13

Advanced Telecommunications and the Economic Diversification of Bahrain

DAVID WINTERFORD AND ROBERT E. LOONEY

13.1 Background

Bahrain has shown an extraordinary capability for acquiring and using advanced telecommunications. Consequently, the island nation has become a vital regional telecommunications center in the Middle East. The field of telecommunications may be similar to computers, in which relatively wealthy developing countries like Bahrain can successfully leapfrog evolutionary stages of technology diffusion by capitalizing on technology transfer and effective assimilation of advanced technology (Ibrahim, 1992).

Having discovered oil long ago, Bahrain must now confront its eventual depletion. Since the early 1970s, Bahraini authorities have attempted to diversify the nation's economy and have determined that telecommunications must play a central role in this effort. In the first phase of diversification, the government sought to establish Bahrain as the region's center for banking and services. These globally oriented economic activities are vitally dependent on a range of communications technologies. Having achieved a degree of success in turning Bahrain into a financial center by the mid-1990s, the government adopted a new goal: creating an advanced telecommunications sector that will ensure that Bahrain will be the hub of the Gulf's high-technology information center (Moneyclips, *Gulf Daily News,* 10 November 1995).

This chapter examines the critical role telecommunications is playing in the diversification of Bahrain's economy. It discusses the role of telecommunications in Bahrain's development strategy and the range of advanced communications technologies being adopted to help ensure national economic well-being. Bahrain may provide some useful insights into the potential for other small, open, strategically located and resource-dependent countries to assimilate technological innovations rapidly and effectively.

13.2 Bahrain: The Geo-economic Context

With an indigenous and expatriate population of 563,000, the state of Bahrain comprises an archipelago of 33 low-lying islands in the Arabian Gulf, about

24 kilometers (15 miles) off the northeast coast of Saudi Arabia and 21 kilometers (13 miles) to the northwest of Qatar. Bahrain and Saudi Arabia were linked physically by a new causeway in 1986.

Only three of Bahrain's islands are of major demographic and economic importance. Almost 85% of the country's total land area of 690 square kilometers (250 square miles) is accounted for by the largest island, al-Awal (also known as Bahrain Island), which is about 50 kilometers long by a maximum of 25 kilometers wide. The capital city, Manama, most of the country's arable land, and the oil-producing area around Jabal ad-Dukhan is located on the main island. A causeway joins al-Awal to the adjacent island of Muharraq to the northeast. The international airport and the docks of the Arab Shipbuilding and Repair Yard (ASRY) are found on Muharraq. A bridge leads from al-Awal to the island of Sitra along its eastern coast. Sitra contains the petroleum-loading terminal and tank farm belonging to the Bahrain Petroleum Company (Lawson, 1989).

Bahrain has been a predominantly urban society for most of the twentieth century. By the late 1950s, 80% of the country's population lived in the larger cities and towns, with the great majority living in the two largest cities, Manama and Muharraq. These two cities are the centers of trade, transportation, and communication for Bahrain and for the surrounding region. They contain the great majority of the commercial and small-scale industries on the islands as well as the primary government offices and diplomatic missions. The concentration of the population in a limited number of heavily urbanized areas is of great importance in assessing the evolution of telecommunications in Bahrain: A dense urban population has facilitated its rapid spread and relatively high penetration.

Although Bahrain is often considered to be another oil-rich Gulf state (and was the first Arab country to export oil), it is critical to emphasize that the island's relatively limited petroleum reserves will soon be exhausted, perhaps in less than 20 to 25 years (Jane's Sentinel, 1994, 20). Bahraini authorities have relied on revenue generated by oil production and refining for most state income from the early 1930s to the mid-1960s. Nevertheless, as early as the mid-1940s, substantial quantities of crude oil had to be imported from the eastern province of Saudi Arabia to keep the refinery on the east coast of al-Awal operating profitably. Bahrain's crude oil production averages 42,000 barrels per day and the island nation is unique among the Gulf states in that it does not export crude oil. Rather, its domestic production is combined with the imports from Saudi Arabia and refined into processed oil products that are then exported (The Economist Intelligence Unit, *Bahrain, Qatar,* No. 2, 1992, 8).

