

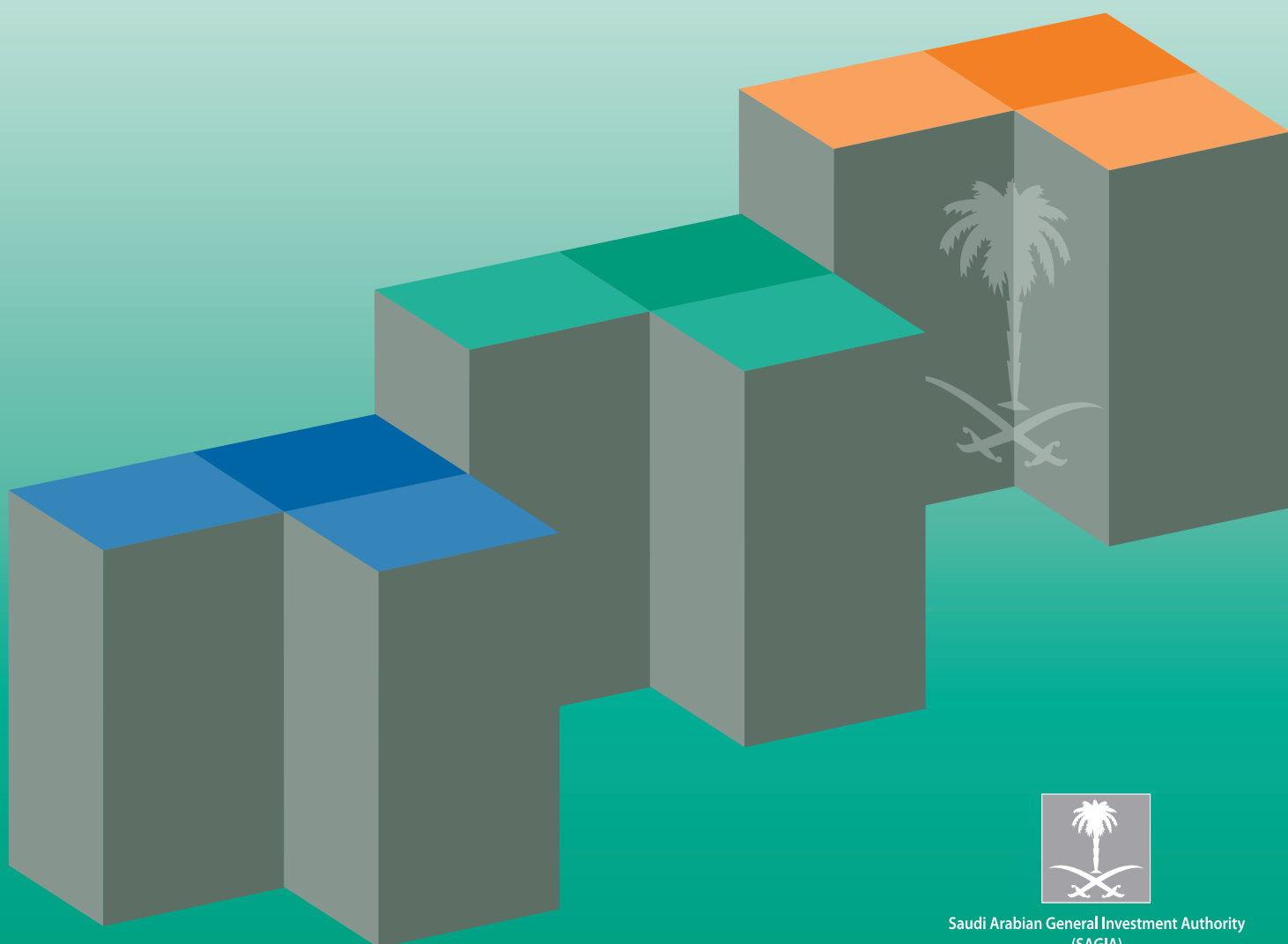


THE NATIONAL
COMPETITIVENESS CENTER

The Competitiveness Review

January 2008

*The Information and Communication
Technologies Cluster in Saudi Arabia*



Saudi Arabian General Investment Authority
(SAGIA)

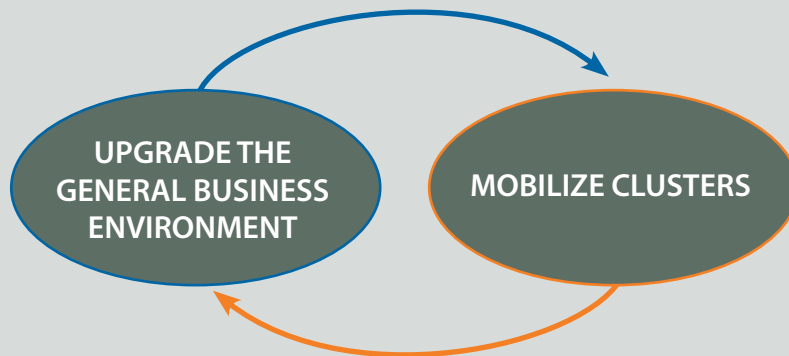
The NCC

NCC mission: *To support the Kingdom of Saudi Arabia's competitiveness agenda through objective, data-driven advice on regulatory reform and sector improvement opportunities that will contribute to increasing, sustainable prosperity for the people of Saudi Arabia.*

The National Competitiveness Center (NCC) was established by SAGIA in 2006 as a body to monitor, assess, and support competitiveness enhancement in the Kingdom of Saudi Arabia.

The NCC fulfils this role in three ways:

It serves as a think tank for change by conducting and developing competitive assessments and monitoring the implementation and results of change programs. These programs focus on two main areas: improving the ease of doing business in the Kingdom, through spurring modernization of the general business environment; and improving the microeconomic fundamentals of competitiveness, through mobilizing development of world-class clusters. A recent example of the NCC's work is its role in eliminating the minimum capital requirement. The NCC prepared the business case that advocated for the elimination of the minimum capital requirement, which was passed by Royal Decree on July 17, 2007.



It works as a facilitator of change by creating forums for discussion between the public and private sector. The NCC is currently supporting the creation of Cluster Advisory Councils that bring together stakeholders from the private and public sectors in key clusters to identify and collaborate on competitiveness improvement initiatives.

Finally, it acts as a communicator for change, sharing the results of the Kingdom's ongoing competitiveness efforts through such channels as its Competitiveness Review.

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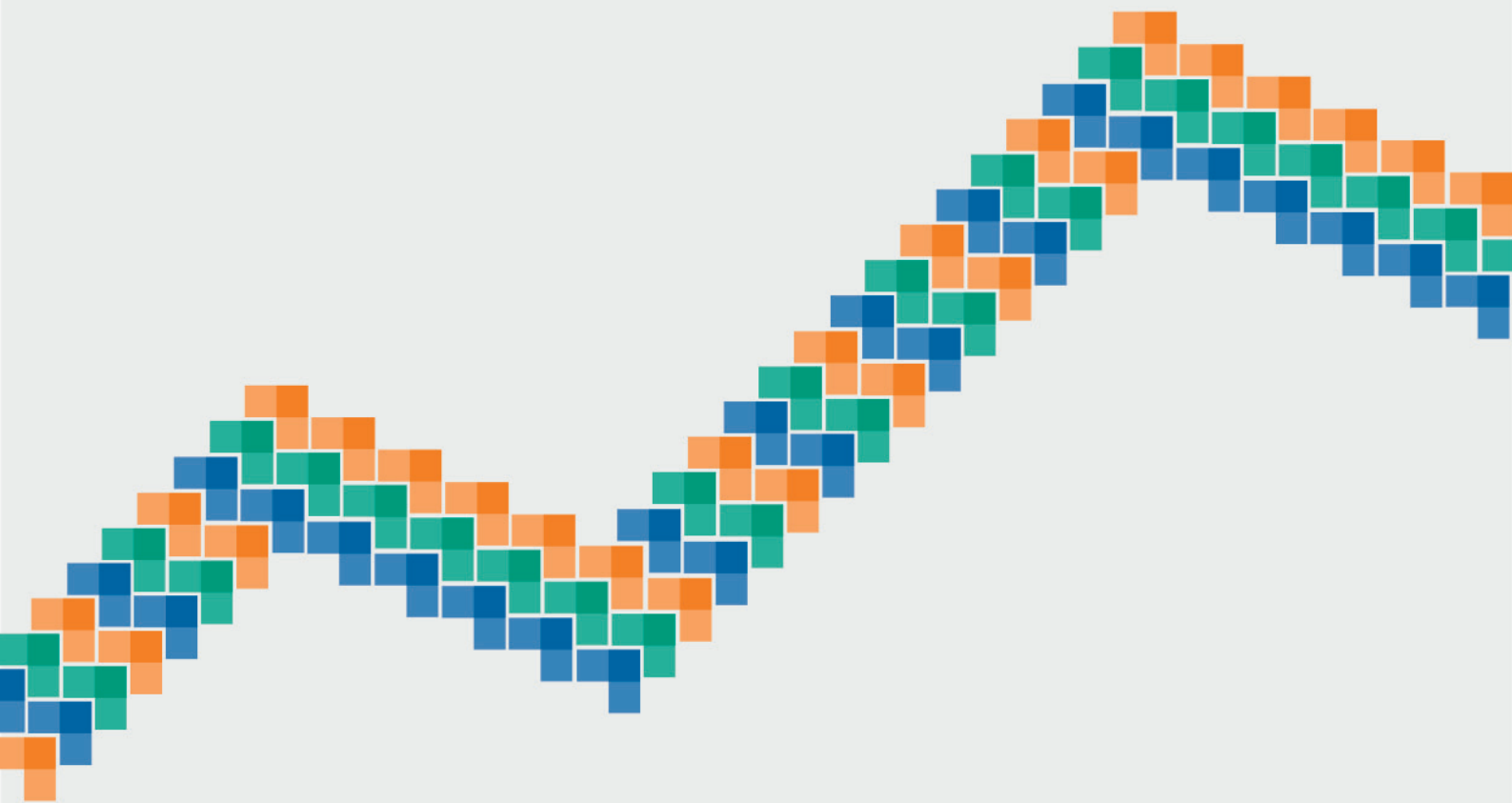




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Introduction by Dr. Ahmad Al-Yamani

Dear Reader:

I am pleased to introduce the Information and Communication Technologies (ICT) Cluster Review, written by the National Competitiveness Center (NCC). As part of the NCC's ongoing efforts to support and enhance SAGIA's 10x10 initiative, the ICT Cluster Review provides a detailed, current, and objective assessment of competitiveness within Saudi Arabia's ICT cluster.

Improving the ICT cluster is critical to promoting the development of the people, communities, firms, and sectors living and operating in Saudi Arabia. The cluster generates productivity growth across the entire economy by refocusing the workforce on higher value-added tasks, accelerating innovation and information dissemination, and opening up new markets. ICT products and services increase quality of life by enabling fast and efficient access to valuable services and applications, higher-caliber education and training, and new employment opportunities.

This report highlights the ICT cluster's impact on other clusters and the country as a whole, and focuses on major initiatives, planned and in progress. New service providers are entering the market, and together with existing firms are investing significantly in next-generation networks that will link the country as never before. Demand for ICT products and services continues to grow: the mobile market alone has increased at 30% per year, from 8 billion SAR in 2001 to over 30 billion SAR in 2006. Similar opportunities are emerging across all of the industries within the cluster.

Challenges exist, but together the public and private sectors can initiate opportunities by:

- Bridging the growing digital divide by stimulating demand for and access to high-speed broadband Internet.
- Addressing the lack of skilled ICT graduates with training campuses built and run by the private sector.
- Encouraging and stimulating a new culture of ICT entrepreneurship with public and private sector funding and business incubator services.

The ICT Cluster Review highlights these challenges and opportunities, and provides a set of critical recommendations based on the current situation in the Kingdom, and the experiences of other competitive nations.

Active participation by the government and private companies to implement these recommendations is key to supporting Saudi Arabia's goals of driving innovation and productivity, attaining a competitive advantage, and, ultimately, achieving a sustainable increase in the standard of living and prosperity for



all citizens. This report clearly outlines the major challenges and opportunities facing the ICT cluster, and provides viable suggestions on how best to move forward.

It is my hope and desire that this report will foster the dialogue and activity for achieving the competitiveness, innovation, and economic improvement that characterize the NCC. Thanks to continued cooperation between SAGIA, the NCC, and the rest of the Government of Saudi Arabia, the country's eyes are firmly set on 10x10 initiative.

Dr. Ahmad Al-Yamani

ICT Cluster Head

Saudi Arabian General Investment Authority



Foreword by Andy Belt

Dear Reader:

The information and communications technologies (ICT) cluster has stimulated an unprecedented global rise in knowledge, productivity, and economic performance. These advances have led to an ongoing major shift in countries' sources of competitive advantage, from economies based on raw materials to those based on ideas.

Saudi Arabia has made excellent progress in establishing a well-regulated, competitive telecommunications market. It now has the foundation for accelerated development in the ICT sector, which will deliver wide-ranging economic benefits. The Kingdom will build on the success of these efforts by actively fostering convergence, the competitive collision between the traditionally distinct service provision and device markets.

As other countries' experience demonstrates, this is only the beginning. ICT markets around the world have matured, while investment and innovation have migrated from telecommunications service providers to edge devices and software. This shift is ongoing, with significant developments in wireless data services still to come. Saudi Arabia must prepare for an environment in which Nokia, Apple, Microsoft, and Google have as much – if not more – power to drive productivity and profits as do the telecom providers.

International ICT trends indicate that creating, accessing, and sharing content – news, blogs, podcasts, music, and videos – will play a significant market role in the future. The growth of Web-based applications, the focus on enabling access to content in multiple, user-driven forms, and the rise of YouTube, Wikipedia, and Facebook are causing established ICT firms to take notice.

Saudi Arabia's challenge and opportunity is to capitalize on ICT evolution, and its positive implications for individuals and businesses alike. SAGIA, the NCC, and the 10x10 initiative are committed to assisting the Kingdom in overcoming these challenges, and pursuing unique market opportunities for sustainable economic growth.

Andy Belt

ICT Practice Leader

Monitor Group



Preface

Under the leadership of King Abdullah, Custodian of the Two Holy Mosques, the Kingdom of Saudi Arabia has championed economic reform, and supported economic diversification and the development of a competitive private sector in the Kingdom. Through its regular publications, the NCC's Competitiveness Review provides the Economic Leadership of Saudi Arabia with a comprehensive picture and an objective assessment of the country's state of competitiveness.

This issue of the review sets the context for the Kingdom's ICT cluster competitiveness worldwide. It begins by highlighting why improving the Saudi Arabian cluster is crucial, and explains the theory underpinning the NCC's analysis. It sets out the current status, highlights recent reforms, and suggests an agenda for future improvement. It also discusses the ICT cluster's key role as an enabler of people, firms, and other clusters.

The NCC fully supports SAGIA's 10x10 initiative, and is committed to supporting national efforts to achieve this goal. For this reason, throughout this report and in future issues the NCC compares Saudi Arabia to the Top 10 most competitive countries in the world. In particular, it measures ICT-related competitiveness parameters in Saudi Arabia against those of Top 10 Countries. Overall, the Competitiveness Review is a key support to the 10x10 initiative, providing analysis, suggesting initiatives for improvement, raising challenging questions, and promoting the competitiveness agenda within and beyond the Kingdom.

Upcoming issues of the review will evaluate the competitiveness of other major economic clusters, and cover further specific subjects related to competitiveness, such as entrepreneurship and innovation.

We at the NCC hope you find the Competitiveness Review informative, thought provoking, and above all useful. As the NCC aims to be as interactive as possible in its discussion and exploration of competitiveness in the Kingdom, your thoughts, input, and perspective are always welcomed and valued. To learn more, please visit www.saudincc.org.sa.



Executive summary

Setting the context

The ICT cluster contributes to a nation's overall competitiveness, both by driving growth, and as an indirect but critical enabler of the productivity and growth of people, firms, and other clusters of the economy. Increasing use of ICT products and services across an economy will result in substantial gains in national competitiveness.

In Saudi Arabia, the ICT cluster has grown significantly over the past decade. The cluster's economic output is estimated to have increased by almost 10% annually over the past five years, compared to 7% growth in the Kingdom's non-oil GDP. Liberalization is occurring across the telecom industry, driving increases in competition, service levels, and usage. Numerous Saudi Arabian IT industries show clear signs of rapid growth, driven by the committed presence of major multinationals, and by the expanding skills and confidence of local companies.

Though Saudi Arabia's spending on ICT products and services is growing, the cluster has yet to reach its potential. In particular, significant opportunities exist in non-mobile telecoms and IT industries. Encouraging growth in these areas is a key step in Saudi Arabia's larger goal of diversifying its oil-driven economy, and in its transition to an innovation-driven society. However, taking full advantage of these opportunities requires addressing critical issues within the ICT cluster. The ICT Cluster Advisory Council, established by SAGIA and the National Competitiveness Center (NCC) this year, creates a platform for private and public sector ICT cluster stakeholders to collaborate, advocate for reform, and generate significant change.

Measuring the competitiveness of the ICT cluster

ICT metrics, such as broadband penetration rates, used in global competitiveness rankings can serve as useful benchmarks to compare the ICT cluster's performance with that of other countries. Such measurements also enable policy makers to identify areas in which to focus competitiveness-enhancing initiatives and investments. In addition to employing competitiveness metrics to assess the ICT cluster in Saudi Arabia, the NCC conducted a thorough analysis of the Kingdom's ICT cluster to reveal underlying issues affecting its competitiveness.

The results of the NCC's analysis constitute the bulk of this Competitiveness Review. The report highlights the major drivers and barriers for the ICT cluster's competitiveness, and provides specific recommendations to address the challenges currently facing the cluster.



Addressing major challenges facing the cluster

The NCC's analysis identified three major challenges:

- Bridging the digital divide in mobile phone and broadband Internet service.
- Increasing the competitiveness of local IT industries.
- Improving the enabling effects of the ICT cluster.

Within each of these major challenges, the NCC has identified the underlying issues, and proposed a set of specific recommendations to address them.

1. Bridging the digital divide in mobile and broadband

The term “digital divide” describes the gap that separates those who can effectively use ICT products and services, and those who cannot due to socioeconomic factors. Compared with other countries, the Kingdom's national penetration rates for mobile, Internet, and broadband service are inconsistent but improving. There are significant regional differences in penetration rates within Saudi Arabia that may require action by the public and private sectors to overcome. Addressing these discrepancies is crucial to improving overall penetration rates, growing domestic telecom markets, and increasing the ICT cluster's enabling effects across the Kingdom.

The main issues inhibiting mobile penetration relate to the accessibility and affordability of mobile service. While additional analysis is needed to understand the drivers and barriers for mobile use in rural areas, there are many ways to improve access to and affordability of mobile service. Specifically, Saudi Arabia should seek to ensure citizens in rural regions have access to basic low-cost service packages. This can be accomplished through the newly created Universal Service Fund, the licensing of a low-cost mobile virtual network operator, or coordination with mobile service providers to ensure availability of products and services for low-income groups.

Increasing broadband penetration is significantly more challenging, and will require a broad strategic effort by Saudi Arabia to address all areas of the Virtuous Cycle of Broadband Penetration to ensure strong, sustainable growth in broadband penetration rates. Specific initiatives will help guide infrastructure and investment toward rural areas, improve the regulatory environment, enhance service development and content availability, and stimulate demand for services.

2. Enhancing competitiveness of local IT industries

The IT industries, including hardware, software, and IT services, have traditionally been composed of large multinational corporations, such as Microsoft, Cisco, and HP, that serve the general IT needs of other multinational corporations and such large Saudi Arabian companies as Aramco. Local firms differentiate themselves from these multinationals by developing offerings in the niche industries of IT training and outsourcing services, local marketing, distribution of ICT products, and, to a lesser extent, development of Arabic software and Web content.



Despite the involvement of multinationals and the emergence of local companies, there seems to be an overall lack of coordination and understanding as to where the Kingdom can build its competitive advantage in IT. Accelerated business formation in the IT industry remains hindered by two major issues: a lack of basic factors, such as financial and skilled human capital; and an underdeveloped culture of ICT innovation and entrepreneurship. By increasing the availability of financial and human capital and encouraging innovation and entrepreneurship in certain IT sectors, Saudi Arabia can ensure its citizens and firms possess the foundation for a sustainable competitive advantage in specific ICT industries.

3. Encouraging enabling effects of the ICT cluster

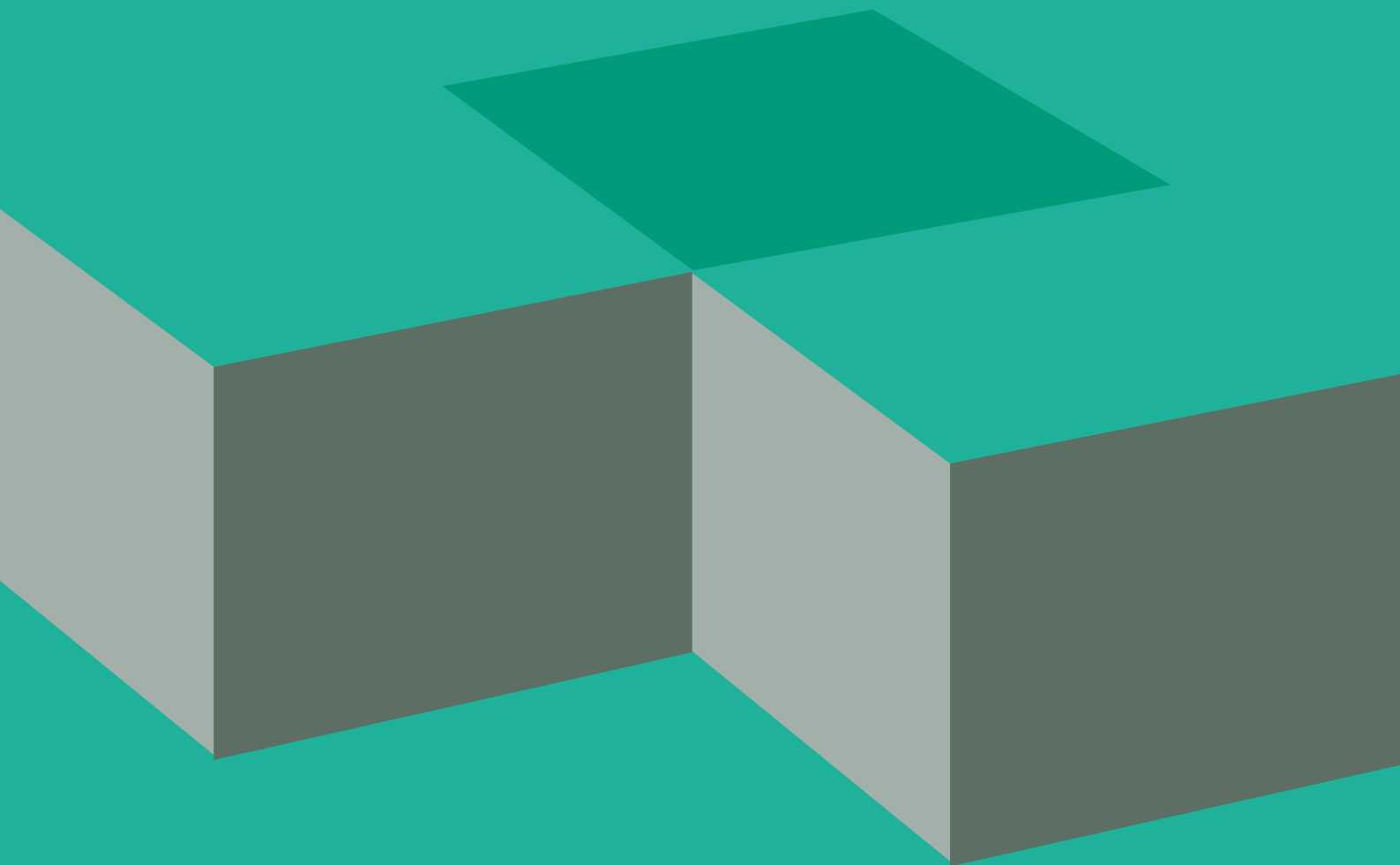
The ICT cluster's role as an enabler in the Kingdom is currently limited. Basic products and services are used by people, firms, and other clusters; however, potential exists for much deeper and wider application of ICTs. Advanced usage beyond communicating by phone and email is limited to just a few clusters, notably oil and gas, financial services, and, to a lesser extent, transportation. The most sophisticated firms in these clusters have developed customized Web-, computer- and phone-based applications that address the cluster's unique and complex issues. Encouraging similar use by individuals and firms across all clusters will grow the market for ICT products and services and increase overall cluster productivity.

While firms and clusters would naturally adopt such ICTs on their own over time, significant opportunities exist to accelerate the process through public sector initiatives. The creation of cluster-specific ICT Centers of Excellence will help to focus public, private, and academic resources on the advancement and adoption of ICTs within clusters. These Centers of Excellence will ensure the ICT cluster's enabling effects reach their potential.

Conclusion

For Saudi Arabia to achieve its objective of becoming one of the most competitive countries in the world, it must successfully transition to a knowledge-based economy. To do so, the Kingdom must grow its nascent ICT cluster by addressing related major challenges, including bridging the digital divide, stimulating ICT entrepreneurship and innovation, and encouraging the use of advanced ICTs in other clusters. This will require strong leadership, substantial investment, and public and private sector cooperation. The recently formed ICT Cluster Advisory Council helps foster needed collaboration between private sector ICT firms and key public sector stakeholders, such as the Ministry of Communications and Information Technology, the Commission for Information Technology and Communication, the King Abdullah Center for Science and Technology, and the Ministries of Education and Higher Education. Their efforts will ensure Saudi Arabia's ICT cluster matures into a highly competitive and dynamic entity and a significant contributor to the economy.

Summary of ICT Recommendations





Summary of ICT recommendations

The recommendations throughout the following report are based on the National Competitiveness Center's assessment of the ICT cluster in Saudi Arabia, and they address current key competitiveness issues. Intervention by public and private stakeholders in the Kingdom is required to enhance the Saudi Arabian ICT cluster's competitiveness, and to elevate that of the country overall.

