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An Aranca Special Report

2014

SAUDI ARABIA

Emergence of an Innovation Kingdom

PREPARED FOR THE EUROMONEY SAUDI ARABIA CONFERENCE 2014

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This report is produced for **The Euromoney Saudi Arabia Conference 2014**.

Aranca is the Knowledge Partner for the Conference.

Foreword

Hemendra Aran
Founder & CEO, Aranca

The infusion of value through the creation and dissemination of knowledge and new ideas has been at the core of economic transformation and growth all through history. Economies and businesses around the globe have been developing strategies on the cornerstone of innovation, and this has resulted in significant productivity gains and (consequently) economic growth. Innovation (or simply the use of technology to boost business processes and efficiency) has and will remain one of the few qualities that distinguish the leaders of tomorrow from the also-rans.

Innovation-led strategic transformation is already underway in the Kingdom of Saudi Arabia and is likely to be the foundation of the next wave of economic and social progress.

Supported by resilient collaboration between the government, academia and industry, the Kingdom has now laid the foundation for a knowledge-driven economy. Five key drivers are creating a cycle of innovation that is self-sustaining. These drivers are: strong infrastructure (supporting government-industry-academia collaboration), improving quality of human capital, growing access to local and global technology, improving business environment reflected in doing business ranking, and increased funding.

The progress is remarkable. Saudi Arabia has moved up 12 notches since 2011 and now stands 42nd (among 142 countries) in the Global Innovation Index. Oil wealth and the transition to an investment-driven, broad-based economy are sustaining this momentum. And with Saudi Arabia poised to join the trillion dollar economy club within this decade (please see our special report 'Saudi Arabia on the Move: Making of a Trillion Dollar Economy'), the virtuous cycle of innovation is only likely to grow.

The priorities for the next decade are clear: bridge the skills-set gap and promote entrepreneurial ecosystem in a big way. To bridge the skills-set gap, much needs to be done to improve the quality of basic and higher education that fosters technical know-how and innovative thinking among students. The nation also needs to work on promoting research collaboration between local universities and global centers of research excellence. An entrepreneurial ecosystem will require work on developing business incubation and industrial/technical clusters as well as financing infrastructure for start-ups.

The road ahead is tough and successful implementation and substantial gains in the priorities identified above are critical. Yet, given the progress so far, I entirely agree with 91% of our survey respondents that the Kingdom has the potential to emerge as an innovation-driven economy in the next decade.

As Knowledge Partner to the Euromoney Saudi Arabia Conference 2014, we present this special report on the innovation landscape in Saudi Arabia and its ongoing transition to an innovation-led economy. We draw on our years of experience working with clients in Saudi Arabia to understand key drivers and inhibitors for this transformation and how different stakeholders – government, academia and industry – are fostering this ecosystem to catalyze economic development.

