



**ICT SERVICES WITHOUT BORDERS:
AN OPPORTUNITY FOR EGYPT?**

Omneia Helmy

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Omneia Helmy is professor of economics at the Faculty of Economics and Political Science, Cairo University; and lead economist at the Egyptian Center for Economic Studies (ECES), email: ohelmy@eces.org.eg.

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Abstract

This paper attempts to identify ways to enhance the efficiency of the ICT sector in Egypt and to promote the diffusion and adoption of ICT in the economy. Since early 2000, Egypt has undertaken several reforms including an ICT supportive legal environment, a mix of market liberalization and the introduction of competition, increased private participation, effective ICT sector regulation, in addition to entering into several international commitments. However, various indicators of access, quality, affordability, institutional efficiency and sustainability as well as ICT applications reveal that a digital divide still exists between Egypt and some other countries at a similar stage of economic development and within the country itself, suggesting that there is still much room for improvement. To narrow the digital gap, the paper suggests areas for future interventions, including strictly enforcing ICT related laws; strengthening ICT sector regulation; fostering competition for landline telephone services; expanding ICT connectivity, particularly to rural communities; securing venture capital; reinforcing the quality of ICT education and training; developing and uploading Arabic e-content online; promoting regional cooperation; and securing an open environment under WTO agreements.

ملخص

تهدف هذه الدراسة إلى تحديد سبل تعزيز كفاءة قطاع تكنولوجيا المعلومات والاتصالات في مصر وتشجيع نشر واستخدام تطبيقاته في الاقتصاد القومي. وتوضح الدراسة أنه منذ عام ٢٠٠٠ اتخذت مصر مجموعة من إجراءات الإصلاح تضمنت توفير بيئة تشريعية ملائمة لتطوير تكنولوجيا المعلومات والاتصالات، ومزيجا من تحرير السوق وتدعيم المنافسة، وزيادة مشاركة القطاع الخاص، والتنظيم الفعال لهذا القطاع، بالإضافة إلى الدخول في عدة التزامات دولية. ومع ذلك، فإن مؤشرات النفاذ والجودة والتكلفة والكفاءة المؤسسية واستدامة الخدمة لا تزال تشير إلى وجود فجوة رقمية بين مصر وبعض الدول الأخرى التي تمر بمرحلة مشابهة من التنمية الاقتصادية، بل وبين المناطق المختلفة داخل مصر، مما يؤكد على حاجة هذا القطاع إلى مزيد من التطوير. وللمحد من هذه الفجوة الرقمية، تشير الدراسة إلى أهمية الإنفاذ الفعال للقوانين المرتبطة بتكنولوجيا المعلومات والاتصالات، وتقوية القواعد التنظيمية للقطاع، وتعزيز المنافسة في مجال خدمات الهاتف الثابت، وتوسيع نطاق خدمات تكنولوجيا المعلومات والاتصالات خاصة في المناطق الريفية. كما تؤكد على ضرورة توفير رأس المال المخاطر، وتطوير جودة التعليم والتدريب في مجال تكنولوجيا المعلومات والاتصالات، وإعداد ونشر المحتوى الرقمي باللغة العربية، وتشجيع التعاون على المستوى الإقليمي، وتدعيم حرية التجارة في هذا المجال وفقا لاتفاقيات منظمة التجارة العالمية.

1. INTRODUCTION

Information and communications technology (ICT) goods and services such as microprocessors, personal computers and cellular phones, as well as the Internet and the World Wide Web are contributing to profound socio-political and economic transformation in Egypt.

The ICT sector¹ is characterized by high rates of technological progress, output and productivity growth. These characteristics imply potential considerable contribution of the sector to the Egyptian economy-wide performance.

Since early 2000, the ICT sector has been one of the fastest growing sectors in Egypt. The contribution of the ICT sector to Egypt's real gross domestic product, employment, investment, international trade and government revenues has been increasing.

A number of studies have demonstrated that Egypt could benefit from a positive contribution by the accumulation of ICT to economic growth. ICT use and applications in different sectors of the Egyptian economy may facilitate better utilization of traditional areas of comparative advantage and open the door for new areas of competitive advantage. Software development could be the driving force leading Egypt's new economy. Raising the level of e-readiness of Egyptian small and medium enterprises, particularly their preparedness for electronic commerce, is crucial and requires increasing awareness of the role of ICT, heavy investment in human capital and upgrading levels and types of connectivity (Abdel-Kader 2006; Rizk 2006, 2002, 2001).

ICT sector reforms have enhanced the sector's efficiency and service quality, which resulted in a rapid improvement in ICT diffusion and adoption in the Egyptian economy, reducing transaction costs and enhancing the competitiveness of Egyptian firms.

Notwithstanding the progress made, Egypt continues to lag behind other countries at a similar stage of economic development in ICT diffusion and adoption. The digital gap

¹ The ICT sector is a combination of manufacturing and services industries that capture, transmit and display data and information electronically (OECD 2002a, b; Jing 2006). These industries are classified according to the International Standard Classification System (ISIC) revision 4 which has been officially released on August 11, 2008 (<http://www.unstats.un.org/unsd/cr/registry>).

between Egypt and other countries and within the country itself suggests that there is still much room for improvement.

The purpose of this paper is to identify ways to further enhance the efficiency of the ICT sector and promote the diffusion and adoption of ICT in the Egyptian economy. Rapid and widespread ICT diffusion and adoption could help narrow the digital gap and enable Egypt to capture a higher share of global exports of ICT services, positively affecting the growth performance of the country.

The rest of the paper is organized as follows: Section 2 explores whether the ICT sector could be an important driver of economic growth in Egypt, by identifying its contribution to the country's real gross domestic product (GDP), employment, investment, international trade and government revenues. Section 3 provides an overview of reforms aiming at improving the ICT sector efficiency and service quality, namely the ICT supportive legal environment; domestic reforms involving the mix of market liberalization and the introduction of competition, increased private sector participation and effective sector regulation; in addition to international commitments to anchor domestic reforms. Section 4 is an assessment of the impact of ICT reforms on the diffusion and adoption of various ICT goods and services in Egypt. The assessment is based on various indicators for access, quality, affordability, institutional efficiency and sustainability, as well as ICT applications, both over time and in comparison to some other countries at similar stage of economic development. Finally, Section 5 concludes by suggesting areas for future interventions.

2. ICT SECTOR IN EGYPT: AN ENGINE FOR GROWTH?

The aim of this section is to explore whether the ICT sector could be an important driver of economic growth in Egypt, by identifying its *direct* contribution to the country's real GDP, employment, investment, international trade and government revenues.

However, it is worth mentioning that the *indirect* economic impact of ICT could be more important, in terms of externalities and spillovers through its use and applications in different sectors of the economy, than its *direct* contribution (Meng and Li 2001).

2.1. ICT Sector Contributes to Real GDP and Employment Creation

ICT sector is one of the fastest growing sectors in Egypt, enjoying a double-digit real annual growth of 20 percent, compared to 7 percent for the national economy in 2007 (ITU 2007a).² In 2007/08, the contribution of ICT to GDP was 3.9 percent (MCIT 2009b). However, the calculation of the ICT component of GDP underestimates the ICT sector performance for two reasons. *First*, this calculation covers only communications, while information technology activities are included in the national accounts under “Other Services”. *Second*, communications are classified as services suggesting that they do not include goods (MOED 2009).

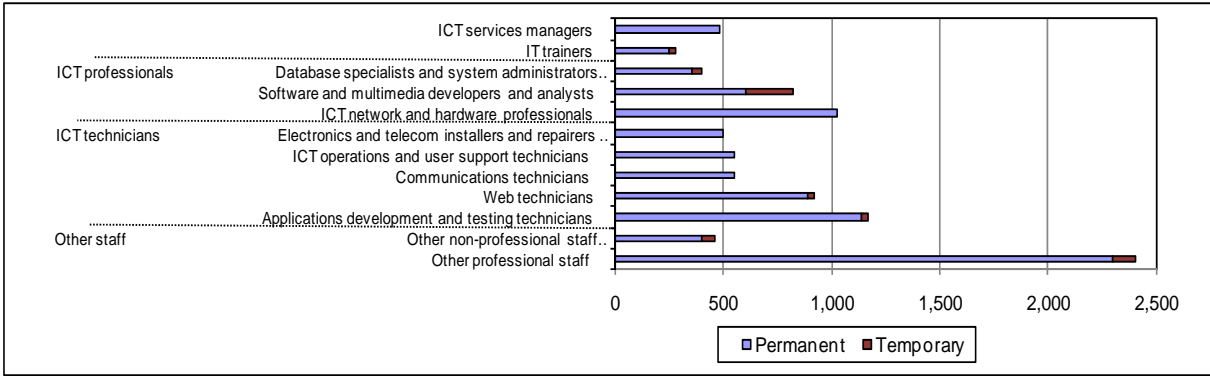
The total number of employees in the ICT sector reached 55,109 employees in December 2008. Adding Telecom Egypt employees, Egypt Post employees and Smart Village employees, the number becomes 175,110 employees compared to 147,853 employees in December 2006, an increase of more than 18 percent in the last two years (MCIT 2009b, 2008c, d). Over the same period, the number of ICT companies increased by nearly 42 percent to reach 2938, of which 79 percent was information technology (IT) companies, 13 percent information technology enabled services (ITES) companies and 8 percent telecommunications companies (MCIT 2009a).³

A 2007 survey conducted jointly by the United Nations Conference on Trade and Development (UNCTAD), the Ministry of Communications and Information Technology (MCIT) and the Information Technology Industry Development Agency (ITIDA) interviewed 151 Egyptian ICT companies as representatives of the ICT sector. It was found that most jobs are for applications development and testing technicians as well as network and hardware professionals, while there were fewer IT trainers (Figure 1). Only 5 percent of the staff employed is in temporary positions, mainly hired as software and multimedia developers and analysts.

² By September 2008, ICT real GDP recorded the highest sector growth rate to reach 14.6 percent, while tourism sector came second with 14.2 percent growth rate (MCIT 2008a).

³ ITES are services that use IT in the processing and delivery of the service, such as call centers, medical transcription, back office operations, revenue accounting, insurance claim processing, legal database, payroll records, logistic management, content development/animation, entertainment software, graphics and design, and computer animation, among others.

Figure 1. Number of Permanent and Temporary Employees in a Sample of ICT Companies in Egypt

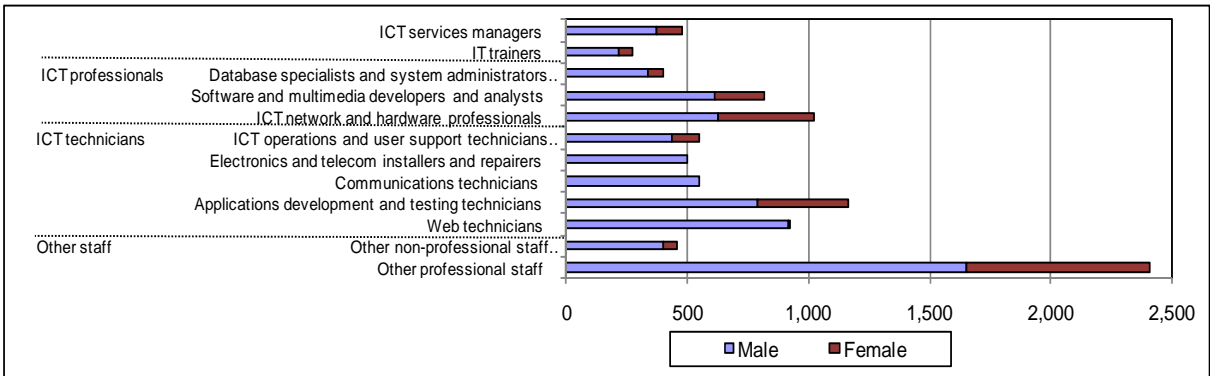


Source: UNCTAD (2007).

Women's participation rate in the ICT sector reaches 23 percent, higher than the 19 percent participation rate of women in total workforce. More women are employed on a temporary basis. On average, for each 4 male permanent staff, there is 1 permanent female staff, while among temporary staff members this ratio is 3 to 1.

