



*Research Article*

# Information and Communication Technology (ICT) Investment in the Kingdom of Saudi Arabia: Assessing Strengths and Weaknesses

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## Abstract

The adoption of Information and Communication Technology (ICT) is one of the key factors explaining growth discrepancies across countries in general and in the Kingdom of Saudi Arabia in particular. ICT has been the most dynamic component of investment in recent years, and until recently the explosive growth of investment in ICT has been at the center of the 'new economy' paradigm, shifting the Kingdom's reliance on growth away from oil. ICT investment contributes to capital deepening in all industrial and commercial sectors, thereby assisting in generating economic growth that is more sustainable in the long term.

The main objective of this research study is to identify the impact of ICT investment in Saudi Arabia and the role that the government has played through its series of 'five year plans'. The current circumstances in Saudi Arabia relating to IT usage and development as well as the factors affecting economic growth are examined and analyzed. This research also assesses the strategies and policies relating to ICT and its investment in Saudi Arabia, and discusses the role of public and private organizations as well as educational institutions at all levels.

The findings reveal that, despite the considerable strides made by the government, certain factors need addressing, in particular, the current state of the Kingdom's ICT infrastructure, the need for adequate numbers of skilled personnel to meet the anticipated growth in ICT, the need for educational establishments to incorporate ICT more fully into their programs, the need to develop the financial markets to facilitate further investment in ICT, and the need to raise the public's awareness of the importance of ICT to the county's prosperity. Accordingly, a number of recommendations are made.

**Keywords:** Economic Growth, Information and Communication Technology, IT investment in Saudi Arabia.

## Introduction

Nowadays, Information and Communication Technology (ICT) is a vital factor in strengthening the growth (and addressing inconsistencies) in all countries. Investment in infrastructure (physical

capital) is particularly important for growth; this also entails expenditure on renewing the capital stock, thereby enabling new technologies to benefit production processes. ICT has been the most dynamic component of investment in recent years; it is defined in accordance

with the UN's 1993 System of National Accounts. It covers the acquisition of equipment and computer software that is used in production for more than one year. ICT has three components: information technology equipment (computers and related hardware), communications equipment, and software. Software includes the acquisition of pre-packaged software, customized software and software developed in-house. ICT Investment contributes to overall capital deepening and therefore it helps raise economic growth levels. Rapid technological progress in the production of ICT goods and services may contribute to faster growth in the ICT producing sectors. Greater use of ICT may help firms reduce their costs, enhance their productivity and increase their overall efficiency, and thus improve the prospects for economic growth. Moreover, greater use of ICT may contribute to network effects, such as lower transaction costs, higher productivity of knowledge workers and more rapid innovation, which will improve the overall efficiency of the economy.

This paper is structured as follows. The next section reviews the background to the educational system (and IT education) in Saudi Arabia. Section 3 presents a review of IT usage and investment in Saudi organizations. Section 4 identifies the policies and national plans of the Saudi government. An empirical study of hardware and software developments, and IT strengths and weaknesses is presented in Section 5. In Section 6, the IT barriers and problems in Saudi Arabia are described. A literature review on Saudi information technology is presented in Section 7, and finally, Section 8 concludes the paper.

### **Background to Educational Systems in Saudi Arabia**

The aims of the Saudi educational policy are to ensure that education becomes more efficient, to meet the religious, economic and social needs of the country and to eliminate illiteracy among Saudi adults.

There are several government agencies involved with planning, administrating and implementing the overall governmental educational policy in Saudi Arabia.

The Ministry of Education (MoE) sets the overall standards for the country's educational system (public and private) and also oversees special education for physically challenged students. Early in 2003, the General Presidency for Girls' Education was dissolved and its functions taken over by the MoE, to administer girls' schools and colleges, supervise kindergartens and nursery schools, and sponsor literacy programs for females.

The General Organization for Technical Education and Vocational Training (GOTEVT) was established in 1980 to coordinate and implement the manpower development plans and supervise all related training centers and institutes in the Kingdom.

The Ministry of Higher Education (MHE) was established in 1975 to implement the Kingdom's higher education policy in the rapidly expanding sphere of post-secondary education. Prior to 1975, higher education was under the supervision and administration of the MoE.

The various responsibilities of the MHE are to:

- a) Provide support and services for the Kingdom's universities and colleges.
- b) Supervise, coordinate and follow-up post-secondary programs and to connect them with the national development programs (in all the various fields); the MHE also provides the various sectors with the necessary technical and administrative manpower.
- c) Supervise awarding scholarships to Saudi students studying abroad, coordinate international inter-university relations, and oversee the educational and cultural mission offices in all countries around the world.