Improving accessibility and affordability of mobile phone service

Increase accessibility of mobile phone service

NCC recommendations:

- Conduct or commission a study to better understand drivers and barriers for consumers accessing mobile services outside urban areas of Saudi Arabia.
- Ensure the Universal Service Fund has an immediate focus on increasing access to basic mobile service in low-income, rural regions of Saudi Arabia.

Address affordability of mobile phone service

NCC recommendations:

- License a low-cost mobile virtual network operator to make telecommunications service more affordable, offer more customer choice, and stimulate telecom usage and penetration.
- Work with mobile providers to develop products and services for low-income groups across the Kingdom that account for the full burden of service usage (e.g., total cost of ownership).

Improving broadband penetration across the Kingdom

Launch a national broadband strategy

NCC recommendation:

- Move beyond the planning stage to rapidly implement a National Broadband Strategy for increasing broadband penetration country wide.

Guide infrastructure and investment toward rural areas

NCC recommendations:

- Ensure new investments in next-generation high-speed networks include rural regions in infrastructure planning and build-out.
- Provide direct subsidies or funding to libraries, schools, and rural areas to increase availability of free public Internet services.

Improve the regulatory environment

NCC recommendations:

- Rationalize the ISP market with higher minimum service-provision requirements and/or regional coverage areas to focus competition and ensure acceptable service levels.
- Increase competition in the telecommunications markets by removing regulatory barriers to fixed, mobile, and Internet products and services (e.g., Voice over Internet Protocol or a unified licensing regime).



Stimulate demand for services

NCC recommendations:

- Develop education and awareness programs for consumers and small businesses on the range of solutions and applications available through the Internet to increase ICT skills and usage.
- Focus the next generation of e-government services on high-bandwidth services and applications, to stimulate broadband use by people, firms (particularly small businesses), and clusters.

Enhance service development and content availability

NCC recommendations:

- Address previous issues with the Saudi Home Computing Initiative, which incorporates a broad marketing and awareness campaign, and inclusion of high-speed Internet service and hardware and software packages tailored to the consumer.
- Enhance EasyNet by simplifying the payment process and extending discounts to broadband service.
- Establish an Arabic content campaign that works with local and international content developers to dramatically increase availability of Arabic Web content.

Increasing availability of ICT-related financial and human capital

Increase availability of financial capital

NCC recommendations:

- Refocus efforts related to the ICT venture capital funds suggested during the 2006 Global Competitiveness Forum.
- Use public sector resources to stimulate funding in ICT companies, through direct investments in these companies, and by supporting venture capital firms willing to invest in the local ICT industry.

Increase availability of human capital

NCC recommendations:

- Partner with multinational IT firms willing to train local Saudi Arabian employees in ICT over the long term, in exchange for foreign worker visas to meet their ICT skills needs in the short term.
- In collaboration with the Ministries of Education and Higher Education, launch an ICT module for primary, secondary, and tertiary curricula, to ensure ICT education and computer usage are made a priority in the education system, and that graduates possess the basic and advanced ICT skills employers seek.



Encouraging innovation and entrepreneurship

Attract ICT investment

NCC recommendations:

- Identify and prioritize attractive ICT markets in which Saudi Arabia can emerge as a regional and global leader, and use joint public and private resources, supportive regulatory regimes, and other incentives to develop local ICT industries.
- Develop and follow through on more effective intellectual property right enforcement measures, and use public sector institutions as role models for the private sector.

Enable new IT business creation

NCC recommendation:

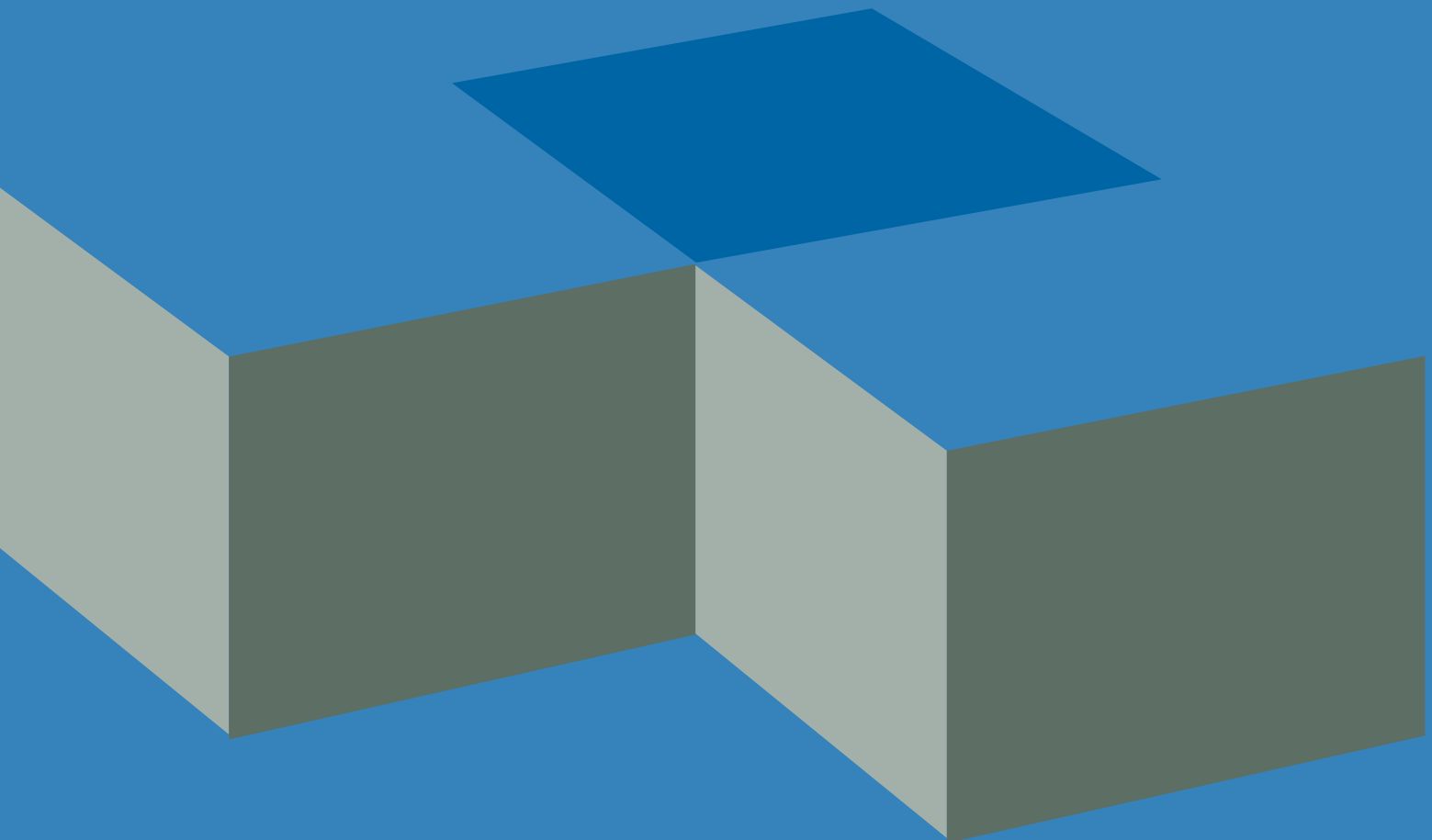
- Create ICT incubators throughout the country, possibly within the Economic Cities, to simplify and streamline management and operation of ICT businesses, similar to SAGIA's One-Step Shop model for foreign investors.

Increasing advanced ICT usage across clusters

NCC recommendation:

- Create ICT Centers of Excellence throughout the Kingdom that serve as hubs for ICT-related investment, R&D, and technology commercialization, each to focus on a specific cluster.

Setting the Context





Setting the context

The following sections set the context for assessing the ICT cluster¹ in Saudi Arabia by answering three basic questions:

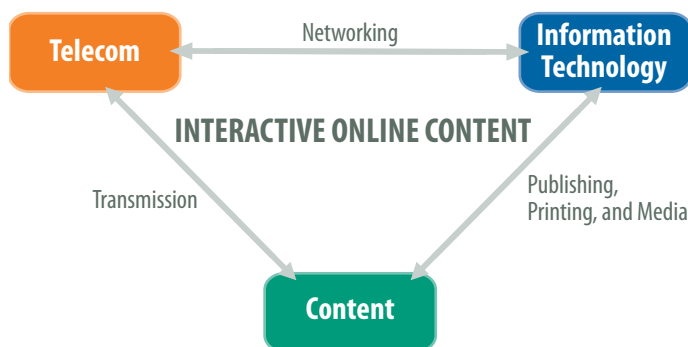
- How is the ICT cluster defined globally?
- Why is the ICT cluster important to national economies?
- What is the current state of Saudi Arabia's ICT cluster?

The answers describe the framework for analyzing the ICT cluster, and provide a broad overview of ICT clusters worldwide and within Saudi Arabia. After setting the context, the NCC analyzes the competitiveness of Saudi Arabia's ICT cluster, describes the key challenges, and sets an agenda for improvement.

ICT cluster definition

Information and communication technologies is a broad term describing various evolving industries. Globally, the ICT cluster includes the telecommunications and information technology industries. As well, increasing overlap exists between pure telecoms, IT firms, and content creation industries (Figure 1).

Figure 1: ICT Cluster Diagram



- **Telecoms.** Fixed, mobile, and data service providers invest in, maintain, and operate the communications infrastructure, and the related provision of voice and data services. Large multinational telecom firms include AT&T, Vodafone, and PCCW.
- **IT firms.** Hardware manufacturers, software and content developers, and IT service providers create products and services that run on the telecom infrastructure. Large multinational IT firms include Nokia, Microsoft, Google, and Cisco.
- **Content developers.** Writers, producers, and publishers of digital (TV, radio, movies, blogs, online sites, etc.) and non-digital (magazines, newspapers, etc.) content create the information, data, and news transmitted via telecom services and digitized via IT services. Large multinational content developers include NewsCorp, NBC, Bertelsmann AG, and TimeWarner.²

¹ A cluster is a geographic concentration of interconnected businesses, suppliers, and associated institutions in a particular field. Clusters increase companies' ability to compete, nationally and globally. The term, also known as a business cluster, industry cluster, or competitive cluster, was introduced and popularized by Michael Porter in *The Competitive Advantage of Nations* (1990).

² While content firms are increasingly important in the global ICT landscape, the extent of content development in Saudi Arabia is currently limited. As such, this area of the ICT cluster is generally described in terms of potential opportunities, such as Arabic content development, rather than a full competitiveness assessment of the content industries in Saudi Arabia.



Mergers, acquisitions, licensing, and partnerships are creating hybrid firms that use different aspects of each of the three major ICT areas. These companies' expansion beyond previously rigid industry borders is creating challenges for legislators and regulators accustomed to distinct products and services. For example, is Google a search engine, a software company, or a wireless service provider; and what set of rules must it obey?³ While not every ICT company is active across all markets in the ICT cluster, Google is not unique in its breadth.

As the definitions of ICT companies change, the relative significance of particular ICT industries and firms is also changing. Though still critical to the global economy, in many mature ICT clusters the telecommunications industry – the original high-growth high-tech industry – has been surpassed by the IT industry as the key driver of the cluster and the national economy. However, this structural transition is ongoing. While firms may participate in any number of specific ICT businesses, the cluster as a whole and the related information and communication technologies (ICTs) will remain critical to national and global economic growth. The following section characterizes and quantifies the mechanisms of ICT contribution to growth.

The ICT cluster's importance to an economy

ICT holds special significance in its role as an enabling cluster. A well-functioning and cutting-edge ICT cluster contributes to a country's competitiveness in two distinct ways:

- As a competitive traded cluster on its own.
- As an enabler and driver of competitiveness for firms and other clusters.

In this dual capacity as a direct and indirect contributor to competitiveness, ICT clusters play a critical economic role. Globally identifying the ICT cluster's direct and indirect contributions will help to benchmark Saudi Arabia's current ICT cluster performance.

1. ICT as a traded cluster

On its own, ICT is one of the world's fastest-growing and most productive traded clusters. The ICT industries generate more global output, with fewer resources, than other industries and economies overall. Recent statistics from economies with advanced ICT clusters, such as those in EU and OECD countries, confirm that ICT clusters' importance is real and growing.

In terms of overall industry contribution to GDP, ICT industries worldwide are growing significantly faster than economies overall. In the EU, the ICT industries grew at 10% annually from 2003 to 2006, compared to a 6% increase in overall GDP during the same period. Additionally, ICT industries are becoming increasingly important as drivers of worldwide GDP growth. Recent studies show that ICT capital, including investments in hardware, communications equipment, and software, has generated over 20% of total GDP growth in the early 2000s, up from 15% during the 1990s.⁴

³ Originally a provider of search and advertising services, Google now offers Web-based email, word processing, and spreadsheet applications, and has developed a software platform for mobile phone manufacturers. The company has also purchased significant numbers of underutilized or incomplete data networks ("dark fiber"), and has expressed interest in acquiring newly available mobile spectrum in the U.S.

⁴ OECD Productivity Database, 2007



Employee productivity in ICT industries, as measured by GDP per worker, is greater than overall employee productivity. In the U.S. and Canada, ICT labor productivity grew annually by 4.8% and 4.1%, respectively, from 1995 to 1999, compared to 1.2% and 1.7% respective growth in total labor productivity. The United States Federal Reserve identified the high-tech industries (including semiconductors, electronic components, computers, peripherals, and communications equipment) as the biggest contributors to production growth in the U.S. from 2001 to 2005. While the total production index – measured as the physical output of manufacturing, mining, and utilities – grew 1%, the production index for high-tech industries grew 12%.

2. ICT as an enabler of competitiveness

The ICT cluster's second role as a driver of competitiveness is to enable individuals, firms, and other clusters. Strong ICT clusters generate higher living standards by providing individuals with access to valuable products and services – such as improved communications, education, and health care – at increasingly affordable prices. These clusters accelerate innovation, facilitate information sharing, and provide firms with access to new markets. Finally, ICTs empower other industries and clusters to allocate scarce resources to tasks that yield higher value-added products and services, in turn stimulating productivity and GDP growth.

The experiences of other countries clearly illustrates that the enabling effects of the ICT cluster on other clusters, firms, and people are real, quantifiable, and substantial. In total, these effects have been shown to have a multiplier effect⁵ on ICT-related investment across clusters. In terms of overall ICT investment, multiple studies from around the world have confirmed that increased spending on ICTs creates a multiplier effect on economy, in the range of 1.1 to 1.7 times investment, compared to a multiplier effect of between 0.2 and 0.4 for manufacturing investment.⁶

Enabling firms

At the firm level, ICT products and services enable existing firms to grow faster, increase productivity, and operate more profitably. The ICT cluster stimulates new business creation by increasing the flow of ideas and information, lowering the cost of business, and facilitating new business models. With the introduction of new technologies, labor can be deployed more efficiently, processes can be streamlined, and raw data can be analyzed and synthesized more quickly to aid decision making. Consequently, firms are more innovative and reap continuous productivity gains.

Businesses using ICT more intensively tend to grow faster in terms of sales and employment.⁷ In a study of 600 medium-sized global firms, the top quartile measured by IT capability grew at 14.5% per year, with an average profitability of 10.3% for a two-year period; while the bottom quartile grew at 8.5%, with an 8.8% profit margin for the same period.⁸

⁵ Multiplier effect: total investment across the (ICT) value chain is multiplied by this number to capture the total additional impact of such expenditure through indirect economic benefits, beyond direct returns on that investment

⁶ *Global Mobile Tax Review 2006–2007*, Deloitte, GSM Association

⁷ After controlling for ownership, export status, size, and age

⁸ *Why IT Matters in Midsized Firms*, Iansiti et al., 2005



Specific ICT products and services, such as mobile phones and the Internet, have been shown to affect company growth rates significantly. For example, 59% of small businesses in Cairo reported increased in profits as a result of using mobile phones.⁹ In a recent World Bank study, firms that used email to communicate with clients and suppliers grew more than twice as fast as those that did not use email. A similar study involving U.S. small businesses found that those using the Internet grew 46% faster than those that did not.¹⁰

Enabling people

Regardless of individuals' age, occupation, race, or gender, ICT products and services enable them to make more informed decisions, decrease response times, and increase availability of goods and services, ICT or otherwise. The net result is increased productivity: communications, actions, and exchanges that once took two weeks now seemingly take two seconds. Many productivity improvements can be difficult to measure, such as the actual value of increased productivity resulting from consumer or student use of ICT; however, several studies have demonstrated the effect of ICT on labor productivity. While ICT industries contributed only 6% to GDP and 29% to national investment in the U.S. economy in 2003, ICT accounted for over 80% of labor productivity growth from 1996 to 2000.¹¹

Enabling clusters

Perhaps one of the ICT cluster's most unique and valuable aspects is the ability of related products and services to be adapted and integrated across the wide range of industries and clusters in an economy. Because the rapid and efficient exchange of information and knowledge is critical to all industries in a country, increasing ICT usage by clusters can rapidly and significantly increase their competitiveness, and ultimately country-level competitiveness. This effect is magnified for service industries that constitute an increasing core component of advanced economies, and are a key growth priority of the Saudi Arabian government.

The following six subsection describe the ICT cluster's function as an enabler, and provide relevant experiences from ICT clusters worldwide. These six clusters were selected based on their importance to the Kingdom's economy and overall competitiveness, and include the education, health care, transportation, financial services, tourism, and oil and gas clusters. While not exhaustive, this list illustrates the breadth and depth of advanced ICT usage by non-ICT clusters worldwide, and forecasts potential benefits for Saudi Arabia as its ICT cluster develops and grows.

EDUCATION

In the education cluster, ICT applications are creating more productive learning environments by improving the delivery of knowledge and critical thinking skills from teacher to student. This occurs in two ways: first, basic ICT applications (e.g., email and the Internet) are enabling teachers and students to work better within their existing environments; second, advanced ICTs are stimulating dramatically new and more effective learning environments, based on new teaching approaches and techniques.

⁹ *The Impact of Mobile Phones in Africa, Vodafone Policy Paper Series, Number 3, 2005*

¹⁰ World Bank

¹¹ *Achieving the Lisbon Agenda: The Contribution of ICT, Indepen and Ovum, 2005*



Teachers are using ICTs to design curricula, lectures, and assignments with increasing collaboration and input from peers. An overwhelming majority (90%) of teachers in Europe use ICTs to prepare their lessons.¹² Students using ICTs are able to draw on growing stores of knowledge via the Internet, and interact with other students and teachers in more informal, non-classroom settings. According to a recent survey of European teachers, 86% believe students with access to ICT products and services in and out of the classroom display increased motivation, teamwork, and independent thinking compared with students lacking such access. In fact, student and teacher ICT usage correlates with improved test performance by students. Recent studies show that ICT use between ages 7 and 16 can result in significant relative gains in English, science, and design and technology. On an international level, the analysis of OECD PISA test results indicates that longer student use of computers correlates with better math performance.

The development of new education methods and systems, collectively known as e-learning, is being enabled by the advanced application of ICTs in the learning environment. Examples of e-learning include computer-based learning, interactive and collaborative assignments, and distance learning. This final application in particular has developed significantly over the past five years, and is one of the clearest examples of how ICTs enable the education sector. Learning is no longer set within programmed schedules and slots. Students can enroll and participate in courses offered by external institutions, sometimes thousands of miles away. In Sweden, the number of students participating in long distance education via the Internet tripled from 21,000 students in 1993 to 64,000 in 2003.¹³ In the U.S., nearly 20% of all higher-education students took at least one online course in the fall of 2006.¹⁴ Advanced ICT applications are also better equipping teachers with necessary teaching methods and skills. Teachers are using electronic education packages, including teacher manuals and educational websites, to increase their subject matter knowledge.

HEALTH CARE

The use of ICT products and services across the health care value chain – from drug discovery and clinical testing to hospital administration and doctor-patient interaction – is significantly lowering costs and improving service and care levels. Health care stakeholders (lab technicians, doctors, and hospital administrators) are spending less on health care administration and more on improving the quality of health care delivery.

The advent of numerous e-health initiatives highlights the growing importance of ICT products and services in the health care cluster. Virtual drug discovery, information dissemination, telemedicine,¹⁵ electronic medical records, and e-prescriptions are just a few of the e-health projects being pursued by the most competitive economies. Results are very promising. In Sweden, 42% of all prescriptions are now transferred electronically from the doctor to the pharmacy, increasing security and quality and reducing errors. By 2008, the system is expected to have generated over US\$460 million in cumulative benefits – an estimated productivity gain, measured in a 58% decrease in per-prescription costs.¹⁶

¹²*The ICT Impact Report*, European Schoolnet, 2006

¹³*e-learning Country Brief: Sweden*, Lone Jensen 2005

¹⁴*Making the Grade: Online Education in the U.S.*, the Sloan Consortium, 2006

¹⁵Includes telemonitoring, remote diagnostics and remote drug delivery

¹⁶*eHealth Is Worth it – The Economic Benefits of Implemented eHealth Solutions at Ten European Sites*, Karl A. Stroetmann, Tom Jones, Alexander Dobrev, Veli N. Stroetmann



TRANSPORTATION

Passenger and cargo transportation systems – including roads, railways, ports, cars, ships, and planes – have traditionally relied on integrated ICT applications to ensure safe, efficient transport of people and goods. Embedded sensing and communications networks, such as RFID scanning, have enabled new business models to evolve: virtual manufacturing operations combine just-in-time delivery from suppliers and made-to-order, customer-facing websites; and shipping companies have become end-to-end logistics and global solutions providers. In the public sector, ICT applications are reducing paperwork, enabling remote management of transit and transportation systems, and automating trade and customs processes.

The EU's Intelligent Car Initiative will implement several integrated ICT solutions to enable faster and more accurate accident reporting and prevention, and traffic aversion systems. In the event of an accident, eCall automatically sends GPS coordinates to local public agencies, which trigger emergency response teams and traffic warnings. A recent study estimated that complete adoption of eCall would reduce accident fatalities between 5% and 15% and congestion times by 10% to 20%; and generate overall savings of some US\$35 billion.¹⁷

FINANCIAL SERVICES

ICT applications assist all aspects of the financial services cluster: retail and wholesale banking, front and back office management, securities information, and research provision. ICTs are also facilitating general business and commerce transactions, through the use of handheld point-of-sale devices that enable completely mobile yet secure buying and selling of goods via credit card.

The retail banking industry in particular is at the forefront of ICT usage, with the introduction of Internet banking. As of 2002, more than 100 million households worldwide used Internet banking services, including account management, money transfers, and bill payment – an increase of more than 2,000% since 1995. If the 1990s represented the move from traditional branch banking to Internet banking, the 2000s are shifting customers from Internet to mobile banking. By 2010, it is estimated that 35% of online banking households will use mobile banking, up from fewer than 1% today.¹⁸

TOURISM

One of the greatest enabling effects of ICTs in service industries, particularly tourism, is customer empowerment. ICTs have completely shifted the tourism industry from a largely channel-based system (via travel agents) to a direct-to-customer model. Finding, comparing, and booking hotels, flights, and rental cars; researching and planning destinations and activities; and sharing experiences, stories, and photos have all moved out of the travel office and into the home. E-tourism is increasing direct information delivery to customers while decreasing the attendant cost.

E-tourism is the leading business-to-consumer (B2C) e-commerce application, accounting for over 40% of all B2C e-commerce and projected to account for 25% of travel purchases within the next five years. In the

¹⁷*On the Intelligent Car Initiative: Raising Awareness of ICT for Smarter, Safer and Cleaner Vehicles*, Commission for European Communities, 2006

¹⁸*Mobile Banking: Beyond the Buzz*, Celent, 2007



U.S., 66% of users believe online tourism portals lead to better-quality services compared with traditional travel agents. UNCTAD has launched an e-tourism initiative to extend the benefits of the tourism sector to developing countries that are responsible for a large portion of the tourism market. ICTs can enable these countries to keep more of the money spent by the tourists they attract.

OIL AND GAS

ICT products and services are increasing productivity across the oil and gas value chain, from discovery, extraction, and oil field management through sales, transportation, and the downstream petrochemicals industry. ICT applications enable remote electronic operation, monitoring, and control; virtual offshore support teams; content management systems; and seamless integration with the worldwide network of suppliers and buyers.

Globally, the oil and gas industry has developed some of the most advanced ICT software. In the early 1990s, the advent of sophisticated 3-D modeling and visualization technology significantly reduced exploration cost and improved drilling success rates. This technology creates three-dimensional images from cross-sections of the earth, allowing technicians to produce more accurate models of the subsurface to improve oil exploration success rates, and wells, total waste, and surface disturbance. From 1980 to 1999, discovery cost decreased from US\$20 per barrel to just under US\$5 per barrel. The technology has also increased the average depth of underwater drilling by more than 50%.

The preceding sections briefly characterize the ICT examples cluster's role as a direct and indirect contributor to an economy. Many more examples exist. As clusters and economies develop and evolve, ICT clusters will play an increasingly important role. The challenge for Saudi Arabia is to ensure the Kingdom's ICT cluster achieves its potential. The following section provides an overview of the Saudi Arabian ICT cluster's present condition and identifies opportunities for future growth.

Current status of the ICT cluster in Saudi Arabia

"Information and Communications Technology (ICT) has become one of the key factors in development of societies as information and knowledge have become a major factor of production in modern economies, with the ICT sector playing the role of the facilitator and motivator of efficiency and productivity in other sectors."

