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Sherif Kamel

The American University in Cairo, skamel@aucegypt.edu

Dina Rateb

The American University in Cairo, dfr@aucegypt.edu

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44. TRANSFORMING THE SOFTWARE INDUSTRY INTO A PLATFORM FOR DEVELOPMENT: CASE OF EGYPT

Sherif Kamel

The American University in Cairo, Egypt

skamel@aucegypt.edu

Dina Rateb

The American University in Cairo, Egypt

dfr@aucegypt.edu

Abstract

During the 1960s, computing was introduced to Egypt. Its use and applications was limited to the government and the public sector throughout the 1970s. During the 1980s, the introduction and diffusion of information technology (IT) was diffused following the global personal computer evolution. Personal computers effectively affected business and organizational development and growth due to the continuous developments in the IT industry and caused by increasing hardware penetration, software innovations and creativity, research and development and the build-up of the telecommunications and information infrastructures. This paper assesses the recent developments in the software industry in Egypt. The focus is on the iterative and dynamic nature of the software industry with the evolving trends of outsourcing and offshoring and their growing active role as a contributor to development through a strong and much needed export-oriented software industry.

Keywords

ICT Transfer, Software Industry, Outsourcing, Offshore Outsourcing, ICT Exports, ICT and Development, and Egypt

1. Overview

Although computing started in Egypt in the 1960s, it was only in 1985 that the active role played by the government of Egypt caused a change in the way IT was perceived as a vehicle for socioeconomic development and a tool to improve the decision making process at the policy level (Kamel, 1999). This change was accelerated by the continuous development of new tools and techniques that had direct and concrete effects on business and socioeconomic development. Furthermore, after putting IT at the cabinet agenda and the establishment of a ministry for communications and information technology (MCIT), Egypt's information society initiative (EISI) was launched in 2001 to provide a broad perspective on the strategic plan for information and communication technology (ICT) diffusion in Egypt (Kamel, 2005). Therefore, it is perceived that the way developing nations will manage the computer driven process of change will influence whether its business and socioeconomic development goals will be promptly achieved. However, it is important to note that this will be bound to the continuous ability to

invest in emerging technologies, the provision of skilled human resources and the completion of a state-of-the-art ICT infrastructure.

Many researchers have identified IT as the combination of information, computing and communication technologies that through convergence could help the development process (American Chamber of Commerce in Egypt, 2001). Today, with the evolution and diffusion of the Internet, the integration of these technology elements is invaluable to societies around the world and strongly contributing to globalization. Moreover, newly evolving “emerging” economies in the 21st century are mainly dependent on hardware to process information; communication that acquire and distribute information and software, which helps, manage the whole process. The importance of ICT has been greatly emphasized in most developing nations in a deliberate effort to ensure that they do not lag behind, with an emphasis on localization and adaptation to local community needs. There is no doubt that ICT has revolutionized the global economy with changes in different economic activities (Kodakanchi et al, 2006). Moreover, ICT has the potential to create job opportunities, improve delivery and access to health and education, facilitate information sharing and knowledge creation, and increase the transparency, accountability and effectiveness of government, business and non-profit organization; all of which contributing to an enabling environment for socioeconomic development (Morawczynski and Ngwenyama, 2007).

Like most developing nations, the government of Egypt has played the most important role in the diffusion of ICT being the largest user of computers (Moussa and Schware 1992) and through its policies, laws and regulations it still exerts the largest influence on the diffusion of IT throughout different organizations (Nidumolu and Goodman 1993). Such concept has gradually started to change throughout the last decade through massive deregulation of the ICT sector with a focus on telecommunications. For example, in the case of Egypt, the government used to be the primary user of IT with an accumulated market share of 25% (www.mcit.gov.eg). However, recently increasing use of ICT has been greatly felt through stakeholders in the private sector and the civil society in the banking, health, employment, trade, and local administration and education sectors among others (www.citegypt.com). The role of the private sector and the civil society through non-governmental organizations (NGOs) has increased in a transforming marketplace that is growingly being orchestrated by a multi-stakeholders approach with different players having complementary roles and responsibilities to introduce and diffuse ICT tools and applications (Kamel, 2008).