### **Information Technology Education in Saudi Arabia**

Currently, the Saudi government supports all aspects of education; however, in the past the educational system did not provide a comprehensive modern education, and some fields, such as mathematics, technology, science and engineering, were found to be inadequate [23]. As a result, many Saudi students traveled abroad to study and gain advanced education and training. Education in Saudi Arabia is now considered to be one of the most important sectors in the Kingdom and receives high priority in the government's development plans.

According to Behary [15], IT in Saudi Arabia is concentrated in three major centres: Riyadh, the capital in the centre of the country, Dammam on the east coast, and Jeddah on the west coast. Riyadh is perhaps the most important, as many multi-national companies are located there, along with the headquarters of many national organizations. However, two of the original market leaders in IT, namely KFUPM and Saudi Aramco, are located in Dammam, which is considered the major IT centre in the country. Jeddah comes in third having the least IT concentration among the three.

Also, according to Behary [15], Saudi IT labor is sourced both locally and globally, and the local source is through college graduates with degrees in IT or computing sciences from Saudi universities. Three major universities in the Kingdom offer programs in Computer Sciences and IT-related studies, and in the other universities, the same studies are currently being established [23]. The first of these three Saudi universities is King Saud University (KSU) in Riyadh, which offers degree programs in Computer Engineering, Computer Science and Information Systems. The second is King Abdulaziz University (KAU) in Jeddah, which offers similar programs with specializations in Computer Science, Structural Programming, Program Languages, Database Systems, System Analysis, Operating Systems, and Computer

Engineering. The third but probably the most recognized, both in the national and international academic community, is King Fahad University of Petroleum and Minerals (KFUPM), which is located in the Eastern Province [15]. KFUPM offers similar programs to KSU and KAU as well as programs in Software and Hardware Engineering.

Behary [15] further states that private institutions and organizations provide the remainder of the local supply, and they offer a variety of programs that aid individuals to be more computer literate. Another source of IT-skilled labor is the global market, which has historically been the major source of such labor for the country. On the other hand, this proportion of the supply chain has been shrinking, mainly due to stricter immigration laws.

### **IT Usage in Saudi Organizations**

Computerized systems are becoming increasingly common in many developing countries, to enhance organizational performance. IT systems are considered to be able to provide a very important advantage for organizations, regardless of their size, and as a fundamental tool for national economic growth and development [22].

In Saudi Arabia, the changing economic environment has led to an increasing interest in improving organizational processes to enhance business performance. Therefore, computers are increasingly being used by both public and private organizations; the private organizations are also interested in using computers as symbols of modernity and progress. In the late 1940s, the first organization in the history of Saudi Arabia to use IT systems was the Arabian American Oil Company (now called Saudi Aramco), which used computers for its oil exploration and information handling services [4; 10; 11].

Over the past few decades, the population of Saudi Arabia has expanded enormously and the economy has developed at an unprecedented rate. It is now generally

accepted that in order to meet the future needs of this growing population, and in order to further develop into a modern knowledge-based economy, Saudi commerce must fully use IT. Therefore, public and private organizations have been encouraged by the Saudi government to computerize their daily functions, and have been provided with substantial funding to enable them to do so [26]. According to Al-Turki et al. [11], the Saudi government has spent billions of dollars on building and improving the national infrastructure in the fields of IT systems and telecommunications. The Saudi government's efforts have been conducted within the framework of the five-year development plans [26; 30], and accordingly, most organizations in the Kingdom have begun using IT extensively in the last two decades or so.

Although the Saudi government has been directly stimulating the IT sector through education and other Ministry-sponsored projects, it has also encouraged the private sector to establish itself locally in the field, and to form partnerships with foreign companies. Thus the skills base of the country has expanded along with the rapid advances in technology, and the Kingdom has witnessed a steep rise in computer sales since the 1980s [10; 11; 4]. At the present time, the private sector is continuing to increase its investment in computer technology, and the largest share of growth in IT is in this commercial sector [15].

Saudi Arabia offers a growing home market and rapidly increasing small business market to computer manufacturers. Throughout the country, local businesses are upgrading their computer systems, and many companies now use the latest technology. It should be noted that Internet services were not introduced into Saudi Arabia until January 1999 and that before this time, only very few people used the Internet, mainly through other Gulf countries such as Bahrain and UAE. E-mail and Internet-based networks are now becoming common features of the small- to medium-sized business community in Saudi Arabia.