– Saudi Arabia's 8th Development Plan

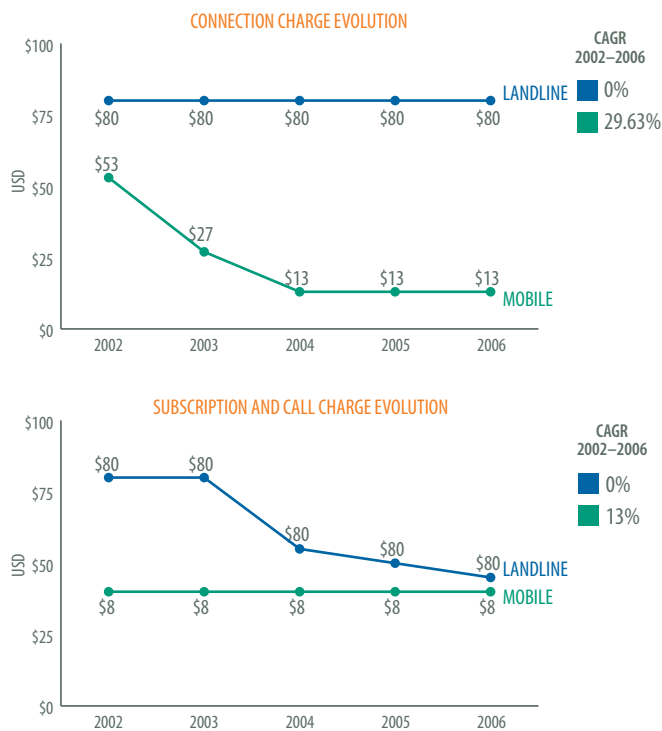
The ICT cluster in Saudi Arabia has grown significantly over the past decade. But expansion at similar rates for the next ten years is not guaranteed. The following overview of the Saudi Arabian ICT cluster characterizes the recent economic performance of the cluster as a whole, while highlighting broad opportunities and challenges it currently faces. These provide the basis for the competitiveness assessment of the ICT cluster and the NCC's forward-looking recommendations for improvement.

Liberalization of the mobile telecom market has decreased the cost to consumers, increased penetration, and enabled the incumbent, STC, and the new entrant, Mobily, to grow their revenues profitably. In anticipation of competition by 2004, STC reduced mobile connection fees by 75% over two years and its subscription fee by more than 31%. Mobily's entrance into the market resulted in further decreases in



connection and subscription, along with a 9% reduction in the per-minute charge to 10 cents per minute. Because subscriber growth far exceeded the decline in average revenue per user (ARPU), due to the reduction in pricing, both Mobily and STC are operating profitably. While ARPU decreased by about 14% from 2002 to 2006, total industry earnings increased by 23% as the number of subscribers increased by 41% (Figure 2).

Figure 2: STC Pricing Evolution, 2002–2006

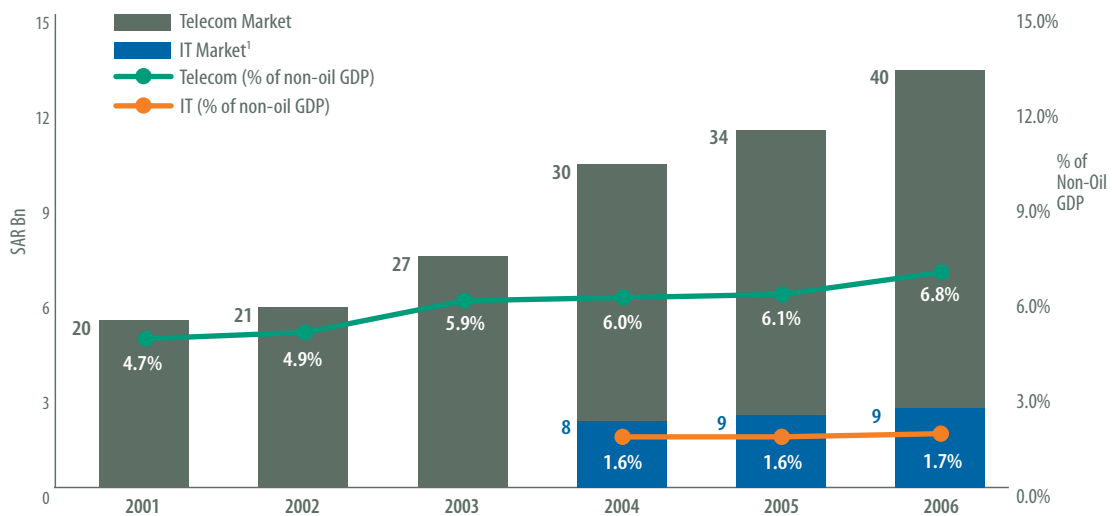


Source: *Launch of New Licensing for Fixed and Mobile Services*, CITC, April 2006; *CITC Annual Report, 2006*; Arab Advisors Group; ITU

Beyond the growth of basic telecommunications services, the ICT cluster in Saudi Arabia will play an increasing role in the development of the Kingdom's economy. As with clusters in other countries, the Saudi Arabian ICT cluster is growing rapidly. Since 2001, the telecommunications market has grown at 15% per year, from 20 billion SAR to 40 billion SAR in 2006. Similarly, the information technology market has grown at 9% over the past three years, reaching 9 billion SAR in 2006. As the telecommunications industry matures, Saudi Arabia must find ways to stimulate the IT industry (Figure 3).



Figure 3: Saudi Arabian Telecom and IT Market Sizes as a Percentage of Non-Oil GDP, 2001–2006

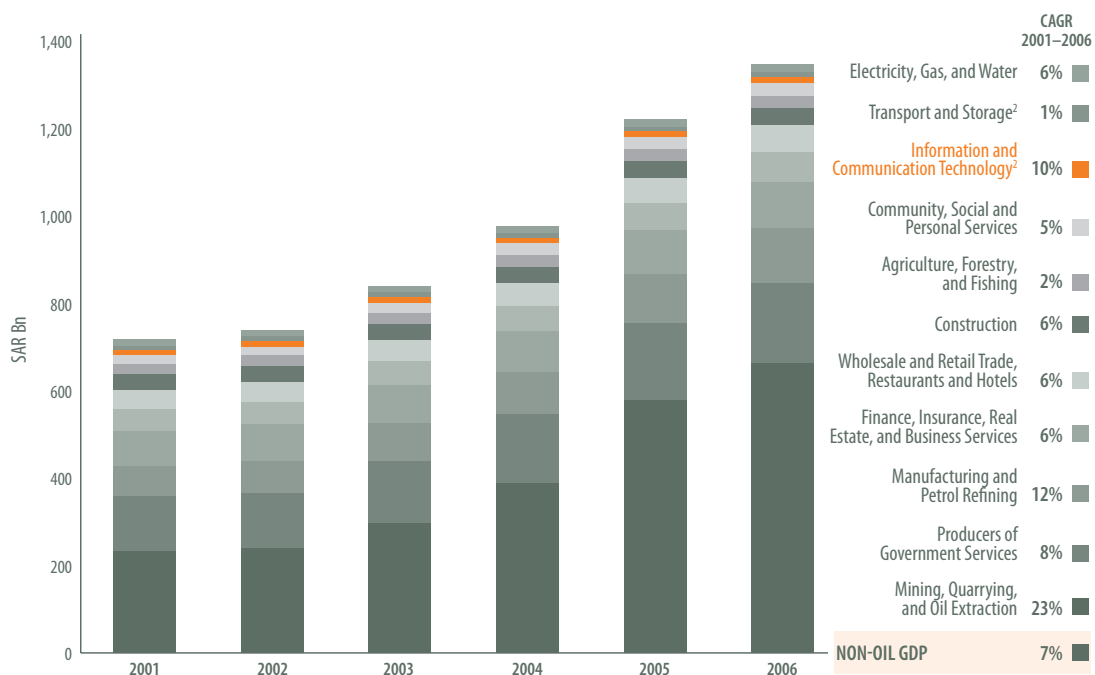


Source: Telecom Sector Reforms in Saudi Arabia: Towards Full Market Liberalization, CITC, June 2007; Saudi Arabia Information and Technology Report Q2 2007: BMI, May 2007; Saudi Arabian Monetary Agency

¹IT market figures not available prior to 2004; figures for IT market size in 2005 and 2006 are estimates

In terms of contribution to GDP, the ICT sector is estimated to have grown almost 10% per year in the past five years, compared to 7% for non-oil GDP. In 2006, the Saudi Arabian ICT cluster contributed 27 billion SAR to the economy, up from 17 billion in 2001. On a percentage basis, the ICT cluster's contribution increased slightly, from 4% in 2001 to 5% in 2006. Maintaining and increasing the cluster's growth contribution can significantly advance the Kingdom's goals for diversifying the economy, ensuring that a larger proportion of economic production results from industries other than oil extraction (Figure 4).

Figure 4: GDP¹ by Economic Activity at Current Prices



Source: SAMA; World Bank; NCC Analysis

¹GDP is defined as gross domestic product by type of economic activity at producers' values in 1999 constant prices

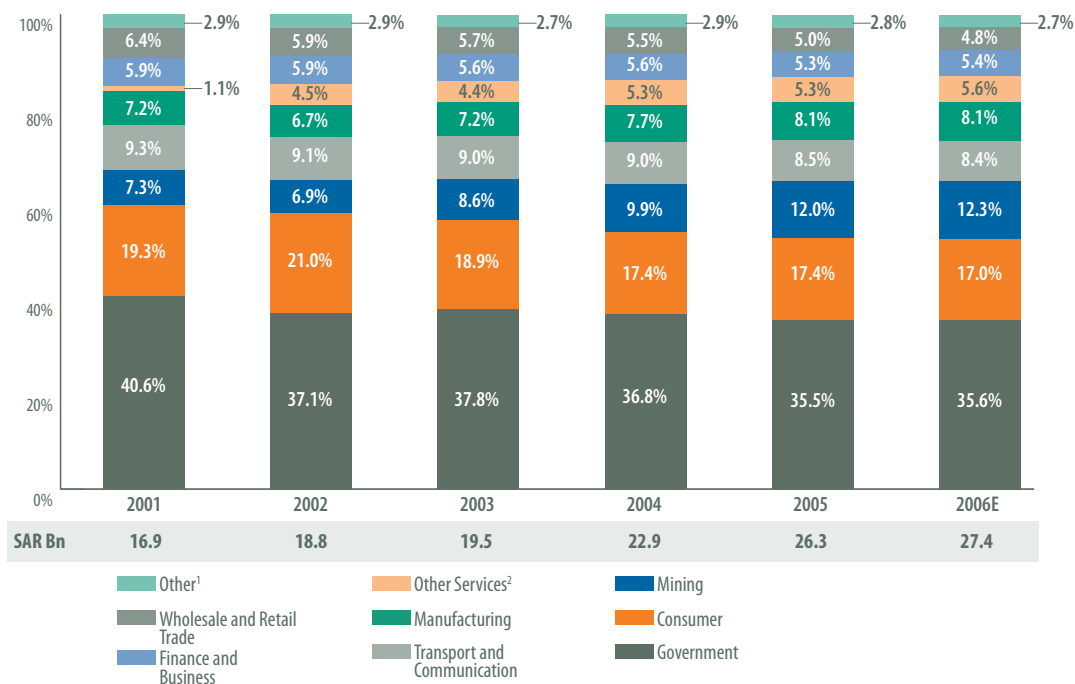
²ICT and transport sectors based on World Bank ICT expenditure data for Saudi Arabia



While growth in the Saudi Arabian ICT cluster is generally strong, it is not well diversified by industry or customer group. The telecommunications industry has been the main driver of overall ICT growth, accounting for 60% of total ICT revenues over the past three years (2004–2006). Within the telecom industry, mobile service provision accounted for over 80%, or 30.4 billion SAR, of the total market in 2006 (40.1 billion SAR), up from 40% (7.9 billion SAR) in 2001.

Customers using ICT products and services are also not sufficiently diversified. ICT spending in the Kingdom has grown at over 10% per year since 2001, reaching 27.4 billion SAR in 2006. However, this spending is primarily driven by the government, due to ministries and other institutions establishing or upgrading computer networks and services. This requires a significant amount of up-front investment but may not be sustainable in the long term. Public sector spending on ICT products and services accounted for almost 36% of ICT spending in 2006, down from 41% in 2001 but still a significant share. In contrast, public sector spending in Top 10 Countries ranges between 10% and 28% of total ICT spending (Figure 5).¹⁹

Figure 5: Breakdown of ICT Spending by Industry, 2001–2006



Source: Digital Planet 2006 Report, WITSA (World Information Technology and Services Alliance), May 2006

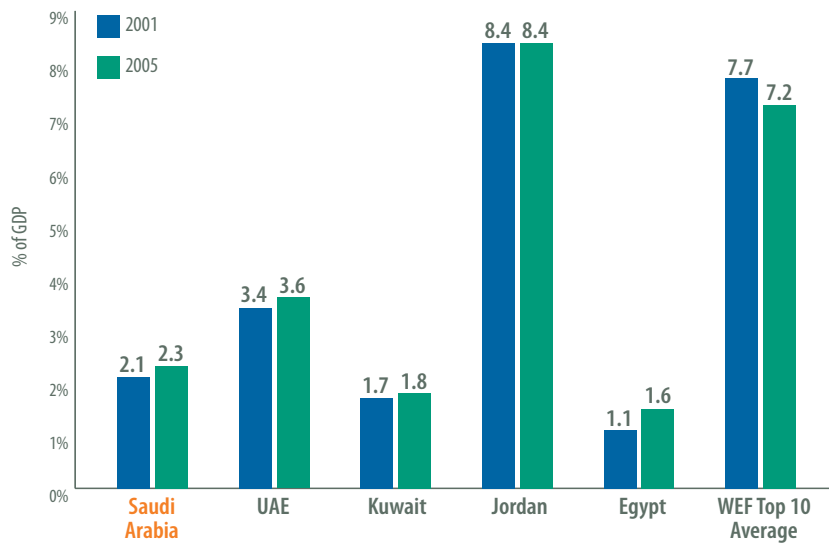
¹Other includes Utilities, Agriculture, and Construction

²Other Services includes all organizations providing services related to recreation, entertainment, health care, legal, education, social, and professional services

Spending on ICT products and services in Saudi Arabia is growing, but by many measures the ICT cluster remains undersized. Its contribution to the Kingdom’s GDP remains small, at an estimated 2% in 2005. ICT cluster contribution to GDP is much greater in the UAE, in Jordan, and in Top 10 economies, where it averages 8% (Figure 6).



Figure 6: ICT as a Percentage of GDP



Source: World Bank, 2006

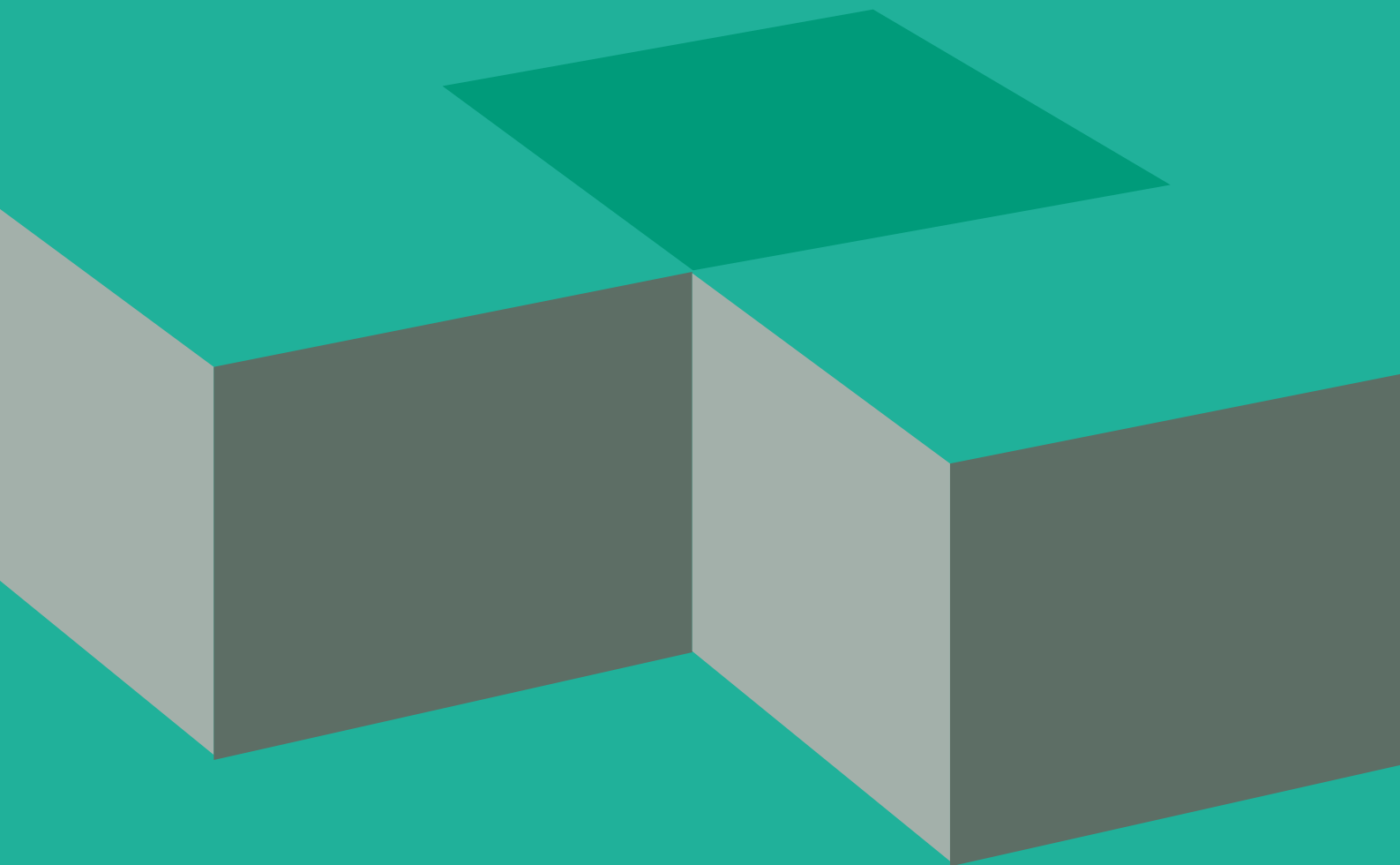
The ICT cluster in Saudi Arabia accounts for only 1% of total employment, compared to Europe (EU-15), where the ICT industry provides direct employment to 3.4% of the workforce.²⁰ One major reason for this low level of employment is the current skew of the ICT cluster in Saudi Arabia toward the telecommunications industry, which requires fewer employees than the information technology industry. Technological improvements, such as high-speed wireless data transmission, fiber optic lines, and advanced switching equipment, are more efficient (because they have higher data capacity) than previous communications technologies, which reduces employment needs. Telecommunications equipment is now more reliable and requires less active monitoring. If the information technology industry were to grow in Saudi Arabia, the ICT cluster's contribution to employment would improve to match that of Top 10 Countries.

Significant opportunities exist for the ICT cluster in Saudi Arabia to grow the non-mobile telecom and IT industries. As a result, the Kingdom can increase the contribution to GDP from a non-oil sector, create new opportunities for employment, and enable people, firms and other clusters to benefit from new ICT products, services, and applications. However, taking full advantage of these opportunities will require significant cooperation among the numerous public and private stakeholders across the Kingdom. Based on available data, there are more than 25 organizations participating in one or more competitiveness enhancement initiatives, and seven different public organizations that have created ICT cluster strategic plans (in varying stages of depth and development).

The ICT Cluster Advisory Council, established this year by SAGIA and the National Competitiveness Center (NCC), creates a platform for ICT stakeholders to align their initiatives, to advocate for reform, and to create significant change. The advisory council will bring together the private sector, the government, and other key stakeholders to address major issues in the cluster, including those identified in this Competitiveness Review.

²⁰World Bank, International Telecommunications Union

Measuring Competitiveness of the ICT Cluster





Measuring competitiveness of the ICT cluster

At the national level, competitiveness measures a country's ability to create sustainable value through its enterprises, and to maintain a high standard of living for its citizens. Competitiveness is assessed across countries by various international ranking agencies applying a uniform set of criteria. The NCC uses two primary indexes to measure Saudi Arabia's competitiveness against that of other countries: the World Economic Forum (WEF) Global Competitiveness Index (GCI), and the International Finance Corporation's (IFC) Ease of Doing Business report.

For this specific analysis of the ICT cluster in Saudi Arabia, the NCC employs ICT parameters in the GCI to benchmark the cluster's performance against that of 130 countries. Within the GCI, there are ten metrics specifically related to the ICT cluster, of which four are based on hard data and six on survey data. Hard data metrics related to the ICT cluster measure penetration rates of mobile phones, computers, the Internet, and broadband, and are calculated based on the number of subscribers divided by the country's population. The WEF's ICT survey-based metrics compile Saudi Arabian business executives' opinions on the Kingdom's ICT laws and availability of technology, among other metrics (see Table 1).

Table 1: GCI Metrics Related to the ICT Cluster

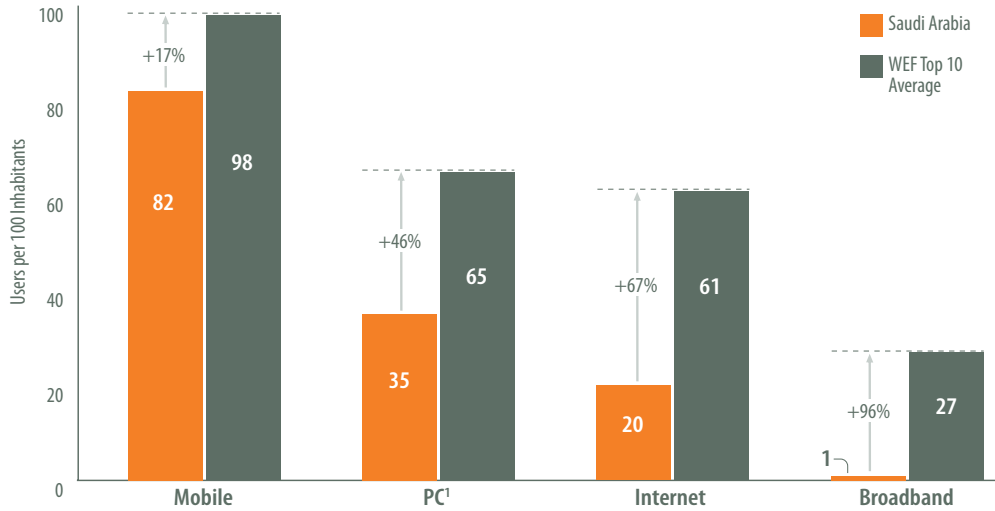
HARD DATA
Mobile telephone subscribers
Personal computers
Internet users
Broadband Internet subscribers
SURVEY DATA
Availability of latest technologies
Firm-level technology absorption
Laws relating to ICT
FDI and technology transfer
Prevalence of foreign technology licensing
Government procurement of advanced technology products

GCI metrics: hard data

While Saudi Arabia's performance across all hard data metrics varies significantly, it is consistently below that of Top 10 Countries. There is only a 16% gap between mobile penetration in the Kingdom and the Top 10 Average, or eighty-two users per 100 inhabitants compared to the Top 10 Average of ninety-eight users per 100. However, the gap in broadband Internet penetration is over 96%, or less than one user per 100 compared to over twenty-seven users per 100 in Top 10 Countries (Figure 7).



Figure 7: Current Penetration Gap – Mobile, PC, Internet, Broadband, 2006



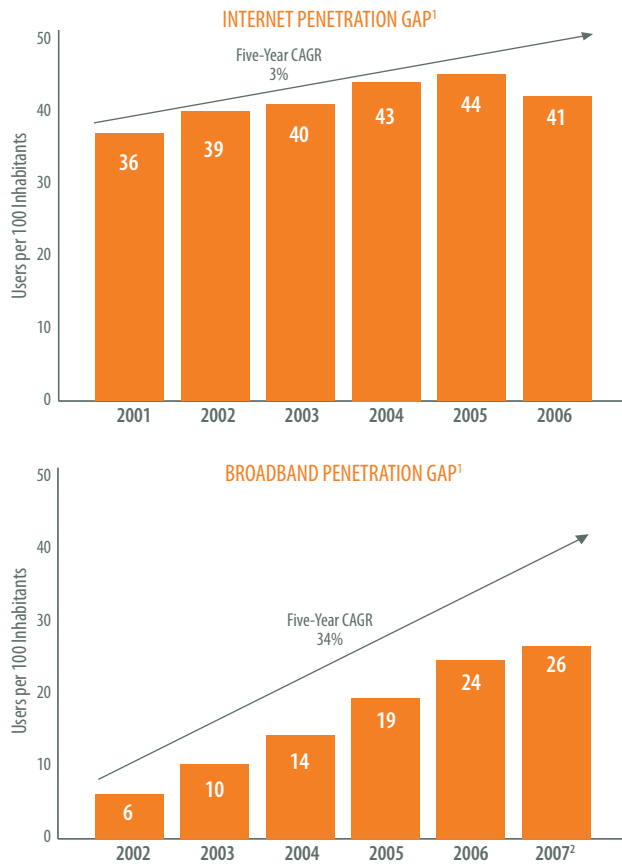
Source: OECD; *Information Economy Report 2006*, *United Nations Report on Trade and Development*; *Telecom Sector Reforms in Saudi: Towards Full Market Liberalization*, CITC, June 2007

¹Latest available PC data is from 2005

While the gap in mobile penetration rates between Saudi Arabia and the Top 10 Countries has narrowed over the past five years, the Internet and broadband penetration gaps are increasing at a rate of 3% and 34% per year, respectively. Saudi Arabia should work to improve its performance across all of these metrics, but broadband clearly needs the most attention (Figure 8).