Women are more commonly employed as ICT network and hardware professionals and as applications development and testing technicians (Figure 2). These same jobs with a high participation rate of women coincide with the most demanded positions among specialized ICT occupations in Egypt. This indicates that women can have an important contribution to reinforcing the numbers of specialized ICT workforce to match demand from the ICT producing sector. Both foreign owned and joint ventures employ less than a fifth of the total surveyed workforce and hire more men than women.

Figure 2. Number of Male and Female Occupations in a Sample of ICT Companies in Egypt



Source: UNCTAD (2007).

2.2. ICT Sector Attracts Domestic and Foreign Investments

During 2005-2007, the ICT sector in Egypt has managed to attract local and foreign investments of more than \$8 billion. Seventeen international companies are operating in Egypt and exporting IT enabled services (e.g., call centers). These companies have created more than 11,249 job opportunities (MCIT 2008a).⁴ In 2006/07, the share of the ICT sector in newly issued capital and newly established companies reached nearly 28 percent and 4.5 percent respectively, as shown in Table 1.

Table 1. Newly Established Companies and Issued Capital (2004/05-2006/07)

	2004/05		2005/06		2006/07	
	Number of companies	Issued capital In LE millions	Number of companies	Issued capital In LE millions	Number of companies	Issued capital in LE millions
ICT	413	576.13	208	524,91	273	10,398.15
Total	6,288	17,796	3,852	11,324	6,032	36,878

Source: Ministry of Investment (2008a).

However, Egyptian entrepreneurs with innovative but risky projects generally face difficulties in finding venture capital (Table 2). Few venture capital firms are willing to take risks with ICT startup companies and private equity firms usually invest in already established companies, rather than provide startup capital.⁵

Table 2. Venture Capital Availability in Egypt

Economy	Score*	Mean**
Egypt	3.35	3.16
Morocco	3.00	
Tunisia	3.80	

Source: World Economic Forum (2009).

Notes: * Entrepreneurs with innovative but risky projects can generally find venture in the country (1= not true, 7= true).

** The mean score across the sample of 134 economies.

To mitigate financing difficulties, the Technology Development Fund (TDF), a public-private partnership, was established to invest venture capital in promising Egyptian

⁴ These companies are: Alcatel-Lucent (French), Ericsson (Swedish), Siemens (German), Nortel (Australian), Lucent (American), Oracle (American), IBM (American), Orange Business (French), Satyam (Indian), EDS (American), Nation Tel (Australian), Valeo (French), Teleperformance (French), Wipro (Indian), ITS (Kuwaiti), SQS (German) and Nokia (Finnish).

⁵ For example, over the last six years, EFG Hermes has invested over \$100 million in the ICT sector in Egypt and the Middle East. It has invested in many of Egypt's most prominent success stories including Vodafone, Raya, ITWorx, Orascom, LinkDotNet and many others (EFG Hermes 2009).

technology companies and start-ups. In addition to financing, TDF provides access to a range of support services and incubation facilities offered by fund advisers and sponsors.⁶

ITIDA is also assisting small pioneer institutions in starting up and developing business skills and managerial efficiency. It offers small and medium ICT enterprises opportunities to participate in joint projects through tenders, helps them reduce the cost of business through financial support packages and facilitates their access to international markets through trade missions to international exhibitions.

Despite these efforts, more venture capital is needed to secure continued development of Egypt's ICT sector.

2.3. ICT Sector Promotes Egypt's International Trade

In 2007, Egypt's total exports and imports of ICT goods reached \$22,451 thousand and \$1,727,143 thousand, respectively. Egypt's international trade in ICT goods lags far behind other countries at similar levels of economic development, as shown in Table 3.

Table 3. Total Exports and Imports of ICT Goods for Egypt and Selected Countries, 2007

Country	Value of ICT exports (000s of \$)				Value of ICT imports (000s of \$)			
	Total	Office machines and automatic data processing machines	Telecommunications and sound-recording and reproducing apparatus and equipment	Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including non-electrical counterparts, n.e.s., of electrical household-type equipment)	Total	Office machines and automatic data processing machines	Telecommunications and sound-recording and reproducing apparatus and equipment	Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including non-electrical counterparts, n.e.s., of electrical household-type equipment)
China	440,951,777	165,880,300	146,267,535	128,803,942	290,420,633	45,458,030	35,737,936	209,224,667
India	4,325,575	446,501	583,348	3,295,726	20,591,533	4,218,287	9,920,038	6,453,208
Tunisia	2,143,760	110,679	170,754	1,862,327	2,211,799	397,352	245,707	1,568,740
Morocco	2,106,719	23,321	45,077	2,038,321	3,452,506	461,087	915,884	2,075,535
South Africa	1,632,112	257,470	489,683	884,959	10,185,680	3,108,247	3,818,186	3,259,247
Jordan	547,477	26,084	356,267	165,126	1,410,647	204,054	832,270	374,323
Egypt	22,451	769	4,316	17,366	1,727,143	215,675	868,624	642,844

Source: UNCTAD (2008a).

Note: According to SITC: Rev.3 classification, ICT exports and imports of goods are: office machines and automatic data processing machines (code 75); telecommunications and sound-recording and reproducing apparatus and equipment (code 76); and electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof [including non-electrical counterparts, n.e.s., of electrical household-type equipment] (code 77).

- N.e.s. = Not elsewhere specified.

⁶ The TDF has investments from banks, many large IT companies and Telecom Egypt. In the initial round, the company raised LE 50 million in venture capital for incubating startup IT related companies. The second round of LE 150 million is in the process of being allocated. In addition, the fund sponsors an annual business plan competition with total prizes of LE 2 million. The winners of the competition receive investment, consultation services and expert advice to help them increase productivity.

As for ICT *services*, the Egyptian ICT sector’s success in attracting foreign investment and outsourcing contracts resulted in \$548 million in exports, of which \$496 million were exports of communications (postal, courier and telecommunications services between residents and non-residents) and \$52 million were exports of computer and information services (such as news agency services and other information provision services) in 2006 (WTO 2008a).

Egypt is one of the leading developing economies exporters and importers of communications services. In 2006, Egypt’s communications services exports and imports reached \$496 million (3.1 percent of Egypt’s total exports of services) and \$309 million (2.7 percent of Egypt’s total imports of services), respectively.⁷

Figures 3a and 3b show Egypt’s per capita exports and imports of communications services in 2006, compared to other leading developing economies exporters and importers of these services.

Figure 3a. Per Capita Exports of Communications Services in 2006 (\$)

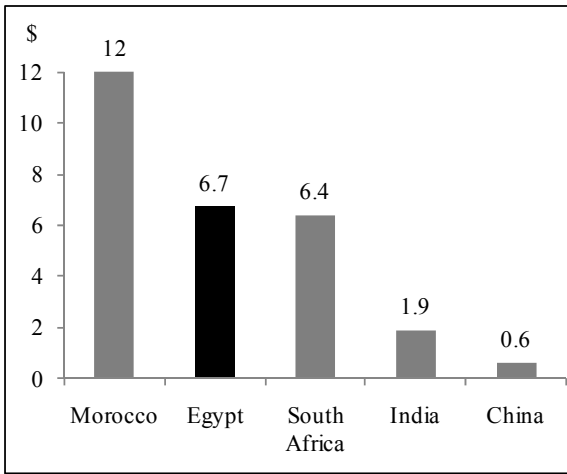
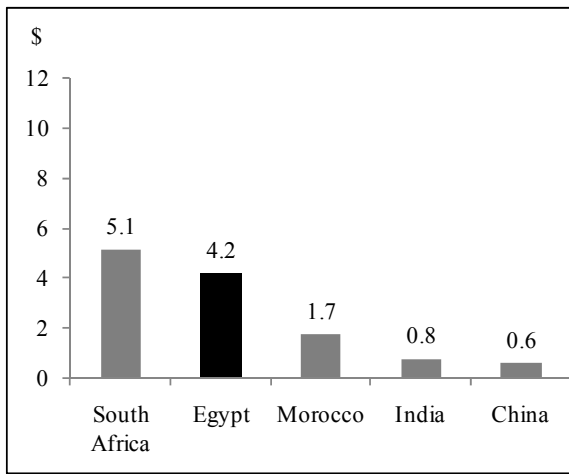


Figure 3b. Per Capita Imports of Communications Services in 2006 (\$)



Source: Author’s calculations based on data from UNCTAD (2008a).

In addition, Egypt is one of the leading developing economies exporters and importers of computer and information services. In 2006, Egypt’s computer and information services exports and imports reached \$52 million (0.32 percent of Egypt’s total exports of services) and \$30 million (0.26 percent of Egypt’s total imports of services), respectively.

⁷ In 2006, Egypt’s total exports of services reached \$16,135 million, while its imports amounted to \$11,569 million (UNCTAD 2008a).

Figures 4a and 4b show Egypt’s per capita exports and imports of computer and information services in 2006, compared to other leading developing economies exporters and importers of these services.

Figure 4a. Per Capita Exports of Computer and Information Services in 2006 (\$)

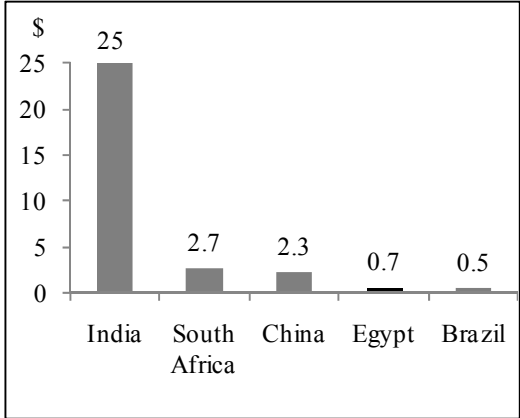
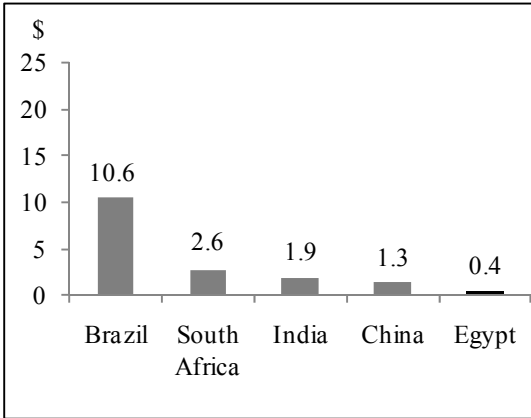


Figure 4b. Per Capita Imports of Computer and Information Services in 2006 (\$)



Source: Author’s calculations based on data from UNCTAD (2008a).

In the last few years, outsourcing, the act of moving an activity to an Egyptian supplier, has accelerated for four main reasons. *First*, rapid growth of global market demand for exportable ICT services has increased the value of total worldwide outsourcing market, including information technology enabled services (ITES) to almost \$300 billion at the end of 2007 (Hovlin 2008; Yankee Group Report 2008; WTO 2008b).⁸ *Second*, technological developments have lowered the price of communications and made it possible for Egypt to transmit digitized information. *Third*, trade and markets have been liberalized. *Finally*, the supply of well-educated, often English-speaking labor has become available.

From 2005 to 2008, the total value of Egypt’s offshore services grew rapidly from \$250 million to \$750 million, and is targeted to reach \$1.1 billion in 2010 (Table 4). Further development of Egypt’s outsourcing capabilities would enable the country to capture a much higher share of global production of ICT services.

⁸ India has a dominant and growing share of the global ITES pie. Its ITES exports are set to exceed \$60 billion by 2010.

Table 4. Egypt’s Target Offshore Services Revenues, in 2010, (\$ million)

Offshore services	Target revenue in 2010, (\$ million)	CAGR during 2005-2010, (%)
IT services	280	27
Content	200	46
Technical support centers	200	27
Contact centers	115	50
R&D engineering	100	38
BPO	75	72
IT products	45	25
Localization	40	22
KPO	30	43

Sources: MCIT (2009b, 2007); World Economic Forum (2009); A. T. Kearney (2005).

Notes: *IT services* include software maintenance and support, IT management, hardware management and support, development and integration. *Content* includes development and management of Arabic/Islamic content for all IT-enabled devices such as Internet, mobile devices, DVDS, multimedia, etc. *Contact Centers* are call centers and customer relationship management (CRM) through other methods including e-mail newsletters, postal mail catalogs, web site inquiries and chats. This also includes technical support that requires specialized knowledge. *Localization* stands for localization/Arabization of software, user assistance, computer-based training, web applications and others. *Business Process Outsourcing (BPO)* includes shared service centers (captive or outsourced) for business functions, including human resources, finance and accounting, sales, marketing and customer care, and supply chain management. Tasks such as call centers and customer care are also examples of BPO. When tasks become more advanced, some begin to talk about *Knowledge Process Outsourcing or (KPO)*.

