

Evolution of Mobile Technology in Egypt

SherifKamel

School of Business, Economics and Communication, The American University in Cairo, 113 Kasr El Eini Street, Cairo 11511, Egypt,

Tel: +202-797-6721 Fax: +202-792-3847, skamel@aucegypt.edu

ABSTRACT

The innovations in information and communication technology are diverse, changing, effective and growing everyday. Individuals, organizations and societies are all affected from these innovations and developments taking place with implications on different aspects of the economy. This paper addresses the telecommunications industry in Egypt since its inception in the 19th century. The paper focuses on the historical background of the industry, a description of the different development phases until the massive infrastructure development that took place in the 1980s and 1990s with the evolution of the mobile technology and its introduction as a service to the public, the competition taking place and the future development and growth plans in the sector. The paper will highlight the liberalization efforts related to the industry at large and to the telecommunication services offered in specific in addition to the improvement and upgrading of the infrastructure both quantitatively and qualitatively with the addition of a variety of value added services.

THE TELECOMMUNICATIONS SECTOR

Telecommunications in Egypt started in 1854, when telegraph was introduced in Alexandria. The government of Egypt has long monopolized telecommunications infrastructure and services. The Arab Republic of Egypt National Telecommunications Organization (ARENTO) was established by the National Assembly law number 153 in 1982 as an autonomous public utility organization under the direct supervision of the ministry of transport, communications, and civil aviation. ARENTO controlled all infrastructure and services related issues to the telecommunications sector.

The telecommunications infrastructure has witnessed remarkable growth over the last decade. The sector has seen a total expenditure of 2.3 billion US dollars in 2001 which represented 2.5% of gross domestic product-GDP (International Telecommunications Union, 2001). Expenditures as a percentage of gross domestic product include external spending on information technology (tangible) such as products purchased by businesses, households, governments, and education institutions from vendors or organizations outside the purchasing entity and internal spending on information technology (intangible) such as customized software and capital depreciation and spending on telecommunications and other office equipment (World Development Indicators, 2002). Modernization, expansion and liberalization of the telecommunications services and that of the sector at large became a national priority for the government and a 3 year plan was formulated in 2000 allocating 1.1 billion US dollars to make Egypt a regional information technology hub (Economist Intelligence Unit, 2001). The plan intends to increase tele-density from the current level of 12% to 14% and tele-accessibility from 40% to 90% by 2010. Moreover, a number of steps addressing restructuring of the sector are also included in the plan. ARENTO, now called Telecom Egypt (TE), owned by the government, has for long controlled the telecommunications sector. However, under the current reform process, the government transformed TE into a corporation and then into a joint-stock company. Moreover, the government introduced to the marketplace two mobile operators (Vodafone Egypt and MobiNil) to entice competition and improve the quality of services. In March 1998, law 19 established TE as an operator, and the Telecommunication Regulatory Authority (TRA) as an independent regulator. In October 1999, a further face-lift

was given to the sector with the introduction of the ministry of communications and information technology (MCIT).

The first global system for mobiles (GSM) network was launched in November 1996 by Telecom Egypt then it was sold to the Egyptian Company for Mobile Services (MobiNil) in April 1998, which launched its services one month later. MobiNil (a consortium of Egypt's Orascom Telecom, Al-Ahram Press Group, Motorola's agent Systel and Alcatel's agent in Egypt in addition to the United State's Motorola and France Telecom Mobile International) paid approximately 470 million US dollars in May 1998 to obtain the license from Telecom Egypt. The consortium inherited 83500 subscribers and a waiting list of 25000. By September 2001, the number of subscribers with Mobinil had reached 1.7 million (Economist Intelligence Unit, 2001). Motorola, an original partner, sold its shares in early 2001 (Sayed, 2003).