Figure 8: Growing Gap in Penetration between Saudi Arabia and the WEF Top 10 Average



Source: *Telecom Sector Reforms in Saudi Arabia: Towards Full Market Liberalization*, CITC, June 2007; *Information Economy Report 2006*, United Nations Conference on Trade and Development, 2006; OECD

¹Gap is measured as the penetration rate for Saudi Arabia subtracted from the WEF Top 10 Average penetration rate

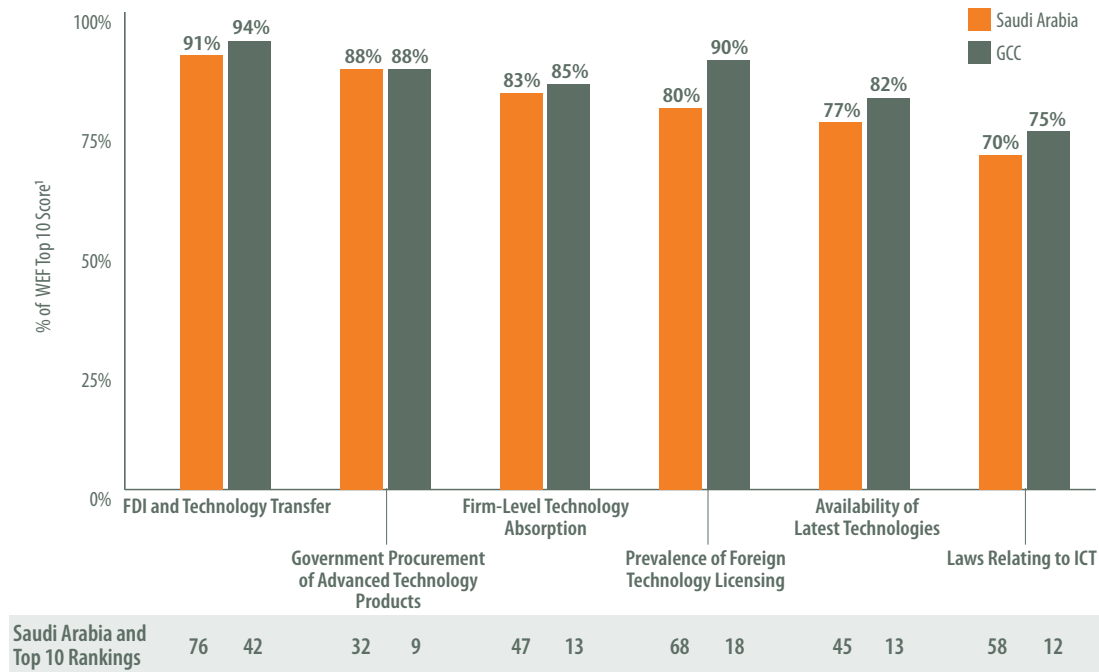
²As of second quarter 2007

GCI metrics: survey data

Converting Saudi Arabia's survey metrics and the GCC average into a percentage of the Top 10 score provides a good benchmark for judging the Kingdom's performance compared with that of peers in the region and the Top 10 Countries. While Saudi Arabia does not perform at Top 10 levels across any of the six survey questions, its performance related to FDI and technology transfer, at 91% of Top 10 levels, demonstrates good performance in the extent to which technology-related FDI flows into the country, and in the extent to which technology is transferred from foreign to domestic firms. The Kingdom also scores well on government procurement of advanced technology products – not surprising, given the public sector's high percentage of total ICT spending over the past five years.



Figure 9: Score Gap in ICT-Related Interview Parameters



Source: *Global Competitiveness Report 2007–2008*, World Economic Forum, October 31, 2007

¹Percentage is calculated as the Saudi Arabian or GCC score divided by the Top 10 score for the metric in question

The Kingdom’s performance on several survey metrics indicates the opportunity for significant improvement from both the public and private sectors. Laws relating to ICT is the lowest-scoring survey metric, at 70% of Top 10 levels – compared to the GCC average of 75% – and should be a priority for the government, in terms of both action and awareness. Regulators and legislators in the Kingdom should actively assess and improve their ICT regulatory framework; but the government should also find ways to increase awareness of existing rules and regulations and their role in encouraging competition and growth. The survey data also indicates a relatively low perception of the private sector’s research, development, and use of ICTs. The Kingdom’s performance on availability of latest technologies, at 77%, and prevalence of foreign technology licensing, at 80%, is low compared to Top 10 and GCC averages, respectively. The metric related to foreign technology licensing shows the largest gap between GCC and Saudi Arabia (Figure 9).

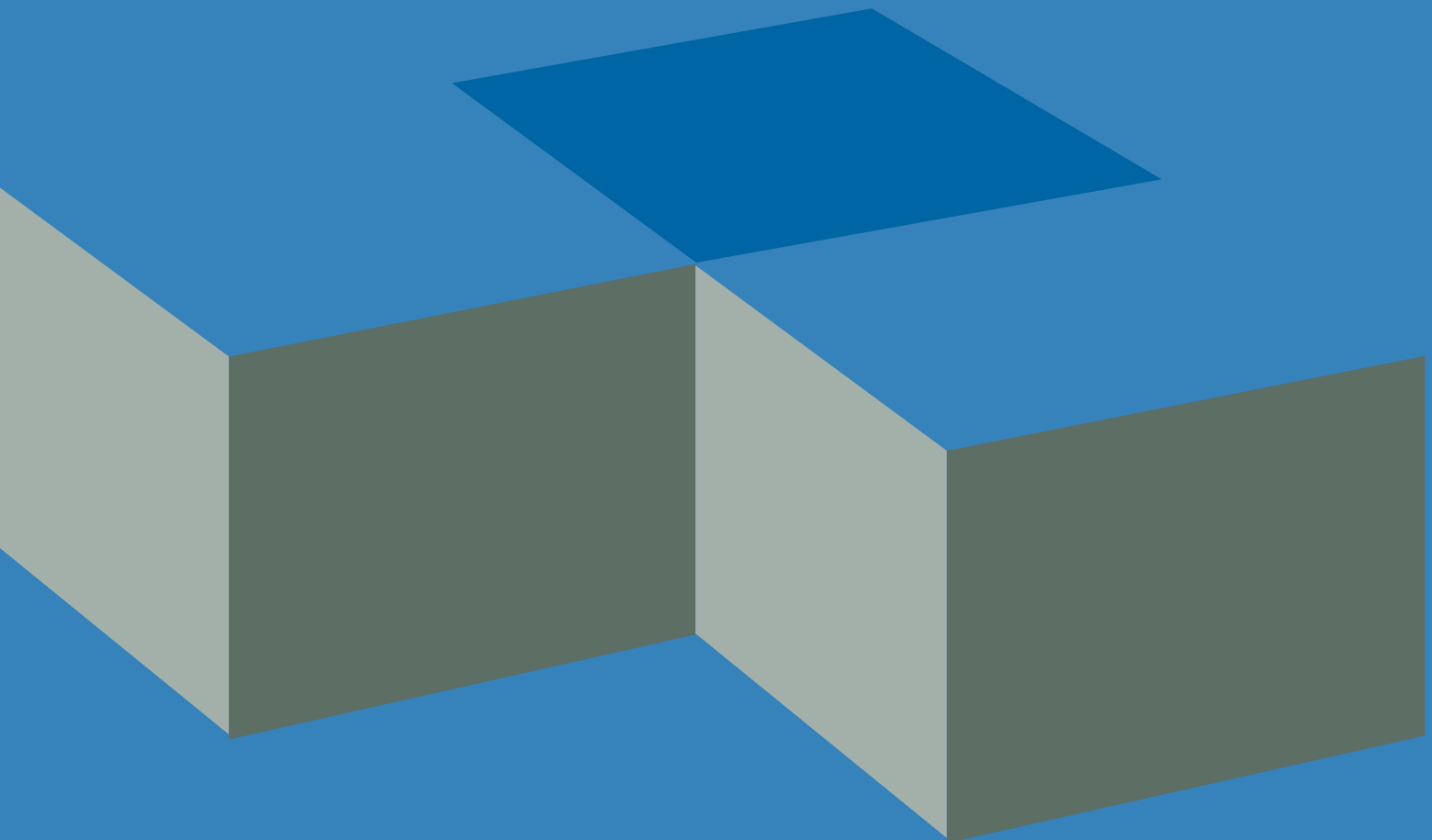
Even though Saudi Arabia appears to perform satisfactorily across most of these survey metrics, based on the percentage of the Top 10 score, its overall rankings need significant improvement to reach Top 10 levels: the Kingdom’s average rank across all six survey metrics is fifty-fourth.

ICT-related competitiveness metrics can identify broad areas in which to focus competitiveness-enhancing initiatives and investments. Such metrics are also useful in identifying gaps between Saudi Arabia’s performance and regional and international benchmarks (e.g., GCC and Top 10 Averages). However, such analyses do not identify underlying issues directly and indirectly affecting the Kingdom’s performance.



To overcome the limitations of competitiveness rankings, the NCC undertook a thorough analysis of the Kingdom's ICT cluster, and assessed the underlying factors affecting competitiveness and the related metrics of the ICT cluster. The following section, constituting the majority of this Competitiveness Review, results from of the NCC's analysis, which highlighted major drivers and barriers of the ICT cluster's competitiveness. Based on these factors, the NCC derived specific recommendations to address the major challenges facing the ICT cluster today.

Addressing Major Challenges Facing the Cluster





Addressing major challenges facing the cluster

From the Diamond Framework analysis, the NCC identified three major challenges facing the cluster, and a set of issues underlying each one.

Bridging the digital divide in mobile and broadband

- Improve accessibility and affordability of mobile phone service.
- Improve broadband penetration across the Kingdom.

Enhancing competitiveness of the local IT industries

- Increase availability of ICT-related financial and human capital.
- Encourage innovation and entrepreneurship.

Enhancing enabling effects of the ICT cluster

- Increase advanced ICT usage across clusters.

The following sections describe each of the above issues in detail, and outline the NCC's recommendations for ICT cluster reform, which focus on improving specific areas while maintaining a broad perspective about how each recommendation affects the Saudi Arabian economy as a whole.

1. Bridging the digital divide in mobile and broadband

"ICT infrastructure is a necessary but not a sufficient condition for growth of the Internet and development of a knowledge-based economy. Users should also acquire the knowledge and skills for using technology to obtain and exchange information, and perform electronic transactions; including e-commerce, e-government and distance learning. In turn, this requires narrowing the digital divide by eliminating digital illiteracy through training, education and awareness; providing the basic infrastructure for connecting schools, universities and libraries with the Internet; developing curricula and the education system; and producing educational materials and services for wired and online communities."

– Saudi Arabia's 8th Development Plan

The digital divide is a global phenomenon that defines the gap between those who can effectively use new information and communications products and services, and those who cannot. The digital divide can be seen more broadly as a reflection of long-standing socioeconomic and demographic trends: developing countries tend to use ICTs significantly less than developed countries, rural residents significantly less than urban residents, and lower-income groups significantly less than higher-income groups.

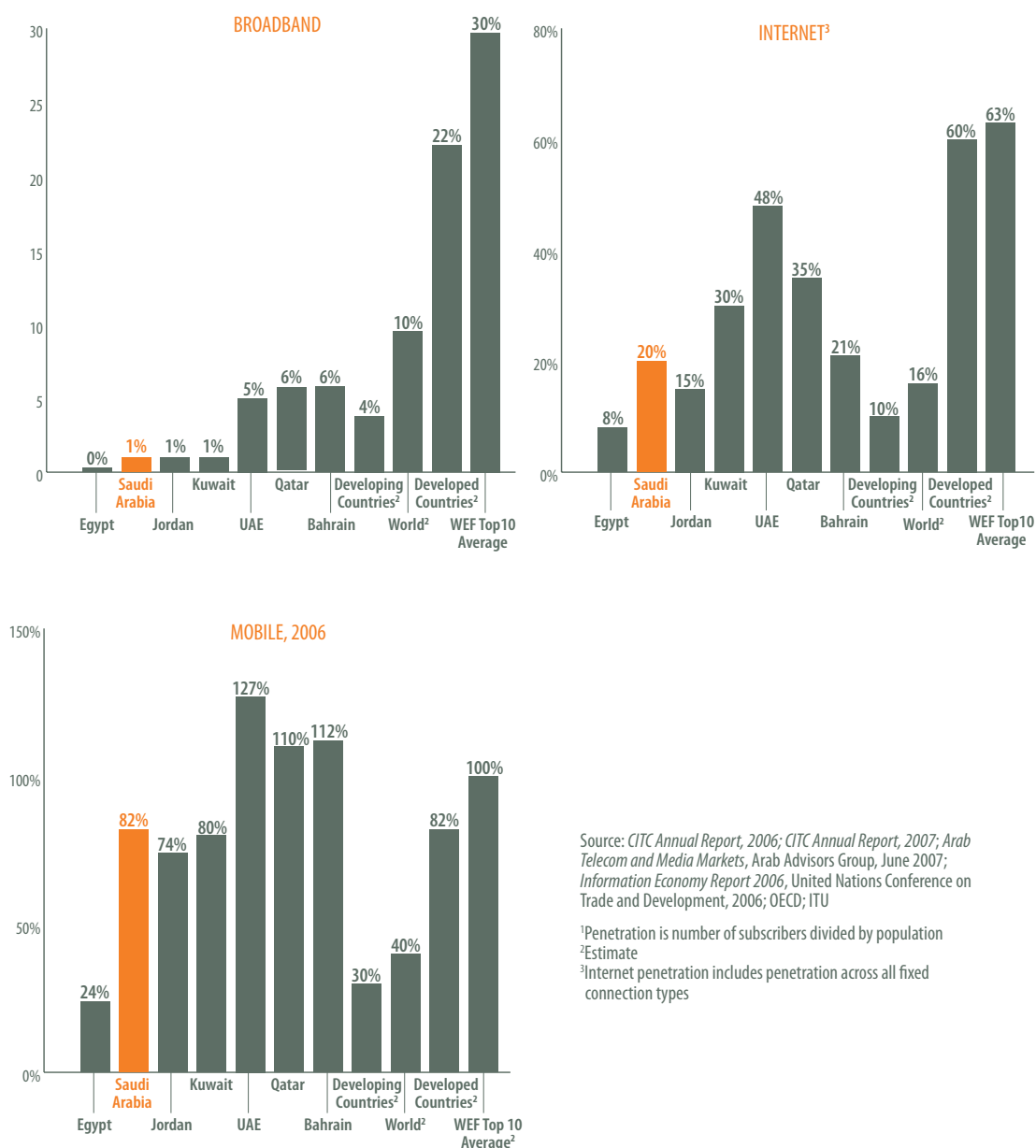
At the national level, mobile, Internet, and broadband penetration data for Saudi Arabia suggests that overall performance compared with regional and global benchmarks is varied but improving. However, there are significant differences in penetration rates among Saudi Arabia's thirteen provinces that may not change without intervention. Addressing these regional differences is crucial for improving Saudi Arabia's overall penetration rates, growing the domestic telecommunications markets, and increasing the ICT cluster's enabling effects across the Kingdom.



The Kingdom’s penetration rates compared with regional and international benchmarks

According to national penetration rates,²¹ Saudi Arabia’s performance is mixed. Regionally, the UAE, Kuwait, and Qatar outperform the Kingdom across all three metrics. Overall mobile penetration, at 82%, is on par with the developed world; however, it remains below the Top 10 Average of 100%. Internet penetration in the Kingdom (20%) is significantly lower than in the developed world (60%) and Top 10 Averages (63%). Broadband Internet penetration, recently described as the “next great utility” after water and electricity, remains substantially underdeveloped in the Kingdom, with penetration below 1%, compared to over 5% for the UAE, Qatar, and Bahrain, and almost 30% for Top 10 Countries (Figure 10).

Figure 10: Telecommunications Penetration Rates, 2006¹



Source: CITC Annual Report, 2006; CITC Annual Report, 2007; Arab Telecom and Media Markets, Arab Advisors Group, June 2007; Information Economy Report 2006, United Nations Conference on Trade and Development, 2006; OECD; ITU

¹Penetration is number of subscribers divided by population

²Estimate

³Internet penetration includes penetration across all fixed connection types

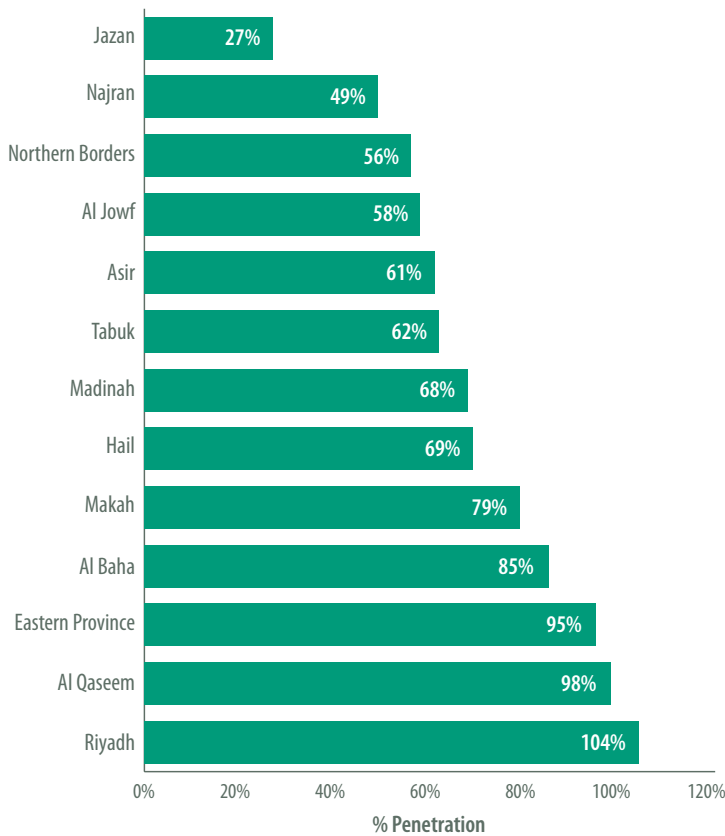
²¹Penetration rate is defined as the total mobile phones, computers, or Internet connections within a country, divided by the total population



Penetration rates within the Kingdom

Regional penetration data indicates the digital divide may be understated at the national level. The national mobile penetration rate of 82% is only achieved in four of the thirteen provinces (Riyadh, Al Qaseem, the Eastern Province, and Al Baha). The differences in penetration among provinces are significant; while there is more than one mobile phone for every person in Riyadh, there is approximately one for every four in Jazan (Figure 11).

Figure 11: Mobile Penetration in the 13 Saudi Arabian Provinces, 2006¹

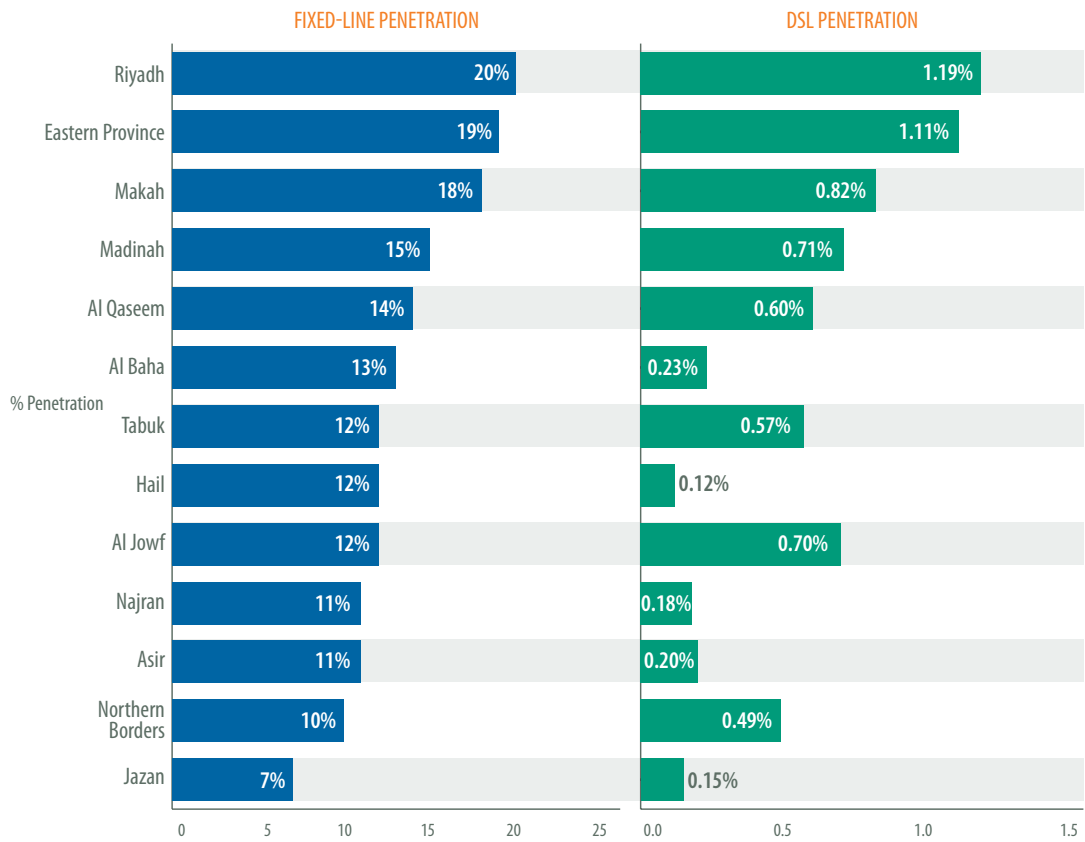


Source: Central Department of Statistics, 2006

¹Penetration is the number of subscribers divided by total population



Figure 12: Estimated Fixed-Line and DSL Penetration in the 13 Saudi Arabian Provinces, 2006¹



Source: Central Department of Statistics, 2006, NCC Analysis
¹Penetration rate is the number of subscribers divided by total population

While significantly underdeveloped at the national level, regional Internet and broadband penetration are more widely distributed than mobile penetration. Riyadh, Makah, and the Eastern Province are the primary drivers of both Internet and broadband penetration in the Kingdom; almost all of the remaining regions exhibit less than half the overall penetration. Fewer than one in 500 people have access to a broadband connection in five provinces in Saudi Arabia, including Jazan, Al Baha, Asir, Hail, and Najran (Figure 12).

The following two sections focus on the underlying issues affecting mobile and broadband penetration rates in Saudi Arabia, and provide specific recommendations for addressing each issue. The main factors inhibiting mobile growth relate to the accessibility and affordability of mobile service. Increasing broadband penetration, however, is significantly more challenging, and will require a broad strategic effort by the Ministry of Communication and Information Technology (MCIT), the Commission for Information Technology and Communication (CITC), and other public stakeholders to address four key areas: guiding infrastructure and investment toward rural areas, improving the regulatory environment, enhancing service development and content availability, and stimulating demand for services. These efforts should also be complemented with private sector initiatives; however, the Saudi Arabian government must take a lead role in coordination and facilitation.

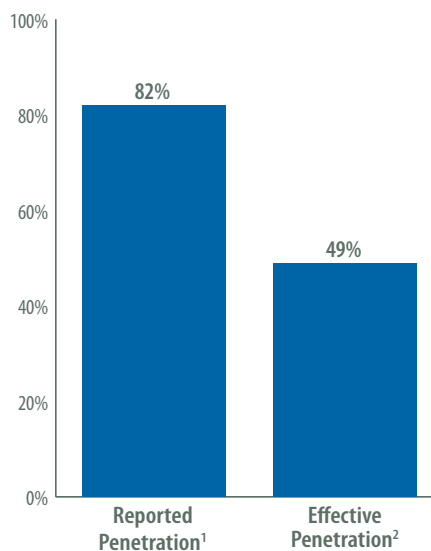


Improving accessibility and affordability of mobile phone service

The ongoing liberalization of the telecommunications industry has created significant opportunities for service providers and customers alike. Though penetration rates have grown in the double digits since 2001, to 82% in 2006, the NCC finds there may be room for further growth if certain barriers are addressed. Much of this growth potential lies with low-income customers in rural areas who are not currently using mobile phones. And this segment is large. Based on ownership and usage statistics, the NCC believes that effective penetration, the number of people using mobile phones divided by the population, is actually 49% in Saudi Arabia, compared to reported penetration of 82% (Figure 13).²²

This is so significant because the average number of phones per person in Saudi Arabia is higher than in even the most developed cellular markets (1.7 SIMs in the Kingdom compared to an estimated 1.5 per person in other countries with penetration rates above 100%). Additional growth opportunities in this heavy user segment are very low.

Figure 13: Reported vs. Effective Mobile Penetration Rates in Saudi Arabia



Source: *A Blue Ocean Market in the GCC*, EFG-Hermes

¹Reported penetration is the number of subscribers divided by total population

²Effective penetration is the number of people using phones (based on 1.7 SIM cards per person) divided by total population

²²Effective penetration is the number of people using mobile phones divided by the population. Reported penetration is the number of accounts divided by the population.



With over half the population still not using mobile phones, the market is considerably underserved.²³ The main issues affecting the 51% of the population without one or more mobile phones are access and affordability. While 2G and 3G+ mobile phone service is available in all the major population centers, rural citizens complain about service reliability. Even in areas with mobile service, most people cannot afford it. Compared to those in other countries, mobile phone carriers in Saudi Arabia do not offer enough basic packages to the large low-income population. The NCC proposes recommendations in the following section to increase accessibility and improve affordability, with the goal of offering mobile phone service to all residents of the Kingdom.

Increasing accessibility

NCC recommendations:

- Conduct or commission a study to better understand the drivers and barriers for consumers accessing mobile services outside urban areas of Saudi Arabia.
- Ensure the Universal Service Fund has an immediate focus on increasing access to basic mobile service in low-income, rural regions of Saudi Arabia.

Despite infrastructure investments and upgrades, rural citizens of the Kingdom face difficulties with service coverage. STC, the dominant mobile service provider, reports that it has 95% 2G and 70% 3.5G coverage of populated areas, and over 30,000 kilometers of mobile road coverage, or 63% of paved roads. Mobily has accelerated plans to roll out 3.5G infrastructure,²⁴ due to customer demand exceeding its projections. In a recent study, over 70% of rural resident respondents cited network coverage as the primary inconvenience related to mobile phones (Figure 14).

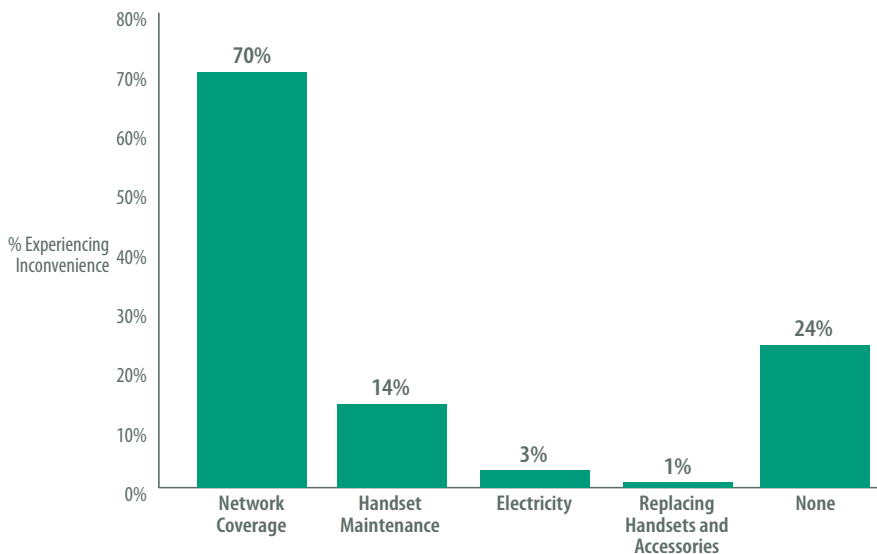
While Saudi Arabia has a high proportion (67% of total) of prepaid mobile users, due to large demand by low-income expatriates, users cite availability of recharge outlets (cards, stores, remote chargers) as a problem. More Saudi Arabian users than those in other Middle Eastern and North African countries, including Morocco and Lebanon (29%, vs. 27% and 3%, respectively), expressed “a lot” or “some” difficulty in obtaining prepaid mobile phone cards.