Egypt has been named the Outsourcing Destination of the Year at the National Outsourcing Association’s 2008 Awards in London. According to A.T. Kearney, Egypt is among the 13 most attractive destinations for offshoring IT or business processes, before other regional competitors such as Jordan, Tunisia and Morocco (A.T. Kearney 2007).

The 2007 A.T. Kearney Global Services Location Index (GSLI)⁹ reveals that an increasing number of American, European and Asian companies are choosing Egypt as a center for regional or global support activities. Egypt has a relatively young population, a multilingual workforce, a large and cost-effective talent pool and strong government support for outsourcing.¹⁰ Additionally, the country’s time zone advantages with EU-based companies

⁹ The 2007 A.T. Kearney Global Services Location Index (GSLI) analyzes and ranks the top 50 locations worldwide that provide the most common remote functions, including IT services and support, contact centers and back-office support. Each country’s score is composed of a weighted combination of relative scores on 43 measurements, which are grouped into three categories: Financial attractiveness, people and skills availability and business environment. Two newest measures on the index analyze the compensation costs and relative experience of business process outsourcing (BPO) analysts in offshore locations, in addition to contact center agents and IT professionals.

¹⁰ The total number of multilingual and therefore suitable talent pool willing to work in the BPO industry in Cairo is estimated to be at least 24,000. It is possible to hire high-quality BPO agents in Cairo for \$225 to \$250 per month, whereas for other established and emerging countries—such as India—the figure is about twice as high (World Economic Forum 2009).

and its equidistance to both Asia and Europe—make it home to an increasing number of outsourcing centers operated by multinationals (Table 5).¹¹

Table 5. A.T. Kearney Global Services Location Index, 2007

Rank	Country	Financial attractiveness	People and skills availability	Business environment	Total score
1	India	3.22	2.34	1.44	7.00
2	China	2.93	2.25	1.38	6.56
3	Malaysia	2.84	1.26	2.02	6.12
4	Thailand	3.19	1.21	1.62	6.02
5	Brazil	2.64	1.78	1.47	5.89
6	Indonesia	3.29	1.47	1.06	5.82
7	Chile	2.65	1.18	1.93	5.76
8	Philippines	3.26	1.23	1.26	5.75
9	Bulgaria	3.16	1.04	1.56	5.75
10	Mexico	2.63	1.49	1.61	5.73
11	Singapore	1.65	1.51	2.53	5.68
12	Slovakia	2.79	1.04	1.79	5.62
13	Egypt	3.22	1.14	1.25	5.61
14	Jordan	3.09	0.98	1.54	5.60
26	Tunisia	3.03	0.90	1.50	5.43
31	South Africa	2.52	1.18	1.60	5.30
36	Morocco	2.92	0.90	1.33	5.14

Source: A. T. Kearney (2007).

Note: The weight distribution for the three categories is 40:30:30. Financial attractiveness is rated on a scale of 0 to 4, and the categories for people and skills availability and business environment are on a scale of 0 to 3.

2.4. ICT Sector Adds to Government Proceeds

Contribution of ICT sector to the Treasury had increased since 2000 from LE 1,575 million to LE 11,142 million in 2007 as shown in Table 6. This increase in government revenues resulted from licensing proceeds and taxes from the ICT sector, whether as considerable one-time or sustainable annual fees (e.g., privatization proceeds of 20 percent of Telecom Egypt shares; fees in return for granting the third mobile license to Etisalat and awarding 3G¹² licenses to the existing operators, Vodafone and Mobinil).¹³

Table 6. Contribution of ICT Sector to the Government Treasury

	2000	2001	2002	2003	2004	2005	2006	2007
Million LE	1,575	2,437	2,587	2,615	3,959	5,257	22,279	11,142

Source: MCIT (2008b).

¹¹ An example of current outsourcing activity in Egypt is Satyam Computer Services, an India-based company that has opened up its Global Solutions Center (GSC) at the Smart Village in Cairo, to provide various IT services for customers. GSC also has an office in Cairo, which is a branch of its India-based operation. This office works with a local airline and some global financial services clients as well as oil and gas companies.

¹² Third-generation mobile network or service (3G) is a generic term for the next generation of broadband digital mobile systems, which will have expanded broadband capabilities for mobile data applications.

¹³ Each license granted to offer the third generation of mobile services is in return for LE 3.34 billion, in addition to 2.4 percent of total annual revenues from services provided by the operator.

To sum up, the ICT sector is playing an increasingly positive role in the Egyptian economy. This positive role is reflected in terms of contribution to real GDP, employment, investment, international trade and government revenues. However, the method of calculation of the ICT component of GDP results in underestimation of the ICT sector economic performance.

Although the ICT sector has been one of the fastest growing sectors in Egypt since 2000, its size remains relatively small to make it an engine for economic growth. However, externalities and spillovers from faster and more widespread use and applications of ICT goods and services could enhance both its direct and indirect contribution to economic growth in Egypt.

3. ICT SECTOR REFORM

Recognizing the ICT sector dynamic and innovative potential and its role in providing enabling technologies, products and services, the government has mainstreamed ICT as part of its national development plan (Table 7).

Table 7. Government Prioritization of ICT Sector Development

Economy	Score*	Mean**
Egypt	5.2	4.67
Morocco	4.14	
Tunisia	5.8	

Source: World Economic Forum (2009).

Note: * Information and communications technologies are an overall priority for the government (1= strongly disagree, 7= strongly agree). ** The mean score across the sample of 134 economies.

Main targets are to promote Egypt as an international ICT hub for the Middle East and Africa and a Business Process Outsourcing (BPO) destination; developing state-of-the-art ICT infrastructure; ensuring continuous, affordable and secure delivery of ICT services to all members of society regardless of gender and location; supporting improvement of the skills required by the ICT industry; attracting foreign investment in ICT and supporting research and innovation in the field of ICT (World Economic Forum 2009; MCIT 2007).¹⁴

¹⁴ Egypt’s ICT strategy 2007-2010 aims to achieve an annual increase of 20 percent in Internet users and information technology (IT) clubs, of 25 percent in mobile phone subscribers and of 15 percent in the number of companies working in the field of ICT, and increase ICT services exports to \$1.1 billion by 2010 (MCIT 2007).

To achieve these targets the government has taken several reform measures including: creating an ICT-supportive legislative environment; ICT sector domestic reforms involving a mix of market liberalization and the introduction of competition, increased private participation and effective sector regulation; in addition to international commitments to anchor domestic reforms.

3.1. ICT-Supportive Legislative Environment

Strong incentives are provided for Egyptian and foreign investors to carry out ICT related activities in Egypt through issuing or modernizing several ICT-related laws (e.g., investment law 8 of 1997, intellectual property rights law 82 of 2002, telecommunications law 10 of 2003 and the electronic signature law 15 of 2004).

As for investment regimes, the investment law 8/1997 allows full repatriation of profits, unrestricted ownership of investment capital, elimination of price controls and reduced tax rates. Special economic zones, under law 83/2002, provide even more incentives to ICT companies including low-cost real estate, lower payroll tax rate and other benefits.

The government removed all customs duties and sales tax on ICT services, which had been 5 percent and 10 percent respectively, and offered a 5-year tax break for all communications and information technology activities. A 10-year tax break was offered to software companies that establish their operations in new industrial zones. Exemptions start from the year following the start of production. More importantly, these companies are exempted from a number of bureaucratic requirements (e.g., having to pay service fees). Table 8 identifies main ICT incentives in Egypt's various investment regimes.

Table 8. ICT Incentives in Egypt's Investment Regimes

	Investment Law no. 8/1997*		Special economic zones (Law no. 83/2002)
	Favorable non-free zone regime	Free zone regime	
Income tax	Tax holiday ranging from 5 to 20 years depending on location and sector. After tax holiday, the standard rate is 20 percent, except for the oil and gas sectors where it stands at 40.55 percent.	<i>Industrial project</i> : 1 percent of value added of outgoing goods <i>Service project</i> : 1 percent on profits	10 percent on profits for all projects
Import duties	No duties on ICT products		
Payroll tax	10-20 percent depending on salary	10-20 percent depending on salary	5 percent flat rate for all salary levels
Export minimum	No export minimum	Ranging from 50-80 percent, depending on zone board's decision and GAFI's approval	Depending on zone board's decision

Sources: El Shafei (2008); Ministry of Investment (2008b); American Chamber of Commerce in Egypt (2007).

Note: *Amended by laws nos. 162/2000; 13/2002; 13/2004; 91/2005; 94/2005; 19/2007 and 114/2008.

The government has taken measures to support *knowledge creation*, mainly through *the protection of intellectual property rights*. The country has been part of the early stages of intellectual property rights protection as shown in Table 9, and has joined the World Trade Organization Agreement on Trade-Related Aspects of Intellectual Property Rights (WTO-TRIPS).

Table 9. Status of Egypt on Intellectual Property Rights

World Intellectual Property Organization (WIPO) treaties and World Trade Organization (WTO) agreements					
Paris Convention (1951)	Madrid Agreement (1952)	Hague Agreement (1975)	Trademarks Law Treaty (TLT) (1981)	Nairobi Treaty (1982)	Trade Related Aspects of Intellectual Property Rights (TRIPS) (1995)

Source: Nour (2002).

Egypt's intellectual property law 82 of 2002 protects patents, trademarks and copyrights. Violation of this law can lead to heavy fines or imprisonment. However, the law is not strictly enforced (Table 10).

Table 10. Weak Enforcement of Intellectual Property Rights in Egypt

Economy	Score*	Mean**
Egypt	3.64	3.8
Morocco	4.38	
Tunisia	3.33	

Source: World Economic Forum (2009).

Note: * Intellectual property protection in the country (1= is weak and not enforced, 7= is strong and enforced). ** The mean score across the sample of 134 economies.

Egypt is one of the countries with the highest piracy rates around the world (Table 11). While the worldwide weighted average PC software piracy rate was 38 percent, Egypt's piracy rate in 2007 reached 60 percent.¹⁵ Losses from piracy reached nearly \$48 billion worldwide and \$131 million for Egypt (Business Software Alliance 2008, 2007).

Table 11. 2007 PC Software Piracy Rankings

Country	Piracy rates (%)	Losses (\$ M)
Total worldwide	38	47,809
China	82	6,664
Tunisia	76	54
India	69	2,025
Morocco	67	66
Egypt	60	131
Jordan	60	20
UAE	35	94

Source: Business Software Alliance (2008, 2007).

¹⁵ The piracy rate is the total number of units of pirated software deployed in 2007 divided by the total units of software installed (Business Software Alliance 2007).

Piracy hurts the IT sector's contribution to GDP by reducing the amount that consumers spend on IT products. Besides the loss in revenues to software vendors, piracy has many negative economic consequences. Local software industries can be crippled by competition with high quality pirated software from abroad, which impedes the IT sector growth and results in loss of tax revenues and jobs (Al Sharari 2006; Boghossian 2006). According to some estimates, if Egypt's rate of piracy were to be reduced by 10 percent, it would result in \$324 million additional GDP growth, a 30 percent increase in growth for the IT sector and 858 more jobs by 2009 (American Chamber of Commerce in Egypt 2007).¹⁶

Despite Egypt's high software piracy rate of 60 percent for 2007, it is 1 percent below the global median (61 percent) and a 3 percent improvement against the previous year. This drop in piracy rate was a result of anti-piracy legalization efforts,¹⁷ frequently conducted raids on computer show vendors and taking legal actions against violators. Yet there is still room for improvement that requires stronger enforcement of intellectual property rights legislation in the country (Business Software Alliance 2008, 2007; <http://www.itida.gov.eg/iproffice.html> on 12/30/2008).