Vodafone Egypt, formerly branded Click GSM, was founded in November 1998 as Misrfone Telecommunications S.A.E (a consortium of the UK's Vodafone, the world's largest mobile communications company, the UK's Mobile Systems International, Frances' CGSAT, Egypt's Banque du Caire, Investment House EFG-Hermes and the Alkan Group). In 1999, the company bought the license for 468 million US dollars (El Bakry, 2003). By September 2001, from a base of zero subscribers at the start, it had 1.3 million (Economist Intelligence Unit, 2001). The company team includes over 1900 employees. Capitalizing on innovative technology, Vodafone Egypt was successful to formulate a current base of more than 2 million subscribers with a network that covers 98% of Egypt's populated urban areas, as well as villages, coastal areas, tourist resorts and 100 major highways throughout the delta, the north coast, the red sea area and upper Egypt.

Both companies (MobiNil and Vodafone Egypt) were guaranteed of market exclusivity until the end of 2002. This agreement with the government, has led both companies to benefit from a monthly growing subscribers ratio of around 1.43% per company (El Bakry, 2002). However, with the ongoing development of the sector and with the need to maximize quality and increase competition for better service provision, the minister of communications and information technology announced the purchase by Telecom Egypt of the 3rd mobile operator's license. The new company labeled (Wataneya) is expected to go live in the 4th quarter in 2003 although some delay might apply (El Bakry, 2003). There are a lot of potentials perceived for Wataneya in specific and for the mobile market in Egypt at large with a country of 70 million people (60% of whom are under the age of 30) and a mobile penetration rate of 6% as announced by Akeel Beshir, TE Chairman. Market analysts believe that the mobile penetration rate will move up to around 12% with three operating mobile companies enticing competition and expansion. However, with each MobiNil and Vodafone Egypt attracting over 30000 subscribers per month throughout 2002, promoting Wataneya's services will not be an easy task.

The structure Wataneya is not finalized however one of the latest proposed options is acquiring 16% stake in Vodafone Egypt. Such step came as a moderated option to another that was proposed by both MobiNil and Vodafone Egypt earlier that was about paying Telecom Egypt 468 million US dollars (the amount Telecom Egypt paid to obtain the license in 2001) on the condition that Telecom Egypt would postpone launching Wataneya for another five years (Atallah, 2003). However, such proposition was turned down by the government and a

presidential decree on May 8th, 2003 effectively gave the go-ahead to Telecom Egypt to reject the proposal and prepare the launch of Wataneya where quality, competition, lower prices and diversity of services were the main reasons.

The mandate of the ministry of communications and information technology is to support and empower the information society in Egypt. This is reflected in different projects including: universal access to telecommunication services as well as information and communication business development. Moreover, the ministry supports the expansion of the telecommunications services through deregulation, liberalization, government-private sector partnerships, and by encouraging private sector and foreign investment as well as transfer of technology. Moreover, presidential decree number 101 of 1998 drew-up TRA's mission, strategies and responsibilities (www.tra.gov.eg). TRA has a number of strategies such as; providing a transparent regulatory framework for advanced and adequate telecommunication services across Egypt at affordable prices, promoting a fair competition for the benefit of the end-user, encouraging investment in the telecommunications sector on a non-monopoly basis, protecting the public interest and user interest and ensuring optimal utilization of scarce resources such as frequency spectrum. Over the last few years, the sector has issued around 143 licenses for different services. Table 1 demonstrates the distribution of the licenses granted.

According to the plan of the ministry of communications and information technology, Egypt is committed to demolish monopoly over its telecommunication services by December 2005. This will create incentives to attract foreign investments (Soriat, 2003). The World Trade Organization has granted the approval for Egypt commitments for liberalization of its telecom market in June 2002. Respectively, the government has set a deregulation plan towards 2005 identifying a number of objectives to be realized including: setting up the environment for multi-operators and multimedia services; re-iterating the telecommunications regulatory authority organizational structure, regulatory rules and directives. In addition to the liberalization of the basic voice services and international voice services as well as the introduction of new services and technologies.