Since the establishment of EISI in 2001 and its amendments in 2003 to cater for the changing local and global market needs, and through a public-private partnership (PPP), there has been a growing and effective role being played by the private sector through a win-win formula that is applied on a variety of ICT projects and initiatives. These projects represent the main building blocks of EISI. They include providing a personal computer for every home, enabling a free-subscription Internet access model, establishing and diffusing IT clubs across different socioeconomic segments of the community in both rural and urban areas, spreading broadband access, increasing mobile penetration, institutionalizing electronic applications and incubating software development (Kamel and Abdel Ghaffar, 2008).

2. Research Methodology

The ICT sector is often researched and studied within the context of developing and emerging nations at the macro level without looking at the sub-sectors within the ICT industry including software, hardware, and networking and human capacities development. Usually, ICT is studied to assess its return, performance and implications on the economy. The objective of this paper is to demonstrate the growth and role of the software industry in Egypt and its implications on the economy and socioeconomic development. The evidence compiled from the literature review is analyzed to identify a set of lessons and recommendations for future implementations in similar developing environments.

The research method followed in this paper is qualitative based on a set of interviews conducted with a number of policy makers from the government and different ICT players in the local market in Egypt coupled with the researcher's impressions and interpretations of the implications of the software industry. Additionally, the paper analyzes the body of knowledge based on an extensive literature survey that includes reports, articles and documents on ICT deployment and diffusion in developing nations with a focus on the software industry in Egypt. The field survey addressed different stakeholders including the government, public and private sector organizations, as well as studying economic and market trends and investments including revenues and expenses in the software sector and the opportunities available to help transform the economy through services such as offshore outsourcing. This paper will primarily focus on the analysis of aggregate level information on the software industry in Egypt and its associated role on the economy given the identification of ICT as a driver for business socioeconomic development as well as a solid platform for enticing foreign direct investment (FDI).

3. Software: Platform for Development

Software as an integral element of the ICT industry is attracting increasing attention of developing nations after many years where hardware was really the focal point and representing the biggest share in the ICT market. The software industry is an excellent setting to understand the features of the knowledge-based economy (Seleim et al, 2004). Additionally, software is important for knowledge acquisition and transfer of technology since the essence of software development is pure knowledge transfer represented by the fact that 95% of software business is intangible capital (Grant 2000; Hoch et al, 2000). India is a classical example with 6.5 billion US dollars industry and increasing steadily (Nasscom, 2006). In recent years, with the evolving trends of outsourcing, software is becoming a viable support tool for development leading to the fact that software exports are becoming a cause of excitement in dozens of developing nations. There is no doubt that software exports demonstrate the advantages and implications of globalization without most of the various related negatives. The width and exposure of the software industry is stemming from the fact that it is a general-purpose technology application that cuts across different sectors and industries of the economy. Respectively, policy makers in different emerging economies are placing increasing attention on the development of vibrant software industries that could effectively contribute to development (Carmel and Tjia, 2007).

In the case of Egypt, the ICT market has been steadily increasing since the late 1990s (www.idsc.net.eg). The software market according to the Egyptian Software Association (ESA) was estimated at 50 million US dollars in 1998 mainly locally developed with a focus on tailor-

made “customized” applications and with an annual growth rate of 35% locally and expectation of 200% increase in exports annually (Harvard Consulting Group, 1999). In the following few years, the total market grew to around 140 million US dollars with more expectations of growth in the years to come. It is also important to note that since the late 1980s, Egypt has been playing a leading role in software publishing in the Middle East and 80% of its software exports are regularly going to countries in the Gulf region and mainly Saudi Arabia (Arab Human Development Report, 2002). Table 1 demonstrates a number of elements that relates to the software industry in Egypt showing the different stakeholders, market outreach and the various applications whether customized or packaged. It also indicates the framework in which the software industry operates.