Today, the petroleum industry accounts for about 80% of Bahrain's export earnings and 60% of government revenue. The Emir became acutely aware of the problems associated with such a heavy reliance on oil when the slump in oil prices during the 1980s led to a 5% decline in Bahrain's gross domestic product, which was in stark contrast to the 5% yearly increases it had enjoyed in the 1970s (Jane's Sentinel, 1994, 20). With a population growing at over 3% per year, the government confronted the need to mitigate the deleterious effects of lower oil prices on continued national economic advance and political stability.

To cope with the nation's vulnerability to downward pressure on oil prices and

faced with dwindling petroleum supplies, national policy makers have pursued (with varying degrees of success) a number of interrelated strategies designed to promote the diversification of the country's economy (Jane's Sentinel, 1994, 20). These strategies were facilitated by the government's 60% interest in the Bahrain oil field and associated activities of the Bahrain Petroleum Company as well as its major holding in the offshore Abu Safa oil field, which is run by the Arabian-American Oil Company. First, the Bahrain National Gas Company (in which the Bahrain government has a 75% ownership) has been producing liquefied gas products (LNG) for export since 1980. Bahrain's large gas reserves are fully state owned.

Second, the government has encouraged the creation of an indigenous heavy industrial sector. The most notable investment has been in Aluminum Bahrain (Alba), which operates the world's second largest aluminum smelter. Aluminum accounts for the majority of the nation's nonpetroleum-based exports, and Alba has been a success since it started production in 1971. It then had an output of about 120,000 tones per day; that figure has nearly doubled now. By the mid-1990s, the government had completed a $1.5 billion expansion program for Alba, ensuring further gains in output.

Third, since the 1970s, the government has actively sought to attract financial and other service industries to establish regional offices in the island nation. As a result of this effort, Bahrain has become one of the primary centers for banking, transportation, and communication in the Gulf.

Fourth, the government has supported the expansion of modern farming and light manufacturing both as a means of supplying necessary inputs for the heavy industrial sector and to produce agricultural products and finished items for export to regional markets. Although Bahrain imports much of its food, the government is raising overall national food production from 5% to more than 15% of domestic needs. There are plans to become totally self-sufficient in some product areas, for example, dairy and poultry produce.

As well, the success of Alba has led to the development of associated industries that use the products of the smelters. The recent expansion of Alba has also been responsible for the addition of an 800-megawatt power station whose surplus supply is used for domestic use.

Finally, tourism has become a thriving industry. Bahrain's attractions include numerous archaeological sites of importance, a traditional crafts industry, and liberal drinking laws. As a measure of Bahrain's appeal to tourists, an average of 160,000 people cross the causeway from Saudi Arabia to visit each month.

These strategies have given Bahrain a diversified economic base that sets the country apart from most of its regional neighbors (Looney and Winterford, 1992). However, by the mid-1990s petroleum products still accounted for over 80% of Bahrain's $3.58 billion worth of exports. Consequently, economic forecasts for the island state remain vitiated by uncertainties and fluctuations associated with global oil markets. These, in turn, are affected in part by recurring political and military crises in the region. Such crises have periodically stalled the government's efforts toward diversification.

By the start of the 1980s, for example, Manama had become the favored Gulf location both for new offshore financial institutions and for international banks

seeking a convenient regional base for serving the Arabian peninsula. However, that early progress could not be sustained. First, the Gulf tanker war in the mid-1980s dealt a blow to confidence. Second, Dubai started to compete vigorously with Bahrain for the title of Gulf service center, and by the start of the 1990s it appeared to be winning. Indeed, since the mid-1980s, many international banks have closed their Bahrain operations, with the number of offshore banks falling from 75 to about 45. Third, Bahrain is a relatively expensive base for banking operations primarily owing to the need to employ a high proportion of expatriate staff in senior positions.