Egypt telecommunication network is diverse and spreading throughout the nation. Telecom Egypt operates around 1500 exchanges. Through its X.25, digital multiplexers and ATM/ frame relay networks, TE launched Egypt's first public switching data network "EgyptNet". The ATM/ frame relay service was introduced in 1998 and recently improved and expanded to a capacity of more than 2 Mbps as frame relay connections and up to 34MPBS as ATM connections. TE's network is composed of some main components including access transmission, switching and signaling services intelligence to aid the voice services. A packet network is available independently as an overlay data network and includes X.25, frame relay/ATM. The access network provides the basic connectivity between customers – both residential and business – and the local access and switching office. The fiber transmission network is divided into (a) the national fiber network and (b) the regional network (Telecom Egypt Annual Report 2002). The digital switching network architecture consists of local exchanges and regional exchanges. Table 2 demonstrates the key indicators in the telecommunications sector.

Table 1 - Licensed Telecommunication Services

Telecommunication Services	Number of Licensees
Mobile services	3
Internet (Class A)	4
Data Networks (Class B)	7
ISPs (Class C)	121
GMPCS	2
VSAT	2
Public Payphone	2
Prepaid Calling Cards	2

Source: www.tra.gov.eg (2002)

Table 2 – Egypt Key Figures on the Network and Traffic

Indicators	2001	2000	% change
Fixed telephone lines capacity (lines)	8.6 m	7.4 m	16%
Access lines in service (ALIS)	6.7 m	5.9 m	14%
Tele-density %	10.2%	8.5%	20%
Waiting list (# of clients)	0.58 m	1 m	-58%
Number of operational international circuits	10,573	7,804	35%
Number of pre-paid cards sold	2.6 m	1.1 m	150%
National traffic volume (minutes)	9,588 m	8,668 m	11%
International traffic volume (minutes)	1,038 m	811.1 m	28%

Source: Telecom Egypt Annual Report 2001.

TELECOM EGYPT – THE INCUMBENT PROVIDER

Telecom Egypt is the sole public authority entrusted by law to provide public telecommunications services in Egypt. In 1998, according to law number 19 TE was transformed to act only as the telecommunications operator and service provider, with all regulatory functions assigned to the telecommunications regulatory authority, as an independent regulator (American Chamber of Commerce in Egypt, 2002). TE portfolio of services includes fixed line domestic and international telephony services, leased lines (X.25, frame relay, etc), data transmission and Internet access service. The state of the art of Telecom Egypt's network is based on 100% digital exchanges and covers all major cities in Egypt. A new Network Operating Center (NOC), a project funded by the US Agency for International Development (USAID) and having General Dynamics as the consulting firm, monitors all switches and outside plants and helps in optimizing the level of network planning and minimizing fault repair time (Ibrahim, 2003). Total number of fixed lines capacity as at June 2003 10.9 million lines (Fahmi, 2003). In terms of market capitalization, Telecom Egypt is ranked number one in the marketplace (El Bakry, 2003).

Telecom Egypt has begun internal reforms and restructuring to serve the objective of a partial privatization of the company. The management style of the company has been transitioning towards that of a private sector company, rather than the usual government bureaucracy. During the past few years the company has embarked on an aggressive network expansion and upgrade plan whereby the quality of service offered to clients has been improved and the client waiting list to obtain fixed lines, in which it holds a monopoly which will expire in 2005, has been continuously trimmed down (El Bakry, 2003). Along TE's continuous efforts to expand its business activities and diversify its sources of revenues, 2001 has witnessed the establishment of TE Data representing TE's Internet and data connectivity arm, which is expected to increase the company's competitive edge in the local marketplace.