The electronic signature law 15 of 2004 was passed specifically for the ICT industry and regulates electronic signature transactions (e-signature). The law also stipulated establishment of the Information Technology Industry Development Authority (ITIDA) to play a leading role in enhancing the Egyptian cyber security and data protection framework. ITIDA's mandate includes the regulation of electronic signature and licensing digital certificates required for conducting any sort of electronic transactions. To date, four companies have been licensed to issue e-certificates.¹⁸

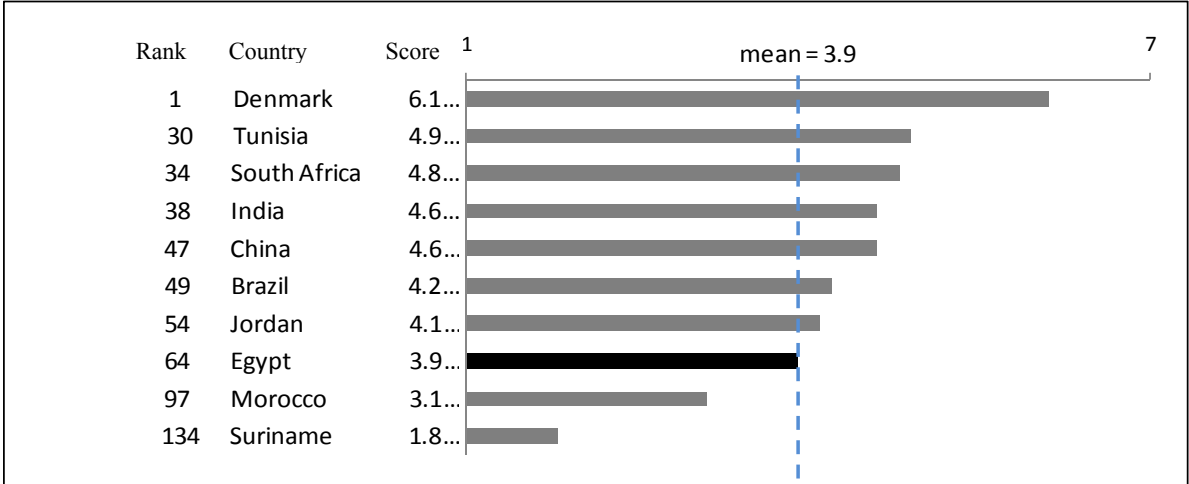
¹⁶ Dropping worldwide PC piracy by ten percentage points between 2008 and 2012 could result in an increase of 500,000 additional new jobs and more than \$100 billion in new revenues for local IT sectors. Most of the benefits that result from lowering software piracy accrue to locally based resellers, software services, and channel firms—meaning that the greatest proportion of economic benefits from lowering software piracy remains within a country (Business Software Alliance 2008, 2007).

¹⁷ The government has been approving deals with vendors since the early 2000s to provide software for government and educational use, and the country has been shipping DVDs with bundles of legitimate software to schools and government offices. Although these sectors are less than 15 percent of the PC market, the programs have had an impact with the piracy rate dropping three points to 60 percent in 2007.

¹⁸ ITIDA is dedicated to promoting Egypt's information and communications technology industry with a particular focus on business process outsourcing.

According to the Global Competitiveness Report 2008-2009 of the World Economic Forum, Egypt is ranked 64 among 134 countries, with a score of 3.9 out of 7, with respect to laws related to the use of information and communications technologies (electronic commerce, digital signatures and consumer protection), as shown in Figure 5. This implies that ICT related laws in Egypt need to be more developed and strictly enforced.

Figure 5. ICT Related Laws in Egypt Need to be More Developed and Strictly Enforced



Source: World Economic Forum (2009).

Note: Laws related to the use of information and communications technologies (electronic commerce, e-signatures and consumer protection) are (1= non-existent; 7= well developed and enforced).

3.2. ICT Sector Domestic Reforms

ICT sector domestic reforms involve a mix of market liberalization and the introduction of competition in several market segments (e.g., by licensing new operators), increased private sector participation (e.g., through privatization of the incumbent and/or by admitting new, privately-owned operators to the market) and effective sector regulation (e.g., by establishing a regulatory body independent of government and the licensed operators).

3.2.1. Market liberalization and increased competition

According to presidential decree no. 379 for the year 1999 and the telecommunications law no. 10 of 2003, both the Ministry of Communications and Information Technology (MCIT) and the National Telecommunications Regulatory Authority (NTRA) are responsible for telecommunications and main facilities-based providers of local, national and international long distance telephone service and mobile service, as shown in Table 12.

Table 12. Egypt's Telecommunications Organizations (Situation on April 7th, 2008)

Organization	Local telephone service	National long distance	International long distance	Wireless	
				GSM mobile*	CDMA fixed**
Ministry of Communications and Information Technology (MCIT)	Ministry				
National Telecommunications Regulatory Authority (NTRA)	Regulator				
Telecom Egypt (TE)	•	•	•		•
Etisalat				•	
Mobinil				•	
Vodafone				•	

Source: ITU (2008a, 2007d).

Notes: * Global System for Mobile Communications (digital mobile standard developed in Europe and currently the most widespread 2G [second generation] digital mobile standard); ** Code Division Multiple Access (a technology for digital transmission of radio signals based on spread spectrum techniques where each voice or data call uses the whole radio band and is assigned a unique code). GSM and CDMA represent different systems of sharing of the radio spectrum for communications. Mobile technologies are normally evaluated on the following three parameters, namely: Data transmission capacity, security and radiation levels.

Contrary to telecom law 10 of 2003, which required Telecom Egypt (TE) to give up its monopoly on *landline telephone services* and open them up to at least two additional operators by early 2006, TE continues to be the country's sole fixed-line operator.¹⁹ On September 7, 2008, the second fixed telephone line license has been delayed for the third time as a result of poor global market conditions.²⁰

The mobile sector was partially liberalized in 1998, when the Mobinil consortium began offering mobile services. The government sold a license for a second network to a consortium led by Vodafone and Misrfone, which launched its services in November 1998 under the

¹⁹ TE, being the sole incumbent in the area of fixed phones now, provides voice-based fixed-line telephony, Internet and data services in addition to wholesale services to other operators via Egypt's only backbone network. TE provides Internet services through its subsidiary TE Data, the country's largest Internet service provider (ISP).

²⁰ The introduction of a second fixed-line operator, if it takes place (when market conditions are suitable), is not expected to hurt TE in the medium term, as the company would benefit from leasing lines to and interconnections with the second operator. A second national fixed line operator will include Worldwide Interoperability for Microwave Access (WiMax) spectrum for broadband connectivity specifically in rural areas and new and evolving services. The license will be able to build an international gateway, significantly increasing competition in what was until recently a TE monopoly, though mobile operators have now been allowed to operate gateways of their own. WiMax is a standard-based technology enabling the delivery of first mile/last mile wireless broadband access as an alternative to cable and DSL. It allows for long-range wireless communications at 70 mega bits per second (Mbits/s) over 50 kilometers. It can be used as a backbone Internet connection to rural areas (ITU 2008b).

name Click GSM. In 2006, Etisalat Egypt won a third mobile license for 2G/3G GSM.²¹ Etisalat became fully operational by mid-2007, ending Mobinil and Vodafone's existing duopoly and increasing the Egyptian mobile market competition.²² Currently, there are three competing providers of mobile services in Egypt.²³

To secure a stake in the thriving mobile market, a cooperative partnership between TE and Vodafone has increased TE's stake in Vodafone Egypt to 45 percent, a stake that TE has been increasing since it first acquired 8.6 percent in December 2003. This partnership allows Vodafone Egypt to extend its services and products through TE's outlets and TE could potentially work regionally on fixed and mobile operations. In addition, TE has agreed with the mobile operators on a deal that channels their international calls through TE on a "revenue-sharing" basis. In this way TE is benefiting revenue-wise from the mobile sector, though it is not a mobile operator per se.

Public Data Networking (PDN) services were liberalized in 1999 and Internet service providers (ISPs) were able to enter the market.²⁴ However, it was not until the following year that the market for Internet infrastructure was opened to competition. The market for high-speed access services was liberalized in 2001, while the first virtual operators—mostly ISPs—were licensed in 2003. Most ISPs work on a revenue-sharing model with the incumbent operator (MCIT 2006).

As for international voice services, Egypt's international gateways were liberalized and the resale of TE's international voice and data services has been allowed.²⁵ With the liberalization of international gateways, it is expected that many companies will be attracted to the prospects of investing in international Voice over Internet Protocol (VoIP) services within the Egyptian market.

²¹ 2G refers to second-generation mobile networks or services, such as GSM and CDMA. Second generations are digital as compared to first generation mobile networks, which are analogue. 3G refers to third-generation mobile networks or services. It is a generic term for the next generation of broadband digital mobile systems, which will have expanded broadband capabilities for mobile data applications.

²² Etisalat Misr pays 6 percent of its annual revenue as royalties to the NTRA.

²³ Licenses to offer the third generation of mobile services were granted to Etisalat in August 2006; Vodafone Egypt in January 2007 and Mobinil in October 2007.

²⁴ ISPs provide end users access to the Internet. ISPs may offer their own proprietary content and access to online services such as email.

²⁵ Near the end of 2007, Etisalat started an international gateway.

3.2.2. Increased private sector participation

To encourage ICT sector *privatization*, 20 percent of Telecom Egypt's shares were sold in December 2005, 19 percent were free floating on the Egyptian and London stock exchanges and 1 percent was sold to the employees. The government continues to hold 80 percent of the shares²⁶ and appoints seven out of eleven of TE's board members.

Three private companies were licensed to provide *public payphone services* and currently there are over 58,209 pay phones spread in the country covering most of the urban areas and some of the rural areas. Two licenses for the provision of *prepaid telephone cards* were granted. The availability of such cards has encouraged demand for fixed-to-mobile calls as well as long-distance national and international calls.

Licenses were issued to several *data carriers and facility-based ISPs* in addition to more than 214 *service-based ISPs* that lease infrastructure and compete in the provision of content to users (ITU 2007b, e).

The increase in the number of private sector telecommunications companies over the period October 1999- January 2008 is shown in Table 13. Despite increased private sector participation, TE continues to maintain a stronghold in the sector through its subsidiaries. It has investments in over 18 companies (e.g., Vodafone Egypt, Nile Online, Egynet, Middle East Radio Company, Menatel and Nile Telecom), giving it a widespread presence in the sector and varied revenue sources.

Table 13. Private Telecommunications Companies are Increasing (October 1999–January 2008)

Type of service	October 1999	January 2008
Mobile phone	2	3
Information transmission	1	8
Internet digital structure	1	4
Subscribers' Internet services	40	210
Voice services	-	2
Public phone services	3	3
Manufacturing of telephone centrals	2	3
Manufacturing of copper communications cables	3	4
Manufacturing of fiber optics	2	2
Communications services through satellites	-	2
Mobile phone through satellites	-	2

Source: MCIT (2008a, b, c, d).

²⁶ The telecom law gives the government a free hand in selling a stake in Telecom Egypt, but stipulates that the state must retain more than 50 percent of the company. The law also decrees that 5 percent of the operator should be offered to employees in the event of any kind of sale proceeding.

3.2.3. Effective ICT sector regulation

Besides market liberalization and increased private sector participation, the third most important element in the recipe for sector reform is effective regulation. Regulation can help ensure market competition and intervention to address areas of market failure, where market mechanisms alone may be insufficient to achieve desired policy outcomes (for example, in universal access).

The National Telecommunications Regulatory Authority (NTRA) is responsible for drawing up telecommunications plans and programs; preparing and publishing telecom services statistics; establishing customer protection rules; providing state-of-the-art services at the best prices; regulating license issuance procedures;²⁷ regulating equipment type approval processes; and conducting research and development and training (Telecom Law 10 of 2003).

The NTRA established the Universal Services Fund (USF) to ensure that non-commercially viable services (i.e., services where the return on investment is too low to allow for a commercial exploitation) would reach low income rural areas, low income citizens, schools and hospitals at reasonable prices.²⁸ USF would compensate telecommunications operators and service providers for price differences between the approved economic price for a service and that, which may be determined by the State in favor of the user. USF is financed by: part of the NTRA's annual budget surplus, additional contributions from the government and a percentage of revenue from license and spectrum fees (Telecommunications Law 10 of 2003; Global Information Society Watch 2007).

As the government continues to own and operate the incumbent operator in the telecommunications sector (TE) and the head of the board of the regulatory body (NTRA) is the Minister of Communications and Information Technology, it is difficult to ensure

²⁷ The NTRA awarded over 20 licenses to operators who offer telecommunications services to the Egyptian market, including mobile, payphone, prepaid calling card, Internet, data and satellite services. The NTRA is also responsible for the advanced radio management and monitoring system and is rationalizing the radio frequency spectrum to introduce new services. During 2006-2008, licensees were allowed to run voice and data services over satellite earth stations and cable landing points operated by Telecom Egypt. The NTRA has the authority to monitor the performance of operators and penalize those that violate the terms of their licenses (Global Information Society Watch 2007).