Although an economic recovery occurred after 1987 despite these challenges, it was thrown abruptly into reverse by the 1990–1991 Iraq-Kuwait crisis. Growth in gross domestic product dropped to 1.3% in 1991 from 6.7% in 1988 (just at the end of the Iran-Iraq war). In turn, the Bahrain-based offshore banks reported a sharp setback as a result of Iraq's confidence-shattering invasion of Kuwait in 1990 (English, 1991). The Kuwait crisis could not have come at a worse time for Bahrain. Its legacy has been to hamper efforts to promote economic growth in a difficult decade that sees oil production falling and population continuing to increase substantially. A recent government study found that the country lost $3 billion as a result of the Gulf War. About half of this was borne by the banking sector, which was forced to make large loan-loss provisions and reduce lending in the second half of 1990. The loss of aid is estimated at $37 million, and the industry lost $200 million (English, 1991).

By the mid-1990s, continuing low oil prices and a Gulf-wide recession led to sluggish, even negative gross domestic product growth. In 1994 the gross domestic product fell by 2.5%, and growth was forecast to fall by a further 1% in 1995. As a result, one central socioeconomic dilemma confronting Bahrain is the growth of unemployment among young nationals, both the educated and the less well off. Estimates suggests that over the next five years only one-third the required number of new jobs will be created to meet anticipated growth in the labor force (Rathmell, 1995). The parameters set by dwindling oil supplies, a rapidly growing labor force, and a recessionary economy have given fresh urgency to creating new forms of economic activity. As a result, state authorities need to continue to seize the opportunities afforded by continuing advances in telecommunications.

13.3 Bahrain's Potential as a Telecommunications Hub

The vulnerability of a small, open, resource-dependent island state to regional and global economic shifts has intensified the pressure on Bahraini authorities to continue diversifying the economy. Bahrain has sought to capture the benefits not only from its central location within the Gulf region but also from its median position between Europe and India and the Far East. In the sphere of finance, Bahrain's time zone advantage bridging the closing of Far East markets and the opening of Europe's contributed to its emergence as a financial center.

Recognizing the importance of being able to communicate across the zones, Bahrain, by the mid-1970s, equipped itself with by far the best telecommunica-

tions system in the Gulf. Indeed, international calls were being made with ease by business visitors from hotels when most other countries in the Gulf were just starting to upgrade their telephones. Other states in the region may now have caught up in basic telecommunications infrastructure, yet Bahrain retains decades of experience over them in running modern services.

Bahrain's early start paid handsome dividends in the late 1970s as European, U.S., and Japanese banks and finance houses identified the island as a reliable and sophisticated communications base from which to conduct business with Saudi Arabia and the other Gulf states. Bahrain was also able to attract those offices and banks seeking to leave Beirut as Lebanon's tragic problems deepened. Indeed, promoting Bahrain as a regional financial center has been a key objective of the government's diversification strategy and one of the central objectives of the drive for telecommunications preeminence.

Determined to acquire the latest in advanced technologies and harness those technologies to its economic future, in 1981 the Bahraini government acquired a 60% share in the telecommunications system run by Cable & Wireless of the United Kingdom. The company now operates as Bahrain Telecommunications Corporation (Batelco). In a move to further increase control over Batelco, in 1988 the state bought half of Cable & Wireless's 40% share.

Toward the end of the 1980s Batelco provided direct dialing to 153 countries and almost 95% of all international calls originated directly by callers whether from offices, homes, or hotel rooms. Batelco also provided permanent channels on a leased basis for customers requiring exclusive transmission of voice, teleprinter, data, and facsimile traffic. The company's leased circuits were considered the most cost effective in the Gulf, and customers approached 500. By the late 1980s Batelco also offered advanced telex connections to 215 countries and access to computer data bases. International Data Access Services (IDAS) had access to data bases in more than 20 countries in Europe, North America, the Far East, and Australia.

In short, international and regional companies have been drawn to Bahrain because of Batelco's ability to provide state-of-the-art telecommunications services. The company is above all flexible. In supplying computer modems and multiplexers for private communications networks, Batelco accommodates all recognized operating systems.

13.4 Critical Investments

13.4.1 Satellites

Bahrain's participation in international telecommunications dates back to 1864, when it became a key link in the Indo-European undersea telegraph cable. By the 1930s the service had come on land, and the island's first public telephones started functioning. The first automatic telephone exchange was opened in 1949, and the subsequent proliferation of public and private telephones was supplemented by the inauguration of telex services in 1963 (*Middle East Economic*

Digest, 1990, Batelco 1). Bahrain's television service, the first color station in the Gulf, came into operation in 1973.