KEY TELECOMMUNICATIONS OPERATORS

There are several big names in the telecommunications industry in Egypt. However, Telecom Egypt plays a dominant role in the Egyptian telecommunications market and is also the largest operator in the Arab region, as measured by the number of fixed telephone lines in operation (Fahmi, 2002). Other key players in the market include Orascom Telecom (OT), NileOnLine, and EgiNet amongst others. With respect to international calling card service; three service providers are operating in the market in Egypt including Global One, AT&T and MCI. As for public payphones; there are two private companies Menatel and Nile Phone providing payphone services. The Menatel consortium includes France Telecom, Menatel, The National Bank of Egypt, and private investors as for Nile Phone it includes Landis and GYR of Switzerland and some private investors. In terms of mobile phones; there are two private consortia, MobiNil and Vodafone Egypt operating Egypt's two GSM networks (Fahmi, 2002). In terms of data communications backbone; there are four companies licensed to offer data communication backbone and also known as Class A Internet service provider. This license allows its operators to build its own national backbone network; operate its international gateway to the Internet; co-locate its equipment at the central offices and sell IP and data communications services to end users as well as other service providers (Internet service providers, application service providers, content providers, etc.). This license is exclusive to the following firms: EgiNet, LinkdotNet, NileOnLine, and

TE Data. The GMPCS is licensed to 3 service operators and the VSAT is licensed to 2 service operators.

Focusing on mobile operators (Vodafone Egypt and MobiNil), both companies have adopted attractive marketing schemes. While MobiNil's marketing policy depended on discounts and stimulating packages, Vodafone Egypt depended more on the power of its network. High-income level users first dominated their market. Initially, the two companies began price cutting during the last two years. This strategy rapidly expanded usage among low and middle income segments. It is important to note that customers were attracted to Vodafone Egypt because it introduced the first prepaid card service in Egypt, which many considered more affordable. However, MobiNil launched its own prepaid card service with card prices ranging between 8 US dollars and 48 US dollars per month with calls made through the card being charged at 0.27 cents per minute.

A significant characteristic of the market in Egypt remains the importance of prepaid users. In October 2001, MobiNil announced having 84% of prepaid customers and 16% of postpaid customers. The ARPU (average revenue per user) amounts to 46 US dollars for postpaid customers while it is only 8 US dollars for prepaid customers. There are two important characteristics in the market in Egypt. Consumers can be divided into two categories: those who buy a mobile phone for rational purposes like promoting self-efficiency and business development, and those who consider it a matter of prestige entailed by social norms and peer pressure. It is the second type, however, that is more dominant. Looking at the side of the population and making a very conservative estimate, it can be assumed that the two categories of consumers constitute at least 2% of the population. In June 2003, there are estimated 4.3 million mobile subscribers and evenly distributed between the two mobile operators. According to the regional ranking of nations in the Middle East and North Africa (MENA) region as reported by Madar Research, on the mobile phone market index, Egypt comes 10th with a score of 0.51 as for the mainline market index, Egypt comes 9th with a score of 0.93.

Telecommunication reform in recent years has encouraged uplifting tele-density and user's intensity. According to the minister of communications and information technology, the number of fixed lines subscribers reached 8.3 million taking the tele-density to 12.1% i.e. one line for every 12 citizens (Fahmi, 2003). Long distance dialing reaches 254 cities, and all lines are now becoming digital. Telecom Egypt has enlisted Swedish equipment manufacturer "Ericsson" to help modernize its infrastructure, this agreement is the basis for a strategic partnership over the next five years, amounting to a total of 200 million Euros. Ericsson is aiding TE in upgrading the national infrastructure to cope with increased demand, as well as to accelerate the migration of its core backbone network from a circuit-switched to an open layered packet-based network (Fahmi, 2002). The new system will separate voice from data traffic, providing for faster connectivity services. Accordingly, the coordination between MCIT and TE aims at enhancing the telecommunications infrastructure so as to deliver adequately on the ministry's master plan which is perceived as a positive step towards expanding tele-accessibility from 40% to 90% by 2010. Table 3 demonstrates the growth of the sector between 1999 and 2003.

According to a recent study by IDC, the numbers show that 1.2 million Egyptians will enter the mobile market every year due to the young population which will drive a sizable expansion in the market in Egypt. In 2002, the mobile services revenue was 780 million US dollars; this figure is expected to increase by 11% in 2003 to reach 867 million

US dollars (IDC, 2002). In terms of mobile subscriptions as percentage of population was 6% in 2002 and expected to reach 8% in 2003.