²³In 2006, the addressable market, calculated as the total potential market measured as a function of total SIM cards divided by population, was forecast at 118%, or a total of 28 million SIM cards, in contrast to current penetration of 82%

²⁴*The Socioeconomic Impact of Mobile Phones in the Arab World*, Zawya, 2006



Figure 14: Inconveniences Faced in Rural Areas of Saudi Arabia, 2006¹



Source: *The Socioeconomic Impact of Mobile Phones in the Arab World: Rural Community Survey*, MTC & Zawya, February 2006

¹Based on a survey of 200 mobile phone users from rural locations in Riyadh province

Recent actions by the Commission for Information Technology and Communication (CITC) demonstrate a commitment to increasing mobile service provision. It has announced the launch of a Universal Service Fund of almost 8 billion SAR, with the goal of achieving 100% access for voice and basic Internet at the household level over seven years, beginning in 2008. This target is ambitious and commendable. Other countries in the region and the world – including Egypt, Jordan, Morocco and Australia – have created or are in the process of creating Universal Service Funds. Though some countries are pursuing 100% service targets for mobile access, none has currently 100% service targets for the Internet.

As part of the rollout of the Universal Service Fund, CITC should use targeted studies in rural regions to understand other potential barriers, such as lack of prepaid recharging outlets, or handset sales and repair locations. Combined with an initial focus on increasing service in low-income rural areas, where mobile phone providers may have been previously reluctant to build out infrastructure, the CITC could significantly improve penetration rates in the short to medium term.

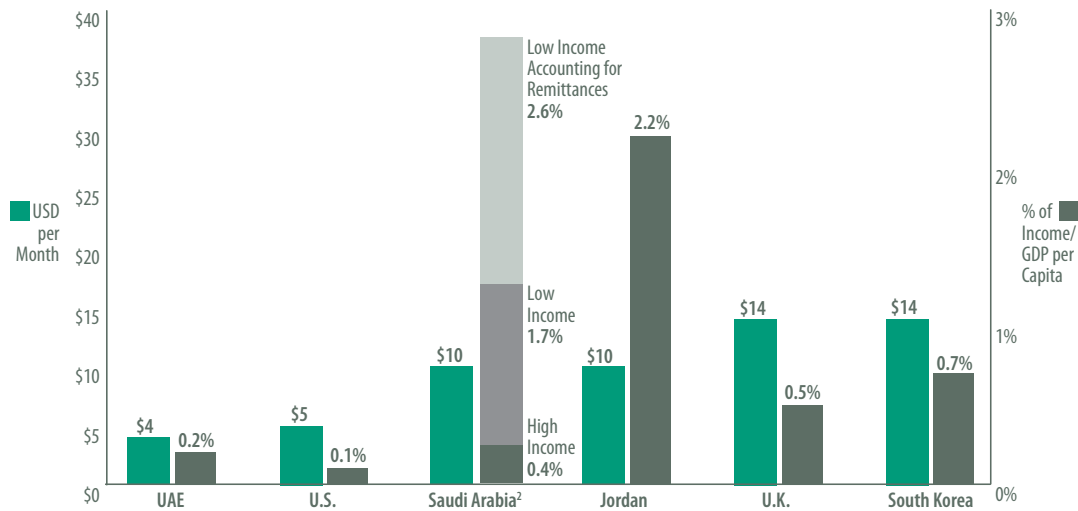
Addressing affordability

NCC recommendations:

- License a low-cost mobile virtual network operator to increase the affordability of telecommunications service, create more customer choice, and stimulate telecom usage and penetration.
- Work with mobile providers to develop products and services for low-income groups that account for the full burden of service usage (e.g., total cost of ownership).



Figure 15: Total Cost of Ownership for Mobile Phones, 2006¹



Source: *ICT at a Glance*, 2005, World Bank; ITU: NCC Analysis

¹Components of price basket for mobile include prepaid cost for 25 calls per month over the same or different mobile networks during peak, off-peak, and weekend hours, and 30 text messages per month

²Income per capita used instead of GDP per capita

Beyond ensuring all residents have access to basic mobile service, the government should focus on the affordability of such service. Based on available data, mobile service may be prohibitively expensive for a large segment of the population – almost 15 million – that is significantly more price sensitive than current subscribers. Over 60% of the population, including expatriates, can be classified as low income. While the total cost of ownership (TCO) for mobile services (Figure 15), estimated at 0.4% of monthly income per capita, may not be an issue for the higher-income minority, it places a significant burden on the lower-income group, with a mobile TCO over four times as large, at 1.7% of income. Taking into account expatriate remittances, this increases to over 2.6% of income, significantly greater than other regional and international comparisons. In fact, as a percentage of total household expenses, the cost of mobile phone service for rural citizens in Saudi Arabia may be as high as 16%. This may be the single greatest factor limiting future mobile penetration growth in lower-income segments.²⁵

With all of the major telecom companies investing significantly to create next-generation networks, these firms will be eager to recoup their investment by targeting high-income customers. Another way for mobile service providers to offset these costs is through the sale of excess network capacity to a mobile virtual network operator (MVNO), which could then focus on specific underserved segments of the market by offering targeted products and services. (Box 1).



Box 1

Mobile virtual network operators (MVNOs) purchase excess cellular capacity from current service providers and act as resellers or service providers, or own some level of network infrastructure. They focus on service delivery rather than infrastructure investment and maintenance, and leverage unique assets of non-telecom firms (brand, distribution networks, and customer bases) to target specific underserved market segments by:

- Adding a level of competition to continue growth in mature markets.
- Enabling current operators to capture untapped customer segments and develop new wholesale revenues.
- Allowing mobile providers to enter an attractive telecom sector without investing in infrastructure.

Introduction of MVNOs in Europe has generated new growth and increased consumer benefits after their markets reached maturity. After growing significantly in the 1990s and early 2000s, mobile service providers in Austria, Germany, and the Netherlands entered a period of low growth, having achieved penetration rates close to 90%. After they established service in these markets, penetration rates surpassed 100%. German mobile customers benefited significantly, as per-minute prices decreased by 20% after MVNOs were introduced in 2004.²⁶

In Saudi Arabia, an MVNO could be licensed to focus on providing basic low-cost service and targeting low-income segments of the country. Current and recently announced infrastructure investments by the three mobile firms²⁷ will result in significant network build-out across the country. In the near future, the Universal Service Fund will finance additional network infrastructure as it focuses on creating 100% coverage. This environment of near-universal and redundant coverage in the Kingdom is particularly conducive to MVNO licensing. In 2005, CITC committed to studying the implications of an MVNO, and given the rapid growth of mobile service it may be timely to accelerate the decision.

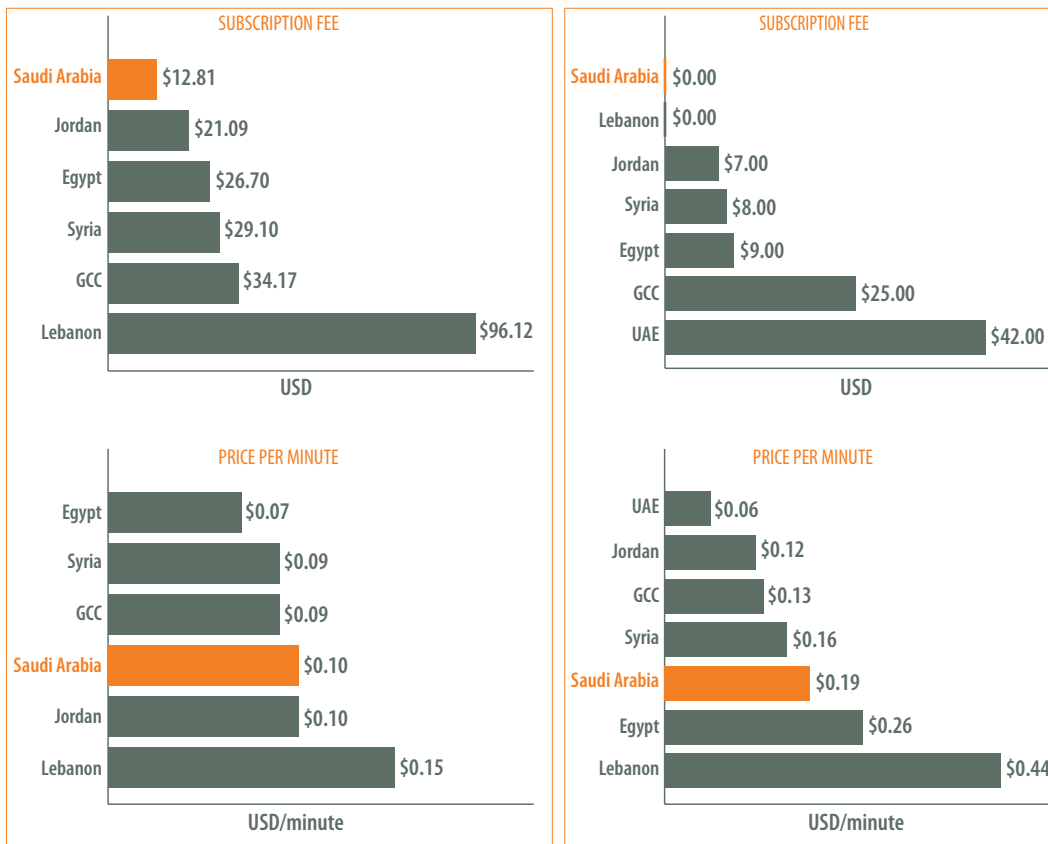
In addition to, or instead of, licensing a low-cost MVNO, the government, through CITC and MCIT, should work with existing mobile service providers to ensure availability of basic services at affordable prices. Although prices have dropped since Mobily entered the market in 2005, GCC and Top 10 benchmarks indicate room for improvement in both price and service offerings.

²⁶MVNOs in the Middle East: Threat or Opportunity? Delta Partners, 2007

²⁷MTC is expected to start operations in early 2008



Figure 16: Mobile Pricing Benchmarks, 2006



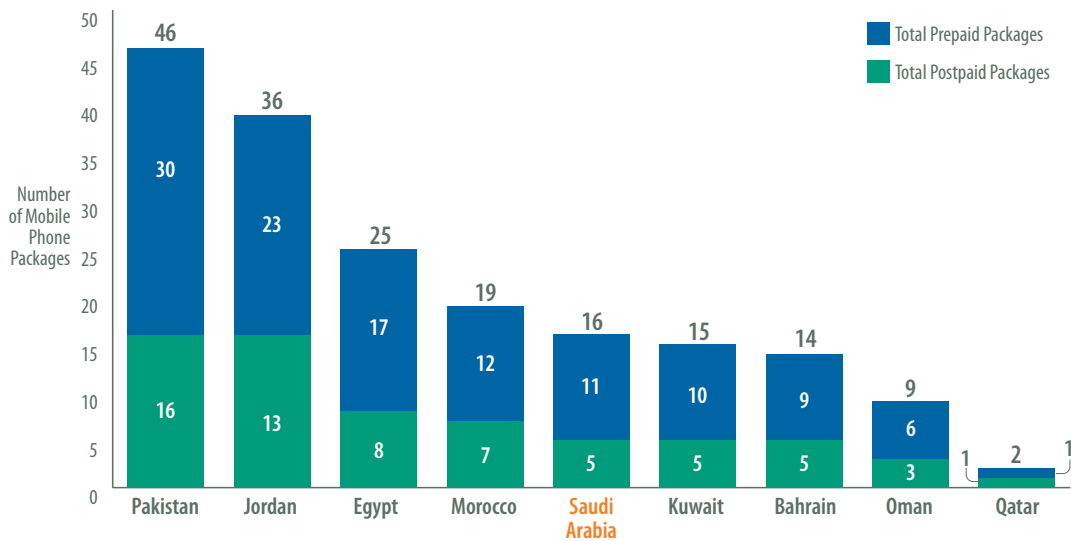
Source: CITC Launch of New Licensing for Fixed and Mobile Services, CITC, April 2007; CITC Annual Report, 2006; Arab Advisors Group

While subscription fees for both prepaid and postpaid service are the lowest in the region, per minute costs remain relatively high. Per-minute pricing is 11% higher for postpaid (10 cents vs. 9 cents per minute) and 46% higher for prepaid (19 cents vs. 13 cents) than the GCC average. The per-minute rate, rather than the subscription fee, is a major barrier to usage, as its long-term cost is significantly higher compared to the onetime subscription fee (Figure 16).

Rather than targeting low-income groups with inexpensive basic services, STC and Mobily have traditionally focused on stabilizing average revenue per user (ARPU) by serving existing, high-revenue segments with such value-added services as multimedia messaging (MMS) and high-speed data services. Firm sophistication, as measured by level of customer segmentation (e.g., packages targeting different segments), is relatively low compared to that of service providers in nearby countries (Figure 17).



Figure 17: Mobile Service Offering Benchmarks



Source: *A Blue Ocean Market in the GCC*, EFG Hermes, July 9, 2007

This lack of basic packages is not expected to improve on its own, as existing and potential future providers indicate a continued focus on delivering new value-added services and growth beyond the Kingdom. In 2007, STC announced a new investment strategy²⁸ to generate 10% of its total service revenues from inorganic growth by 2010. In 2007, the company invested US\$3 billion to acquire a 25% stake in Maxis and a 51% direct stake in Maxis’s NTS subsidiary in Indonesia. Mobily is actively working to accelerate fixed-mobile substitution in Saudi Arabia. In September 2007, the company announced its intention to buy 99.9% of Bayanat Al-Oula for 1.5 billion SAR. This will enable Mobily to leverage Bayanat’s 12,000-kilometer national fiber optic network to complement Mobily’s current HSDPA-based²⁹ mobile broadband service. A few months earlier, Mobily became one of just a few mobile firms worldwide to offer unlimited mobile broadband Internet at rates competitive with fixed-line solutions. The third service provider, MTC, is expected to enter in early 2008. Based on the company’s actions in other markets³⁰ and the extremely high price it paid for its Saudi Arabian mobile license,³¹ long-run low-cost offerings that target underserved customers are not expected.

²⁸According to a senior STC official, “The company is looking for large acquisitions in Asia and the MENA region with a market of at least 15 to 20 million users...and can comfortably raise US\$10 billion to US\$15 billion as debt to fund the new acquisition.”

²⁹HSPDA (high-speed packet download access) is a cellular-based mobile broadband technology.

³⁰Executives at MTC have indicated that competing purely on price is not a goal of the company: “Any price war would be damaging for the sector; competition should target quality and the introduction of new products.” And “MTC has never aimed to compete solely on price...but there is need for better coverage and better quality of service provision.”

³¹The consortium led by MTC paid the highest price per population in the region, at US\$234 per person, compared to the next highest, US\$137 per person, paid by Etisalat’s for a Saudi Arabian license; and an average of US\$45 per person for the past eight license acquisitions since 2002.



Improving broadband penetration across the Kingdom

“ICT infrastructure is a necessary but not a sufficient condition for growth of the Internet and development of a knowledge-based economy. Users should also acquire the knowledge and skills for using technology to obtain and exchange information, and perform electronic transactions; including e-commerce, e-government and distance learning. In turn, this requires narrowing the digital divide by eliminating digital illiteracy through training, education and awareness; providing the basic infrastructure for connecting schools, universities and libraries with the Internet; developing curricula and the education system; and producing educational materials and services for wired and online communities.”

– Saudi Arabia’s 8th Development Plan

NCC recommendation:

- Move beyond the planning stage to rapidly implement a National Broadband Strategy to increase broadband penetration across the country.

Of all of the ICT competitiveness metrics, broadband Internet penetration in Saudi Arabia is most significantly below the Top 10 Average. National broadband penetration is less than 1%, with little to no access outside major urban areas. The broadband penetration rate is lower than that of many GCC countries, and well below the Top 10 Average of 22%.

Broadband Internet access presents the greatest opportunity to increase competitiveness directly and indirectly through its enabling effects, providing more than just a faster connection. The high-speed, “always-on” service enables advanced two-way communication and data transfer services and applications not previously possible with dial-up Internet. High-quality video and audio access, large-file data transfer, distance education, telecommuting, telemedicine, and numerous other applications are all made possible by broadband Internet access.

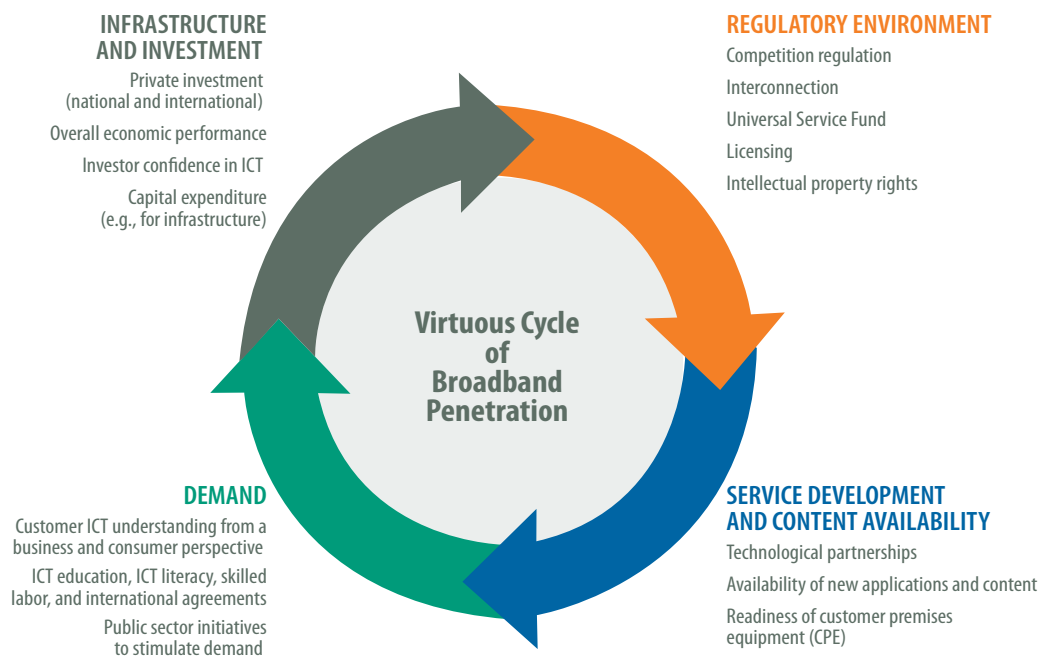
Public and private sectors around the globe have recognized the importance of broadband Internet access as the major enabling technology of the 21st century. Increased access to and usage of broadband Internet enhances ICT’s enabling effects and elevates an economy’s competitiveness. However, Saudi Arabia is at a critical point, as broadband access has not developed sufficiently on its own.

Public sector stakeholders, including CITC, MCIT, and others, can pursue a wide range of actions and initiatives, but they must focus on benefits created for the user, and proper sequencing is critical. Saudi Arabia should develop a National Broadband Strategy, to ensure penetration rates grow faster than current regional and world-class averages, so it can advance in the competitiveness metric, and, much more important, so it can benefit from the resulting productivity, innovation, and market creation, as many countries do now. The ultimate risk in not properly stimulating broadband penetration is that Saudi Arabia will not lay a sufficiently solid foundation for an internationally competitive, knowledge-generating economy.



Other countries that have successfully overcome similar challenges have implemented national broadband strategies that do more than simply liberalize markets or provide infrastructure subsidies. They have understood and leveraged the Virtuous Cycle of Broadband Penetration (Figure 18), and focused on content and demand development, in addition to infrastructure and regulation. By actively targeting all areas of the Virtuous Cycle of Broadband Penetration, Saudi Arabia can ensure broadband usage increases quickly and comprehensively.

Figure 18: Virtuous Cycle of Broadband Penetration



Source: *eEurope Strategy* (2005)

A successful national broadband strategy must target all areas of the Virtuous Cycle to achieve sustainable increases in penetration. This begins by creating the initial impulse for increased broadband access and usage, through proper regulation and investment in critical infrastructure. Future actions should provide ongoing support via an effective regulatory environment, sequenced competition-enhancing measures,³² and well-timed investments in key infrastructure upgrades. Finally, governments must shift their investment focus to supporting demand and content-development initiatives.

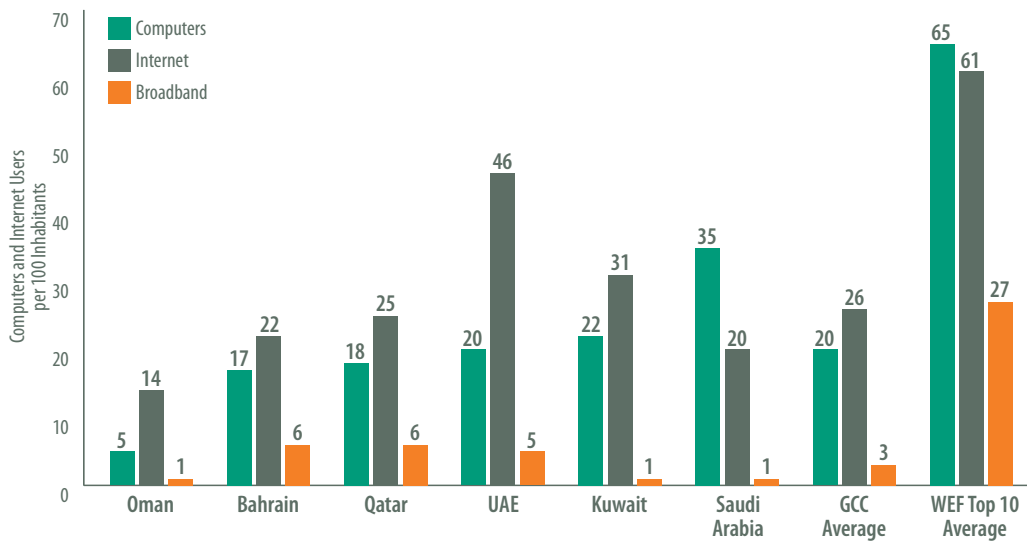
In Saudi Arabia, the National Broadband Strategy must address one unique aspect as compared with its GCC peers and Top 10 Countries, related to computer, Internet, and broadband penetration. In the Kingdom, there are significantly greater numbers of computers per capita than broadband and dial-up Internet connections. In contrast, Top 10 Countries tend to exhibit similar levels of computer and Internet penetration; the WEF Top 10 Averages for computer and Internet penetration in 2006 were sixty-five and sixty-one per 100 inhabitants, respectively. In the GCC, Internet penetration tends to be higher than com-

³² Such measures include local loop and bitstream unbundling, proper network access regulations, and wholesale pricing



puter penetration, indicating multiple Internet users per computer. In Saudi Arabia, this is not the case. Instead, computer penetration, at thirty-five computers per 100 inhabitants, is almost double Internet penetration, at twenty computers per inhabitant. Broadband penetration, specifically, tends to correlate with Internet penetration. In Top 10 Countries on average, broadband connections constitute 45% of total Internet connections, representing 12% of GCC Internet connections, and just 5% of Saudi Arabia’s Internet connections (Figure 19).

Figure 19: Computer, Internet, and Broadband Penetration, 2006



Source: CITC; UNCTAD; ITU

These distinct differences in penetration rates (between computers and Internet, and Internet and broadband) indicate a breakdown of the Virtuous Cycle, due to several factors. The following sections describe these factors as they relate to the four areas of the Virtuous Cycle:

- Infrastructure and investment
- Regulatory environment
- Customer demand
- Service development and content availability

The NCC offers specific recommendations to overcome barriers to broadband penetration in each area. As experience in other countries demonstrates, all aspects of the Virtuous Cycle must be addressed concurrently to accelerate national broadband penetration. A national broadband strategy for Saudi Arabia is no small undertaking; it will require significant up-front investments of time and money by the government, as well as ongoing commitment from and cooperation between ICT-related public sector stakeholders to act as role models and facilitators of change.

Australia has invested substantial public sector resources to rapidly increase its broadband penetration. Since 1996, the Australian government has contributed over US\$2 billion to numerous infrastructure development initiatives, and plans to spend an additional US\$1.7 billion to ensure the benefits of broadband



are shared across the country. Each of Australia's six states have also supported expansion of broadband with hundreds of millions of dollars in investments and subsidies. As a result, broadband penetration has risen significantly, from less than 1% in 2001 to over 18% in 2007. Investment of similar magnitude will be required for Saudi Arabia to achieve comparable gains in broadband penetration.

Guiding infrastructure and investment toward rural areas

NCC recommendations:

- Ensure new investments in next-generation high-speed networks include rural regions in infrastructure planning and build-out.
- Provide direct subsidies or funding to libraries, schools, and rural areas to increase availability of free public Internet services.

Current broadband infrastructure in Saudi Arabia is significantly underdeveloped, due to current technology. New entrants to the market have announced ambitious infrastructure build-outs but these investments only focus on urban areas in the near to medium term. Unless the Kingdom ensures that most, if not all, of the population has access to some form of broadband Internet, the digital divide will inevitably expand. Beyond providing communications infrastructure, Saudi Arabia should ensure that equipment (e.g., public computers) is available across the country.

Access to dial-up Internet service is not an often-cited issue in the Kingdom, but access to high-speed (broadband) Internet is severely limited, based on the primary broadband technology in use, ADSL.³³ ADSL's performance characteristics do not particularly suit Saudi Arabia's unique geography, population density, and current telecom infrastructure. The technology's significant limitations require subscribers to be between 0.5 and 5.0 kilometers from a main connection point (known as a local exchange), which makes ADSL infrastructure cost effective only in densely populated areas. As a result, over 50% of applications for ADSL service are rejected because the customer lives more than five kilometers from an STC local exchange.

ADSL technology has further limitations. It is only fast in one direction (i.e., download speed).³⁴ While not an issue for text-based Web pages and messages, global bandwidth demands (download and upload) by Internet applications continue to increase, and Internet use studies in Saudi Arabia show increasing similarities between the Kingdom's usage patterns and those elsewhere in the world. ADSL's data transfer limitations preclude adequate service levels.