One of the most far-reaching strategic developments was the commissioning of the island's satellite earth station in 1969, ahead of any other Middle East country. Bahrain's pioneering decision came just before the region's spectacular oil price–driven boom period of infrastructural development was about to start. The then costly but far-sighted move to acquire a satellite earth station underlined an intention to invest boldly in a drive to establish Bahrain as a sophisticated and key link in a fast-expanding global telecommunications network (Moneyclips, *Gulf Daily News,* 10 November 1995). Indeed, the opening of the region's first satellite station vividly demonstrated the vision of Bahrain as the communications center of the Middle East (The Economist Intelligence Unit, *Bahrain, Qatar,* No. 3, 1991, 15).

A second satellite terminal was added in 1980 to allow links with both the Atlantic and Indian Ocean communications satellites of the International Satellite Organization (INTELSAT). In 1985 a third dish was added to the complex at Ras Abj Jarjur on Bahrain's southeast coast to link with the ARABSAT system, to be described shortly. In 1990, the oldest station, acquired in 1969 to serve the Atlantic, was replaced by a new updated system supplied and installed by Japan's Sumitomo Corporation (The Economist Intelligence Unit, *Bahrain, Qatar,* No. 3, 1991, 15; Pyramid Research, June 1990, 13).

Eighty percent of the island's international communications are currently handled by the three satellites. They not only relay telephone calls, telexes, and data but also transmit television signals and provide for video conferencing, electronic mail, data collection from remote locations, booking seats on airlines, the exchange of aeronautical navigation information, and the simultaneous printing of foreign newspapers at plants in Bahrain (Pyramid Research, June 1990, 13).

ARABSAT, one of the key elements in the expansion of Bahraini telecommunications, is a $400 million telecommunications network that links the Arab League's 22 member states. ARABSAT integrates their communications with the global INTELSAT network and with the International Maritime Satellite Organization (INMARSAT) (Pyramid Research, June 1990, 13). Conceived in the early 1970s, ARABSAT was formally created in 1976, and the network began operation in 1985. Two communications satellites, ARABSAT 1A and ARABSAT 1B, were launched into geostationary orbits some 35,900 km above Zaire, where they are in permanent view of the Arab nations they serve (*Middle East Economic Digest,* 10 November 1989, v).

Both satellites can carry 8,000 simultaneous telephone circuits and seven television signals or their equivalent in other forms of electronic traffic. These include electronic mail, fax, computer links such as those used in banking or airline booking, picture and text transmissions, sound for radio broadcasts, telex, or the complex package of sound and picture relays required for teleconferencing.

Until the fiber-optic link with Saudi Arabia was completed in 1990, the 20% of Bahrain's international communications not handled by its satellites were handled largely with microwave links with Saudi Arabia.

13.4.2 Fiber Optics

Bahrain and Saudi Arabia were quick to establish a fiber-optic link, the first between two countries in the Middle East. The Saudi-Bahrainian link, offering 7,680 voice-grade circuits as opposed to the previous microwave system's 300, was designed to cover communications growth between the two countries for 25 years. The 70-kilometer line, only 12 mm in diameter and containing eight fibers, was laid in special ducts running under the King Fahd Causeway that bridges Bahrain and Saudi Arabia.

In Bahrain itself fiber-optics were first introduced in 1985, when Isa Town exchange and Telephone House were linked by a fiber cable. The system is currently being extended to cover all the island's trunk lines. The provision of fiber-optic links to every individual subscriber is planned for completion during the mid- to late 1990s.

A new message switching center completed in 1988 was the largest real-time computer-operated switching center in the region and reinforced Batelco's development of international services by providing for more private network applications.

13.4.3 Digital Exchanges

With the huge potential created by the digital era of telephony, the period of growth for Bahrain's telephone system is far from over. Over half of Batelco's 82,000 subscribers were already served by digital exchanges in 1988 supplied by Sweden's Ericsson. By the end of 1992 virtually all of Bahrain's telephone network was on digital exchanges. One specification for the next switching system is that it include Integrated Services Digital Network (ISDN) capability.