RESEARCH DESIGN

This paper reports the findings of two studies that were conducted in 2002 and 2003 to examine and analyze the mobile technology in Egypt and the experience of the current two mobile operators Vodafone Egypt and MobiNil and the business and economic potentials in a nation that is home to over 70 million people where only 3.4 million possess a mobile. The studies intended to address a number of issues including gender preferences, age, and class in the society, services offered and the criteria based upon which customers made their selection between the two competitors, customer relationship management, quality of the service itself, and the extent of use of various mobile services other than telephony. The studies will assess the implications on the rural and remote areas that do not have full coverage of telephone facilities and infrastructure as well as the potentials of the mobile industry and that of launching a third mobile operators and the effective implications of such step on the industry and the economy at large.

METHODOLOGY, DATA COLLECTION AND ANALYSIS

The methodology used was based on the conduct of a case study with a set of interviews with various officials, policy makers in MobiNil and Vodafone Egypt, Telecom Egypt, and decision makers from the government and the public sector. Moreover, a questionnaire (instrument in appendix) was distributed among the community of mobile users at large. An empirical investigation was launched in an attempt to answer the studies questions. There were over 1500 copies of the questionnaire sent (almost 7% responded equaling 100 copies). The sample was randomly selected; however, it reflected different income groups, varying backgrounds, accessibility, professions and interests. Moreover, a survey of the available documentations exploring the status of the telecommunications infrastructure in Egypt was also conducted. The data collected was analyzed using statistical models, relating different independent and dependent variables with a focus on cultural values and norms which represents a major critical factor in Egypt. The analysis aimed at identifying the importance of different factors important to the society (critical factors) and understanding the level of satisfaction held by individuals for the mobile services and addressing the most important determining factors.

RESEARCH FINDINGS AND ANALYSIS

The analysis of data collected yielded a number of significant findings addressing different elements of the mobile industry. The demographics of the sample which included 100 recipients were divided into 59% MobiNil users and 41% Vodafone users. In terms of gender, the sample was divided into 55% females and 45% males and the age bracket varied between 18 and 60 years. In terms of importance of elements in the mobile services, 53% mentioned that quality of service was the most important criteria for choosing a mobile network; followed by 29% indicating that customer service was second in the priority list. 55% of the sample indicated that the coverage of the service varied dramatically in Cairo as opposed to other cities and only 5% did not use it outside Cairo; i.e. in any of Egypt's 27 provinces, so they could not make the comparison while 40% mentioned that the coverage is the same throughout Egypt. Moreover, in terms of coverage, 71% of the respondents mentioned that 80% of the time they had good network coverage while only 21% believed that there is good network coverage all the time. About 57% of mobile users faced no problems with the billing system, 8% indicated that they were not receiving their bills on time and 23% indicated that the bill frequently come inaccurate. In general, most of the respondents believed that the employees in both companies were friendly (82%) and only 18% felt that more customer relationship management environment should be provided and friendlier atmosphere needs to be created. In terms of the quality of the feedback and the added value they get 76% believed that the employees provided useful information for the subscribers while 24% felt that the operator's staff did not really provide useful information.

Table 3 – Egypt Telecommunications Figures [1999-2003]

Item	October 1999	January 2003	Increase %
Exchanges Capacity in million lines	6.4 m line	10.3 m line	61%
Fixed Line Subscribers in million	4.9	7.7	57%
Waiting Line in million	1,265 m	200,000	-84.20%
Suburb exchanges	775	1008	31%
Mobile Subscribers	654,000	4.5 mil	588%
Payphone	13,300	48,000	261%
No of operational International Circuits	6,130	11,900	94%
Internet Users	300,000	1,700,000	466%
International Internet Bandwidth	20 Mbps	850 Mbps	4150%

Source: (2003)www.mcit.gov.eg

Table 4 – Mobile Services Awareness and Usage

Services	Awareness	Usage	Percentage
Short messaging services	91%	83%	91%
Call holding and waiting	88%	70%	79%
Voice mail	85%	28%	33%
Call forwarding and diverting	83%	52%	63%
Roaming	75%	36%	48%
Internet connectivity	70%	7%	10%
Conferencing	63%	6%	9%
Facsimile and data services	50%	3%	6%
Call barring	46%	12%	26%

With respect to the services offered by MobiNil and Vodafone, the majority (83%) of users only knew and used the short messages service (SMS) followed by 70% using the call waiting service. Only 46% knew about the call barring service and 50% knew about the facsimile and data services and respectively they were among the least applied by the users. Moreover, some of the services that were least used were conferencing and internet connection; roaming (36%), call forwarding (52%) and voice mail (28%).