As per the information supplied by the Saudi government, Internet access has been spread all across the Kingdom, with the percentage of Saudi citizens using it increasing from 5% in 2001 to about 41% by 2010, i.e. the number of Internet users grew from around 1 million in 2001 to an estimated 9.8 million at the end of 2009 [18]. This rapid growth in the number of Internet users is attributable to increased public awareness, the growth in broadband availability, decreasing costs of personal computers and Internet access, and the enhanced usefulness of e-services such as online banking, e-commerce and e-government applications.

### **IT Investment in Saudi Arabia**

Developments in the global ICT industry are continuing to accelerate, introducing a great variety of new services. In Saudi Arabia, a significant market for networking and related software has evolved as well as for computer hardware and software products [30]. The first organizations to implement IT systems after Saudi Aramco were financial institutions [15], and other organizations followed suit but the costs involved and the lack of skill personnel limited this process. Recently, with the rapid advances in technology, reduced costs and an increasing level of skills, the IT sector has expanded, and currently the largest share of growth in IT is in the commercial sector.

Saudi Arabia is currently the largest computer market in the Gulf region. The Gulf region has an annual turnover of approximately \$1.2 billion, and Saudi Arabia accounts for about 40% of this. Recent price wars between the world's largest PC producers are expected to fuel the Kingdom's ever-growing computer market [15]. According to Al-Gahtani [5], the tremendous recent growth in the Saudi IT market is expected to continue for next few years. According to a report prepared by the Research Department of the US-Saudi Arabian Business Council (2002) [34], Saudi IT per capita expenditure on computers and related accessories continues to be one of the highest in the Middle East [33]. In 2000, Saudi Arabia

reported a 2.5% increase in its import market for computers on the previous year. This reached approximately \$250 million and included terminals, keyboards, printers, and other peripherals. Saudi Arabia spent \$133 million importing personal computers and printers from the USA in 2000, an increase of 2.5% over 1999 [33]. Hundreds of computer stores have been founded, mainly in the largest cities, but now they are scattered all over the Kingdom.

According to a Saudi Arabian IT report [32], the Kingdom has the largest IT market in the Gulf region, with a value of US\$ 3.4bn in 2008, and it is expected to rise to US\$ 5.6bn by the end of 2013, a CAGR of 11%. According to a report by the Royal Embassy of Saudi Arabia in Washington [33], the increasing use of the Internet and of e-commerce in Saudi Arabia is fuelling a demand for personal computers, and Voice Over Internet Protocol (voip) (for long distance calls) is also increasing in use and contributing to this demand, as is the need for newer and improved services and hardware (including up-to-date processors, hardware and graphics accelerators). The increased demand for more highly sophisticated computer systems necessitates the replacement of many computers in the near future. At present, approximately 40% of the import market is supplied by Compaq, IBM, Dell, HP, Apple and other manufacturers from the USA. However, products such as Unix-based systems, NetWare, and NT will also be required as demand rises in the Kingdom [33].

The ability to manufacture computers within Saudi Arabia was facilitated in 2000 through a joint venture between Al-Faisaliah Group with both Microsoft and Intel, creating a new computer brand called ZAI. The initial investment in this venture, as reported by the headquarters in Riyadh, was \$3.2 million [33]. The ZAI computer manufacturing plant produced 8,000 units in only its first year of operation (in 2001), and will soon be able to produce 15,000 units per year; with the exception of a few parts such as chips (which are to be imported from the USA and Asia), the

majority of the components will be manufactured on site. Nevertheless, Saudi Arabia remains a net importer of both hardware and software, although the capacity for domestic production is increasing; there remain excellent opportunities for investment from abroad, especially for USA companies, in the field of telecommunications and computer equipment provision.

According to Behery [15], Saudi Arabia is encouraging the growing home market in IT. In addition, there is a growing awareness in the small business market of local computer manufacturers. Throughout the country, local businesses are upgrading their computer systems [15], and increasing numbers of organizations are using the latest technology. A few years ago, e-mail and networking were not available for most organizations; however, they are now common features in small- and medium-sized ones in Saudi Arabia.

According to the report of the Arabian Gazette [13; 31], Saudi Arabia has the fastest growing IT market in the Middle East and accounted for nearly 50% of all ICT investments in the GCC between 2010 and 2012. This huge spending on the ICT sector includes projects such as e-government portals, e-government networks, the e-government interoperability framework, an e-payment gateway (SADAD), the e-tax system, electronic information exchange, etc. As a result, numerous government services are currently available online, such as investment licenses, visa applications, traffic penalty enquiry & payment, paying passport fees, and settling utility bills.