²⁸ The objectives of universal service policies are to increase the average penetration rate of fixed line telephony within the 26 governorates from the current average of 13.7 percent to around 20 percent, decrease the domestic digital divide by providing universal access to the Internet to maximize the benefits of e-services such as access to the e-government portal and reach a tele-density of 100 percent when measured by the number of fixed phone lines per family (www.ntra.gov.eg).

transparency, neutrality and fairness in the decisions of the regulatory body (NTRA). The dual role of the Minister as the final decision-maker for the regulator and for TE casts doubt about the effective independence of the regulator and results in over-protection of the incumbent telecommunications operator in the liberalization process. For example, TE has been advantaged in relation to other ICT service providers in that it was exempted from paying license fees on services before 2006 (www.itu.int/ITU-D/icteye/DisplayCountry.aspx?countryId=74).

In addition, the degree of NTRA financial autonomy plays an important role in determining the regulator's effectiveness. The NTRA is financed through license and other fees. Funds are remitted to the treasury with budgets fulfilled through government allotments. Such funding can prove unstable and may make the regulator subject to political interference and regulatory capture (ITU 2008a).

3.3. International Commitments to Anchor ICT Domestic Reforms

According to *the General Agreement on Trade in Services of the World Trade Organization (WTO/GATS)*, Egypt's commitments included opening some of the country's telecommunications market to foreign suppliers, competition and interconnection safeguards and rules to promote transparent and fair mechanisms for licensing, universal service and allocation of scarce resources, such as radio spectrum. Egypt's GATS commitments extended not only to foreign investment in telecom companies, but also to cross-border trade by means such as global data networks. Commitments also required having a regulator that is independent of the entities that operate telecom networks or otherwise supply the services (WTO 2002).

In June 2002, Egypt joined the World Trade Organization agreement governing trade in telecommunications services (*Basic Telecommunications Agreement [WTO-BTA]*), thereby committing itself to dismantling the governmental monopoly on the provision of telecommunications services. Commitments under WTO-BTA agreement resulted in removal of restrictions on foreign capital in telecommunications companies and deregulation of the markets of data, Internet, value-added services and mobile services. A grace period for the deregulation of the international voice market was granted till the end of 2005. The government has announced licensing submarine cables connecting Egypt to Europe and the Gulf region during the fourth quarter of 2006, to be operational by 2008. The government is

also committed to awarding licenses for establishing and operating international telecommunications services through a transparent and competitive process.

Recognizing that the opportunities created by the availability of IT technology and products are not limited to the IT hardware sector itself but could have beneficial repercussions on many sectors of the economy,²⁹ Egypt joined *the World Trade Organization Information Technology Agreement (WTO- ITA)* for reducing customs tariffs on ICT related products (e.g., personal computers, computer monitors, computer printers, semiconductors and telecommunications apparatus) in 2003.

As a result, the number of duty free ITA tariff lines increased from zero before joining the agreement to 190 after joining it and the share of ITA tariff lines in all duty free tariff lines for industrial products reached 99 percent (WTO 2007). In 2005, abolishing customs duties on ICT products reduced the capital costs of rolling out new wireless infrastructure by almost 30 percent compared to 2004 costs (ITU 2008a; WTO 2007).

4. ICT DIFFUSION AND ADOPTION: IS EGYPT A LAGGARD?

This section is an assessment of the impact of ICT sector reforms on the diffusion and adoption of various ICT goods and services in Egypt. The assessment is based on various indicators for access, quality, affordability, institutional efficiency and sustainability; as well as ICT applications, both over time and in comparison to some other countries at similar stage of economic development (measured by the value of their human development index), such as Morocco and Tunisia.³⁰ This assessment will help gauge ICT performance and progress, as well as suggest areas for future interventions.

²⁹ For example, the fourfold increase in Indian IT imports (mostly consisting of finished IT products such as telecoms and computers) between 2000/01 and 2005/06, to \$14.1 billion was associated with the surge in India's software exports after 2000. By effectively employing information technology, India obtained important gains in services exports, output and employment (International Chamber of Commerce 2008; WTO 2007; Wong 2001).

³⁰ The value of the human development index (HDI) for Egypt is 0.72, while that for Morocco is 0.65 and Tunisia is 0.76. The human development index (HDI) is a summary measure of a country's average achievement in attaining: a long and healthy life (as measured by life expectancy at birth), access to knowledge (measured by two indicators: the adult literacy rate and the combined gross enrolment ratio in primary, secondary and tertiary education) and a decent standard of living (as measured by the GDP per capita expressed in purchasing power parity [PPP] in US dollars). These three dimensions are standardized to values between 0 and 1 and the simple average (or arithmetic mean) is taken to arrive at the overall HDI value in the range 0 to 1. Thresholds are used to classify HDI values as high, medium or low (at or above 0.800; between 0.500 and 0.800; and below 0.500, respectively) (UNDP 2008, 2007).

4.1. ICT Access

Over 2002-2007, access to ICT goods and services in Egypt has improved. However, ICT access in Egypt remains below that in Morocco and Tunisia. The ICT Development Index (ICT-DI), which captures the level of advancement of ICTs in 154 countries and compares progress made in each of these countries between 2002 and 2007 towards becoming information society,³¹ shows that Tunisia and Morocco have increased their ICT access considerably faster than Egypt during the five-year period, as shown in Table 14.

Table 14. ICT Development Index (ICT-DI) (2002 and 2007)

Economy	Rank out of 154 countries	ICT-DI	Rank out of 154 countries	ICT-DI
	2002		2007	
Egypt	95	1.81	94	2.54
Morocco	111	1.37	101	2.34
Tunisia	94	1.86	83	2.73

Source: ITU (2009).

Although Egypt's position in the index has improved, ranking 94th in 2007 (in 2002, it was 95), Tunisia and Morocco have improved their positions at a much faster pace. Tunisia moved up 11 places (to 83 in 2007) and Morocco has also improved its ICT level significantly (up ten places from 111 in 2002, to rank 101 in 2007). Both Tunisia and Morocco have gained mainly on access (mobile penetration and international Internet bandwidth) and skills (secondary enrolment).

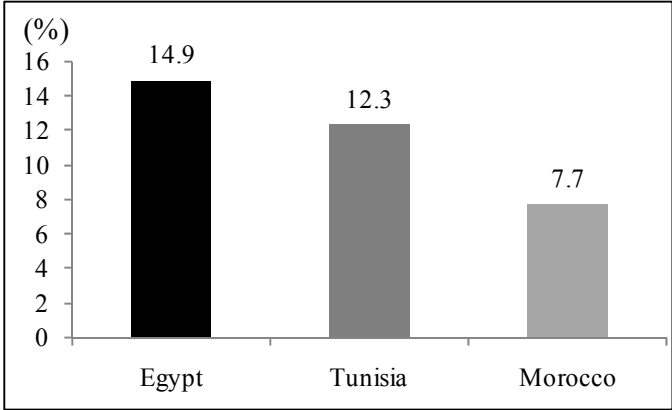
Recent developments in ICT access indicators for Egypt reveal that penetration rates for various ICT goods and services are increasing, but the digital divide between Egypt and comparable countries and within the country itself remains, as discussed below.

4.1.1. High fixed telephone penetration rate but mainly in urban areas

In 2007, Egypt's main (fixed) telephone line penetration stood at 14.9 (per 100 inhabitants), higher than the penetration rate in Morocco (7.7) and Tunisia (12.3), as Figure 6 reveals.

³¹ The ICT-DI was constructed around three subcomponents: access, use and skills. There are five indicators included in the access sub-index: fixed line penetration, mobile penetration, international Internet bandwidth per Internet user, the proportion of households with computers and the proportion of households with Internet access. The ICT use sub-index includes three indicators: Internet user penetration, fixed broadband penetration and mobile broadband penetration. The three indicators included in the skills sub-index are: adult literacy, secondary and tertiary enrolment (ITU 2009).

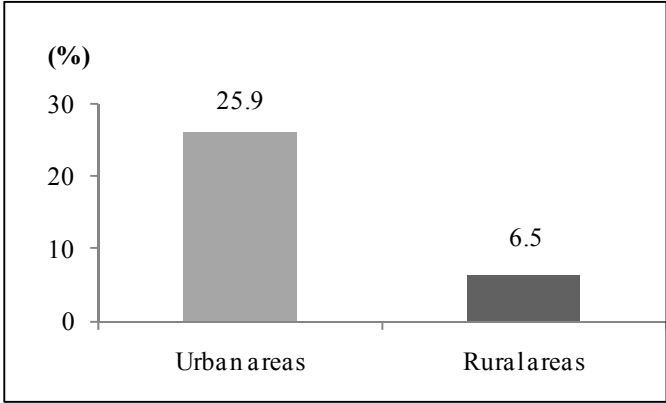
Figure 6. Fixed Telephone Penetration Rates in Egypt, Morocco and Tunisia, 2007



Source: ITU (2009, 2007c).

Although penetration rate for fixed telephone lines in Egypt increased to 15.6 percent in November 2008, it remains much higher in urban areas (25.9 percent) than in rural communities (6.5 percent), reflecting a digital divide within the country (Figure 7).

Figure 7. Fixed Phone Penetration Rates in Egypt are Higher in Urban Areas than Rural Areas



Source: MCIT (2009b; 2008a, b).

4.1.2. Low effective teledensity

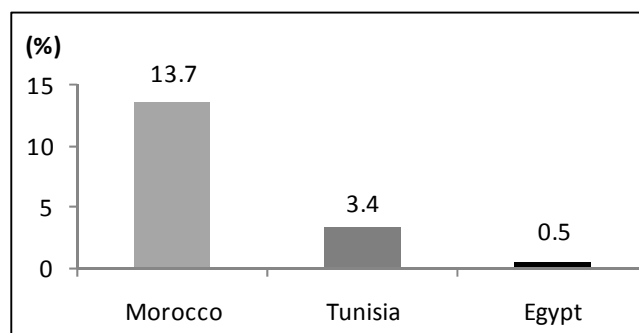
Effective teledensity³² in Egypt (39.8 percent) was much lower than in Tunisia (75.9 percent) or Morocco (64.2 percent) in 2007 (ITU 2008a; World Bank 2008). An increase in the number of telephone subscribers in Egypt to 51.5 million (11.4 million fixed line subscribers and 40.1 million wireless subscribers) by November 2008 may help narrow this digital gap (MCIT 2009b).

³² Effective teledensity is the higher value of either main (fixed) telephone lines per 100 inhabitants or mobile subscribers per 100 inhabitants (ITU 2008a).

4.1.3. Low teleaccessibility

Teleaccessibility³³ remains much lower in Egypt than in Morocco and Tunisia as Figure 8 reveals. Over the past six years, Egypt has issued three pay phone licenses. As a result, 58,209 public phones are currently spread in the country. However, public phones cover most of the urban areas but only some of the rural communities (MCIT 2009a).

Figure 8. Teleaccessibility in Egypt, Morocco and Tunisia



Source: ITU (2008a).

4.1.4. Growing mobile market

Affordability (e.g., cheaper handsets), mobility, market innovations, value added services and choice of multiple service providers favor mobile technology in Egypt. By the end of 2007, mobile subscriptions' annual growth rate reached 64 percent in Egypt, being one of the highest mobile growth rates in the world (ITU 2009). Transnational corporations (TNCs) have contributed substantially to this rapid mobile market growth.³⁴ Two of the top 10 mobile operators in Africa in terms of the number of national subscribers are Mobinil and Vodafone (Table 15).

Table 15. Mobinil and Vodafone are Among the Top 10 Mobile Operators in Africa

Rank	Operator	Subscribers			Mobile revenues		
		Total (000)		Change (%)	Total (million \$)		Change (%)
		Dec-05	Dec-06		Dec-05	Dec-06	
7	Mobinil (Egypt)	6,696	9,267	38.4	928	1,114	16.7
8	Vodafone (Egypt)	6,125	8,704	42.1	878	1,243	29.4
	Africa	83,680	110,649	32.2	13,196	14,469	8.8

Source: UNCTAD (2008b).