To meet these new technological challenges, an important leap forward for Batelco was the signing in December 1989 of a BD1.5 million contract with France's Alcatel to supply a super high-technology integrated services digital exchange for Budayya, an area where many top bankers and other executives live. By November 1991 work on the new advanced telephone exchange had been completed, with five remote-line units providing a total capacity of 12,000 lines. It was the first exchange in Bahrain to offer an ISDN capability and marked Bahrain as one of the first states in the Middle East to adopt this state-of-the-art technology.

13.4.4 Mobile Telephones

As elsewhere in the world, Bahrain's business people, both local and foreign, have come to depend on permanent access to a telephone and connections to Batelco's Mobile Automatic Telephone Services (MATS). The number of users has risen sharply. In the late 1970s Bahrain was the first country in the Middle East to introduce mobile telephony. The present more effective service was established in 1986 based on a cellular system and supplied by Japan's NEC.

Batelco's mobile network is considered to be among the cheapest in the world for callers using its facilities. A small premium is charged to local callers, and

international callers pay tariffs on par with fixed network users for international calls. Batelco has held the monopoly on handset sales and installations, using revenue generated from this activity to support its policy on reasonable call charges (*Communications Middle East/Africa,* November 1991). Users have a choice of car, portable, and hand-held versions. The mobile sets can be bought or leased—and even temporarily hired by visitors to the island.

During 1990, the company spent approximately BD2 million to add four new base stations supplied by Sumitomo Corporation to enhance the mobile telephone system. As a result, by the end of 1991 capacity had increased from 4,800 to 7,500 lines. The network of "cells" handling the MATS system has also been increased throughout Bahrain to ensure that subscribers meet with no gaps in their ability to communicate either locally or internationally. An agreement between Batelco and its counterpart in Kuwait allowed mobile telephone subscribers of both companies to use domestic networks while traveling within the other country. This facility was extended to the United Arab Emirates as well (Pyramid Research, June 1990, 13).

As of March 1996 mobile subscribership had reached 27,500 customers. It consists of two systems, one analog and one Global System for Mobile Communication (GSM). The GSM network has 15,000 subscribers and was installed in 1995 by Ericsson.

13.4.5 Pagers

Pagers, less expensive than mobile telephones, are in even wider use, numbering 5,200 as early as 1989. (Batelco has been offering alphanumerical pagers since August 1986.) Pagers provide an instructive illustration of the market-oriented strategy followed by Batelco. A surge in demand for the paging service occurred after the company reduced the rental by one-third in 1989; by the start of the decade, the total capacity of the paging exchange had reached 9,991. The system features a liquid crystal display panel that can show messages sent by telex of up to 64 characters, with more contained in memory. After 1990, the company offered a simpler, tone pager.

13.5 Telecommunications Modernization in the 1990s

Expansion and modernization are continuing in the 1990s as Bahrain attempts to maintain its advantage over other countries in attracting financial and international service industries through ongoing adoption of advanced telecommunications technology.

In 1991 Sweden's Ericsson was awarded two contracts worth a total of BD1.3 million by Batelco. The first job, amounting to BD819,000, was to upgrade the existing national transit exchanges at Salmanyia, Sanad, and the diplomatic area in Manama to accommodate an interexchange signaling system known as CCITT Signaling System No. 7 (SS7) (*Middle East Economic Digest,* 27 September 1991, 12). The SS7 equipment provides faster response time for calls between dif-

ferent exchanges as well as technical improvements to operations. The system is necessary for the planned introduction of more advanced services, such as the ISDN, which is discussed later.

The second contract, worth BD481,000, was to supply, install, and commission a digital telephone exchange for the Isa Town region. SS7 signaling equipment was also introduced on Batelco's international traffic to selected designations (*Middle East Economic Digest,* 14 June 1991, 18).