### **Saudi Government Efforts and Policies**

The Saudi government has made significant strides to promote and develop the IT environment. The main objective in so doing is to establish a strong IT infrastructure in order to facilitate and improve the efficiency and effectiveness of the operations of all organizations, both in the public and private sectors.

The Saudi government has established several guidelines pertaining to IT development, which focus on constructing a strong IT infrastructure as well as advancing the computerization process, which in turn involve planning, implementation and measuring effectiveness. The guidelines provide an outline of the steps to be taken as well as the pitfalls to avoid when selecting new computer systems or upgrading existing ones. It is anticipated that they will assist private organizations in computerizing their operations, solving the problems that many of them face, and ensuring that they obtain maximum returns on their IS investments.

The five-year development plans mentioned above address the issue of technology and the need to implement a specific strategy for developing the IT sector. According to the report of the Ministry of Planning [27], there is also a long-term national plan that provides guidance for the development of science and technology more generally, and based on these efforts, Saudi Arabia is expected to become a very important country in terms of IT by 2020 [12]. The government's current five-year development plan includes many IT-reliant infrastructure projects, and the IT sector is expected to grow into a \$4.9 billion market by 2015 [14].

### **The Five-Year Development Plans**

The overall development process in Saudi Arabia is based on five-year plans, and since the early days of these plans, the government has utilized all available resources and accessible tools to implement them, and to meet the objectives that form the essence of these plans, in order to achieve the desired progress and growth of the economy. With regard to technology, the first development plan (1970-1975) was to establish an infrastructure that could support a modern economic base. Saudi Arabia was dependent on imported technology during the three of these plans (1970-1985), and the establishment of the physical infrastructure was accomplished during

that time. Consideration was also given to developing the human resources necessary to assist in the planned economic transformation. By 1985, with most of the physical infrastructure in place, attention shifted to diversifying the economy away from being wholly dependent on revenues from oil [32].

During the fourth and fifth plans (1985-1995), it was noted that there had been a rapid trend toward utilizing new IT systems in the private sector [24]. There was emphasis on implementing IT systems in organizations in order to facilitate daily organizational activities and enhance overall productivity. Therefore, IT became an important resource and enabler of policy formulation and action for organizations. In addition, in the fifth development plan (1990-1995), the government planned to fill the technology gap by introducing several new policies [7]:

- a) Establishing a new long-term plan to support technology and the sciences;
- b) Ensuring coordination between government organizations to achieve active cooperation with the private sector in this regard;
- c) Increasing or upgrading programs and curricula related to science and technology at all educational levels (primary school to university);
- d) Raising public awareness of the important worldwide role played by the sciences and technology, through the media, symposiums and exhibitions;
- e) Subsidizing and improving support services related to science and technology, such as information services and patents;
- f) Encouraging research and development activities in both the public and private sectors.

However, the number of Saudis with technology skills, and the level of such skills, is still insufficient to fulfill the rapid and dynamic changes that are taking place

in technology [11]. It was recognized that keeping up to date with technology needs yet more human resources, money and time.

The need for development in technology and the importance of IS continued to be emphasized in the sixth development plan (1995-1999) [24]. This plan was designed to facilitate building a long-term plan for all technologies and sciences, coordination between agencies, enhancing educational programs, encouraging people to learn about new technologies and science, and encouraging research in this field [32].

The seventh development plan (2000-2004) aimed to identify scientific and technological development trends in Saudi Arabia [27], and various Saudi government departments were charged with playing a key role in industrial and economic development. According to [32], the Ministry of Planning played a crucial role in formulating all the five-year development plans that set the long-term economic goals. Accordingly, the infrastructure is now taking shape, and the government has launched a major effort to expand the industrial base [32]. Throughout the course of the development plans, Saudi Arabia's steady but dramatic industrial and economic transformation has been accomplished through the careful guidance and active support of the government.

### **The Saudi National Plan for Science and Technology**

The seventh development plan (2000-2004) emphasized that every effort should be made to develop science and technology, enhance public awareness, and support scientific research and technological development. These objectives aim to increase the utilization of modern technology throughout the country. According to an article in the Al-Watan newspaper [12], the main objectives of this Saudi national plan are to reduce the technological gap between the Kingdom and industrialized countries by 2020 (by encouraging research and development activities in the various technological areas), and to use modern technology

systems and educational techniques to develop human resources and to upgrade standards to an international level (capable of dealing with advanced technologies).