³³ Teleaccessibility refers to the number of public telephones divided by the number of main (fixed) lines (ITU 2008a).

³⁴ The rate of return on invested capital in Egypt's mobile phones sector has reached 22 percent in July-September 2008, while the net profit after tax has reached 23 percent of total revenues (EFG Hermes 2009).

By December 2008, coverage (percentage of people within range of mobile cellular signal regardless of whether they are subscribers or not) has reached 99 percent (ITU 2008b). Mobile subscriptions have reached 43.1 million subscriptions and mobile penetration (per 100 inhabitants) reached 57.3 percent (MCIT 2008a, b).³⁵ By 2011, mobile subscriptions are expected to reach 65 million subscriptions and mobile penetration to rise to 70 percent (MCIT 2009a). This marked increase suggests that mobile telephony could serve as a “digital bridge,” which would help Egypt reduce the connectivity divide, reduce transaction costs, facilitate the conduct of business and employment search.

4.1.5. Modest households computer penetration rate

The government has implemented a number of programs such as: PC for Every Home and Egypt PC 2010-Nation Online. By discounting nearly 50 percent of personal computers’ initial price and providing them in installments starting from \$7 per month, these programs have provided personal computers to more than 3 million households.

Despite these efforts, households computer penetration rate remains modest standing at 13 percent in January 2009. While 25 percent of urban households have computers, only 4.5 percent of households in rural areas have computers (MCIT 2009a, b). As for the business sector, only 10 percent of 400,000 medium or large sized Egyptian companies have computers (Business Monitor International 2009). Factors contributing to a relatively low percentage of computer penetration include insufficiently trained human resources, the absence of advanced Internet training in school curricula, low Arabic content on the net and lack of public awareness.

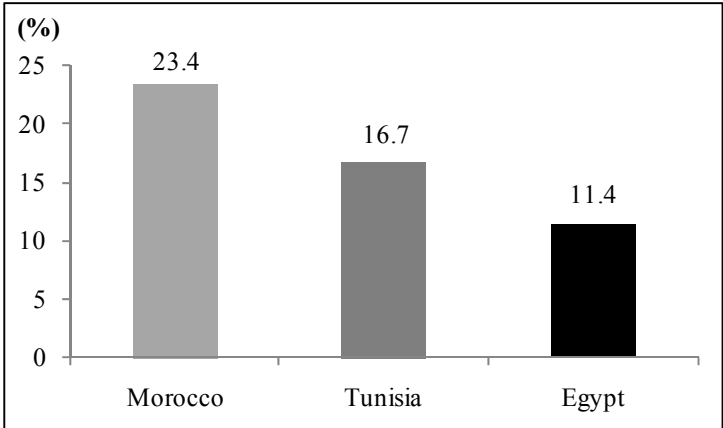
4.1.6. Increasing Internet penetration rate but multiple digital divides

Egypt’s Free Internet Initiative launched in January 2002 has helped increase accessibility to the Internet and made connectivity affordable to most citizens at the cost of a local telephone call and with no additional subscription fees. “Free Internet” is based on a public-private partnership model, where licensed operators and service providers cooperate to offload the calls made for Internet dialup access from the telephony network and share revenues from the subscription-free Internet calls.

³⁵ The number of people subscribed to mobile phone service may differ from the total number of subscriptions. There is the possibility that some people may have more than one mobile phone subscription. It is also possible that multiple people may share one subscription.

As a result of this initiative and other broadband connectivity programs, Internet user penetration (per 100 inhabitants) hiked from 1.0 percent in 2000 to 11.4 percent in 2007 with an average annual growth rate of 10.4 percent during the period. However, Internet penetration in Egypt (11.4) remained lower than in Morocco (23.4) and Tunisia (16.7), as Figure 9 reveals.

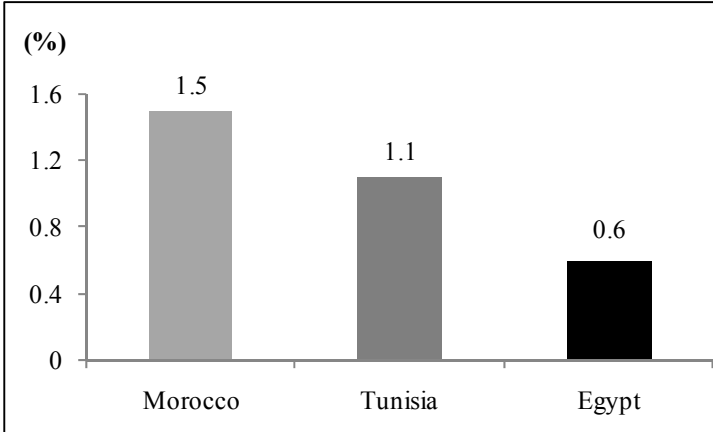
Figure 9. Internet User Penetration in Egypt, Morocco and Tunisia, 2007



Sources: ITU (2009, 2008a, 2007c).

Also, broadband³⁶ Internet subscribers (per 100 inhabitants) remained less in Egypt (0.6) than in Morocco (1.5 percent) and Tunisia (1.1 percent), as shown in Figure 10.

Figure 10. Broadband Internet Penetration in Egypt, Morocco and Tunisia, 2007



Sources: ITU (2009, 2008a, 2007c).

³⁶ Broadband is Internet access with a minimum capacity of greater or equal to 256 kilo bits per second (kbits/s) in one or both directions.

In 2008, Internet user penetration increased to 16.7 and the number of Internet users rose to 12.6 million (MCIT 2009b).³⁷ Broadband users increased from 5 million in 2007 to 7 million in 2008, with an annual growth rate of 41 percent.³⁸

Despite increasing Internet penetration rate, Internet usage differs between households, government entities, private enterprises, economic sectors, geographic regions, men and women and between the young and elderly citizens.

While 60 percent of private enterprises use the Internet, only 34 percent of government entities and 15 percent of households use it. Although 51 percent of manufacturing enterprises use the Internet, 90 percent of financial intermediaries prefer using secured methods such as peer-to-peer connections rather than using the Internet (MCIT 2009b).

As for regional disparities, while 21 percent of urban households use the Internet, only 10 percent of rural households use it. Cairo region constitutes nearly 50 percent of total Internet subscriptions, while Alexandria and Matrouh constitute only 10 percent of total subscriptions and Sinai, the Red Sea and Canal area's share is 6 percent of total subscriptions.

The use of the Internet differs by gender and age. Nearly 59 percent of Internet users are males ranging from 16 to 54 years old (MCIT 2009b, 2008a).

4.1.7. Limited number of Internet hosts

Egypt has only 175,342 Internet hosts,³⁹ while Morocco has 275,889, India has 2.707 million and China has 14.306 million (<http://www.cia.gov/library/publications/the-world-factbook/fields/2184.html>, last visited 19 May 2009). Internet hosts per 1000 inhabitants are 121.3 in Egypt, 825.6 in Morocco, 200,000 in India and 1,803,393 in China (Tanguturi and Harmantzis 2008; UNCTAD 2007; Jing 2006; Meng and Li 2001; Wong 2001).

To sum up, although access to ICT goods and services in Egypt has increased substantially over the last six years, it remains below that in other countries at a similar stage of economic development, with multiple digital divides within the country.

³⁷ In Egypt, Internet subscription is often used by different members of the household, by clients of a cybercafé or by visitors at a library. As a result, the number of effective Internet users may be considerably high.

³⁸ Google recently opened an office in Egypt; due in part to projections of over 50 million Internet users in the Middle East by 2009.

³⁹ The "Internet hosts" concept refers to the number of computers that are directly connected to the worldwide Internet network, measured in terms of country-specific domain names registered.

4.2. ICT Quality

Not only the quantity, but also the provision of good quality ICT infrastructure is the basic building block of connectivity and a prerequisite for economic and social development. The quality of fixed line network in Egypt has improved substantially. Competition among various ISPs has made the cost of asymmetric digital subscriber line (ADSL)⁴⁰ connection cheaper for consumers and has increased the number of broadband Internet subscribers, while ensuring high quality and infrequent interruptions. However, Internet broadband penetration rate remains low in Egypt relative to comparable countries, suggesting the need to promote further competition to offer ADSL consumers more competitive prices relative to their average monthly incomes, and reduce illegal connection sharing.

4.2.1. Improved fixed line network

Complete digitization of the fixed line network was completed by mid-2000, faults per 100 main (fixed) lines have been substantially reduced to only 0.1 per year and the waiting list for telephone lines has declined by more than 39 percent since 2001. Currently, the waiting time for the installation of a fixed telephone line is only a few days and new telephone lines are available and reliable, as shown in Table 16.

Table 16. Quality of New Telephone Lines in Egypt

Economy	Score*	Mean**
Egypt	6.4	5.5
Morocco	6.3	
Tunisia	6.0	

Source: World Economic Forum (2009).

Notes: * New telephone lines for your business are (1 = scarce and difficult to obtain, 7= widely available and highly reliable). ** The mean score across the sample of 134 economies.

4.2.2. Increasing broadband Internet subscription but low penetration rate

A fast and reliable broadband connection usually means that households, companies and the government make use of applications like e-commerce, e-banking and e-government, take part in the global division of labor (e.g., outsourcing), or even engage in activities that require high bandwidth, such as downloading music or playing games online. Hence, total

⁴⁰ ADSL is a technology that enables high-speed data services to be delivered on existing phone lines (twisted pair copper cable), typically with a download speed in excess of 256 kbits/s, but with a lower upload speed.

international Internet bandwidth in Egypt and total broadband (more than 256 kbits/s) subscribers could be good proxies for the state of Egypt’s ICT infrastructure.

Over 2001-2008, total international Internet bandwidth in Egypt grew at an annual rate of 94 percent, reaching 27,077 mega bits per second (Mbits/s), as a result of huge investments in the ICT sector (MCIT 2009a, b).

ADSL *subscribers* have increased dramatically by 108 percent in 2007 to stand at 427,000 subscribers compared to 206,000 subscribers in 2006. By end of November 2008, the number of ADSL subscribers has further increased to 641,073, accounting for around 52.6 percent of the total Internet users in Egypt (12 million).⁴¹ However, the ADSL penetration rate reached 0.8 percent, lower than that of Morocco (1.5 percent) and Tunisia (1.1 percent).⁴²

By January 2009, ADSL became the most prevalent Internet access mode in Egypt,⁴³ as the monthly cost of ADSL connection for households and businesses declined to reach about \$8, with many companies providing this service (e.g., LinkDotNet, TE Data and Vodafone Egypt). Sufficient competition among ISPs in Egypt helps ensure high quality, infrequent interruptions and low prices, as Table 17 reveals.

Table 17. Quality of Competition in Egypt’s ISPs Sector

Economy	Score*	Mean**
Egypt	5.34	4.3
Morocco	4.09	
Tunisia	4.84	

Source: World Economic Forum (2009).

Notes:* Is there sufficient competition among ISPs in your country to ensure high quality, infrequent interruptions and low prices (1= no, 7= yes, equal to the best in the world). ** The mean score across the sample of 134 economies.

4.3. ICT Affordability

Affordable access to high-quality ICT, measured in terms of income and cost of a service (fixed line, mobile phone and Internet), is key for the uptake and use of ICT. Cheaper

⁴¹ ADSL numbers may be misleading, since each subscriber is a household and many people use the connection. Moreover, there is a substantial illegal connection sharing that increases the households that get ADSL (MCIT 2008a).

⁴² To reap the potential benefits of broadband connectivity, the government plans to have 1.5 million households connected to broadband Internet service by the end of 2011.

⁴³ Nearly 74 percent of households, 72 percent of private enterprises and 63 percent of government entities that are connected to the Internet use ADSL connection. Fast and better Internet connection helped 93 percent of the private entities using it to speed up customer services, 53 percent of the private entities to expand customer base and 22 percent to reduce transaction costs (MCIT 2009b, 2008a).

telecommunications services are an important ingredient for e-commerce, participation in international trade and the development of successful centers of offshoring. The regulatory agency (NTRA) monitors and regulates the price of telecommunications services to ensure that they remain affordable (relative to average local income).

In January 2009, the average Egyptian household monthly spending on different ICT services has reached 14.9 percent of the average monthly income, of which spending on mobiles constitutes 4.9 percent (MCIT 2009a, b).