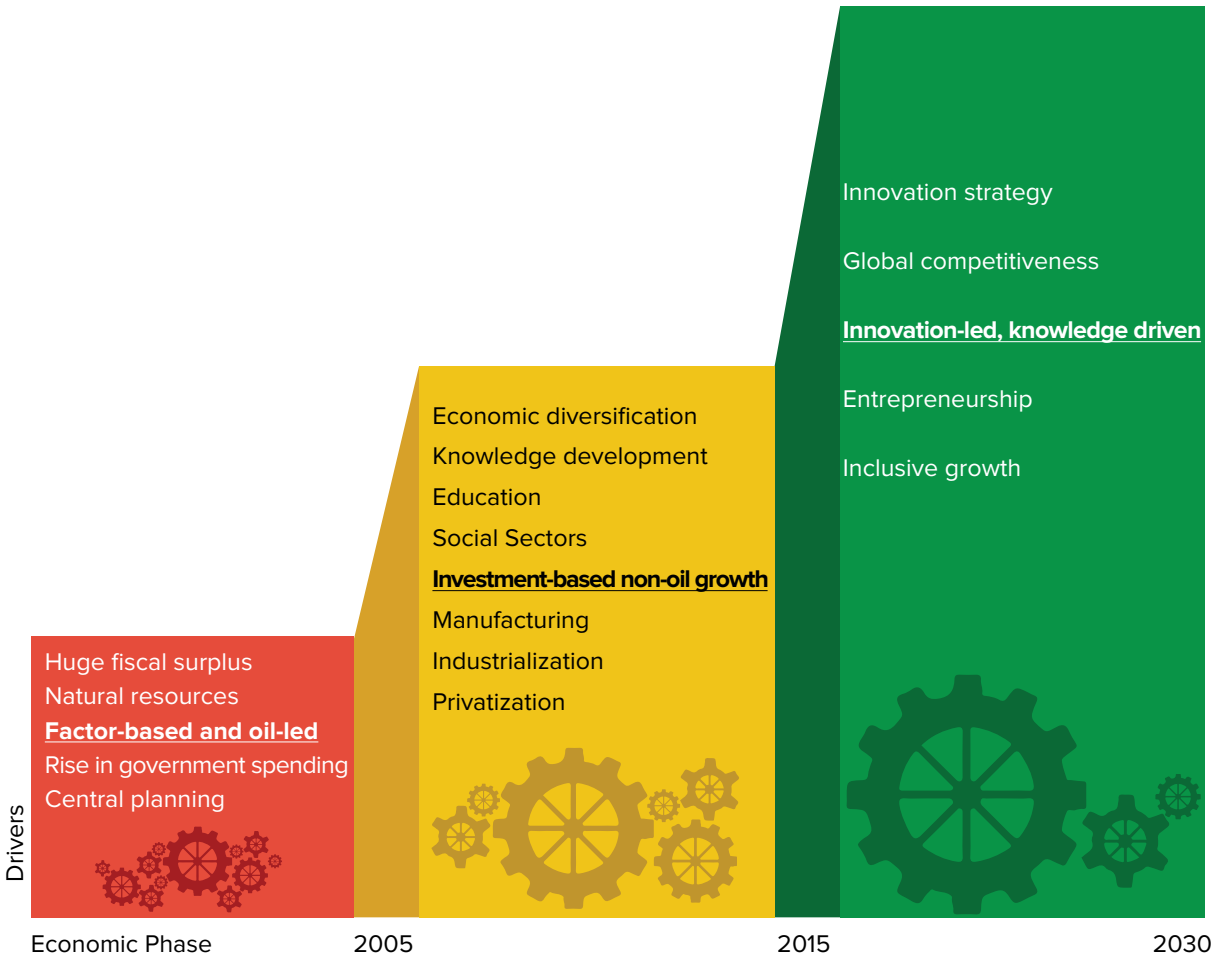
We enjoyed the entire process – interaction with stakeholders and research preparation – and hope you will also find it useful. I welcome your comments. Please write directly to me at **hemendra.aran@aranca.com**.

Executive Summary

"Innovation is anything, but business as usual" – Anonymous

The realization that the creation and dissemination of knowledge creates immense economic value has led companies and economies across the world into building strategies with innovation at the core. Innovation will be one of the few qualities that will distinguish the leaders of tomorrow from the also-runs. The Kingdom of Saudi Arabia's (KSA's) efforts to become a knowledge-centric economy and society have ushered in an era of tremendous change. From a pure resource-dependent economy just a few decades ago, Saudi Arabia is now firmly on track to become a knowledge-driven economy.

Figure 1: Historical shift in Saudi economy and the way forward



Source: Aranca analysis

Saudi Arabia poised for the next leg in economic transformation

Saudi Arabia's emphasis is on developing an investment-driven broad- based economy.

Saudi Arabia has now moved into the second phase of its economic development plan, which commenced in the 1980s. In this phase, the emphasis is on developing an investment-driven broad-based economy that will help the nation diversify away from factor-based, oil-led growth. This phase has seen the development of hard infrastructure, industrialization, a move toward privatization, and in recent years, the laying of the foundation for a knowledge-driven economy. With one-quarter of the world's hydrocarbon reserves, Saudi Arabia is still reliant on oil—hydrocarbons account for almost 90% of the Kingdom's total exports and 75% of government income. Nevertheless, the strong emphasis on moving to a non-oil economy is reflected in the shifting GDP contribution pattern (non-oil activities contributed 51.8% to the GDP in 2013 vis-à-vis 37.1% in 1980). This broad-based development framework decreased the Kingdom's dependence on the oil sector and economic volatility, shielding the domestic economy from the fallout of the global recession. The Kingdom's annual GDP growth averaged a strong 5.5% during 2000–13, with the economy touching USD0.7 trillion in 2013. (*please refer figure 2 on next page*) Saudi Arabia changed gears at the cusp of the century, shifting focus to human resources and social infrastructure. This transition is reflected in the Kingdom's changing budget allocation over the past few years.