It is important to note that 67% of the sample showed that the number of service stations was enough and that a majority of 36% of the sample believed that both companies spend most of their time handling complaints and 64% of the sample felt that the companies spent their time on handling new subscriptions, paying bills among other activities. 38% mentioned that both MobiNil and Vodafone Egypt focused on collection of payments. However, 70% of the sample showed that both companies handled complaints and managed the payment process in a satisfactory manner. In terms of promotion and awareness of the different services offered by the two operators, table 4 demonstrates subscribers' knowledge with respect to different services.

When asked about the leading market share, 61% believed it was MobiNil and 49% believed it was Vodafone Egypt. With respect to the challenges associated with the introduction of the 3rd mobile operator (Wataneya) 67% believed that Telecom Egypt will offer cheaper prices, 26% believed it will offer more options, and 18% believed it will provide better customer service and help improve the overall competition in the marketplace and 77% believe that the challenges will be imposed on both companies equally. On the contrary, 19% believed that the Wataneya will not impose any threat MobiNil or Vodafone Egypt. The findings showed that 56% of the sample are loyal to their network and will not change it, while 29% are willing to switch to Wataneya once it is launched.

Management of both mobile operators feared that the government will subsidize Wataneya leading to a war price. However, they do believe that there are a lot of administrative and managerial problems and challenges to overcome. This is stemming from the fact that because TE was originally a monopoly since 1950s the company's management saw no need to develop marketing strategies or their services in search for customer satisfaction or attraction. Moreover, the company for long has been hindered with red tap and bureaucracy and it would take some time to transform all such challenges into opportunities and use them in its favor.

CONCLUSION

The findings of the studies provide a comprehensive understanding of the telecommunications industry in Egypt with a focus on the evolution of the mobile sector. With two major players in the marketplace (MobiNil and Vodafone Egypt) there is a huge potential for growth and Wataneya could complement the role the two companies played in the market in Egypt since 1997. The strategies that they used changed with the changing market conditions focusing on profitability and closer attention being given to cost efficiencies. The shift could be seen as a move from a growth strategy (horizontal growth) focusing on growth in the subscribers base to a value-driven strategy (vertical growth) focusing on profitability. The recent slow down in the mobile industry is a reflection of the macro economic conditions which caused a slowdown in growth figures and with an economic recovery of the economy, the mobile industry will be driven to more development and growth. Network deployment has been easy for mobile operators because the population of Egypt lives in only 4% of the land along the Nile.

However, with the introduction of a third mobile operator irrespective of its business formula and with the role expected to be played by the TRA, the market could envision more competition which will be in favor to the industry at large and in favor to the individual in specific. There are a lot of potentials in the telecommunications sector in Egypt and with a growing population increasingly relying on the use of information and telecommunication technology including mobiles the opportunities will be realized with proper planning and better services provided to the community of customers who are price sensitive and at the same time keen to benefit from a reliable service. This research has shed some lights on the developments of the mobile industry in Egypt however more detailed analysis of the industry needs to be conducted in the future with a comparison of the environments in similar economic and social conditions.

APPENDIX

Research Instrument

General Information

Name: (Optional) Gender:
 Profession: Class:
 Organization: Age:

Which mobile network are you using?

MobiNil Vodafone Egypt

Which one of the following do you think is the most important?

Customer Service Services
 Coverage Quality Service Stations
 Billing System

Customer service offered

Do you wait for a long time for your call to be answered?