Industry Characteristics	
Stakeholders	Government Private sector Public sector Civil society organizations Individuals
Market Outreach	Europe Arab countries North America
Applications (customized and packaged)	Functional applications Educational applications Cultural applications Arabization of applications

Table 1: Software Industry Elements
Source: (Arab Human Development Report, 2002)

4. ICT in Egypt

Egypt is a regional hub linking the Mediterranean, Europe, Asia and the Middle East. With a population of about 78 million growing at 1.7% annually, it is the most populous country in the region (www.idsc.gov.eg). About 28% of its population is enrolled in educational programs, schools and universities education; 58% are under the age of 25 and 19 million represent its workforce; around 5.7 million are working for the government sector (www.ad.gov.eg). Egypt is witnessing its reincarnation into a modern, liberal and private sector-led market driven economy. Moreover, it is trying to expand its industrial base and modernize itself technologically with agriculture accounting for 17% of the gross domestic product, industry for 32% and a large service sector 51%, mainly built around tourism and transportation.

A comprehensive economic reform program that started in 1991 was implemented enabling its current economic growth rate to stand at 5.8% annually with an inflation of 19.7%. Estimates show that unemployment is standing at 9.1% and the labor force is growing at around 3.6% annually. Egypt is undergoing a liberalization program of its public sector, investing heavily in its human capital, encouraging FDI and using innovative ICT as a platform for business and socioeconomic development. The government in collaboration with the private sector through a variety of public-private sector partnerships is restructuring many of its major economy sectors such as education, health, government reform as well as working on closing both inter and intra digital divides and promoting social inclusion (Kamel, 2008).

The government of Egypt is more determined than ever to build-up the national infrastructure to be able to keep pace with the ICT evolution worldwide. Since the late 1990s, the objective of the government was to transform the ICT sector from a sector competing for subsidies and grants to a revenue creating sector for public proceeds. Such objective has started to be realized in 2005 when the ICT sector added to the revenues generated around 1 billion dollars (Kamel et al, 2009). Since 1999, MCIT in collaboration with different stakeholders, including but not limited to, the ministries of state for administrative development, ministry of trade and industry, ministry of education and ministry of health and population embarked on formulating a master ICT plan to build the nation in terms of human, information and technology infrastructure. The plan assumes that as an emerging market, Egypt has already made considerable achievements in terms of economic development and is ready to move aggressively into the global market and the only vehicle to realize that objective is through a state-of-the-art ICT infrastructure (Osman, 2000).

There is no doubt that the ICT sector can act as a driver behind a potential new economy for Egypt. With the growing size of the global software market and the emerging trends of business process reengineering (BPO) and knowledge process outsourcing (KPO), Egypt has promising potentials to compete in the middle market segment of companies. Egypt can compete with the likes of India and China based on prices, quality of human capacities and the ability to master different languages, besides the advantage of its geographical location. It can only compete based on the relatively low price of labor compared with the higher level of value added, business vision, and innovation (Rizk, 2002). The world is witnessing various changes in the demographics of different markets that represent a window of opportunity for emerging markets to contribute to their socioeconomic development through penetrating global markets. Table 2 demonstrates ICT exports projections in the case of Egypt by 2010 as compiled by A T Kearney (2005).

ICT Industry Element	Target Revenue (Million US\$)	Compounded Annual Growth Rate (CAGR)	Percentage of Total
Software and IT Services	280	27%	34%
Arab Content Management	200	46%	12%
Technical Support Centers	200	27%	24%
Contact Center Markets	115	50%	6%
R&D Engineering Design	100	38%	8%
Business Process Outsourcing Services	75	72%	2%
IT Product Exports (Emerging Markets)	45	25%	6%
IT Localization	40	22%	6%
Knowledge Process Outsourcing Services	30	43%	2%
Total	1,085		100%

Table 2: Projections of ICT Exports by 2010
Source: (Kearney, 2005)

5. An Evolving Software Industry

The software industry in Egypt has been gradually growing over the last two decades with more promises and potentials as indicated in table 2. The industry is diverse, heterogeneous in nature with the presence of local vendors, and multinationals like most mature markets. Most recently, the local market has been successful in attracting leading ICT multinationals to start regional and global service centers in Egypt's smart village, a 600-acres local technology park that was established in 2003. Table 3 demonstrates sample of the ICT companies operating out of the smart village with more phases being established as the demand rises with the most recent phase added in January 2009 (www.mcit.gov.eg).