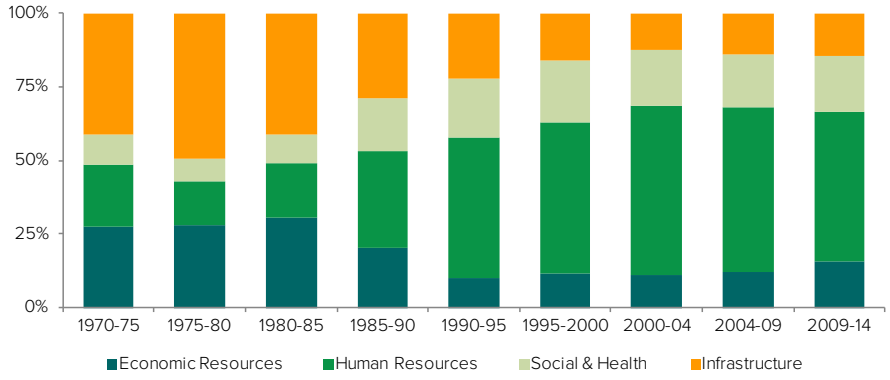
Budgetary allocation reflect the tilt in priority in favor of human resources and social welfare.

The Kingdom is looking at global best practices from current innovation leaders that could be implemented in Saudi.

Improving macroeconomic variables led by momentum in the non-oil sector have now set the stage for the next leg in the Kingdom's economic transformation. Saudi Arabia's well-publicized demographic dividend will possibly be its trump card in the next phase. Home to about 29.5 million people, Saudi Arabia is among the youngest nations in the world. More than 65% of the Kingdom's total population was below 35 years of age as of 2013. This ratio compares well with its peers (Qatar 56.9%; UAE 59.3%) and other emerging economies (China 48.5%, Brazil 56.9%, and Russia 43.8%). KSA's efforts to build human

talent through education and social infrastructure are also well-timed. The Kingdom is looking to replicate best practices implemented by current innovation leaders to fast-track its journey. US, Japan, South Korea and Singapore offer valuable insights in fostering innovation-led entrepreneurial societies. The models developed by Nordic countries such as Finland, which successfully transitioned from a resource- and investment-driven economy to one led by technology and knowledge, could also offer crucial insights.

Figure 2: Budgetary allocations shifting towards human resource and social sectors



Source: Ministry of Finance, Kingdom of Saudi Arabia

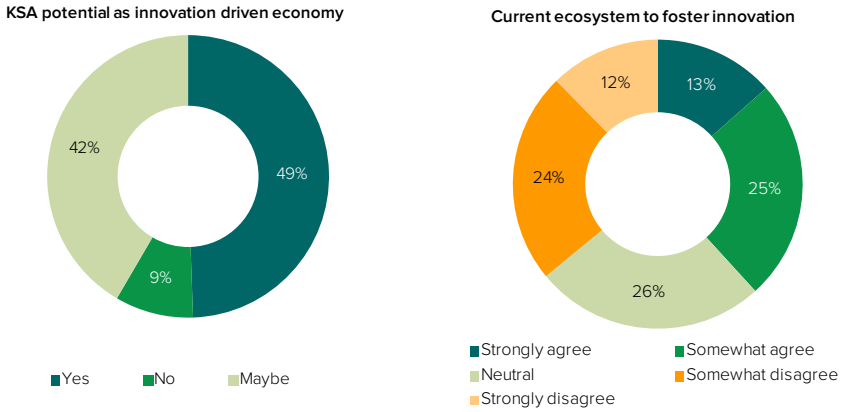
Government-led initiatives over the past decade have begun to yield results

The focus on innovation in Saudi Arabia has started to yield results. Today, awareness of the role of innovation and entrepreneurship in a vibrant economy is gaining ground. The Kingdom's innovation environment is improving, as reflected in its ranking in the Global Innovation Index (GII). The Kingdom's GII ranking has moved up 12 notches and now stands 42nd (among 142 countries) during 2011–13. The Kingdom has advanced in both knowledge & technology and creative output, as measured by the increasing number of patents and trademarks registered during the period.

Gains have come in the form of increased awareness of the importance of innovation and improved GII rankings.