According to the Ministry of Planning [27], the seventh development plan emphasized the need to work on developing the Kingdom's IT systems throughout the period of the plan (2000-2004). The plan argued that weaknesses in the national IS in particular and in information services in general need to be addressed, and so the plan concentrated on the current information networks as well as on scientific awareness programs, which aimed to improve knowledge amongst citizens and enhance their understanding of the significance of technology. The plan focused on the importance of improving the quality of information services in both public and private organizations. Thus, the main principles of this Saudi national plan were to provide guidelines for future development and to improve the science and technology environment but it was also intended to guide long-term developments in technology (and to incorporate cultural, social, economic and technical aspects) over an extended period, from 2001 to 2020. According to the article in the Al-Watan newspaper and to Al-Ghobiri [6; 12], the main objectives of the plan are therefore to provide a framework and certain regulations for the scientific and technological development of the Kingdom. Specifically, these objectives are designed to:

- a) Improve the technological sector in the Kingdom by encouraging research and development activities in the various technological areas, and by improving the nation's skills in all technical areas.
- b) Provide educational techniques to develop human resources in order to deal with advanced technologies.
- c) Develop the national IT industry.
- d) Provide a master reference for all development and activities in science and IT.

- e) Provide a high level of human resources skilled in science and IT, and to ensure that this is achieved in terms of both quantity and quality.
- f) Support scientific research at all levels.
- g) Continue to promote science and IT-based organizations and to improve the level of cooperation, integration and interaction among them.
- h) Enhance the level of cooperation with other countries in the area of science and technology and to open wider channels of communication in order to cope with current and future international developments, while still maintaining a strong national identity and set of values.
- i) Reinforce activities that have a direct effect on science and technology, such as information services and standards, piracy authorities, engineering consultant offices and scientific societies, including efforts by both public and private actors.
- j) Ensure sustainable technological development and the protection of natural resources.
- k) Promote national awareness of the importance of science and technology and the role citizens can play in the national interest, and to promote the ongoing development and investment in this important field.
- l) Encourage the use of IT systems by incorporating them in education and training at all levels and in all sectors.

Evaluation is not specifically mentioned in the above but each step in systems development does require evaluation. This ambitious plan, if fully realized, is likely to have a dramatic effect on Saudi Arabia's IT/IS capability.

### **The IT Industry**

Saudi Arabia has made rapid advances in IT development, largely due to the huge

revenues from oil, although efforts are now being made to diversify the economy in order to reduce dependence on this single resource. Moreover, in order to reduce the financial burden on the government, which in the past took responsibility for most of the production and service provision in the country, increasing importance is being attached to the role of the private sector.

The importance of employing up-to-date IT in public and private organizations lies in the evidence that this improves performance. The widespread use of IT throughout Saudi Arabia should therefore have tangible benefits for the economy as a whole. Saudi Arabia has the advantage of being able to learn and benefit from the experiences of developed countries with respect to all areas in IS development, and this is expected to yield profound benefits, especially in terms of efficiency, increased productivity, customer satisfaction and cost savings; Saudi Arabia will not have to reinvent the wheel.

### **Hardware Development**

In terms of hardware development and production, most of the components being manufactured in Saudi Arabia were developed by foreign multinational companies, and represent transferred technology; however, the Kingdom is lacking in terms of human resources and technology, contributing to inadequate levels of hardware production [15]. Nevertheless, many local firms are playing a significant role in addressing this in the short run and possibly in the long run in the region as well.

In addition, one of the largest companies in Saudi Arabia is the Saudi Cable Company (SCC), which is involved in all the most important projects and operations across the country. SCC has established itself as a market leader with a reputation for technical excellence and uncompromising product quality. It is regarded as one of the major companies in Saudi Arabia and could be a major global player in the future [15]. Saudi Arabia is not considered as a leader in the area of hardware manufacturing in the region, but it has the potential to



become one in the near future. Saudi firms could become the providers of one or several high-quality hardware components exporting to the region [15].

### Software Development

The development of software receives a great deal of attention amongst economists in the country, as it is an important growth area. However, not much is being done to promote local software development, as Saudi Arabia only began using computers extensively in the last decade. The first goal of the software industry in the country was to satisfy the local demand. Once this had been achieved, the focus shifted towards the regional demands.