Company	Activities	Staff
IBM	Software Development Centre focusing on Arabization	400+ skilled IT developers
Mentor Graphics	Design Centre	170+ engineers
Intel	Regional Platform Definition Centre Regional Software Enablement Lab	
Microsoft	Developer Support Centre for Regional Developers Cairo Innovation Centre	
Cisco	Core competency eLearning Institute	
Oracle	Global Support Center providing regional customer support	600+ engineers
Orange and France Telecom	Global Support Center	1200+ engineers
Alcatel Lucent	International Support Centre providing GSM and wireless support services	300+ engineers
Satyam	Business Process Outsourcing Services	500+ engineers
WIPRO	IT Services	300+ engineers
VIAS	Automotive Embedded SW Development for Valeo	120+ engineers
EPICOR	BPO and managed services	100+ engineers
SQS	Quality management and testing services	50+ engineers
EDS	IT Solutions and Services	450+ engineers
Teleperformance	Global Support Centre	800+ engineers

Table 3: ICT Multinationals Operating IT Services in the Smart Village
Source: (www.mcit.gov.eg)

It is important to note that most of the software development companies provide regular training services to support their products and clients. The services offered also include consultation, turnkey projects management and general awareness campaigns to contribute positively in the overall computing penetration rate, which currently stands at 2% (Kamel, 2008). The training and investment in human resources is intended to help diffuse more IT awareness among the community. At the macro level, the number of ICT companies grew since 1999 from 312 to 2907 marking over 900% and employing over 175000 compared to 6000 in 2000 including managers, programmers, experts, consultants and project managers mostly involved in the development and delivery of information systems to local and international markets (www.mcit.gov.eg).

The software industry is divided into four main categories including software tools, packaged applications, tailored applications and multimedia applications and Arabization of applications. Software companies range in terms of employment between 1 to 5 staff members for start-ups as

for more established firms the range is around 50 to 150 employees including technical, administrative and support staff. The majority of firms are located in and around Cairo or Alexandria, some of the software companies are located in industrial zones to benefit from tax reductions or exemptions and others are located in the smart village.

Following the global trends of KPO and BPO, it is important to note that since 2001, a growing number of local firms have been involved in a variety of off shore outsourcing activities (Kamel, 2008). This has led to having these companies expanding their outreach beyond the national borders and positively contributing to a healthy export-oriented software industry. The major players in such market include ITWorx, MNS, DMS and Raya who are taking the lead in a growing and promising market and capitalizing on a niche that could prove important to socioeconomic development at large especially that the cost structure of the industry relies on information that is expensive to produce and inexpensive to reproduce. Respectively, there are a variety of opportunities for economies of scale and increasing return on investment (Rizk, 2002). Respectively, given the important role of human capital in shaping an effective and rewarding software industry and Egypt's well-educated workforce it is important to highlight the importance of expanding investments in the ICT sector and especially in the software industry.

Egypt's dream is to become a leading software exporter in the region with a global outreach, which is relatively realistic considering the gradual growth in the software industry in Egypt and the potentials in the global markets. From a regional perspective, opportunities are enabled through Arabization with a population of over 300 million and high penetration rates in PCs, the Internet and mobility while from a global perspective the potentials are huge through outsourcing (www.itu.int). The market for Arabized software is large and there is a great potential elsewhere throughout the Arabic speaking world that can be served with language-specific software produced in Egypt. In 2003, the Union of Egyptian Industries developed a plan to lift the software exports to 2 billion US dollars within 5 years (www.ameinfo.com). The plan was formulated based on the potentials of the local software industry mainly in the domain of localization, customization and consulting although there were concerns for high taxation on IT imports as an obstacle to promoting a competitive software industry and a deterrent to investments in software research and development. The study presented by the union was partially based on the analysis of the findings of a SWOT analysis that was conducted on the local market as indicated in table 4. However, it is more likely that around 50% of the envisioned plan will actually be realized as indicated earlier according to the 2005 study conducted by A T Kearney.