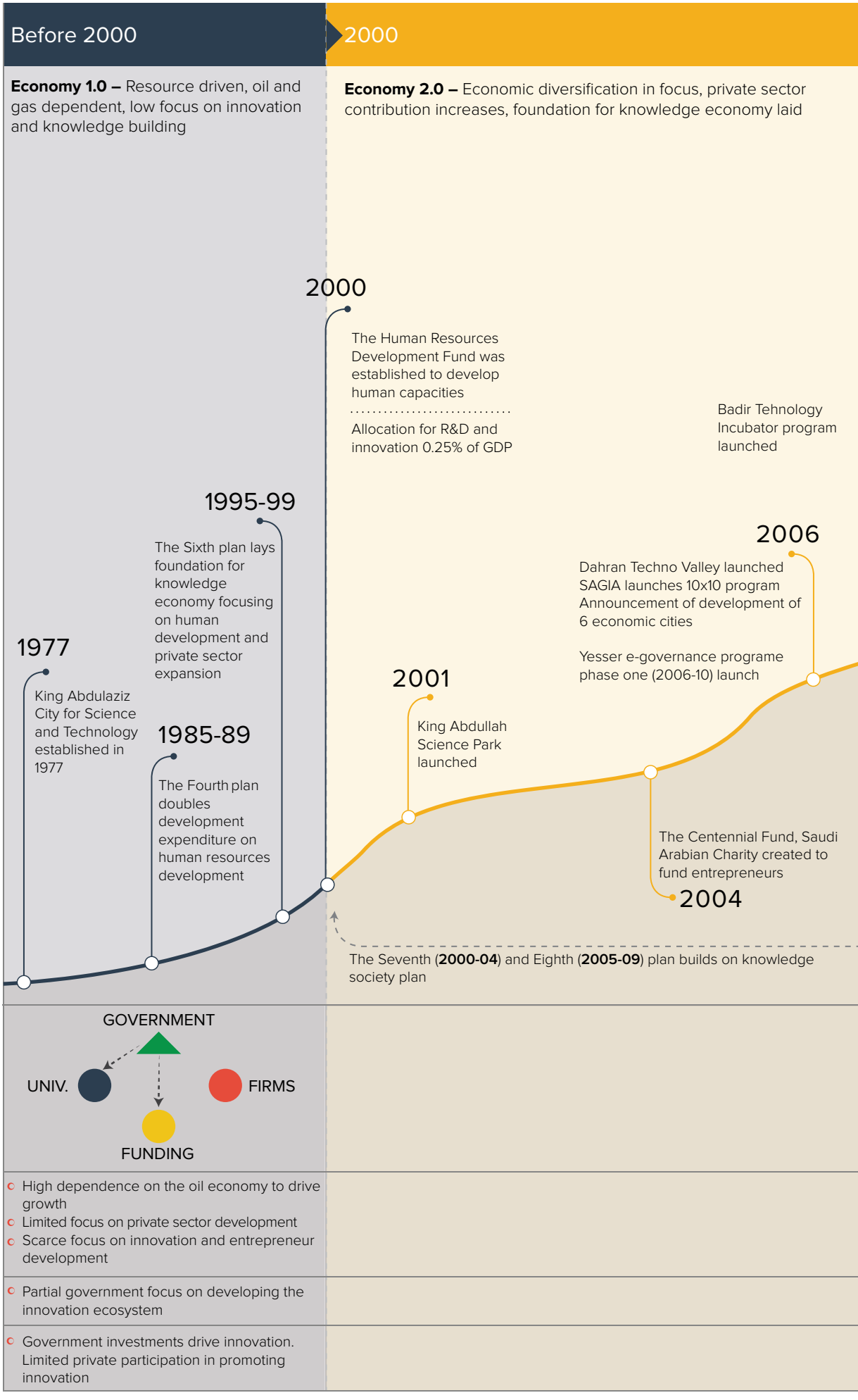
The optimism within Saudi Arabia is palpable. Nearly half of the 231 respondents covered in our survey (please refer Appendix for details on respondents) believe the Kingdom can emerge as a knowledge-based economy. Only 9% think this transition may not be possible. Optimism among the fence-sitters (42% of respondents) is likely to improve further if Saudi Arabia continues to develop its innovation ecosystem.

