bank of Bahrain & Kuwait is the only bank in Bahrain which offers both retail and corporate Internet banking facilities. The bank also provides customers with the Internet payment gateway, www.bahrainpay.com, which accepts payment cards (debit and credit) issued by the Bank of Bahrain & Kuwait only. Moreover, the bank offers its customers the facility of buying savings certificates online through the eHayrat service. The other banks to offer Internet delivery channels are the Al Ahli United Bank and Shamil Bank, which are limited to retail Internet banking services.

The National Bank of Bahrain and the Bahrain Islamic Bank have established websites, but these only provide information on bank products and services. The website of Bahraini Saudi Bank was under construction at the time of writing this report. HSBC is the only foreign bank to offer retail and corporate Internet banking to its customers.

Internet banking services offered by Bahraini banks are more or else similar across the different banks. The common services offered include viewing account transactions and balances, transferring money between accounts, paying utility and credit card bills and check book requests.

According to a statement issued by the National Bank of Bahrain, the bank has undertaken a major IT project to implement a new banking system which would be implemented by September 2004. The project involves replacing front end systems of all branches, as well as replacing the data center environment with new hardware and software.

Table 7. Bahrain Local Commercial Banks offering Internet Banking Services

Bank	Website	Retail E-Banking	Corporate E-Banking
Bank of Bahrain & Kuwait	www.bbkonline.com	Yes	Yes
National Bank of Bahrain	www.nbbonline.com	No	No
Ahli United Bank	www.ahliunited.com	Yes	No
Shamil Bank of Bahrain	www.shamilbank.net	Yes	No
Bahrain Islamic Bank	www.bahisl.com.bh	No	No
Bahraini Saudi Bank	www.bsb.com.bh	No	No

Source: Madar Research, E-Banking Report 2004

Maturity of regional ATM and banking networks

The ATM network of Bahrain is also set to be linked with Iran, following the signing of an agreement in May 2004 between Bahrain Monetary Agency and Bank Markazi Jomhouri Islami Iran.

Table 8. Bahrain Local Commercial Banks Offering Electronic Banking Services

Bank	Branches	ATM	Phone Banking	Mobile Phone Banking
Bank of Bahrain & Kuwait	17	25	Yes	Yes
National Bank of Bahrain	26	38	Yes	Yes
Ahli United Bank	15	N/A	No	No
Shamil Bank of Bahrain	6	6	Yes	Yes
Bahrain Islamic Bank	11	10	Yes	No
Bahraini Saudi Bank	7	N/A	No	No

Source: Madar Research

N/A-Information not available

Table 9. Maturity of Bank to Bank financial transfer system

Payment and Clearing System		
Country	Brief Description of option available	Future Changes
Bahrain	Paper based cheque clearing system run by BMA clearing house, one clearing zone. Cheques lodged before 10am and value >BHD5,000 cleared on same day basis. Others on T+1 basis.	BMA has looked at rolling out a euro RTGS system in the past. Also currently working on rolling out a USD RTGS system.

Source: The Middle East Payment Structure, Standard Chartered Bank 2005.

9. Applications in Healthcare

Databases for national healthcare (volume, coverage, online/offline availability, and updates)

The Ministry of Health is spearheading the single most ambitious and costly project in the e-government drive in Bahrain. Running at a cost of BD20 million (\$53 million), and approved in September 2001, the Strategic Health Information System will allow clinics, physicians and health officials to share healthcare related information and have instant access to tens of thousands of updated medical records over an intranet, which is also connected to the Internet. The project, launched in April 2002, will pass through four phases over a period of six years.

Phase One, which was completed in 2003, focused on setting up a new infrastructure and basic health information services. Existing legacy systems are being replaced – after historical data are retrieved and new applications installed. Subsequent phases will deal with patient records and other end products before the entire medical information system is made available online.

The Ministry of Health maintains a website (www.moh.gov.bh) where forms can be completed and submitted online, in addition to online directories.

Table 10. Bahrain Health Sector Statistics

Health Services	2001	2002	2003
Government Hospitals	4	4	4
Private Hospitals	5	6	6
Government Health Centers	21	21	21
Government Maternity Hospitals	5	5	5
Total Doctors	1,118	1,189	1,189
Total Beds	1,859	1,897	1,912
Total Public Expenditure on Health ¹	833,000	984,600	1,159,000
As % of Government Expenditure	7.7	7.2	7.4

Source: Bahrain Government Website (www.bahrain.gov.bh) & Ministry of Finance and National Economy.

Note: Numbers are in (000) Bahraini Dinars.

Multinational IT company Microsoft Corporation is a staunch partner and supporter of Bahrain's e-Health initiative, having provided technology solutions to the ministry's Business Intelligence Project in 2002. Among Microsoft's initiatives to serve the health sector in Bahrain is its support announced in 2003 for the creation of a Center of Excellence, which will provide a facility for health-related training, research and education.

The aggressive adoption of IT in improving health administration is also evident in a number of hospitals in Bahrain. The Bahrain Defense Force (BDF) Hospital, for instance, implemented the Oracle Collaboration Suite in early 2004. One of the key incentives behind the project, according to BDF, was the capability of the application to consolidate the hospital's communication requirements around a single server, thereby reducing costs and lessening the impact on network bandwidth. (Source: Ministry of Health website www.moh.gov.bh)

Telemedicine and medical use of teleconferencing

Bahrain Specialist Hospital stands as a center of excellence in the Arabian Gulf connected digitally through telemedicine to the most reputed Medical centers. Our excellence is based on a highly specialized team of Doctors and nurses, utilizing state of the art medical equipment and systems, housed in a purposely-designed hospital according to the high JCAHO Standards.

Maturity and implementation of Health Care Information Technology Systems

The government of Bahrain has focused on integrating ICTs into the health care system with great effectiveness. In addition to the Strategic Health Information System, a national health information database, investments in modern infrastructure are ongoing. With a total cost of nearly \$45 million USD, the Bahrain Specialist Hospital is an example of this campaign. This state-of-the-art hospital has laboratory facilities capable of locally handling nearly 95% of all laboratory needs. In addition to these technologies, the hospital has deployed functionality to support on line patient consultations through its website²².

10. *Digital Arabic content*

Arabic vs. English content on the Web for national use

Beginning with the national web site²³, the government of Bahrain has provided for Arabic content. This effort has been so successful, that sites such as that serving the Chamber of Commerce have won international recognition. Because of the linguistic diversity within the country, a multi-lingual approach has been employed to provide information to both Arabic and non-Arabic speakers.

Bahrain has proactively pursued the generation of Arabic content on the web. A notable example of these efforts can be seen in the portal for women's issues, www.womengateway.com. This site, features broad ranging material dealing with issues of women's employment, health, empowerment, and parenting as well as issues specific to expatriates. The site is intended to serve both local nationals and women in the entire Arab world.

Local creation of software products in Arabic

In general, no major developments of software products in Arabic are taking place in UAE. Arabization of software is mainly conducted as part of in-house activities and as part of the localization process by solution providers. Most local activities revolve around arabizing websites for local companies.

²²<http://www.bsh.com.bh/>

²³<http://www.bahrain.gov.bh>

Obstacles for its development and ways for removing them

Neither legal nor regulatory hurdles exist in Bahrain for the creation of software products. However, the slow advancement of the sector can be traced to the regular supply and demand factors which limit the number of potential consumers locally. In addition, the relatively small size of the population and the lack of real demands in the local market contribute to the slowness in this field. Although Bahrain has achieved considerable steps towards computerization and other Arabization efforts in the field of E-Government services, most of these developments were conducted by the governmental or quasi-governmental agencies.