Batelco allocated BD96.8 million for expansion projects during 1990–1995. The aim was to increase domestic telephone capacity to 127,631 lines and complete the goal of digitizing the entire network. Shortly after completing the expansion of its mobile telephone system in late 1991, Batelco announced that its TACS mobile network would be expanded for a fourth time. The expansion of the mobile telecommunications network was designed to reach a capacity of up to 11,000 lines, a capacity that was saturated within 18 months.

To meet rapidly growing demand, in 1994 Batelco introduced the GSM, a widely used wireless telephone standard. A roaming facility that allows customers to use their GSM sets while traveling abroad was available shortly thereafter between Bahrain, Kuwait, and the United Arab Emirates. In 1995 Batelco's roaming facility was further extended to the United Kingdom (Moneyclips, *Gulf Daily News,* 28 September 1995).

Bahrain's telecommunications system is also to be linked to a BD30 million submarine cable network, which will be ready for service by May 1997. Bahrain, Kuwait, Qatar, and the United Arab Emirates signed a BD30 million contract with Japan's Fujitsu to install 1,300 km of an optically amplified submarine cable system between these four Gulf states. Fujitsu was awarded the contract over competing bids by Alcatel and AT&T.

This project, known as Fiber Optical Gulf (FOG), is the first optically repeated system in the region. It will initially operate at 5 gigabits/second (equivalent to 60,000 telephone lines between each country) and will be the world's fastest. To accommodate future demand, capacity can be increased to 10 gigabits/second with installation of additional ground equipment (Information Access, 7 August 1995).

The FOG project will also allow the participating telecommunications companies to benefit from other international submarine fiber-optic cable systems that are available in the region, such as Fiber Optic Link Around the Globe and the South East Middle East West Europe (SE-ME-WE) cable systems (UPI, 11 September 1995). Thus, the new cable system will be used for voice, data, and image communications between the four Gulf states and the rest of the world. Clearly, FOG represents a major contribution to the international communications infrastructure of the Gulf nations.

In 1995 Batelco became an investor in the INMARSAT-P. This is a company that was set up by over 40 other telecommunications companies in January 1995 to implement a global mobile satellite telephone system. It is scheduled to begin operations in 1999 (Information Access, 6 October 1995).

Newbridge has reached an agreement with Batelco to supply asynchronous transfer mode (ATM) technology on a trial basis for the purpose of exploring ATM applications that may be relevant to Batelco business. Asynchronous trans-

fer mode is an emerging switched technology and promises to be the first industry-wide standard to meet the growing needs of both local area and wide area computing and networking. The outcome of phase one of the ATM trial indicated the ability to handle broadband integrated services such as data, video, and voice potential to customers. As of this writing, Batelco intends to proceed with further trials with other suppliers and then to invite tenders (Moneyclips, *Gulf Daily News,* 24 October 1995).

By the end of 1995 Batelco had also finalized all arrangements related to the introduction of Internet services to Bahrain. Batelco had earlier signed a contract with Omnes, a U.S.-based joint venture of Schlumberger and Cable & Wireless, to install and commission an Internet access service (Information Access, 26 September 1995). Under the brand name inet all Internet applications are provided including e-mail, file transfer protocol, newsgroups, and the World Wide Web. In keeping with the strategy of investing in telecommunications to diversify the economy, Shaikh Ali foresaw the Internet as making "a great contribution to stimulating economic and business activities in Bahrain" (Moneyclips, *Gulf Daily News,* 9 November 1995). In addition to creating a market for information services, private business considers the Internet as a venue for marketing goods and services to international and local customers (Moneyclips, *Gulf Daily News,* 23 October 1995). At the time of this writing, Batelco had not confirmed the rate for the Internet but earlier had indicated rates would compare favorably with international rates.

In late 1995 Transport Minister and Batelco Board Chairman Shaikh Ali bin Sulman Al Khalifa announced that a number of additional new investments were to be made aimed at continuing the expansion and upgrading of the telecommunications network in Bahrain and at enhancing its performance. The approved projects include digital mux development and PCM network development (Moneyclips, *Gulf Daily News,* 9 November 1995).