Strengths	Weaknesses
<ul style="list-style-type: none"> - Well educated graduates interested in ICT - Growing mass of fresh graduates interested in learning entrepreneurial skills - Computer science schools in all national and private universities (30+ universities) - Basic and advanced training programs in ICT and management domains - Growing technical skills in ICT tools and applications - Low and competitive labor costs - Good command of English for dealing with overseas customers (other languages include French, German and Spanish) encouraging the potentials for a hub of contact centers - Same time zone advantage with Europe and provides a 	<ul style="list-style-type: none"> - ICT technical skills are too broad and thin requiring further training and orientation - Lack of sufficient expertise in any one ICT application - Software companies spend around 6 months to turn graduates into productive contributors - Lack of project management, marketing and managing start-ups skills - Limited local demand for software - Lack of management recognition to the value of using ICT as a business vehicle - Effective role of government still limited due to resource availability despite some promising initiatives - Infrastructure level and cost is high compared to the capacities of manufacturers and beneficiaries

<ul style="list-style-type: none"> second-shift for the United States (outsourcing services) - Geographically well located from most African and European cities and some Asian cities making it a hub for trading - Encouragement of the government by facilitating procedures and logistics related to the software industry 	<ul style="list-style-type: none"> - Government regulations needs to be firm and enforced - Perception that software has little intrinsic value among commercial and government customers
<ul style="list-style-type: none"> - Opportunities - Creation of software business incubators such as the smart village model - Establishment of centers of excellence for research and development - More proactive role played by educational institutions and training centers - Internships and scholarships from software vendors both local and multinationals - Promotional role played by software associations to activate the role of software development companies - Government support role needs to be more at the macro and micro levels - Changes in tax treatment, reduction on telephone tariffs and the introduction of new intellectual property laws to entice further investments and interests - Penetration of PC in homes and businesses is increasing - Penetration of broadband is catching up although still a long way to go 	<ul style="list-style-type: none"> - Threats - Intellectual copyright violations - Piracy rates are relatively high - Lack of understanding for software products and their implications on business development - Lack of market research in domestic and overseas markets that Egyptian companies could target - Lack of financial support to the industry - Limited distribution skills to serve the international software market - Although level of education is good, there are considerable mismatch between the skills taught in schools and those required by most employers

Table 4: SWOT Analysis of the Software Industry in Egypt
Source: (Kearney, 2005)

Capitalizing on over 160 software development houses and around 10000 developers, Egypt has all the ingredients to become a regional leader in the domain of value-added services and localization (www.ameinfo.com). The plan aimed at a cut on import taxes from 25% to 3% in order to make the software industry more attractive and profitable. Lowering custom duties on imports would directly result in boosting the software industry by 300 million US dollars in the first year due to the decrease in cost of production. More importantly, the plan calls on the government of Egypt to include the software industry as a priority in trade agreements signed between Egypt and other countries.

While these numbers are not impressive if compared with more developed and mature software industries, they do provide a foundation from which to start a serious development of the industry and attempt to build a critical mass of developers within the marketplace. Moreover, MCIT has embarked since 2001 on a multi-phased plan to train around 30000 graduates (11% of university graduates) annually to enter the labor market in the software industry and MCIT has also allocated around 9 million US dollars for professionally qualifying them (www.mcit.gov.eg) in different accredited and certified software development programs. Egypt realizes that it must allocate considerable resources to educating IT professionals to reach a reasonable critical mass that could act as agents of transformation and change and help create a healthy and strong software development platform that is an integral element of a high-tech industry and a contributing factor to the development of a knowledge-oriented and productive society. The plan aims to continuously increase and diversify the development of fresh graduates as well as IT professionals that could represent the core of the development of a high-tech industry (Osman, 2000). The expectation for growth in the domestic marketplace for IT products and services is expected to be in the range of 35% for services and products on annual basis for the many years to come. Such figure is expected to increase with the growing trend of having ICT multinationals

starting some of their software development operations through their offices in the smart village in Cairo.