Three international consortia, led by Verizon, Batelco, and PCCW, have announced plans to build next-generation voice and data networks in Saudi Arabia. For instance, Verizon plans to invest US\$3 billion to build a fiber optic network linking 21 cities in seven years. Saudi Arabia needs to ensure that the benefits of these next-generation networks spread quickly across the country. Incentives, subsidies, or direct funding, perhaps through the Universal Service Fund, should be used to ensure new investments in high-speed networks to connect rural regions to the rest of the country and the world.

³³Asymmetric digital subscriber line

³⁴The asymmetric transfer rates provided by ADSL are designed to optimize the speed of Internet downloads, and as a result the upload speed is relatively much slower, meaning the service is less equipped to send large files.



Facing a similar situation in 2005, Australia created the US\$760 million Broadband Connect program as part of its broader Connect Australia initiative. Broadband Connect focuses on boosting the reach, quality, and capacity of broadband networks in regional, rural, and remote areas. It will target 1.6 million homes, small businesses, and not-for-profit organizations in such remote areas, by providing funding to support the capital cost of establishing new broadband infrastructure and upgrading existing infrastructure, to enable the broad provision of wholesale broadband services to underserved premises and areas across regional Australia.³⁵

In the United States, the government has proactively managed the development of Internet access, including broadband, to ensure rural areas and public access points, receive acceptable levels of service. In 1997, the Federal Communications Commission established the Universal Service Fund for Schools and Libraries, also known as the E-rate, with the express purpose of providing affordable access to telecommunications services for all eligible schools and libraries, particularly those in rural and inner-city areas. Funded at up to US\$2.3 billion annually, the E-rate provides discounts to eligible schools and libraries of 20% to 90% off telecommunications services, Internet access, and internal networking connections (e.g., network wiring within schools).³⁶

Beyond ensuring that high-speed infrastructure extends to every corner of the country, urban and rural, Saudi Arabia must ensure customers have devices to connect to the wiring. Lack of access to devices, such as personal computers, that connect users to the Internet is a significantly greater issue in Saudi Arabia than is the lack of access to devices that connect users to mobile and fixed-line services. Therefore, lack of access to end-user broadband connecting devices is a critical barrier to growing broadband Internet penetration. Though computer penetration in the Kingdom is high at the national level, access to computers is limited beyond major urban areas and within low-income groups.

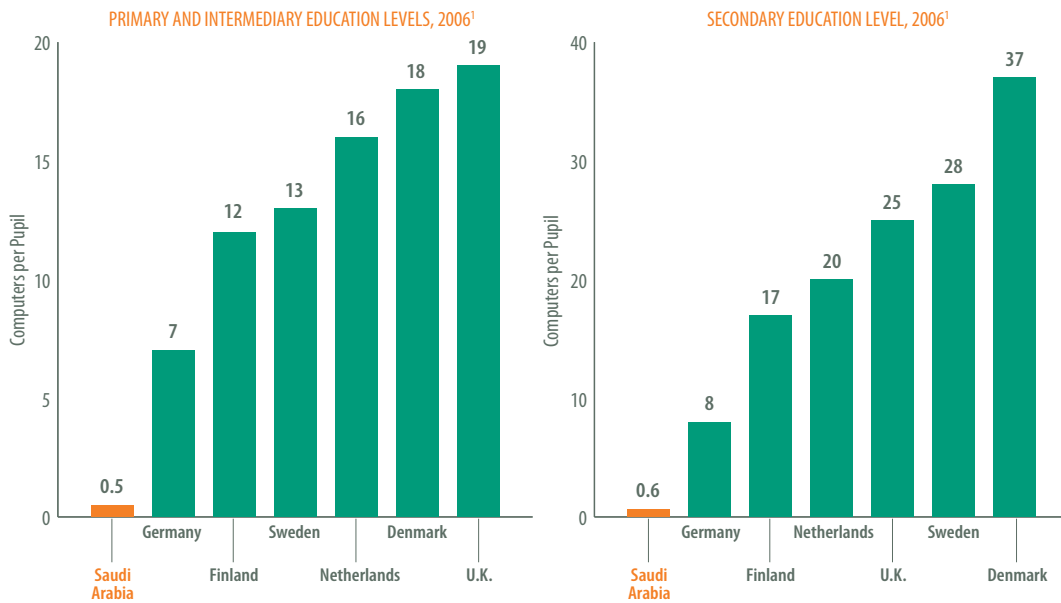
Internet cafés, libraries, universities, and schools are all Internet access points that are currently underdeveloped in Saudi Arabia (compared with other countries with higher Internet penetration rates). In the case of computer access in Saudi Arabian schools, on average there is less than one computer per 100 pupils at all levels (primary, intermediary, and secondary). Top 10 Countries have substantially more computers available to the student population, between 16 and 75 times as many computers per 100 pupils (Figure 20).

³⁵Broadband Connect Infrastructure Program Guidelines, Department of Communications, *Information Technology and the Arts*, 2007

³⁶Federal Communications Commission, 2007



Figure 20: Computers per 100 Pupils, 2006¹



Source: Saudi Arabia’s Ministry of Education; *Benchmarking Access and Use of ICT in European Schools 2006*, European Commission

¹Due to available data, only six countries are included in Top WEF in the measurements: Finland, Sweden, Denmark, Germany, Netherlands, United Kingdom

Internet cafés provide a private sector alternative to ensuring widespread high-speed Internet access in the Kingdom. After South Korea invested heavily in Internet infrastructure, Internet cafés in the country grew rapidly, from 100 in 1998 to over 22,000 by 2006. These cafés provided many users with their first broadband experience, for less than US\$1 per hour. This trial use significantly increased awareness and demand for broadband across the country. Internet cafés have also existed in Saudi Arabia since 1998; however, Internet use in these cafés requires a tedious registration process, and café growth has been limited.

Saudi Arabia should provide subsidies or direct funding to libraries, schools, and rural areas to increase availability of free public Internet services. This could be accomplished through CITC’s Universal Service Fund; however, other options are available. The ICT Advisory Council can bring public and private stakeholders together to address the issue. Canada has in recent years allocated significant public funds to market leadership programs to ensure that schools, health clinics, and rural communities have Internet access. These programs are led by the Department of Industry, and Human Resources and Development Canada rather than the telecommunications regulator.



Improving the regulatory environment

NCC recommendations:

- Rationalize the ISP market with higher minimum service provision requirements and/or regional coverage areas, to focus competition and ensure acceptable service levels.
- Increase competition in the telecommunications markets by removing regulatory barriers to fixed, mobile, and Internet products and services (e.g., via Voice over Internet Protocol or a unified licensing regime).

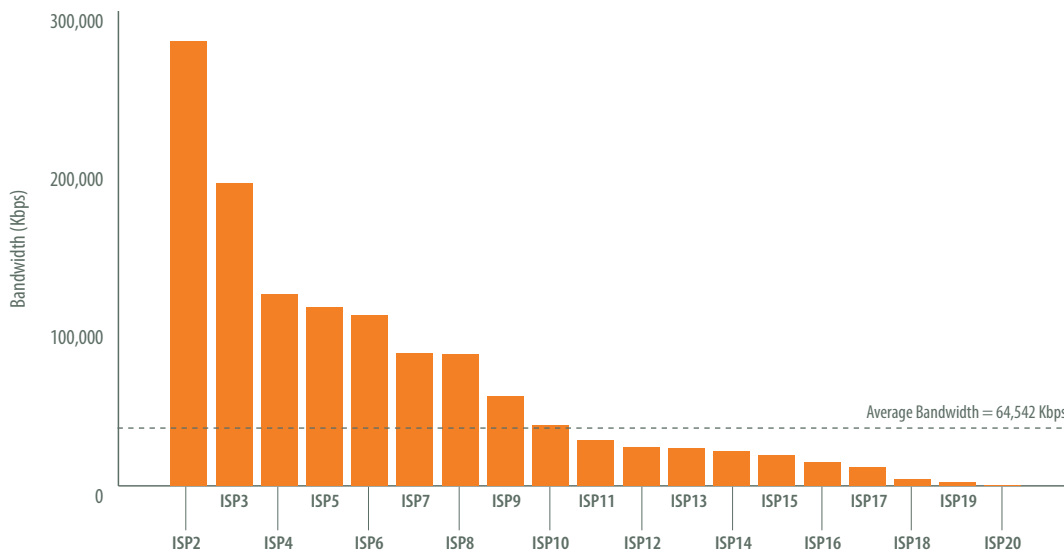
Connecting customers to the Internet requires two traditionally separate sets of service providers. Data service providers (DSPs) are responsible for the national network, or backbone, and for interconnections between the national backbone and the Internet. Internet service providers (ISPs) provide consumer and business customers with access to DSP networks. Liberalization of these markets has occurred at different times, and rules governing the interactions between these two sets of participants may not be ideally suited to stimulating competition.

The government began with a fully liberalized market for ISPs, but kept the supply of Internet bandwidth (DSP) as a monopoly provided by STC. Over 40 companies were granted licenses to operate ISPs in 1999, but severe restrictions on supply and burdensome fees led many companies to adopt wait-and-see policies, while others lost interest in starting operations. Without regulatory measures that gave ISPs access at economically viable prices to STC's national network (the backbone) or the physical connection from the network to the household (the "last mile"), Internet customers had to pay a double charge: for access to the backbone the ISP purchased from STC, and for the last mile to access the backbone through an STC phone payment.

This lack of regulatory measures could not be mitigated by ISPs, as most lacked sufficient scale to negotiate effectively with STC, compared with ISP markets in WEF Top 10 Countries, where three to six major providers have this scale. Saudi Arabia's bigger ISPs have acquired smaller competitors to gain scale and purchasing power, but ISPs remain at a disadvantage. Of the 19 operational ISPs in the country, fewer than 10 have average available bandwidth greater than 64 Kbps, and only six have bandwidth greater than 1 Mbps (1 Mbps = 1,000 Kbps). In South Korea, the average access speed to 80% of households in 2005 was 20 Mbps (Figure 21).



Figure 21: Internet Bandwidth Available to ISPs, 2006



Source: Internet Services Unit, Saudi Arabia

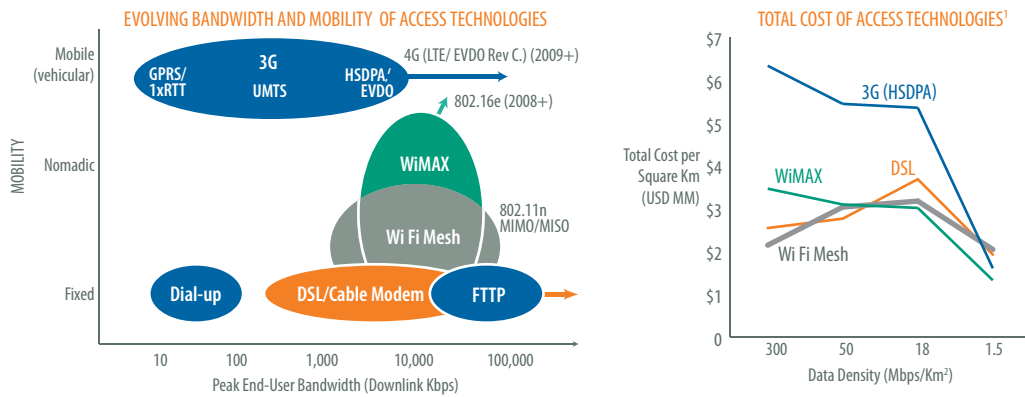
As of 2003, the latest year for which data is available, the top five ISPs in Saudi Arabia held about 45% of the total market share. Compared with Top 10 markets, however, the market remains significantly fragmented. As of 2007, the top five U.S. ISPs held 57% of the market. In 2006, the top five ISPs in the U.K. held 72% of broadband market share. In 2002, the top five ISPs in South Korea had a combined market share of 94% of all Internet services. Saudi Arabia should find ways to rationalize its ISP market. Higher minimum-service provision requirements and/or regional coverage areas to focus competition would improve the competitive dynamic between ISPs and DSPs, and help ensure acceptable service levels for customers.

Beyond regulations for traditional Internet and data service providers, developing the proper regulatory environment is becoming increasingly challenging as the lines between service provision, content, and technology have blurred. Known globally as fixed-mobile convergence (FMC), this trend refers to the fact that both voice and high-speed data services are increasingly provided and accessed through a range of seamlessly integrated wired and wireless technologies and devices. For example, Research in Motion recently released a handheld device that switches from a cellular signal to a Wi-Fi hot spot with no call interruption.

FMC benefits customers by creating direct competition among traditionally distinct fixed, mobile and data service providers. It offers customers greater choice, with a range of options in cost, mobility, and speed. While 3G mobile service may provide the greatest mobility for data access, it is the least cost effective in demand-dense urban environments. Given Saudi Arabia’s population densities and the relatively low level of infrastructure already in place, WiMax may be particularly attractive, as it offers high bandwidth combined with relative cost effectiveness across various population densities (Figure 22).



Figure 22: Speed, Mobility, and Cost Trade-Offs across Access Technologies



Source: 3GPP, Alcatel, Siemens, CSFB, Nortel, Monitor Analysis

Source: Nortel

¹Excluding common items

FMC also enables service providers to leapfrog legacy systems and decrease infrastructure and service costs. The establishment of interoperability standards between technologies and private sector working groups, such as the Fixed Mobile Convergence Alliance, are creating the roadmap to realizing truly convergent networks and devices within the next decade.

In Saudi Arabia, CITC’s liberalization efforts have begun to create a regulatory environment that encourages convergent offerings; however, licenses are still largely service and/or technology specific, which creates barriers for operators interested in providing multiple-play services (voice and data, fixed or mobile). To overcome regulatory barriers that prevent multi-play offerings, operators are buying service providers with licenses in other technologies and services. Mobily’s purchase of Bayanat is one such example; the combined company will offer combined WiMax and 3G mobile broadband services.

Prior to the acquisition, Mobily could only offer 3G services; CITC would not license it to offer broadband services. In a technology-neutral or unified licensing regime, Bayanat and Mobily could compete with each other. CITC’s regulations should seek to encourage competition rather than incentivize companies to favor consolidation. By accelerating development of both the technology-neutral, service-specific regulatory framework and the planned rollout of a unified licensing regime, CITC could anticipate such future technology developments rather than react to them.

Stimulating demand for services

NCC recommendations:

- Develop education and awareness programs for consumers and small businesses on the range of solutions and applications available through the Internet to increase ICT skills and usage.
- Focus next-generation e-government services on high-bandwidth services and applications, to stimulate broadband use by people, firms (particularly small businesses), and clusters.



While having high-quality infrastructure and an effective regulatory environment in place enables improvement in Internet penetration, it does not guarantee growth in penetration. Consumers and businesses must have a reason (e.g., a desire to connect with others and/or to access information) and the capability (e.g., IT literacy) to access the Internet. Compared with mobile phone users, who need only know how to operate a mobile phone, Internet users must be literate and possess ICT skills. In particular, English literacy is important (though not a requirement) for Internet use. Over half of the Internet's content is in English, compared to less than 1% in Arabic. Saudi Arabia needs to develop initiatives that actively stimulate demand for Internet and broadband services.

Many people and firms in Saudi Arabia do not use the Internet, because they are unaware of the benefits. Computers are used for word processing and managing small business transactions, or for entertainment (DVDs, games, etc.), but these computers are not being connected to the Internet for users to conduct research, engage in commerce, or communicate with others. Using two parameters in the Economist's 2007 e-Readiness Rankings to compare Saudi Arabia with the WEF Top 10 Countries illustrates how significant the awareness and usage gap is. The first, the social and cultural environment, considers a country's e-literacy by broadly measuring its experience using the Internet, its receptivity to it, and the technical skills of the workforce. In the social and cultural parameter, based on measures of the level of education, level of Internet literacy, degree of entrepreneurship, technical skills of the workforce, and degree of innovation, Saudi Arabia is ranked 50 out of 69 countries, with a score of 4.8 compared to the WEF Top 10 Average of 8.0. The second relevant parameter, consumer and business adoption, rates utilization of digital channels by people and companies. As inputs, this parameter uses consumer spending on ICT per capita, level of e-business development, level of online commerce, and availability of online public services for citizens and businesses. Saudi Arabia ranks 48th out of 69, with a score of 4.9 compared to the WEF Top 10 Average of 8.9.

To overcome this lack of e-literacy, MCIT, CITC, and the Ministries of Education and Higher Education should prioritize initiatives that actively educate citizens on the value of using the Internet, and broadband in particular. Increasing the awareness of consumers and small businesses on the range of solutions and applications available through the Internet will increase demand and usage of these services. This will in turn grow the market for ICT firms, and increase the enabling effects of ICTs throughout the country.

A second way to stimulate demand for Internet service is through Yesser, the Kingdom's e-government program; e-government initiatives provide valuable services to citizens, firms, and clusters, which stimulate ICT and Internet usage. Other countries have used e-government to better inform and interact with citizens, successful e-government initiatives are found in most Top 10 Countries (see Box 2).

Were Saudi Arabia to offer its citizens similarly high-quality e-government services in Arabic, the skills barrier to Internet use would lower (i.e., English would not be a prerequisite), and the availability of useful Web content and services would grow. In fact, the more useful Yesser's services, the more people will want to be connected to the Internet to take advantage of them, thereby stimulating broadband demand and penetration.



Box 2

In a 2007 e-government study,³⁷ seven of the Top 10 e-government organizations were also WEF Top 10 Countries. The defining characteristics of their programs are:

- **A citizen-centered perspective.** Focus on the customer, with relevant information organized around consumer groups.
- **Cohesive multi-channel service.** Fast, efficient, and convenient service, regardless of the chosen channel. Seamlessly coordinated interactions among multiple channels (e.g., email and telephone).
- **Fluid cross-government service.** Government agencies work together at the local, regional, and national levels to provide integrated services.
- **Proactive communication and education.** Active outreach, communication, and education, to increase awareness and adoption of government services through appropriate channels, improve ease of use, and strengthen citizens' ability to comply with government policies, regulations and laws.

Singapore has pursued several e-government initiatives over the past 25 years. It has been extremely successful because it has focused on services consumers need and want, and has delivered these services in systems, formats, and applications that are easy to use and understand. Singapore is now actively streamlining its e-government programs, through the US\$1.3-billion iGov2010 program it launched in 2005, using ICTs to simplify, standardize, and integrate government processes. Recognizing that its population is extremely mobile savvy (with one of the highest mobile penetrations in the world), the government plans to increase its services accessible via mobile phone from 150 to 300 by 2010. Future service channel options may include voice recognition and interactive TV – both of which the government has recently piloted.

Singapore's e-government initiatives have improved the speed and efficiency of government service organizations and the people and firms they serve. Furthermore, the government increased awareness and interest in the ICTs necessary to access e-government services, providing a valuable stimulus to Internet and broadband demand.

Enhancing service development and content availability

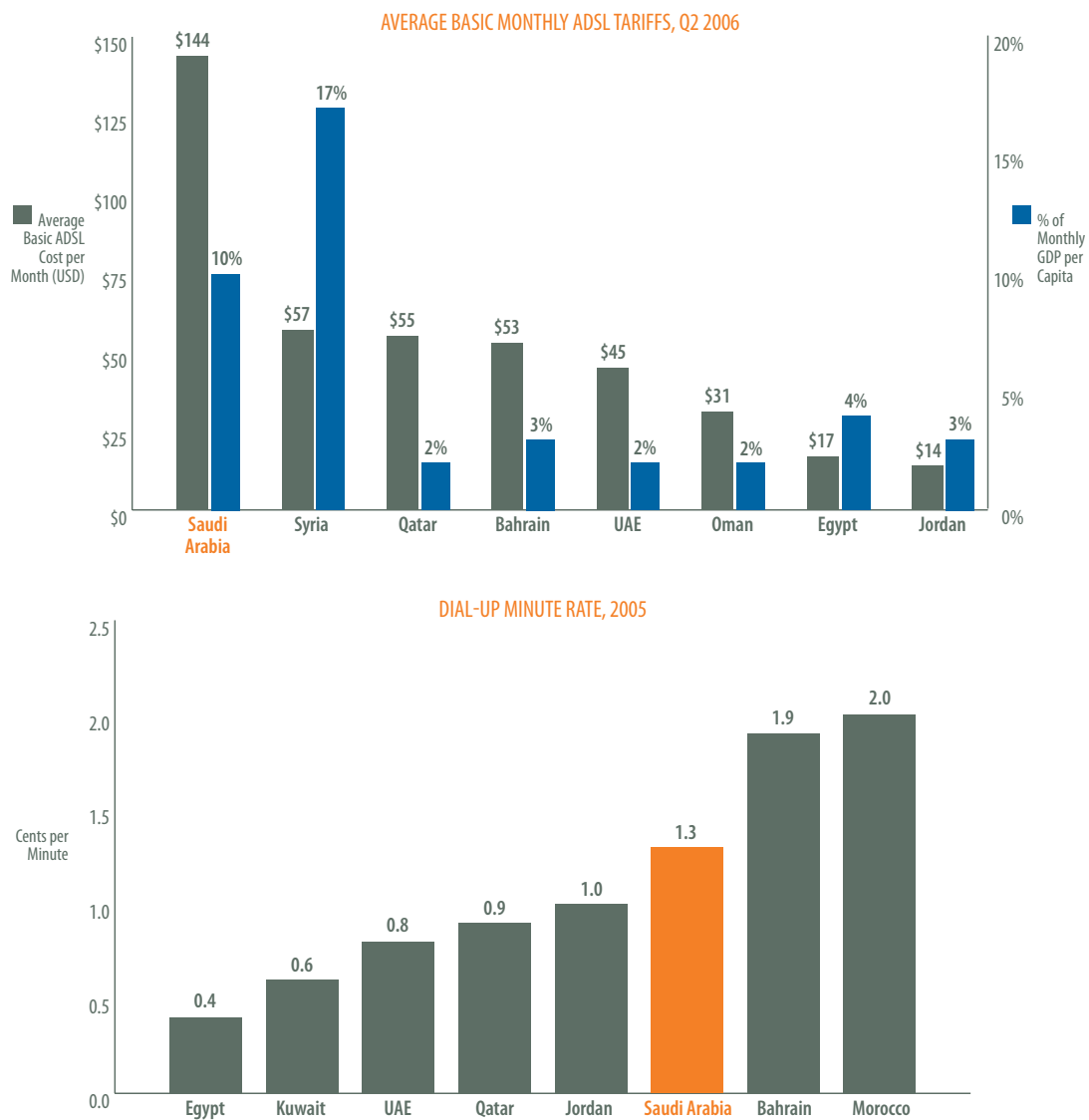
NCC recommendations:

- Address previous issues with the Saudi Home Computing Initiative, which incorporates a broad marketing and awareness campaign, and inclusion of high-speed Internet service and hardware and software packages tailored to the consumer.
- Enhance EasyNet by simplifying the payment process and extending discounts to include broadband service.
- Establish an Arabic Content campaign that works with local and international content developers to dramatically increase availability of Arabic Web content.



Several CITC initiatives have sought to lower the total cost of ownership (TCO) of computers and Internet access in innovative ways. The Saudi Home Computing Initiative (SHCI) was launched in 2005 with the goal of offering over one million Saudi Arabians PCs through an easy and affordable installment payment process (US\$25 per month over two years). Though this goal appears unattainable at this time, based on the current sales trend the initiative is a step in the right direction. Aligning awareness campaigns, payment mechanisms, and hardware and software packages with the target segment (e.g., low-income consumers) would address major barriers to the program’s success.

Figure 23: Dial-Up and Broadband Pricing in Saudi Arabia



Source: Launch of New Licensing for Fixed and Mobile Services, CITC, April 2006; Broadband for Development in the ESCWA Region, UN-ESCWA and Alcatel-Lucent, 2007



EasyNet, another recent CITC initiative, lowered the dial-up Internet price by removing the double charge consumers previously had to pay. In the past, users had to first purchase a prepaid Internet card from their preferred ISP, then pay a connection fee to STC to access the Internet. The initiative eliminated the cost of the prepaid card, generating a 25% savings for the consumer. Prior to EasyNet, the number of Internet users grew at 32% per year. In the year following the EasyNet launch, that rate nearly doubled, to 57%. EasyNet's accomplishments should be applauded; however Saudi Arabia's per-minute prices for dial-up Internet access are still among the highest in the Middle East. An expansion of EasyNet or the creation of new, similar programs that simplify the payment process and extend discounts to broadband would further encourage Internet use and increase penetration rates. The public and private sectors' ongoing focus on affordability issues will continue to ease the cost burden for consumers, stimulate broadband penetration, and expand commercial opportunities for the ICT cluster (Figure 23).

Arabic content is a broad category composed of at least three key areas. First, Arabization is the conversion of existing intellectual property from a non-Arabic language into Arabic. This can take a wide range of forms, including software, websites, products, services, and applications. Second, Arabic content refers to the creation of new IP: news, information, entertainment, research, analysis, etc., relevant to the 255 million Arabic-speaking people around the world. Third, Arabic software development (also related to the creation of new IP) is the building of new software with an explicit focus on Arabic, including applications that assist with the first two areas (e.g., software that can automate Arabization processes, applications, and services that assist Arabic speakers to create Arabic content).

Saudi Arabia does not currently develop Arabic software on a large scale; nor does it export significant numbers of software products. Local IT solution providers carry out some Arabic software development as part of their system integration and related services. A few IT companies develop Arabic software in the fields of education, entertainment, and religion, but it is a very small industry. Website development and Arabization services are also available to meet a limited market demand. Large enterprises in the Kingdom are responsible for the only prominent development of Arabic software. Saudi Aramco stands out for having Arabized the well-known German enterprise solution SAP. With the largest installation of SAP in the world, Aramco has even developed additional SAP modules, through its SAP Arabization Centre, which are now commercially available by agreement with SAP.