The ICT price basket value for Egypt, Morocco and Tunisia is shown in Table 18.⁴⁴ Analysis of the different components of the ICT price basket highlights that the prices for ICTs vary considerably between the three countries, as well as between services as discussed below.

Table 18. ICT Price Basket Value in Egypt, Morocco and Tunisia, 2008

Rank (out of 150 countries)	Economy	Sub-baskets			GNI per capita, \$**	
		ICT price basket value*	Fixed	Mobile		Broadband
53	Tunisia	2.9	1.1	2.7	4.8	3200
67	Egypt	4.1	2.3	3.6	6.3	1580
104	Morocco	12.4	14.6	11.8	10.7	2250

Source: ITU (2009).

Notes: * The ICT price basket value is the sum of the three sub-baskets (fixed-telephone; mobile and fixed broadband Internet) as a percentage of GNI per capita, divided by 3. ** The gross national income (GNI) per capita is based on the World Bank's Atlas Method.

Fixed telephone line expansion is slowing in Egypt as mobile phones extend into poorer communities and the installation fee for a residential or business line is high relative to average per capita GDP, as shown in Table 19.

Table 19. Installation and Annual Subscription Fees for a Fixed Telephone Line in Egypt, Morocco and Tunisia (as a Percentage of GDP Per Capita, 2008)

Economy	One-time residential telephone connection charge	Residential monthly telephone subscription	One-time business telephone connection charge	Business monthly telephone subscription
Egypt	5.15	0.99	10.31	1.98
Morocco	3.02	8.71	6.05	8.71
Tunisia	0.46	0.73	0.46	0.73

Source: ITU (2009).

⁴⁴ The ICT price basket value combines fixed telephone, mobile and fixed broadband tariffs into one measure and compares it across countries, not only in absolute values, but also relative to each country's gross national income per capita (ITU 2009).

To encourage faster increases in fixed telephone penetration, the installation fee for a new fixed line has been suspended up to December 2008. As a result, average monthly requests to install a new landline increased from 300,000 requests in 2007 to 700,000 requests in 2008.

Concerning mobile call prices, Egypt has some of the cheapest per-minute rates in the world for mobile phones.⁴⁵ However, the monthly mobile payments relative to the average GNI per capita remain higher in Egypt (3.6 percent) than in Tunisia (2.7 percent).

As for Internet tariffs, Egypt has a subscription-free Internet model that offers Internet access at a price of local call. The monthly cost of using Internet for 20 hours is about \$4 in Egypt, much lower than the monthly cost in Tunisia (\$11.6) and Morocco (\$15.6). This cost represents 3.7 percent of per capita GNI in Egypt, lower than in Tunisia (4.7 percent) and Morocco (9.9 percent), as shown in Table 20.

Table 20. Internet Tariffs, 20 Hours per Month, in Egypt, Morocco and Tunisia, 2007 (\$)

	Connection fee (\$)	Internet charges (\$)	Local call charge (\$)	Total Internet price		ISP
				(\$)	As % of GNI per capita	
Egypt	0.00	0.00	4.20	4.2	3.7	Telecom Egypt
Morocco	0.00	15.6	0.00	15.6	9.9	Maroc Telecom
Tunisia	0.00	11.6	0.00	11.6	4.7	Planet

Source: ITU (2008a).

Around 70 percent of the total number of ADSL subscribers in Egypt has a connection speed of 256 kbit/s with unlimited load, which costs 95 LE per month.⁴⁶ Although the monthly charge for ADSL connection to the Internet is lower in Egypt (\$17) than in Tunisia (\$33.6) and Morocco (\$20.3), consumers in Egypt spend 5.9 percent of their average monthly income on broadband connectivity, whereas in Tunisia and Morocco, this broadband offering costs only 3.7 percent and 0.3 percent, respectively (Table 21).

⁴⁵ In April 2008, number portability (i.e., allowing mobile customers to switch from one provider to another without giving up their original number) was introduced for a fee of LE 75. As a result, fierce competition between mobile operators led Mobinil and Etisalat to lower call tariffs. While tariff reductions ranged between 33 percent and 56 percent for Mobinil, they ranged between 31 percent to 39 percent for Etisalat.

⁴⁶ The monthly price of limited 256 kbit/s ADSL is LE 45.

Table 21. Broadband Tariffs in Egypt, Morocco and Tunisia, 2007

	Type	Lower speed		Higher speed		Lowest sample cost		
		Monthly charge \$	Speed (kbit/s)* download	Monthly charge \$	Speed (kbit/s)* download	\$ per 100 kbit/s*	As % of monthly income (GNI) per capita	ISP
Egypt	ADSL	17.0	256	17.03	256	6.65	5.9	Soficom
Morocco	ADSL	20.3	256	101.71	2000	0.51	0.3	Menara
Tunisia	ADSL	33.6	256	92.97	1024	9.08	3.7	Hexabyte Internet

Source: ITU (2008a).

Note: * Kilo bits per second.

In order to cut ADSL prices, Telecom Egypt (TE) reduced the rates that it charges ISPs for several of its services. The concern is that if fixed line service is privatized, TE might not abide by setting Internet access at such a low price. It is unlikely that a private company would go to the same lengths to ensure that there is cheap access to the Internet.

To sum up, monthly payments for local fixed-line calls, mobile calls and the monthly charge for ADSL connection to the Internet in Egypt remain high relative to average monthly income per capita, limiting demand expansion. This is clearly one of the main policy challenges that need to be addressed in the ICT sector in the years to come. It may be necessary to look into ways of lowering prices—for example, by introducing or strengthening competition, by reviewing operators' revenues and efficiency, or by reviewing specific tariff policies; in addition to increasing personal disposable income through rapid economic growth.

4.4. Telecommunications Institutional Efficiency and Sustainability

Since 2000, telecommunications institutional efficiency and sustainability have been improving in Egypt as indicated by the increase in telecommunications revenue as a percentage of GDP, the rising number of subscribers per employee and the high telecommunications investment per capita and as a percentage of revenues.

4.4.1. Increasing telecommunications revenue

In Egypt, total telecommunications revenue as a percentage of GDP has increased from 2.8 percent in 2000 to 3.8 percent in 2006, higher than the Middle East and North Africa (MENA) region average, as shown in Table 22. This increase could be mainly attributed to a growing number of customers and the provision of value-added services, primarily 3G.

Table 22. Telecommunications Institutional Efficiency and Sustainability in Egypt, 2006

	Egypt		Lower-middle-income	Middle East and North Africa
	2000	2006	2006	2006
Total telecommunications revenue (% of GDP)	2.8	3.8	<i>2.1</i>	<i>1.5</i>

Source: World Bank (2008).

Notes: Figures in italics are for years other than those specified.

4.4.2. Rising number of telecommunications subscribers per employee

In 2006, there were around 59,500 employees of telecommunications companies in Egypt, of which 10 percent worked in mobile companies. An increase of total telecommunications subscribers per employee took place between 2000 and 2006, from 125 to 484. This indicates that employees are increasingly generating more income in Egypt's telecommunications sector. Despite this improvement, total telecommunications subscribers per employee remain much lower in Egypt (484), than in Tunisia (915) and Morocco (821), as Table 23 reveals.

Table 23. Telecommunications Staff in Egypt, Morocco and Tunisia, 2006

	Total telecommunications staff				Mobile staff	
	Total (000s)	CAGR* (%)	Female (%)	Subscribers per employee	Total (000s)	Subscribers per employee
	2006	2001-06	2006	2006	2006	2006
Egypt	59.5	1.7	23.1	484	5.95	3007
Morocco	13.0	-7.2	...	821
Tunisia	9.4	4.9	28.9	915

Source: ITU (2008a).

Notes: * Cumulative annual growth rate. ... indicates data are not available.

4.4.3. High telecommunications investment

Telecom investment as a percentage of revenues of the same year is relatively high at 65.5 percent, and Egypt had a telecommunications investment per capita of \$35.5, higher than Morocco (15.3 percent) and Tunisia (30.5 percent), as shown in Table 24 (ITU 2008a). High investments in telecommunications are needed in order to participate better in the information society as well as in the regional and global economy.

Table 24. Telecommunications Investment in Egypt, Morocco and Tunisia, 2006

	Telecommunications investment				
	Total \$ (mill.)	Per inhabitant (\$)	Per telephone subscriber (\$)	As % of revenue	As % of GFCF*
Egypt	2676.2	35.5	92.9	65.5	13.3
Morocco	463.5	15.3	33.7	16.5	3.5
Tunisia	311.8	30.5	36.2	23.2	...

Source: ITU (2008a).

Notes: * Gross fixed capital formation. ... indicates data are not available.

4.5. ICT Applications

Moving into high-margin service sectors such as software development and IT services requires rapid and widespread diffusion and adoption of ICT applications in many service sectors of the Egyptian economy such as financial services. However, ICT applications in Egypt are still limited as a result of: low ICT intensity (ICT expenditure as a percentage of GDP), modest level of e-government readiness, few secure Internet servers and rising wages of skilled programmers and engineers.

4.5.1. Low ICT intensity

Egypt's ICT expenditure (which includes computer hardware, software, services and wired and wireless communications equipment) is only 1.4 percent of GDP, much lower than the average for the MENA region (2.9 percent) and lower-middle-income group (5 percent) as shown in Table 25. This low ICT intensity neither helps firms adopt ICT applications such as electronic data interchange (EDI) nor store, share or use their acquired knowledge.

Table 25. ICT Applications in Egypt, 2006

	Egypt	Lower-middle-income group	Middle East & North Africa region
ICT expenditure (% of GDP)	1.4	5.0	2.9
E-government readiness index (scale 0-, 1= most ready)	<i>0.48</i>	<i>0.45</i>	<i>0.36</i>
Secure Internet servers (per million people, Dec. 2007)	0.8	1.6	0.8

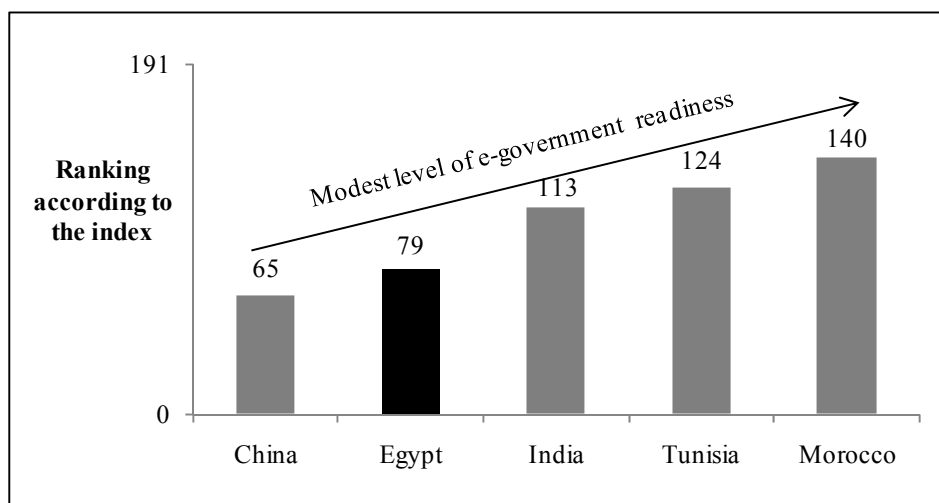
Source: World Bank (2008).

Notes: Figures in italics are for years other than those specified. GDP= gross domestic product; ICT= information and communications technology.

4.5.2. Modest level of e-government readiness

According to the United Nations E-Government Readiness Index, Egypt is ranked at 79 out of 191 countries, higher than India (113), Tunisia (124) and Morocco (140), as shown in Figure 11.

Figure 11. E-Government Readiness in Egypt



Source: United Nations (2008).

The use of e-government in Egypt and the application of ICT by government agencies promise to enhance the effectiveness and efficiency of government and alter its relationship with the public by facilitating transactions and reducing transaction costs (money, time and effort). Table 26 shows that using ICT in Egypt’s government offices enhances their efficiency.

Table 26. ICT Government Usage in Egypt, Morocco and Tunisia

Economy	Presence of ICT in government offices ¹		Availability of government online services ²		ICT use and government efficiency ³	
	Score	Mean ⁴	Score	Mean ⁴	Score	Mean ⁴
Egypt	4.1	4.3	4.1	3.8	4.4	4.3
Morocco	3.6		3.3		4.0	
Tunisia	5.0		4.5		5.3	

Source: World Economic Forum (2009).