Several firms have the opportunity to gain market share by providing solutions to the many problems entailed in developing or upgrading IT systems. According to Behery [15], increasing numbers of Saudi firms are able to provide a variety of services to the local and regional markets. As there is a growing demand in the IT market and in order to meet that demand, all sorts of applications are being developed. Recently, the IT market in Saudi Arabia has concentrated on software development, networks and Internet solutions. Most of the large firms in the IT market are joint ventures with global firms, such as IBM, Comet Group and AT&T [15]. These large firms are the ones that usually provide total solution services but smaller organizations have gained ground in the area of software development. One of the major firms to have progressed in the area of software development is DowLog Technology Co.; they produce PC-based educational programs based on national curriculums [15].

### IT Strengths and Weaknesses

When assessing IT in Saudi Arabia, no competitive advantages from IT could be identified by Behery [15], who stated that the country had fallen behind in terms of IT when compared with its neighbors in the region. However, one of the main strengths of IT in Saudi Arabia is its current infrastructure; although not to the

standards of fully developed countries, the national IT infrastructure is probably the most modern in the region, which ameliorates the weaknesses of the other aspects of IT.

Many firms in the country have developed and produced a great deal of their own IT software. This supports the indigenous software industry and, to some extent, the hardware industry. Nevertheless, a large market exists for the purchase and sale of hardware technology and some Saudi companies have endeavored to meet this demand by establishing a local manufacturing base. Saudi firms have also achieved a level of reliability that allows them to be identified as Original Equipment Manufacturers (OEMs) [15; 32].

With regard to IT weaknesses, Behery addressed the main reasons why Saudi Arabia is behind in the area of IT [15]. These reasons are listed as:

- a) Computer illiteracy of the end-users;
- b) Lack of government incentives to attract businesses (free-trade zones/subsidies);
- c) Absence of adequate infrastructure to support industry;
- d) Poor enforcement of intellectual property and copyright laws, and lack of resources.

Despite these difficulties, if the national plans proposed by the government are fully realized, then the future prospects for the Saudi IT industry as a regional player ought to be good.

### IT Barriers and Problems in Saudi Arabia

Technology development in Saudi Arabia faces many barriers that can also be said to influence the implementation, development and performance of IS more generally.

According to Al-Sudairy [10], cultural differences can result in limitations for IT development. For example, different ideas

of logic and reasoning, the prioritizing of religion, and the limitations of languages can create barriers to effective communication and understanding. There is deemed to be a culture impact on IS implementation in Saudi organizations, and it is not unreasonable to suggest that all these factors affect the development and implementation of IS.

According to the literature [e.g., 4; 6; 10; 11; 28], there is some evidence that IT development in Saudi Arabia faces many difficulties, which are not only scientific and technical, but also, and possibly more importantly, educational, economic, political, social and cultural. Usually people at the decision-making levels in business have little experience or training in the introduction and effective use of IT, in taking advantage of the technology, or in minimizing its shortcomings, and so it is unlikely that they will be best placed to understand the relevant issues.

Abdul-Gader [4] stated that the inadequate infrastructure, lack of technology education, lack of skills, and lack of local vendor support are the most apparent problems facing IT/IS development and implementation in Saudi Arabia. [4] asserts that some of the difficulties constraining implementation in Saudi Arabia are, for example, resistance to change, organizational policy, and hardware and software availability.

Saudi researchers attribute most of these problems to socio-cultural and technical factors. These include lack of IT-skilled Saudi manpower, shortcomings in the national IT infrastructure, and lack of national IT policies [10; 11]. They assert that most of the problems found in the Saudi environment can be overcome by developing good national IT plans and policies, encouraging and supporting the local IT (hardware and software) industry and, more importantly, improving the national IT infrastructure and the status of technology/computing education at all educational levels [6; 10; 11].

[4, 6, 10, and 11] identified the factors that hinder IS development in Saudi Arabia, and these are:

- a) Lack of knowledge and experience to use and maintain IT systems;
- b) Lack of organizational IT infrastructure, resulting in inadequate maintenance;
- c) Lack of IT planning;
- d) Lack of quality training programs;
- e) Lack of top management support;
- f) Lack of technical support;
- g) Lack of suitably qualified and skilled Saudi human resources;
- h) Shortage of IT training, resulting in inadequate IT skills.

This list indicates how significantly organizational, social and cultural factors in Saudi Arabia are affecting the IS development effort. It must be emphasized that Saudi Arabia is not alone in having such problems, as some of the above issues are faced by organizations worldwide.