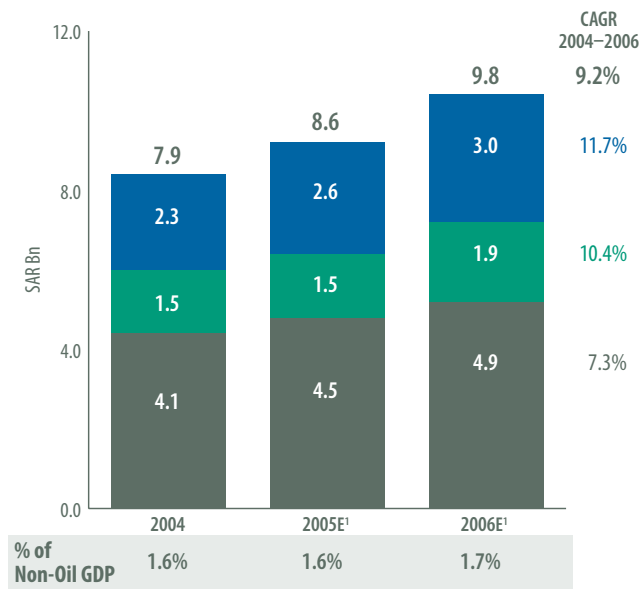
Saudi Arabia should establish an Arabic Content campaign by encouraging local and international content and software developers to establish Arabic Content development offices within the Kingdom. Modest increases in the amount of online Arabic content dramatically affect demand for further Arabic software applications, content, and media. In addition to facilitating privately developed content, Saudi Arabia should actively encourage its citizens to participate in content development, as user-generated content is the fastest-growing type available on the Internet today. Such an initiative would encourage ICT use while making additional Arabic content available online, further increasing the demand for such content.



2. Enhancing competitiveness of the local IT industries

The Saudi Arabian IT industries, including hardware, software, and IT services, account for more than 51% of the GCC market. The country’s population accounts for 71% and GDP accounts for 54% of the total GCC market, the Saudi Arabian market is undersized relative to the Kingdom’s non-oil contribution to world GDP. As a whole, the IT industry in Saudi Arabia is expected to grow at 9% per year for the next five to seven years, from 7.9 billion SAR in 2004 to 14.6 billion SAR in 2011. More specifically, IT services and software are expected to grow at 12% and 10%, respectively, significantly higher than the 6% forecasted global growth rate for the IT industry. While this increase is significant, the current size of the IT markets is small: hardware, the largest, was estimated to be only 4.9 billion SAR in 2006. The other two sectors, software and IT services, were estimated at 1.9 billion SAR and 3 billion SAR, respectively, compared to 30.4 billion SAR for the mobile industry alone (Figure 24).

Figure 24: The Saudi Arabian IT Market, 2004–2006



Source: *Saudi Arabia Information & Technology Report, Q2 2007*, BMI; *Telecom Sector Reforms in Saudi Arabia: Towards Full Market Liberalization*, June 2, 2007, Saudi Telecom Society, and Saudi Arabian Monetary Agency

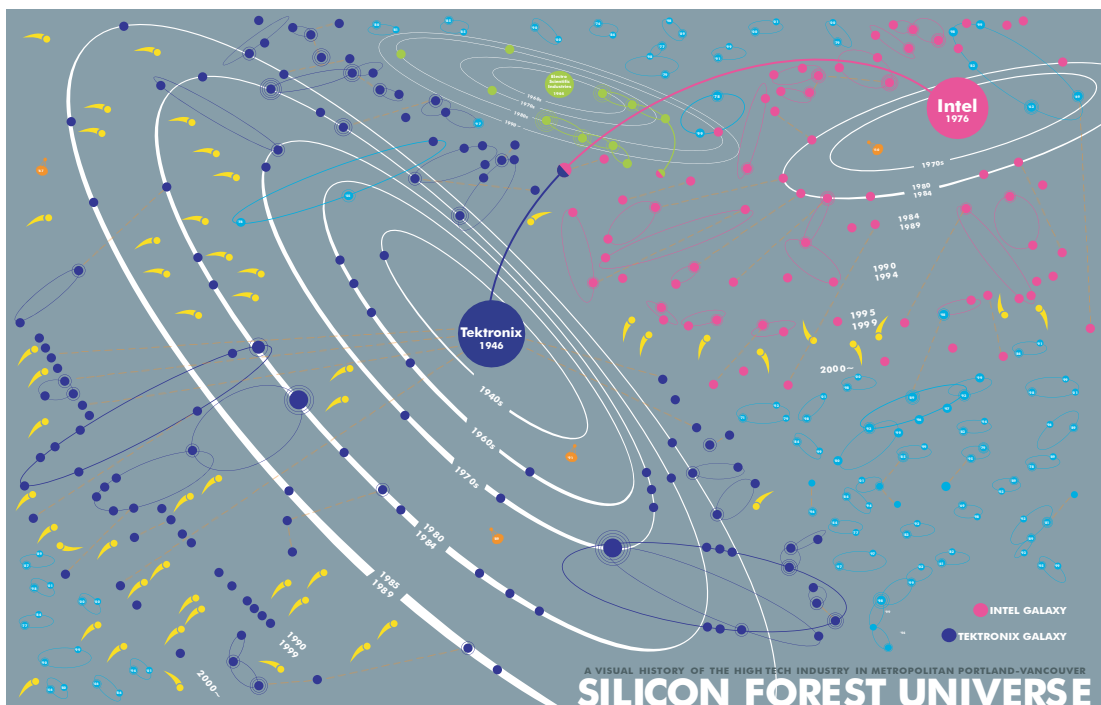
¹2005 and 2006 non-oil GDP figures are preliminary estimates

Over the past ten to fifteen years, the demand for IT products and services has largely come from the Saudi Arabian public sector and large Saudi Arabian companies, such as Aramco, Saudi Arabian Airlines, and the Saudi Arabia Basic Industries Corporation (SABIC). Many of these customers have focused on enterprise-wide upgrades that require the scale and capacity of multinational IT providers, such as Microsoft, Cisco, and HP. While these large multinationals have focused on large public and private sector Saudi Arabian customers, small and medium-sized businesses have been largely underserved, which presents a potential growth area for Saudi Arabian IT companies.



As a result of the demand for IT products and services from the Saudi Arabian public sector and large Saudi Arabian companies, some multinational IT firms have established regional hubs in the Kingdom. This is an important driver of competitiveness for the local IT industry. Regional hubs facilitate formal and informal knowledge transfers, as human and intellectual capital moves between local and multinational firms, spurring significant job creation and knowledge transfer to local Saudi Arabian firms. The establishment of multinational IT firms in Portland, Oregon, in the United States highlights precisely how their presence benefits the local IT community. When Tektronix and Intel established themselves in Portland in 1946 and 1976, respectively, a tremendous number of local spinoff IT companies formed over time (Figure 25). Consequently, the number of high-paying IT jobs has soared (Figure 26), as have innovation and locally generated patents (Figure 27).

Figure 25: The Ecology of the Silicon Forest



Source: Heike Mayer



Figure 26: High-Tech Job Growth in Oregon, 1946–2000

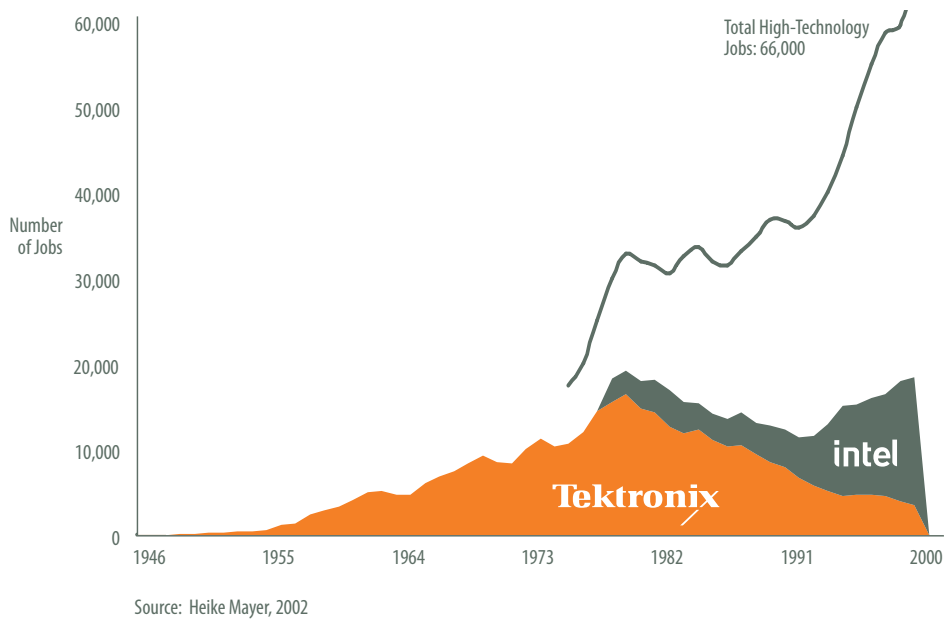
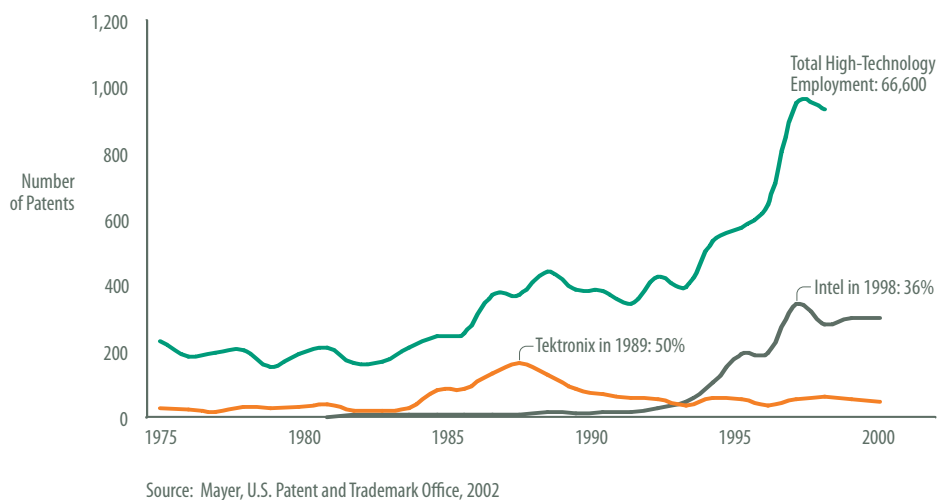


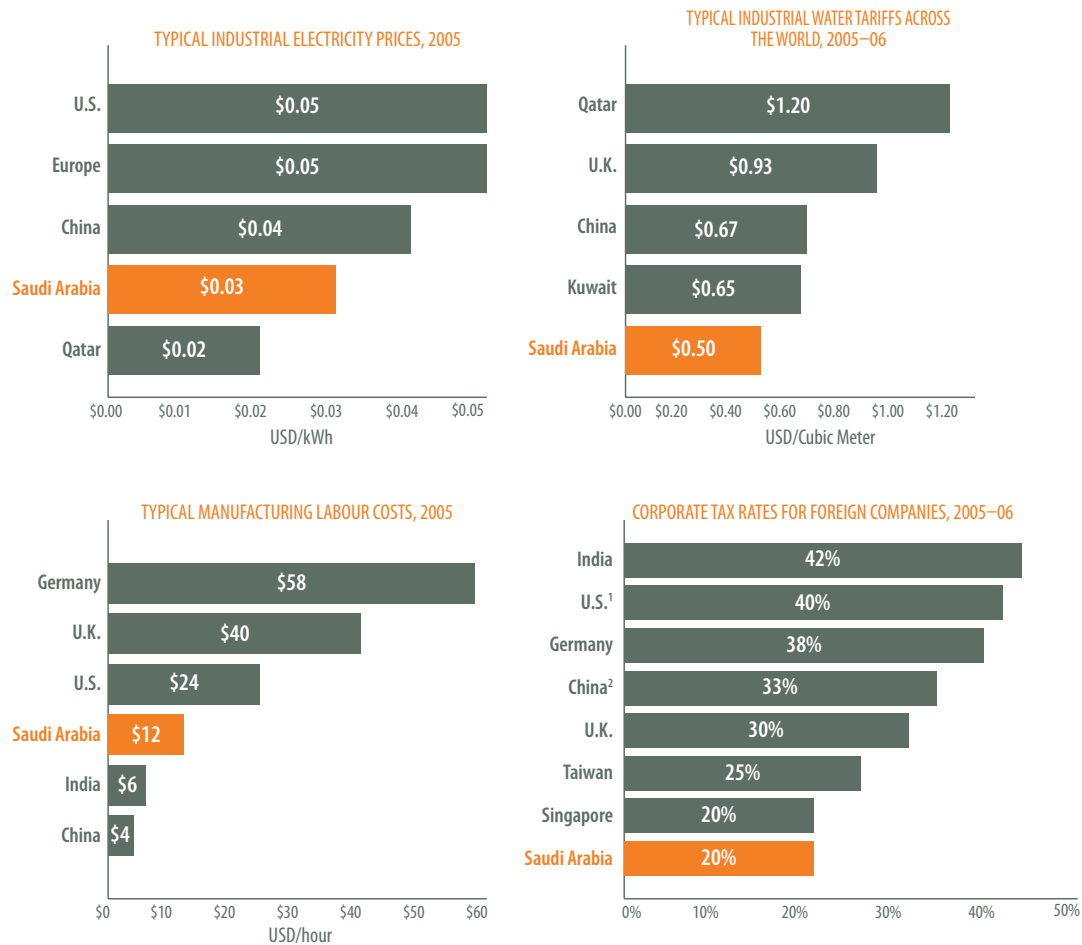
Figure 27: Patent Growth, 1975–2000



The NCC expects the influx of multinational IT firms and the resulting spinoff effects are just beginning. Several basic factors – such as low tax rates, low utility costs, and access to low-skilled labor – are attracting multinational IT firms to Saudi Arabia. At 20%, corporate tax rates for foreign companies are among the lowest in the world, compared to 40% in India and the U.S.; and utility costs are similarly inexpensive (Figure 28). Saudi Arabia’s accession to the WTO, which is reducing tariffs and import duties for ICT industries, with exemptions from tariffs on government sales, is also attracting multinational IT companies to the Kingdom.



Figure 28: Basic Factor Benchmarks



Source: CRA Analysis; Saudi Central Department of Statistics; *Corporate Tax Rate Survey 2006*, KPMG

¹U.S. taxes vary by state

²In China, foreign investment enterprises located in specially designated zones may qualify for lower tax rates

Beyond serving the small and medium-sized business community, another significant opportunity for local IT companies involves such services as training, education, and implementation. Until recently, the IT services industry has been relatively fragmented. An influx of regional and global companies is now occurring through agreements with local firms, as the need for economies of scale and service portfolio expansion increase.

To enable local IT companies to seize these myriad opportunities and realize potential growth rates, critical barriers must be addressed. The following section focuses on two related areas that will create the foundation for future growth in Saudi Arabia's IT industry:

- Availability of ICT-related financial and human capital
- Presence of innovation and entrepreneurship among local IT companies



Both issues require public sector stakeholders, including MCIT, the Ministries of Education (MoE) and Higher Education (MoHE), the General Organization for Technical Education and Vocational Training (GOTEVOT) and others to work with the private sector to develop near-, medium-, and long-term solutions to increase the competitiveness of Saudi Arabia's IT industry. Below, the NCC articulates several recommendations to initiate a dialogue on such solutions.

Increasing availability of ICT-related financial and human capital

ICT-related financial and human capital are key ingredients in developed ICT clusters throughout the world. Risk capital for new ventures (e.g., venture capital) is a major driver of business formation across all industries, but it plays an especially important role in assisting the formation of IT companies, which are inherently more risky than non-IT start-ups, as they rely on human rather than physical capital. Consequently, IT start-ups, with few physical assets to pledge as collateral, find it more difficult to secure capital from traditional financial institutions.

Skilled human capital is another major driver of IT business formation. In Saudi Arabia, local and multinational companies cite the lack of adequate skilled ICT labor as the single biggest challenge to successfully growing a business. Increasing availability of these advanced factors will encourage new business formation and enable existing businesses to grow.

Increasing availability of financial capital

NCC recommendations:

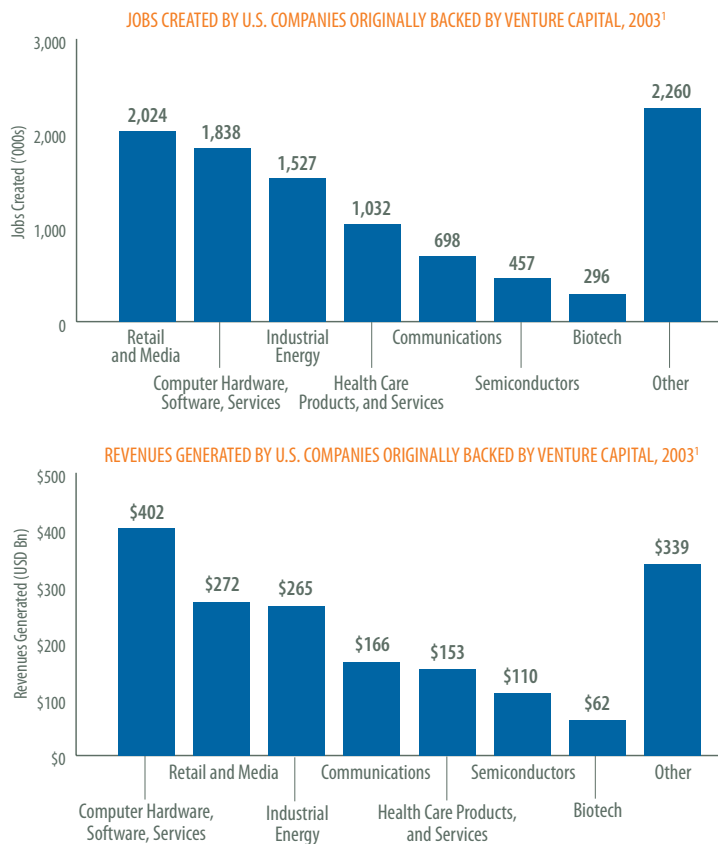
- Refocus efforts related to the ICT venture capital funds suggested during the 2006 Global Competitiveness Forum.
- Use public sector resources to stimulate ICT venture funding, through direct and indirect investments in new ICT companies, and venture funding companies that will invest in the ICT industry.

Over the past two decades, private sources of funding, such as venture capital, have been among the greatest drivers of ICT-related growth in the United States. Research on the effects of venture capital in the U.S. has shown that ICT companies tend to benefit disproportionately from venture capital. ICT companies³⁸ backed by venture capital since 1970 currently gross nearly US\$700 billion combined and employ 3.5 million workers (Figure 29).

³⁸Includes computer hardware, software, and services, communications, and semiconductor companies



Figure 29: Economic Benefits of Venture Capital



Source: *Venture Impact 2004*, Global Insight, June 2004

¹Data collected from 26,494 companies originally backed by Venture Capital, starting in 1970

While the significant positive effect of venture capital on the IT industry is clear, there is a general lack of such capital available for new and existing IT companies in Saudi Arabia. The Kingdom has only one locally based VC fund that targets new firms in Saudi Arabia, with US\$26 million in assets, or 0.01% of Saudi Arabian GDP, while Malaysia and Tunisia (countries with similar GDP per capita to that of Saudi Arabia) have significantly more VC funds, 22 and 39, respectively. Kuwait has only two funds, but they are worth over US\$325 million and represent almost 1% of the country's GDP.³⁹

While new funding mechanisms were announced recently in Saudi Arabia, they have not been implemented. For example, Intel and SAGIA entered into an agreement in 2005 to establish a US\$100-million venture capital fund that aims to invest in IT companies located in or connected to Saudi Arabia. This initiative has yet to move beyond the planning stages; however, SAGIA, Intel, and other involved and interested parties should restart efforts to develop ICT venture capital funds. These funds, primarily led by the private sector, can serve as role models to future financing, and encourage other regional and international funds to enter the Saudi Arabian market, further increasing availability of financial capital to new IT companies.

³⁹Liberalization Strategy for Saudi Arabia's ICT Market, CITC, 2005



Beyond private sector involvement, the public sector can play a significant role in creating conditions that encourage availability of further financing options for new ventures in the Kingdom. In the United States, for example, the Small Business Investment Company (SBIC) program was established to fill the gap between small businesses' financing needs and availability of venture capital.⁴⁰ In over 40 years of operation, in nearly 120,000 transactions, SBIC has invested over US\$21 billion in American small businesses, including such eventual giants as Intel, Apple, and America Online. Indeed, most American IT firms have their roots in the SBIC program. Other programs in Australia and elsewhere have generated similarly successful results.⁴¹ Saudi Arabia should develop such a program, to support development of a local venture capital industry that uses public sector resources to encourage ICT venture funding, through direct and indirect investments in new ICT companies, and in venture funding companies that will invest in the ICT industry.

Increasing availability of human capital

NCC recommendations:

- Partner with multinational IT firms willing to train local employees in ICT over the long term, in exchange for foreign worker visas to meet their ICT skills needs in the short term.
- In collaboration with the Ministries of Education and Higher Education, launch an ICT module to include in primary, secondary, and tertiary curricula, to ensure that ICT education and computer usage are a priority in the education system, and that graduates possess the basic and advanced ICT skills sought by employers.

The competitiveness of any cluster is significantly affected by the quality of local skilled labor available to the firms and industries operating within it. Nowhere is this more true than in the ICT cluster. The cluster's success and competitiveness are entirely driven by the quality and creativity of the ideas it generates. In the absence of highly skilled human capital, no innovation takes place. To remain competitive, ICT firms must either import labor or relocate.

The lack of ICT-related skills in the local Saudi Arabian labor force is apparent and expected to worsen in the next five years. The skilled labor gap, if measured in terms of networking skills,⁴² will grow by almost 350%, from 4,300 workers in 2005 to over 19,300 by 2009. The advanced technology skills gap, measured on a full-time equivalent (FTE) basis, will increase by nearly 100%, from 44,000 FTEs to 85,000 FTEs. In addition to the lack of skilled labor, the combined effects of Saudization and the difficulties of obtaining skilled worker visas make matters worse. IT firms tend to base their skilled labor-intensive components outside of the country; as a result, India, Jordan, and Egypt offer cheaper and more highly skilled ICT labor. If an infusion of highly skilled ICT workers, Saudi Arabian or otherwise, fails to materialize, the growth potential for the local IT industry will be strictly limited (Figure 30).

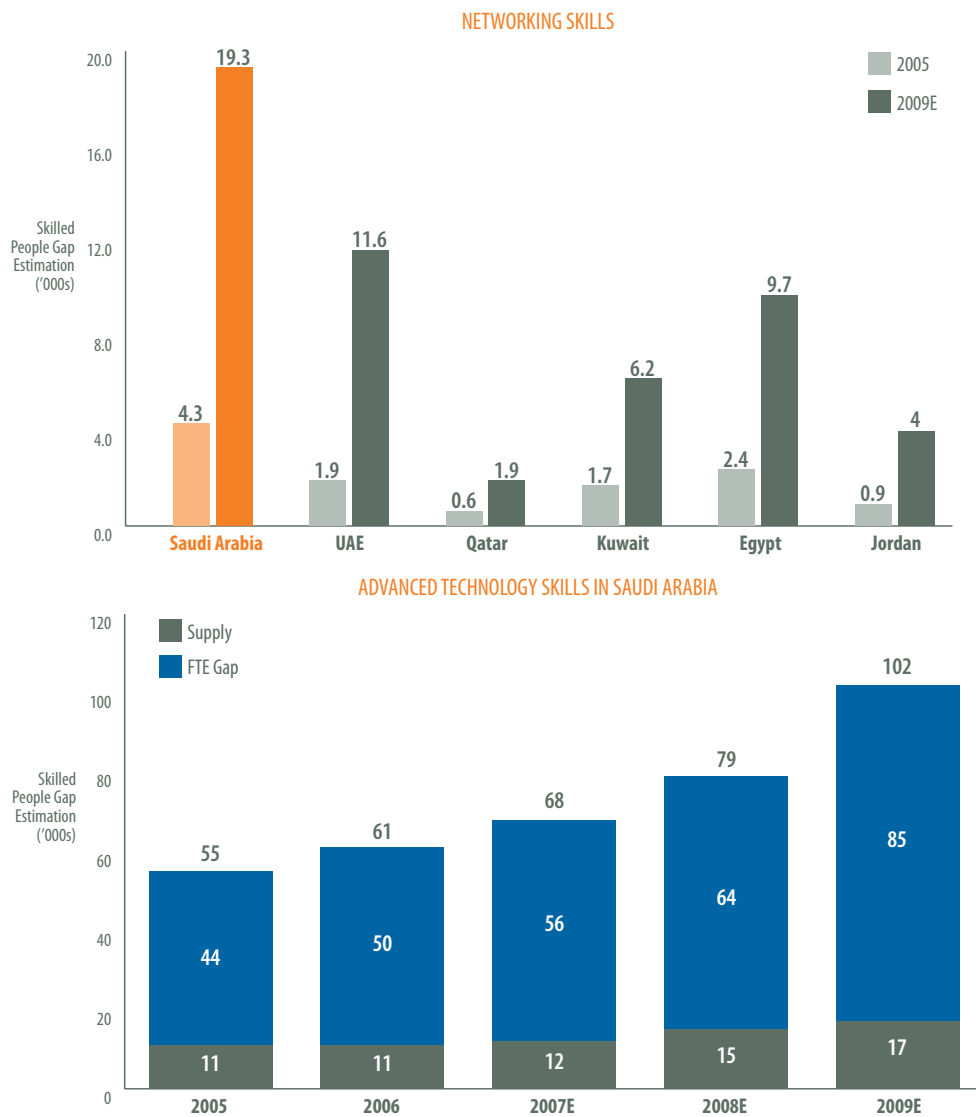
⁴⁰The U.S. government provides two-thirds of a venture fund's capital, but takes only a government interest rate plus 10% of the fund's profits. Any excess profits flow to the equity investors, who have provided only one-third of the fund's capital. This again enhances, or leverages, the potential profit to the private investor.

⁴¹*Development of SME Financing Support System*, Asian Development Bank, 2002

⁴²"Networking skills" is defined as those needed to plan, design, manage, and support networking technologies in an organization.