Notes: 1- The presence of information and communications technologies in the government in your country is (1= very rare, 7= commonplace and pervasive). 2- In your country, online government services such as personal tax, car registrations, passport applications, business permits and e-procurement are (1= not available, 7= extensively available). 3- The use of information and communications technology by the government has improved the efficiency of government services, facilitating interaction with businesses and individuals (1=strongly disagree, 7= strongly agree). 4- The mean score across the sample of 134 economies.

E-government services are expected to reduce the average number of visits required for citizens to obtain a government service to 1.5, from 3.5. This will result in annual direct cost savings to Egyptians of LE 24 million, reduce annual purchase costs by 3 percent (LE 360 million) and slash 900,000 in wasted work hours, saving an additional LE 9 million each year (American Chamber of Commerce in Egypt 2007). Despite potential gains, to date only 5.4

percent of individuals are e-government users. Most of them use it for checking and paying for their phone bills and for licensing and extracting civil certificates (MCIT 2008a, b).⁴⁷

4.5.3. Few secure Internet servers limiting e-commerce capabilities

Electronic commerce (buying, selling, marketing and servicing of products or services over the Internet) allows efficient interactions among customers, suppliers and development partners cutting down on transaction time and reducing the costs of doing business.

A low number of secure Internet servers in a country is a rough indicator of limited electronic commerce. Secure Internet servers (per million people) stood at 0.85 only for Egypt in 2008, much below the lower middle income group average (1.6) (World Economic Forum 2009; World Bank 2008). In addition to the low number of secure Internet servers in Egypt, other limitations for widespread e-commerce services in the local market include the relatively low diffusion of Internet users and the minimal use of credit cards in financial transactions. Only 0.3 percent of individuals in Egypt use the Internet for e-commerce. Nearly 12.5 percent of households do not undertake e-commerce for fear of denial of e-contracts, while 7.6 percent of them for fear of data disclosure (MCIT 2009a, 2008a). The lack of e-commerce is an obstacle to growth of the ICT sector in Egypt.

4.5.4. Rising wages of skilled programmers and engineers

Skilled individuals are fundamental to developing the innovative and competitive capacity of Egyptian ICT companies. Education and training are ever more important in providing graduates with the technical and business skills required by the ICT industry.

Although Egypt has approximately 16,000 information technology graduates in software engineering and programming each year, it is estimated that with the ICT sector expansion, the country will be short of 9,700 information technology professionals by 2009 (American Chamber of Commerce in Egypt 2007).

Egypt has a strict workforce localization policy. The country imposes a 90 percent local workforce quota. The 10 percent non-Egyptian workforce can only be breached in exceptional circumstances, and then only if permission is given (law 137/1981). As demand for ICT

⁴⁷ Results of a survey conducted in January 2008 on 19,289 households by the Ministry of Communications and Information Technology in cooperation with the Central Agency for Public Mobilization and Statistics (MCIT 2008a, b).

services grows, this strict workforce localization policy may make it extremely difficult to ramp up IT skills rapidly and could hurt the development of Egypt's outsourcing industry.

It is worth mentioning that during 2006, the increasing demand for high quality workers resulted in a 20 percent increase in their salaries. This upward pressure of wages, for example in technical support services, voice-based customer care and multi-media customer care, decreases Egypt's cost advantage over many of its rivals and weakens its competitiveness on the world market (American Chamber of Commerce in Egypt 2007).

In sum, the above findings suggest that despite the rapid improvement in all ICT diffusion and adoption indicators, Egypt seems to be a laggard relative to some other countries at a similar stage of economic development and multiple digital divides within the country remain. Egypt has still great potential to improve its ICT sector performance. Areas for future interventions to further enhance the ICT sector's efficiency and service quality, and promote ICT diffusion and adoption in the Egyptian economy are suggested below in Section 5.

5. CONCLUSION AND POLICY IMPLICATIONS

The ICT sector is playing an increasingly positive *direct* contribution to the country's real gross domestic product, employment, investment, international trade and government revenues. However, the *indirect* economic impact of ICT, in terms of externalities and spillovers through its use and applications in different sectors of the economy remains modest. For the ICT sector to be an important driver of economic growth, faster and more widespread diffusion and adoption of ICT goods and services in the Egyptian economy are required.

An ICT supportive legal environment; domestic reforms involving a mix of market liberalization and the introduction of competition, increased private participation and effective ICT sector regulation; in addition to international commitments to anchor domestic reforms have enhanced the ICT sector's efficiency and service quality.

Notwithstanding the progress made in ICT diffusion and adoption in the Egyptian economy, various indicators for access, quality, affordability, institutional efficiency and sustainability as well as ICT applications, reveal that the digital divide between Egypt and some other countries at similar stage of economic development and within the country itself remains, suggesting that there is still much room for improvement.

Suggested areas for future interventions include: strictly enforcing ICT related laws; strengthening ICT sector regulation; fostering competition for landline telephone services; expanding ICT connectivity, particularly to rural communities; securing venture capital; reinforcing the quality of ICT education and training; developing and uploading Arabic e-content online; promoting regional cooperation and securing an open environment under WTO agreements

5.1. Strictly Enforcing ICT Related Laws

Strong ICT related laws (e.g., intellectual property rights law; electronic signatures law and cyber crime law) are essential, but meaningless without effective enforcement.

Egypt can elevate its enforcement of the intellectual property rights law by creating specialized intellectual property protection enforcement units and providing dedicated resources to investigate and prosecute intellectual property theft; providing better technical assistance to ensure that law enforcement and judiciary officials are better capable of handling computer software piracy cases; and increasing cross-border cooperation among enforcement agencies to improve coordination for law enforcement in multiple countries.

Reducing software piracy often requires a fundamental shift in the public's attitude toward piracy. The government can increase public awareness of the importance of respecting creative works by informing businesses and the public at large about the risks associated with using pirated software, encouraging and rewarding the use of legitimate products and imposing penalties for violations.

Leading by example is one of the most effective mechanisms for public persuasion. The government as a large user of software should send a strong and clear message that it will not tolerate piracy. This can be achieved by implementing legalization programs typically entailing bulk purchases of licenses for software, to set an example that the private sector should follow.

Equally important is achieving rapid economic growth and increasing personal disposable income to prompt consumers to re-evaluate the trade-off between the risks of using pirated software and the cost of legitimate software.

5.2. Strengthening ICT Sector Regulation

To ensure transparency, neutrality and fairness in ICT sector regulation, the head of the board of the regulatory body (NTRA) should be independent from the government. Sufficient and sustainable financial resources are required to enhance NTRA's financial autonomy.

More effective use of the Universal Services Fund (e.g., increasing payphone services) is needed to help narrow the multiple digital divides within the country.

5.3. Fostering Competition for Landline Telephone Services

Granting a license for a second fixed telephone line operator would enhance the efficiency and quality of the services provided, including WiMax spectrum and CDMA spectrum for broadband connectivity specifically in rural areas, among other new and evolving services. Introducing competition for landline telephone services would also lower the cost of international lines and calls upon which offshoring services depend, promoting the exports of call centers and software development.

5.4. Expanding ICT Connectivity, Particularly to Rural Communities

Establishing communications networks, developing infrastructure and leveraging public-private partnerships as an implementation mechanism whenever possible would support knowledge diffusion and increase ICT access, particularly in rural communities.

One of the most promising ways of increasing access to ICT is through communal access, such as information technology (IT) clubs (i.e., public facilities where people can access ICTs, communicate with others and develop digital skills).

In November 2008, the network of IT clubs comprised nearly 1,776 IT clubs, with nearly 36 percent of them in Upper Egypt, 31 percent in Lower Egypt, 28 percent in urban governorates and 5 percent in borderline governorates (MCIT 2008a). However, IT clubs may have to overcome significant obstacles to gain more acceptances, including poverty, illiteracy and a lack of Arabic content. IT clubs can better support economic activities when providing value-added services, and not only connectivity. For instance, there is scope for working with business-supporting organizations or micro credit institutions to provide training programs to develop skills important for undertaking economic activities (such as e-business skills).

As for developing infrastructure, setting up and operating new satellite systems could help in providing rural connectivity. Otherwise, with Egypt's high rates of electricity penetration, transmission of the Internet over power lines could be a useful technology for extending Internet access into rural communities, without costly infrastructure expenditures (ITU 2008b). Extending Internet connectivity to rural areas would provide their inhabitants with electronic access to government services.

Launching government projects could create opportunities for public-private partnerships to introduce electronic services and new applications, hence promoting e-capabilities in the economy and increasing demand for ICT goods and services.

5.5. Securing Venture Capital

Although ITIDA and TDF support small institutions in starting up by providing them with funds (e.g., soft loans and venture capital), developing their business skills and managerial efficiency and helping them in local and international marketing, access to finance remains a major hurdle against developing the domestic software industry.

The concept of venture capital needs to be further developed in Egypt. Private investors should be encouraged to step up and secure venture capital for incubating startup IT related companies. It is noteworthy that Intel Corporation is in the process of setting up the Intel Capital Middle East and Turkey Fund, with \$50 million in venture capital for investment in technology companies developing innovative hardware, software, local content and services throughout the Middle East and Turkey. Egypt needs to grasp such opportunities to stimulate local innovation and the continued growth of its IT industry.

5.6. Reinforcing the Quality of ICT Education and Training

An internationally competitive ICT sector requires a strong pool of local talent. Further investment in the development of human capital capable of rapidly absorbing and effectively using new technologies, would help in boosting Egypt's exports of outsourcing services and creating new employment opportunities related directly and indirectly to the ICT sector.

To address market needs, a wide spectrum of programs has been developed by the MCIT in cooperation with the National Telecom Institute (NTI), the Information Technology

Institute (ITI) and the E-Learning Competence Center (ELCC) ranging from basic ICT literacy to advanced and specialized training.⁴⁸

Notwithstanding these efforts, more focus on the enhancement of specialized technical skills and development of managerial and business skills for practitioners in the ICT sector is needed to match up skills with employers' needs. ICT companies need to increase investment in staff training and link incentive pay to corporate performance.

5.7. Developing and Uploading Arabic E-Content Online

The Arabic content on the web accounts for less than 0.5 percent. Developing and uploading Arabic e-content online and making it affordable is crucial for the Arabic speaking population that wants to access information in its own native language.

Egypt has launched a regional Arabic e-content initiative in May 2005 to ensure the role of Egypt as an electronic hub of culture and civilization and to design, deploy and market the Arabic e-content portal with the target of having 300 thousand titles by the end of 2008.

Supporting the production, use and distribution of Arabic digital content and culture on global networks and making it affordable would enhance the competitiveness of the Egyptian e-content industry and provide significant job and export opportunities as Arabic content-producing business develops.

5.8. Promoting Regional Cooperation

Conscious public policy actions are needed to promote regional cooperation in ICT market development in general and cross-border internet-based e-commerce activities in particular.

Harmonization of legal frameworks at the regional level (i.e., aligning individual member country laws by removing unwanted gaps, overlaps and duplication), such as e-commerce legislation, would facilitate cross-border e-commerce and the cross-border

⁴⁸ Since early 2000 to date, the number of trainees on basic ICT skills, specialized training programs and on continued training courses to develop ICT services industry (call centers, BPO, etc...) reached more than 140342, 27200 and 2500 graduates respectively. For example, MCIT, in partnership with various multinationals, launched the professional training program in 2000, which aims to build a pool of skilled Egyptian ICT graduates. The program focuses on engineering and computer science graduates, who are trained in the latest technologies and receive internationally recognized certification. So far, 35,000 students have successfully completed the program. A revision of the program was carried out in 2005 to ensure that the skills taught more closely match industry and market requirements (MCIT 2009b, 2008a, b).

recognition of digital signatures leading to larger consumer and business markets. It would also increase legal certainty for multinationals that are attempting to expand their business in the region. However, challenges awaiting countries in the development of a common regional and national e-commerce legal framework include different e-readiness levels and the development stage of e-commerce legislation, which can vary from one country to another (United Nations 2007).

5.9. Securing an Open Environment under WTO Agreements

Rise of protectionism in the West as a reaction to growing outsourcing poses a major threat to trade in services emanating from developing countries including Egypt. This calls for innovative WTO negotiating strategies to secure an open environment to promote Egypt's exports of ICT services through outsourcing.

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