Typically, most of these problems appear to revolve around certain technical issues but also around the non-technical issues of the shortage of Saudi manpower with the necessary expertise, the apparent lack of clear vision and planning, and the lack of management support. Other barriers hindering IS development in Saudi organizations are attributed (as alluded to above) to problems that are considered to be common even in developed countries, such as administrative problems, the growth in the number and spread of PCs (that is, as a level of dependence on IT/IS), and maintenance and support [10]. These are only some of the reasons why Saudi Arabia is far behind many countries in IT, and unless some of these issues are dealt with, progress will be hindered.

### Previous Studies on IT in Saudi Arabia

Relatively little research has been done to investigate IT barriers and problems in Saudi Arabia. Most of the research conducted is primarily concerned with the impact of IT, IT/IS development, and the implementation of IT/IS. Recent research in IT in Saudi Arabia indicates a growing interest in finding suitable solutions for IT/IS problems in Saudi private organizations [6]. For instance, a survey conducted by Abdul-Gader [2] investigated the end-user perspective in terms of success factors in computing; it provided further evidence from developed nations. The author attempted to measure and validate a set of individual and organizational factors thought to affect the success of end-user computing in Saudi Arabia. The study indicates that end-user computing success is closely associated, among other factors, with organization size, training, source of computer application, computer literacy, top-management involvement, and availability of native language software. In addition, Al-Sudairy [10] conducted a research to identify the barriers that hinder the development of the IT industry in Saudi Arabia; he found that lack of IT planning, lack of IT-skilled Saudi human resources and insufficient government support were the main factors hindering the development of IT/IS. Accordingly, he proposed a strategic plan that could be used to guide the nation's development in this field.

Abdul-Gader [3] conducted a study to investigate IS strategies for multinational companies in Arab Gulf countries. The author found that various factors hinder IT/IS implementation and development, in particular, lack of IT planning and lack of IT infrastructure. Al-Turki and Tang [11] examined the factors that influence the IT/IS adopted and used in Saudi organizations. They identified the major factors hindering the implementation of IT applications in Saudi private organizations, in particular, lack of IT training, lack of top management support, lack of vendor support and language barriers. Al-Khaldi et al. [7; 8] conducted surveys on attitudes to

computer utilization in Saudi Arabia. They found a positive relationship between social factors concerning the use of PCs and PC utilization. In addition, they found that the support of senior managers and CEOs in the use of IT positively influenced the utilization of PCs in Saudi Arabia.

Abdul Gader [4] conducted a study on the management of computer-based IS (CBIS) in developing countries (including Saudi Arabia) from a cultural perspective. He reported that among the reasons for the failure to use IT were: lack of communication, inadequate infrastructure, severe multidirectional pressure on monetary exchanges, lack of technology education, expertise and skills, and lack of local vendor support; these represent the most apparent problems facing CBIS development and implementation in developing countries.

Al-Ghobiri [6] investigated the IS implementation process as an important element in IS success. He focused on identifying the procedures involved in the implementation process, rather than how CBIS should be implemented. In addition, he examined the role of senior executives in the CBIS implementation process in both Saudi public and private organizations. Al-Ghobiri found that there was a clear lack of qualified staff; many of those currently working for IS departments had gained their education in other disciplines, i.e. not in computing or IT and related studies. In addition, he found that senior managers showed little understanding of IT complexity and its impact. Moreover, he found that both samples (i.e. public and private organizations) indicated a lack of involvement on the part of senior managers in their own CBIS process.

### Discussion

The concept of the private sector is based on the private ownership of establishments that engage in various industrial, agricultural and commercial activities with the aim of realizing profits. This scope can be extended to include some companies of mixed public and private ownership, which operate as joint stock companies according

to the disciplines of the market [25]. Many companies in the Saudi private sector have been operating in this fashion since 1994 [10; 11]. The majority of organizations in Saudi Arabia, whether private, public or joint stock, realize the need to accelerate their technology development and acquisition if they are to fulfill their ambitions and to broaden their revenue base; this interest is more apparent in large organizations such as banks, financial institutions, oil companies and manufacturing [11].

The private organizations are encouraged and supported financially and legally by the government. This special treatment from the Saudi government to the private sector stems from the significant role that the government is preparing for this sector to play in its attempts to diversify and strengthen the national economy. This is clearly stated in the various governmental development plans [26]. The fourth (1985-89), fifth (1990-94), sixth (1995-99) and seventh (2000-04) development plans have all emphasized the need to strengthen the growing private sector and to increase the efficiency of the industrial sector. The Saudi government has encouraged the private sector to cooperate with it and participate in raising efficiency and improving productivity in the Kingdom's economy [11]. Developing IT systems, of which evaluation is a key part, is considered vital to the government plans for supporting management in the Saudi private sector.