Batelco's ongoing mission is to provide state-of-the-art business-oriented services such as high-speed circuits and, increasingly, value-added services. Its development strategy has been to build a sophisticated, fully digital infrastructure based on the ISDN standards. ISDN service was launched on 15 April 1996 and is being used to provide Internet service, video conferencing, and other high-tech service. As Bahrain seeks to enhance its entrepot status, the modernization and expansion of international communications facilities clearly remains a high priority for Batelco.

With teledensity of 25% and a fully digitalized system with Internet access, the telecommunications system in Bahrain is one of the most advanced in the region.

13.6 Conclusions

Throughout the 1980s and into the 1990s the growth rate of the telecommunications system in Bahrain has been extraordinary. Using the short-term resources provided by the mid-1970s to mid-1980s oil boom, Bahraini decision makers seized the remarkable opportunity that came their way to pursue aggressively

their blueprint of increasing the size, scope, complexity, and versatility of telecommunications by vigorous new investments in the total communications infrastructure of Bahrain.

As the Bahraini economy remains buffeted by lower oil prices and the Gulf-wide recession of the mid-1990s, the country is moving to reinforce its core role as an entrepot and communications center. This is critical if the island state is to draw new offshore banking units, investment houses, accounting offices, and insurance companies necessary to further diversify the economy. Batelco continues to play a vital role in attracting new financial institutions to Bahrain. Its continuing expansion programs aim to build the Bahraini network into one of the world's most sophisticated. Although investments in Bahraini telecommunications moderated in the early 1990s, another major burst of expansion occurred in the middle of the decade and is expected to continue for the remainder of the decade (see table 13.1).

Table 13.1. Rate of Growth in Telecommunications Expenditures by Middle East States, Forecasts 1990–2000 ($ billions)

Country	1990	1995	2000	1990–1995	1995–2000
Afghanistan	21.7	34.0	46.0	9.4	6.2
Algeria	203.0	375.0	590.0	13.1	9.5
Bahrain	33.7	37.8	56.3	2.3	8.2
Cyprus	18.5	19.2	21.6	0.7	2.4
Djibouti	2.8	3.2	5.1	2.7	9.8
Egypt	280.0	521.0	750.0	13.2	7.6
Ethiopia	15.7	18.9	22.1	3.8	3.2
Iran	410.0	587.0	850.0	7.4	7.7
Iraq	283.0	339.0	550.0	3.7	10.2
Jordan	28.2	29.4	34.1	0.8	3.0
Kuwait	92.7	131.3	173.6	7.2	5.7
Lebanon	28.2	29.4	34.1	0.8	3.0
Libya	117.8	130.8	188.5	2.1	7.6
Mauritania	1.1	1.3	1.8	3.4	6.7
Morocco	37.1	44.2	50.2	3.6	2.6
Oman	8.6	8.9	10.2	0.7	2.8
Pakistan	539.6	651.0	830.0	3.8	5.0
Qatar	63.9	96.8	135.4	8.7	6.9
Saudi Arabia	770.2	885.0	1,400.0	2.8	9.6
Somalia	2.3	3.4	4.6	8.1	6.2
Sudan	12.3	13.1	17.3	1.3	5.7
Syria	158.3	211.0	300.0	5.9	7.3
Tunisia	32.0	37.2	43.7	3.1	3.3
UAE	152.3	202.0	307.0	5.8	8.7
Yemen (Aden)	3.6	3.9	5.6	1.6	7.5
Yemen (Senaia)	9.8	12.4	15.0	4.8	3.9
Middle East (total)	3.8	5.0	7.4	6.1	8.1
World Total	112.8	133.2	184.5	3.4	6.7

Source: Middle East Economic Digest. 1989 (10 November):iv.

The thrust of the government's economic policies in the 1990s is to enhance the economy's attractiveness to foreign capital and to strengthen the competitive base of local and foreign-owned Bahraini business. Bahraini authorities continue to liberalize the economy and eliminate some of the structural weaknesses that might constrain further diversification away from oil. In a radical bid to reposition the economy, the authorities decided in 1991 to permit wholly foreign-owned companies to operate in Bahrain, abandoning previous requirements that any venture should be at least 51% Bahraini owned. This policy change, virtually unprecedented among the Gulf monarchies, was aimed at attracting new finance and technology.