No Yes

Are the employees friendly enough?

No Yes

Do they provide you with meaningful feedback?

No Yes

Coverage

Do you get the same coverage in and outside Cairo?

No Yes

You get coverage

100% of the time 25% of the time
 80% of the time Below 25% of the time
 50% of the time

Billing system

Problems with billing system (check one or more)

Bill does not come on time Shortage of allowance period (line is withdrawn)
 Bill not accurate None of the above

Services

How many of these services have you heard about?

Conferencing Call Hold/Call Waiting
 Internet connection Call Barring
 Roaming Voice Mail
 SMS Fax and Data Services
 Call Forwarding/diverting

REFERENCES

- American Chamber of Commerce in Egypt (2002) Information Technology in Egypt, Business Studies and Analysis Center, April.
- Atallah, L (2003) Fate of TE's Third Network Still Uncertain, Business Monthly, July.
- Economist Intelligence Unit (2001) Statistics on Information and Communication Technology in Egypt.
- El Bakry, R (2002) Does Not Compute, Business Today, October.
- El Bakry, R (2003) Targets: Acquired, Business Today, February.
- Fahmi, A (2002) Information and Communication Technology as a tool for economic development in Egypt, The American University in Cairo.

Fahmi, H (2003) World of Telecommunications, Al Ahram Newspaper, 08 June.

Ibrahim, S (2003) Getting out of Business, Business Today, July. International Data Center [www.idc.com] Last accessed 1 August 2003.

International Telecommunications Union (2001) Internet on the Nile: Egypt Case Study, March.

Ministry of Communications and Information Technology (2003) [www.mcit.gov.eg] Last accessed 15 July.

Sayed, H (2003) Data Communication Offering by Enterprises, Master of Science in Business Information Technology Thesis, June.

Sorial, G (2003) Assembly frets over Voice-over IP, Business Monthly, January.

Telecom Egypt (2002) Annual Report.

Telecommunications Regulatory Authority [www.tra.gov.eg] Last accessed 01 August 2003

World Development Indicators (2002) Information and Communication Technology in Egypt.

This paper is based on the analysis of the findings of two market studies covering the mobile industry in Egypt. The first study was conducted by Heba Sayed (Middlesex University, UK) in 2003 and the second study was conducted by Iman Aref, Dina Kastour and Farah Moussa (The American University in Cairo, Egypt) in 2002.

0 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/proceeding-paper/evolution-mobile-technology-egypt/32466

Related Content

The Influence of Digital Currency Popularization and Application in Electronic Payment Based on Data Mining Technology

Xiaoyuan Sun (2023). *International Journal of Information Technologies and Systems Approach* (pp. 1-12). www.irma-international.org/article/the-influence-of-digital-currency-popularization-and-application-in-electronic-payment-based-on-data-mining-technology/323193

Artificial Intelligence Ethics Best Practices Model for Financial Decision-Making in Chinese Financial Institutions

Wenzhen Mai, Mohamud Saeed Ambasheand Chukwuka Christian Ohueri (2024). *International Journal of Information Technologies and Systems Approach* (pp. 1-18). www.irma-international.org/article/artificial-intelligence-ethics-best-practices-model-for-financial-decision-making-in-chinese-financial-institutions/337388

Query Languages for Graph Databases

Kornelije Rabuzin (2018). *Encyclopedia of Information Science and Technology, Fourth Edition* (pp. 2031-2042). www.irma-international.org/chapter/query-languages-for-graph-databases/183916

Expert (Knowledge-Based) Systems

Petr Berka (2015). *Encyclopedia of Information Science and Technology, Third Edition* (pp. 4555-4563). www.irma-international.org/chapter/expert-knowledge-based-systems/112897

Optimization of Cyber Defense Exercises Using Balanced Software Development Methodology

Radek Ošlejšekand Tomáš Pitner (2021). *International Journal of Information Technologies and Systems Approach* (pp. 136-155). www.irma-international.org/article/optimization-of-cyber-defense-exercises-using-balanced-software-development-methodology/272763