In recent years, the private organizations have begun to take the lead and assume responsibility in providing many services in a range of different sectors of the Saudi economy that used to be provided by the government. This is due to the Saudi government's privatization program that was announced in 1994. Through this program, the government is planning to convert many governmental ministries and agencies from the public to the private sector [25]. In December 1997, the Ministry of Posts and Telecommunications, which controls the Kingdom's communications sector, was transferred to the private sector and became the first governmental ministry to be privatized.

In 2003, the government established a new Ministry for IT in order to develop the IT sector, which will increase the use and development of IT/IS throughout the country in both the public and private sectors. This move by the Saudi government was seen as a very important step in improving the long-term economic conditions of the country.

In order to transfer technology and expand the operations of the private sector, the government provides various incentives to foreign companies that enter into joint ventures with Saudi firms [32]. The combination of loans, incentives, subsidies and information, and the government emphasis on strengthening the role of the private sector, particularly during the course of the fifth and sixth development plans (1990-94 and 1995-99), and now under the seventh plan (2000-2004), have had the desired result [32]. While the overall GDP for 1999 amounted to 139 billion U.S. dollars, the GDP for the private sector was \$58.67 billion, almost 42 % of the total. Industrial goods produced by this sector constitute more than one quarter of this amount, and about 20% of these are exported [32]. During the last decade of the 20<sup>th</sup> Century, the private sector contributed more to the country's GDP than did the oil sector. Moreover, the country has seen a decrease in imports, directly proportional to the increase in domestic production.

In Saudi Arabia, expenditure on computer and related accessories continues to be the highest in the Middle East [15; 32; 33]. Together with the increase in expenditure, a crucial question arises as to whether an organization is getting value for the investment made. Effective evaluation is essential to address this issue. In many cases in Saudi organizations, computers are bought on the advice of vendors without conducting feasibility studies. This has led to lack of consistency among hardware and applications in use in those organizations and also within the same agency. Organizational factors, for example size and structure, have been said by many researchers, such as [17 and 29] to have an effect on IS performance. Accordingly, the

way IS is managed in organizations affects performance.

The IS literature suggests that there is a variety of factors affecting an IT investment; these include organizational, technical and human factors [19; 20; 34]. In addition, reviewing the literature on IT in Saudi Arabia has led some researchers to identify a number of factors that may affect the decision and process of IT investment. Furthermore [1, 4 and 16] suggest that there is a relationship between IT systems and Saudi culture and business requirements.

The general findings indicate that there is a need to focus on IT investment in Saudi organizations, which, as the literature indicates, has not been adequately studied. The important issues are why and how Saudi organizations decide to invest in IT, and the factors that influence the IT investment process.

### Conclusion

This research paper has been reviewed and provided a description of the current IT environment in Saudi Arabia. It has discussed its impact on various social, economic and administrative areas so that the implications and consequences of introducing this technology into Saudi Arabia could be more fully understood. This led to a consideration of the importance of this technology with regard to its strategic, economic and social influence on the country. Saudi organizations were also introduced as a critical component of the long-term economic wellbeing of the country, as was the IT investment that has been made through various governmental initiatives.

The following recommendations are intended to serve as policy guidelines on which attention needs to be focused by the Saudi Arabian authorities. Should the factors hindering advances in ICT in the Kingdom be addressed, and should these recommendations be implemented, then Saudi Arabia could develop into a key player in this field both in the region and more widely.

- a) More attention should be given to the availability of information on ICT in Saudi Arabia and to its equitable distribution.
- b) In giving higher priority to science and technology, it is recommended that the government increase the use of ICT in modernized educational plans and programs.
- c) To strengthen the role of higher educational institutions in delivering ICT education, the government should enhance their capacity and capability in order that they may develop high quality science and technology education based on further research, and to do so in a manner that meets international standards.
- d) To ensure and secure appropriate financial resources in financing investment in ICT-related infrastructures, the Saudi government should develop its financial markets in order to create new opportunities in the field of ICT.
- e) The government should continue to support the public and private sectors (or through joint stock companies) to increase the use of ICT in order to raise levels of efficiency in production and administration throughout the economy, and should endeavor to improve the ICT infrastructure to the level of fully developed countries.

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