In 1992 the authorities also approved a new commercial agencies bill that ushered in major changes to the way agencies operate in the country. The amendments sought to break the product monopoly enjoyed by commercial agents, ending artificial shortages and injecting fresh competition into the market.

Together, these two sweeping measures confirm the government's strategy to revitalize the economy, enforce structural changes to make it more efficient, and promote nonoil activities, especially those requiring the latest in advanced telecommunications capabilities, for example, banking and financial services.

It is believed that with the change in ownership regulations, the relatively open economic policies pursued by the government, the availability of skilled labor, excellent access to the regional market (along the causeway to Saudi Arabia), and lower operating costs, Bahrain will be in an even stronger position to encourage foreign businesses to establish their base on the island. Undoubtedly, this will further spur the growth in demand for advanced information processing and communications systems. Bahrain's experience suggests that macroeconomic conditions, including the incentive to invest and adequate growth rates, are central to the ability of a developing country to take advantage of new technologies.

References

Bruce, J. 1995. Bahrain, Oman, and Qatar. *Jane's Defense Weekly* (September 30):25–30.

Communications Middle East/Africa. 1991. vol. 1, no. 11, November.

el Din, M. S. 1978. Bahrain: Poised to become Gulf financial center. *The Banker* (March).

English, T. 1991. Bahrain considers its future. *Middle East Economic Digest* (May 17).

Jane's Sentinel. 1994. *The state of Bahrain, 1994.* (Couldson, Surrey: Jone's Information Group.)

Government of Jordan. 1989. Existing telecommunications facilities and prospects for more reliable communications among OIC member countries. *Journal of Economic Cooperation Among Islamic Countries* 10:129–138.

Ibrahim, R.L.R. 1992. Computer usage in developing countries: Case study Kuwait. *Information and Management* 8:103–112.

Information Access. 1995. *IAC (SM) Newsletter Database* (7 August; 26 September; 6 October).

Khan, E.H. 1992. The stages of evolution of information systems functions: Findings in the Bahrain environment. *IEEE Transactions on Engineering Management* 39, no. 3:84–95.

Khuri, F.I. 1980. *Tribe and state in Bahrain.* Chicago: University of Chicago Press.

Lawson, F.H. 1989. *Bahrain: The modernization of autocracy.* Boulder, Colo.: Westview.

Looney, R. E., and D. Winterford. 1992. Patterns of Arab Gulf exports: Implications for industrial diversification of increased inter-Arab trade. *Orient* 33, no. 4:579–597.

Middle East Digest. 1990. *Bahrain: Encouraging international investment.* London: Middle East Digest.

Moneyclips, *Gulf Daily News,* various issues, 1991–1996.

Middle East Economic Digest, various issues, 1991–1996.

Middle East Executive Reports, various issues, 1991–1996.

National Accounts of Arab Countries: 1979–1989. 1991. Abu Dhabi: The Arab Monetary Fund.

Osborne, C. 1977. *The Gulf states and Oman.* London: Croom Helm.

Pyramid Research. 1990. Batelco key to Bahrain's resurgence. Cambridge, Mass.: Pyramid Research.

Rathmell, A. 1995. The troubled state of Bahrain. *Jane's Intelligence Review* 7, no. 6:267–269.

Stutely, R. 1987. Gulf reforms aim at economic stimulation. *Asian Finance* (15 May).

The Banker, various issues, 1991–1996.

The Economist Intelligence Unit. 1991. *Bahrain, Qatar: Country profile, 1991–92.* London: The Economist Intelligence Unit.

The Economist Intelligence Unit. 1991. *Bahrain, Qatar: Country profile, No. 3 1991.* London: The Economist Intelligence Unit.

The Economist Intelligence Unit. 1992. *Bahrain, Qatar: Country profile, No. 3 1992.* London: The Economist Intelligence Unit.

The Economist Intelligence Unit. 1992. *Bahrain, Qatar: Country profile, No. 2 1992.* London: The Economist Intelligence Unit.

The Economist Intelligence Unit. 1992. *Bahrain, Qatar: Country profile, No. 1 1992.* London: The Economist Intelligence Unit.

UPI. 1995. (11 September).