The software industry distribution channels in Egypt are still relatively underdeveloped with around 63% of software sales without intermediaries; 50% of tailored applications are sold bundled with niche products and services. Moreover, software sales through system integrators are low because of limited subcontracting, technical cooperation and interchange of skill and specialization's between local companies. Finally, function-oriented software is sold primarily through dealers (Seleim et al, 2005). With regard to software demand, the government purchases generate 25% of total software revenues, making it the largest demand segment with two major purchase determinants, which are quality and after-sales service for fear of system failure with cheaper systems (American Chamber of Commerce in Egypt, 1998). However, only 6% of revenues are from sales to small office and homes, which is in part due to the widespread piracy rate of 86% that plagues this segment. This figure is gradually decreasing due to the newly introduced laws against violators of software piracy laws. According to the Business Software Alliance (BSA) if Egypt were to reduce their rates of piracy by 10% that could result in around 324 million US dollars additional in gross domestic product (GDP), a 30% increase in the growth of the ICT sector and around 900 additional jobs in 2009 (Kamel, Rateb and El-Tawil, 2009).

In addition, the number of software applications sold to households is increasing due to the boom in PC sales for household usage and the spread of Internet among younger generations due a few public-private partnership (PPP) programs addressing the Internet diffusion and PC penetration in the society such as PC for every home and PC for every student. The competitive advantages of Egypt's domestic software production environment have attracted numerous international producers to subcontract programming of tailored applications. It is important to note that the software industry in Egypt is dominated by customized business solutions or "software as a service". Coupled with the growth of the ICT sector and the software industry, the establishment in 2004 of the Information Technology Industry Development Authority (ITIDA), a government entity established through law 15, represented a boost to promote ICT as an export-oriented industry and pave the way for the diffusion of electronic business services. The establishment of ITIDA capitalized on a number of strong attributes that places Egypt as a potential hub for offshoring of outsourcing IT services including but not limited to favorable technical staff and infrastructure costs; language capabilities; improving infrastructure; pro-business governmental reforms; strong government support for the ICT sector and a strategic geographic location. Additionally, there is an expected increase in the development of software applications of a number of key sectors in the economy including, but not limited to, the financial, oil and gas, tourism and health sectors (Loch, Straub and Kamel, 2000).

According to ITIDA, total IT exports reached 500 million US dollars in 2006 dominated by proceeds from technical support and call centers. The projections for the years to come are positive with expectations that companies exporting software and involved in offshore outsourcing activities will expand in North America reaching about 94 million US dollars from total exports which is expected to reach 250 million US dollars by the end of 2008 (Software and High Tech Export Council, 2006). It is clear that offshore outsourcing will take the lead with the presence in the local market of major players including but not limited to IBM's Technology

Development Center and Microsoft's Innovation Center in addition to local software outsourcing companies such as ITworkx, Harf and others (American Chamber of Commerce in Egypt, 2007).

6. Conclusion

The software industry in Egypt is still developing and maturing and the potentials are huge. While the projected growth in the domestic market is envisioned to be 230 million US dollars in 2010 the opportunities in the global outsourcing market is unlimited pending the provision of a competitive and differentiated services (American Chamber of Commerce in Egypt, 2007). Egypt has an excellent opportunity to develop the ingredients of a small but effective software industry. The industry has high potential to be developed way beyond the current levels. All the efforts and support enabled by the government and backed by the industry, financial institutions and the educational system will ultimately determine the level of success of the industry making it profitable and active contributor to business and socioeconomic development. There is a wealth of opportunities for Egypt to improve all aspects of development for the software industry. Egypt could dramatically increase the level of revenue and growth in the software business with a relatively small investment and focus to be able to attain the levels of achievement realized in nations such as Ireland and India.

Increasingly, Egyptian software companies are establishing partnerships with global software vendors offering complete and integrated solutions as well as customized applications designated for vertical markets. Egypt has all the resources to become a leading player in the regional industry and even to establish a global reputation as a software development center due to the growing presence of its human capacities, skills and educational infrastructure. Such industry can benefit economic growth and work as a vehicle for knowledge acquisition and transfer which is an important element for societal development and building competitive advantages. It is suggested that an action plan is formulated to be able to leverage the software industry and take it to the next global competitive level especially in offshore outsourcing. The plan should include investing more in building human resource capacities, introducing more incubator programs to link industry with research and development, regularly improving the ICT infrastructure, improving the salary scale in the industry to other international markets and setting-up a regulatory authority to regulate the software industry (Kamel, 2009).

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