Figure 30: ICT Skills Shortage in Middle Eastern Countries



Source: *Networking Skills in Pakistan and the Middle East, an IDC White Paper*, IDC, 2006

Although the Saudi Arabian government has recognized these issues and established a number of publicly funded ICT education and training initiatives to increase the availability of quality human capital, the NCC does not foresee that these programs will meet anticipated ICT labor needs. For example, despite efforts by the General Organization for Technical Education and Vocational Training (GOTEVOT) to increase national diploma programs in ICT-related disciplines, the skills gap is forecast to widen. The 16% annual growth in graduates from GOTEVOT programs (not all of which are ICT related) falls below the estimated 18% annual growth in ICT-related employment demand. Additional public and private sector initiatives will be required to close the gap in the short term, and ensure that there is sufficient skilled labor in the long term.



Private firms offer a market-based solution to the ICT training issue; however, the NCC does not believe these will be sufficient. Growth in private IT training in Saudi Arabia is expected to increase by 16% per year, from about 188 million SAR to 394 million SAR from 2003 through 2008, as companies look to develop their employees. Several large local IT training firms offer a broad range of classes and certification programs. One such company, Al Khaleej Training and Education, owns 67 training centers for men and women across the Kingdom, and operates in over 17 other locations in the region. It also offers customized services to meet customers' needs in enterprise-wide training and e-learning applications.

Public sector initiatives led by the MCIT, the Ministries of Education and Higher Education, and others should be used to supplement the ICT training conducted by private firms. Government agencies with the mandate to issue skilled worker visas, including SAGIA and the Ministry of Commerce, should partner with multinational ICT companies currently operating in the Kingdom to address the ICT skills gap in the short and long terms. These companies are already active in ICT training initiatives, such as Hewlett-Packard's campaign to improve women's IT literacy, or Microsoft's initiative to ensure that university curricula adequately develop students' ICT skill sets.

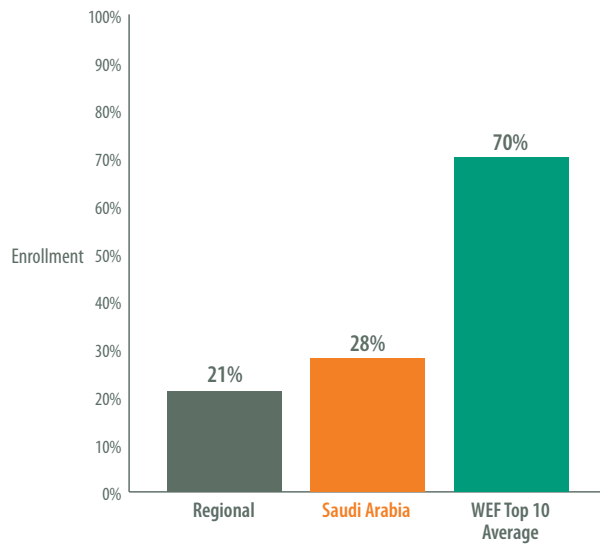
It is vital that public and private sector initiatives cooperate rather than compete with each other, potentially through the ICT Advisory Council, to establish targets for training Saudi Arabian citizens. The Kingdom should partner with like-minded multinational IT firms to address the long-term ICT skills gap. Their assistance in addressing the issue in the short term could be offset by skilled worker permits.

While upgrading existing workers' ICT skills through training is critically important to solving the Kingdom's short-term ICT labor needs, it is equally important if not more so to build the ICT skills of the country's future employees before they reach the workforce. Top 10 Countries have incorporated ICT training into all levels of their public education systems. In the United Kingdom, for example, students progress through eight levels of ICT training. During the first few levels, students use ICT in very basic forms, to interact with text, sounds, images, and tables. At advanced levels, interaction becomes more complex, until students learn to use ICT to develop and refine their own content, select appropriate information resources, and evaluate software packages. In Canada, ICT is included in the curriculum from Grade 1 to Grade 12. During postsecondary education, students identify potential technology-related career paths, design scientific and mathematical models, and employ technology skills outside formal class settings.

In Saudi Arabia's public schools, in contrast, training beyond basic computer usage is not taught at the primary or secondary levels. At the tertiary level, although universities in Saudi Arabia offer a number of ICT-related programs, enrollment remains below Top 10 Averages (Figure 31). Tertiary enrollment in ICT disciplines is a key enabler of the ICT cluster and must therefore be grown. To foster interest in ICT disciplines at the tertiary level, ICT education and computer usage must become a priority at the primary and secondary levels. The Ministries of Education and Higher Education are currently undertaking major initiatives to enhance the Kingdom's public education system, to better incorporate ICT education and skills training into curricula, and to ensure graduates of primary, secondary, and tertiary schools have the basic and advanced ICT skills required by employers inside and outside the Kingdom.



Figure 31: Tertiary Enrollment Gap



Source: UNESCO

Encouraging innovation and entrepreneurship

Competitive IT industries rely on two major forces for new business creation: first, new ideas, concepts, and technologies must be generated consistently and continuously; second, these creations must be commercialized. The twin forces of innovation and entrepreneurship characterize IT hubs from Silicon Valley, California, to Bangalore, India. These centers of IT activity often develop as a result of guidance, incentives, and participation by the public sector. The original stimulus for Silicon Valley was the granting of ninety-nine-year leases on land owned by Stanford University for the development of a center of high technology close to a cooperative university.



Attracting ICT investment

NCC recommendations:

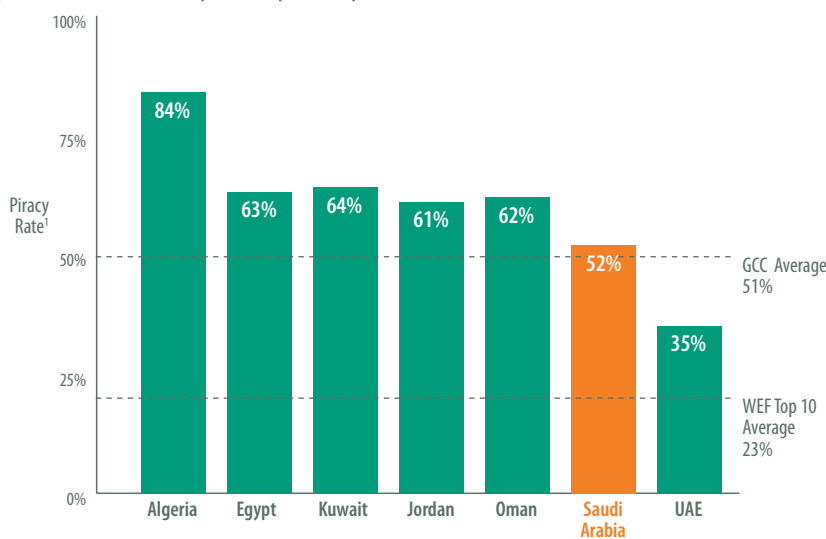
- Identify and prioritize attractive ICT markets in which Saudi Arabia can emerge as a regional and global leader, and use joint public and private resources, supportive regulatory regimes, and other incentives to develop local ICT industries.
- Develop and follow through on more effective IPR enforcement measures, and use public sector institutions as role models for the private sector.

One aspiration for Saudi Arabia's Economic Cities is that they become hubs for ICT innovation, investment, education, and employment. To realize this aspiration within the Economic Cities, and more broadly across Saudi Arabia, the Kingdom must first identify future high-growth ICT markets that will drive global ICT demand in the short, medium, and long terms. Next, it must create a regulatory environment that encourages domestic and foreign investment in ICT.

Saudi Arabia needs to actively target specific IT niches where locally based companies can establish a competitive advantage. It should embark on a collaborative approach between the public and private sectors, to understand the future scenarios of the global IT industry and the Kingdom's position within this evolving market. After identifying attractive markets in which to establish global leadership, it needs to create the best possible environment for success. It should develop an ICT strategy that focuses on creating incentives to attract the best firms and employees. Establishing a regulatory framework that supports new product development, commercialization, and competition is a critical first step in this strategy.

Effective IPR laws and stringent enforcement are critical prerequisites for encouraging innovative companies from any cluster, but especially ICT, due to the relative ease of copying such IP (Figure 32).

Figure 32: Software Piracy Rates by Country, 2006



Source: *Global Software Piracy Study 2007*, Business Software Alliance (BSA), 2007

¹Percentage of total illegally acquired software installed



Enabling new IT business creation

NCC recommendation:

- Create ICT incubators throughout the country, possibly within the Economic Cities, to simplify and streamline management and operation of ICT businesses, similar to SAGIA's one-step shop model for foreign investors.

In addition to encouraging entrepreneurs and innovators to create new products and services, Saudi Arabia needs to ensure these start-up firms have supporting resources to help them survive and grow during the period when they are most vulnerable. Business incubators provide start-ups with a one-step shop for such resources and support services. In some cases, incubators deliver management and financing assistance while providing shared office services, access to equipment, and flexible leases with expandable space.

Two such incubators in Saudi Arabia are currently in the planning stage. The King Abdullah Center for Science and Technology (KACST), in collaboration with the United Nations Economic and Social Commission for Western Asia (ESCWA), plans to create a science and technology incubator, to link the private sector and academia to facilitate commercialization of research and development activities in the Kingdom. King Fahd University of Petroleum and Minerals (KFUPM) plans to establish a business incubator aimed at improving and standardizing products and services in the industrial and business sectors. The private sector has also expressed interest in establishing incubators, including one in Riyadh for ICT start-ups. The establishment of more of these business incubators should be encouraged, as they help support Saudi Arabian entrepreneurs and foster new business formation. Even if such incubators begin with limited services, they can create awareness and stimulate new business development. As more start-ups are created, resources can be expanded to meet demand. The Economic Cities could provide an attractive opportunity for outside investors looking to develop and manage ICT incubators, with the ultimate goal of commercializing products and services developed within them.

3. Increasing enabling effects of the ICT cluster

Relative to more competitive countries, the Saudi Arabian ICT cluster's enabling role is currently limited; basic ICT products and services are primarily used by people, firms, and other clusters. But potential exists for much deeper and wider application of ICTs. Advanced ICT usage beyond phone and email communication is currently limited to just a few clusters, notably oil and gas, financial services, and to a lesser extent transportation. The most sophisticated firms in these clusters have developed customized Web-, computer- and phone-based applications to address unique and complex problems within the sector. Encouraging comparable use by individuals and firms across all clusters will grow the market for ICT products and services, and increase productivity gains within those clusters.



While firms and clusters will naturally incorporate such ICTs on their own, public sector initiatives present significant opportunities to increase the speed of this process. Funding, research grants, incentive programs, and partnerships with academia constitute potential ways to increase the amount and quality of advanced ICT research. The greater challenge is how to apply advanced ICT research and development toward specific applications within clusters rather than just funding research for its own sake.

ICT Centers of Excellence have emerged as an effective mechanism to accomplish this task. Such Centers of Excellence focus time, effort, and financial resources from a number of public, private, and academic agencies on applying ICTs in other clusters. Countries around the world have used such centers to focus public and private sector resources on identifying, analyzing, and solving complex problems within a particular industry. Saudi Arabia would benefit from the establishment of similar ICT Centers of Excellence.

Increasing advanced ICT usage across clusters

NCC recommendation:

- Create ICT Centers of Excellence throughout the Kingdom that serve as hubs for ICT-related investment, R&D, and technology commercialization, each with a focus on a specific cluster.

Saudi Arabia should first identify those clusters that would benefit most from the establishment of cluster-specific Centers of Excellence, to increase the enabling effects of ICT in the cluster and create unique pockets of competitive advantage. The NCC selected four clusters in Saudi Arabia that would particularly benefit from an ICT Center of Excellence: oil and gas, health care, education, and transportation. For each cluster, the current state of ICT use is discussed, and the potential for an ICT Center of Excellence is explored.

OIL AND GAS

One of Saudi Arabia's only ICT Centers of Excellence is the King Abdullah Bin Abdulaziz Science Park (KASP). Established in 2002, it operates at the intersection of the private and academic sectors, with a specific focus on oil and gas research. The science park is affiliated with King Fahd University of Petroleum and Minerals (KFUPM), which provides university resources, including research time from students and professors; and with Saudi Aramco and ICT companies, which provide funding, business incubator services, and internship and mentoring opportunities for university students and professors. Patents and copyrights developed by KASP are sold or licensed to the private sector for commercial deployment.

Given the success of KASP and the importance of the upstream and downstream oil and gas industries in Saudi Arabia, the Kingdom should replicate the KASP model across clusters. Within the oil and gas cluster in particular, there are opportunities for additional Centers of Excellence. For instance, the Saudi Arabia Basic Industries Corporation (SABIC) has two research and technology centers in the Kingdom. Either of these centers, located in Al Jubail Industrial City and Riyadh, could serve as anchors for a new ICT Center of Excellence, with a specific focus on downstream chemical processes, technologies, and products.



HEALTH CARE

Beyond the oil and gas cluster, an ICT Center of Excellence would play an invaluable role in the health care cluster. In Saudi Arabia, the Ministry of Health (MoH) has been active for over a decade with several e-health initiatives that use ICT products and services to improve health care delivery. In 1993, the ministry established an e-health center as part of the King Faisal Specialist Hospital and Research Center; and created the National Telemedicine Project, which uses fiber optics and international video conferencing to facilitate video medical consultations, information sharing, and the institutionalizing of electronic medical records across the Kingdom. In April 2006, the MoH announced its intention to implement a large-scale Oracle database across 150 clinical centers in the Kingdom, to centralize medical data and enable improved data availability. Going forward, the Ministry of Health has proposed development of a National e-Health Plan in 2008. The primary objective is to develop a master e-health strategy for Saudi Arabia that focuses on better use of ICT products and services.⁴³ The opportunity should be taken to explore the benefits of incorporating an ICT Center of Excellence into the e-health strategy. A Center of Excellence could work with domestic and international medical research institutes, public health groups, and private sector e-health firms to identify or develop best practices for using ICT products and services to improve health care management, administration, and delivery. In addition to coordinating public and private sector research, development, and commercialization efforts for e-health technologies and applications, a Center of Excellence could serve as a hub for foreign direct investment from international, technology-enabled health care solution providers.

EDUCATION

The Ministry of Education is introducing ICT systems in learning tools, administrative procedures, and buildings infrastructure. In 2004, Microsoft Arabia signed a memorandum of understanding (MoU) with the ministry to bring improved ICT education to schools in the Kingdom, with teacher training as one of the four pillars of the agreement. In addition, several public and private schools in Saudi Arabia have adopted ICT-enabled programs using e-learning tools, including wireless infrastructure. Some schools are already experimenting with e-classrooms, where all students and teachers are equipped with computers. Universities and colleges in Saudi Arabia are also adopting e-learning programs. For example, the King Abdul-Aziz University was the first in the Kingdom to deploy distance education in addition to regular classes.⁴⁴ It also maintains the largest electronic library in the Kingdom, with 16,000 e-books.

King Abdul-Aziz University could further its leadership in ICT-enabled education in Saudi Arabia if it were to establish an ICT Center of Excellence focused on advancing e-learning technologies. In particular, a Center of Excellence could focus on ICT learning tools and applications that enable teachers to reach students in rural areas. A center could also design and implement new ICT components within existing school curricula, piloting concepts within a single university or set of regional schools for national rollout after proving the concept. Partnerships with private ICT companies already involved in ICT-enabled

⁴³*eHealth in Saudi Arabia: Just around the Corner?* Majid Altuwaijri, PhD, 2007

⁴⁴Saudi Government Electronic Portal



education, including large multinational companies (e.g., Microsoft, Cisco, and HP) and local IT training companies, such as New Horizons, could increase research funding and ultimately lead to commercialization of successful innovations beyond Saudi Arabia.

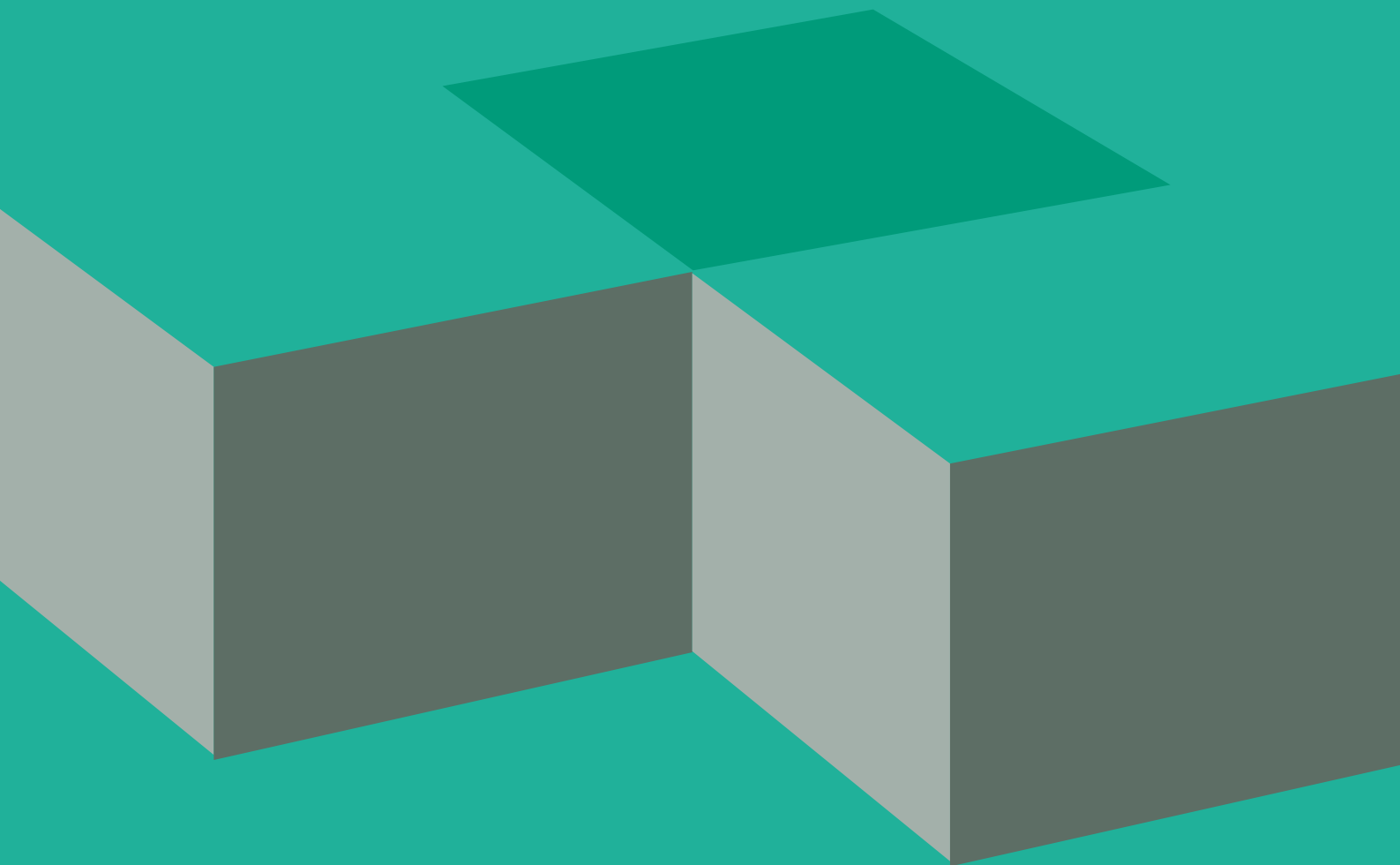
TRANSPORTATION

The Ministry of Transport in Saudi Arabia is applying advanced ICTs as part of the Intelligent Transport System (ITS), to facilitate road transportation across the Kingdom. ITS includes electronic cameras to monitor traffic movement and violations, electronic synchronization of traffic lights, and centralized reporting of violations within a national database. Enhancing the ITS's technological sophistication and linking it to other systems and agencies could significantly reduce costs and increase efficiency. The establishment of an ICT Center of Excellence focused on surface transportation would help. In California, for example, the Partners for Advanced Transit and Highways (PATH) was designed to promote ICT to manage traffic congestion. The center is administered by the California Department of Transportation (Caltrans), in collaboration with the Institute of Transportation Studies (ITS) at UC Berkeley. PATH develops solutions to issues confronted by California's surface transportation systems, through cutting-edge research conducted by transportation experts working in conjunction with those in the fields of IT, engineering, economics, transportation policy, and behavioral studies. PATH activities include conducting leading research; planning and evaluating field operational tests; developing partnerships between academia, the public sector, and private companies; and educating students and practitioners.⁴⁵

Elsewhere within the transportation cluster, an ICT Center of Excellence focused on intermodal logistics could generate substantial economic benefits for the Kingdom, particularly if it were established in Hail Economic City, which plans to become a multi-modal logistics hub connecting Saudi Arabia and the Economic Cities via the North-South railway and the Landbridge. An ICT Center of Excellence would help create the applications to facilitate the efficient transit of goods into and out of Saudi Arabia, and to establish Hail and Saudi Arabia as world leaders in trade and transport facilitation.

⁴⁵California Partners for Advanced Transit and Highways, 2007

Conclusion





Conclusion

“The future vision for ICT calls for the creation of a knowledge-based society that is able to produce, access, use, and interact with the flow of latest information; thereby contributing to improving efficiency, productivity and quality of products and services.”

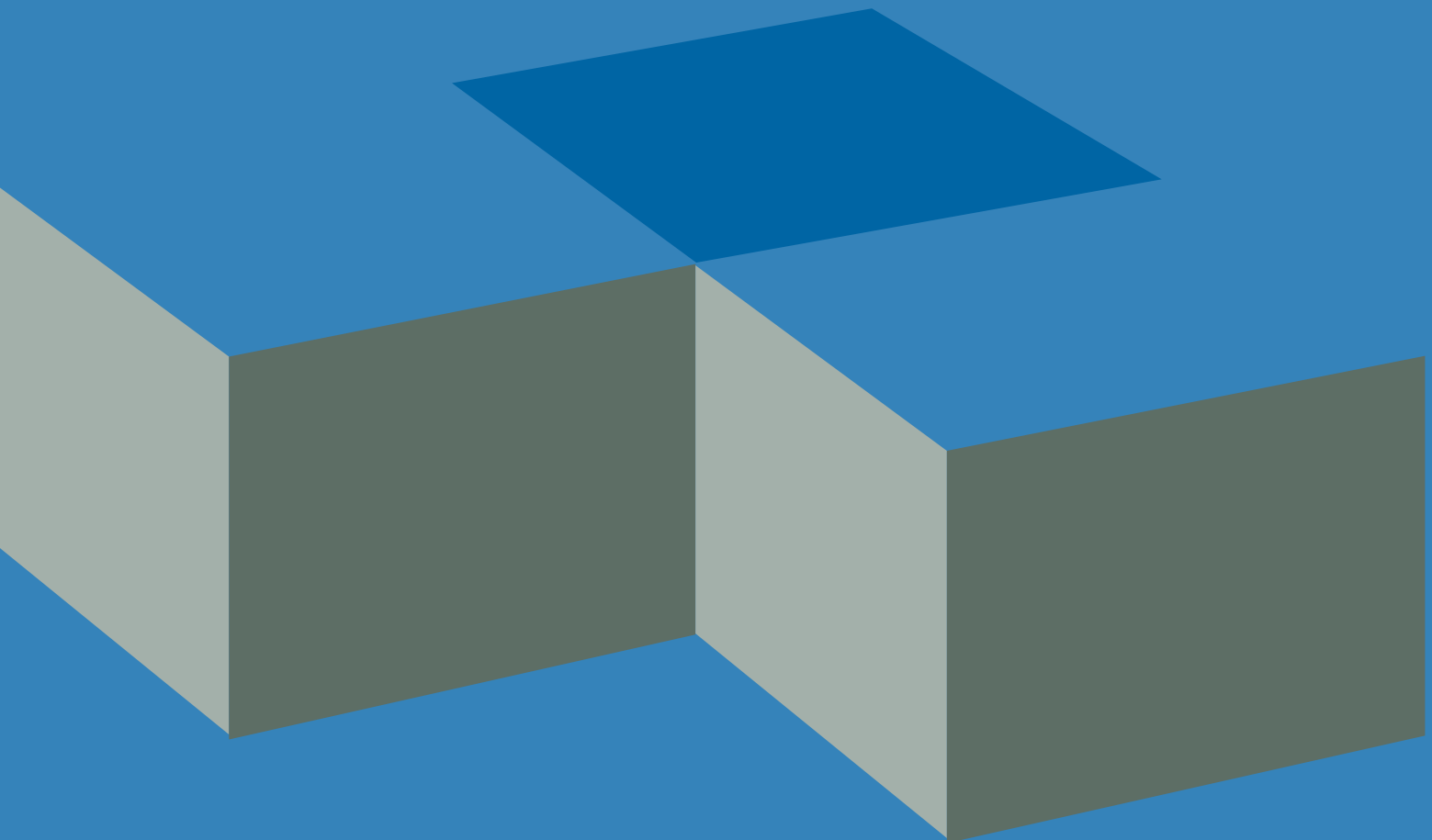
– Saudi Arabia’s 8th Development Plan

Saudi Arabia’s aspiration to become one of the Top 10 most competitive economies by 2010 and its objective to quickly develop a knowledge-based economy are one and the same. The unifying aspect of the most competitive economies in the world is their ability to rapidly create, disseminate, and generate value from information. The existence of large, growing, and competitive telecoms, information technology, and content industries in the ICT cluster is central to accomplishing these tasks.

The ICT cluster in Saudi Arabia is growing rapidly; however, challenges remain. The growing digital divide, low levels of entrepreneurship and competition in the IT industry, and a lack of advanced ICT usage by other clusters indicate that the ICT cluster has yet to reach its potential. Overcoming these challenges will not be easy, but in similar situations other countries have succeeded; Saudi Arabia can, too. The recommendations contained within this report are meant to initiate a discussion on how to proceed with improving the cluster’s competitiveness in Saudi Arabia.

To implement any or all of this report’s recommendations, strong leadership and substantial investment are required. Private sector involvement is also critical. The ICT Cluster Advisory Council, established by SAGIA and the NCC, creates a mechanism to bring about change through public and private sector collaboration. The Advisory Council provides MCIT, CITC, KACST, MoH, MoHE, other public agencies, and private sector ICT firms with a vehicle to develop and champion ambitious and innovative projects that directly address the cluster’s challenges. By working together, public and private sector stakeholders can ensure Saudi Arabia’s people, firms, and clusters are equipped with the advanced ICT products, services, and skills necessary to enable Saudi Arabia to become one of the most connected and competitive countries in the world.

Appendix





Appendix

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