Figure 3: Current innovation ecosystem and potential as an innovation-led economy



Source: Aranca research survey response (n=231)

Figure 4: Evolution of innovation in Saudi Arabia



Source: Aranca analysis

2015 2025

Economy 3.0 – Private sector dominates, the economy possesses the skilled manpower and research base to emerge as a knowledge powerhouse

2007

2008
Riyadh Techno valley technology cluster launched
Saudi Fast Growth 100 awards created to reward entrepreneurs

2009
KAUST – the Arabic MIT founded

2010
National Science and Technology Policy launched
National Industrial Strategy launched

2011
GII ranking 54
Taqnia, multistrategy technology development and investment company founded
Aramco establishes Saudi Aramco Entrepreneurship Company (Wa'ed)

2012
Yesser e-governance programe phase two (2012-16) launch

2013
GII ranking 42

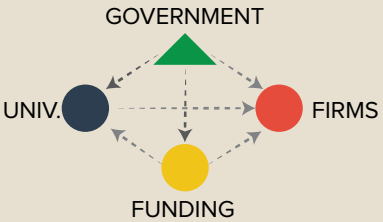
2015
Government plans to establish 20 technology incubators by 2015
Allocation for R&D and innovation to reach ~1% between 2010 and 2015

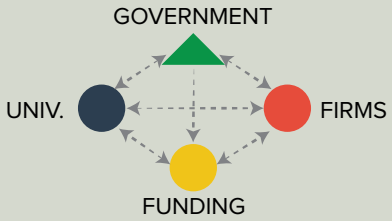
2017
KSA achieves Industrial strategy goals – GDP contribution 20%, industrial exports share 35%, technology exports 60%
KSA emerges as leading leading science and technology country in Asia as per NSTP goal
Allocation for R&D and innovation to reach ~2% by 2017

2020
ICT sector contribution to GDP 20%
Economic cities contribute 150 billion to KSA GDP & employment to 1.3 million people

2025
Government plans to establish 30 incubators by 2025
The culmination of the NSTP. KSA emerges as a leading science and technology country

The Ninth plan (**2010-14**) clearly lays down the goal of achieving a knowledge based society





- Shifting priorities of the government with greater focus on private sector development
- Developing innovation and entrepreneurship becomes priority due to realization of finite nature of oil reserves

- Focus on developing the country into a knowledge economy becomes overarching aim of the government
- The innovation and entrepreneurship ecosystem becomes self sustaining

- Government actively trying to develop the innovation ecosystem also seeks private sector participation

- Sustaining the innovation juggernaut becomes a key priority for the government

- Government still the leading player but growing private sector participation and linkages being established

- Govt. is an integral part of the ecosystem but private companies and universities become more interlinked creating a vibrant ecosystem

The building blocks of an innovative and entrepreneurial society are being put in place since the past decade.

This anticipated improvement is rooted in government-led initiatives through five-year economic plans and long-term vision policies aimed at transitioning to a knowledge-driven economy. The Kingdom began investing in building this holistic innovation and entrepreneurial landscape as early as the 2000s. The government was the biggest agent of change, encouraging R&D by providing grants to universities and research centers, and setting up technology parks and incubation centers. Several public firms also began partnering Saudi universities. With research activities gaining traction, private sector participation in innovation-related initiatives is expected to surge in the coming years. The graph overleaf illustrates the Kingdom's projected emergence as a global innovation powerhouse by 2025.

Policymakers are working toward innovation goals through 5-year economic plans and long-term policy initiatives.

The Economic Vision 2024, encompassing four 5-year economic plans was formalized in 2004 starting with the Eighth Development Plan (2005-09) to the 11th (2020–24).

It laid the foundation for the third economic phase. Under the Eighth five-year plan, emphasis was laid on encouraging scientific and technological research, and improving information and communication technologies.

The current plan (2009-14) has earmarked USD240 million in grants to support innovative scientific research projects every year. It envisages 10 research organizations and 15 technological innovation centers in collaboration with the King Abdullah City for Science and Technology (KACST), the Kingdom's national science agency. The budgeted expenditure on Human Resources development has increased by 52.4% to ~USD195.1 billion as compared to the Eighth plan. KSA also has various policies that encourage broad-based scientific development.

The National Science, Technology and Innovation Plan is KSA's roadmap to gradually evolve into a regional powerhouse.

The National Science, Technology and Innovation Plan (NSTIP) is a step change in the approach towards knowledge and innovation. NSTIP was chalked out by KACST to develop local strategies for key technology areas across strategically important fields such as oil & gas, space and aeronautics. The plan is essentially a 20-year roadmap (up to 2025) that will achieve KSA's aim to gradually evolve into a regional powerhouse, first in the GCC and Asia and then globally.

Ecosystem for an innovative, entrepreneurial society already in place

As it transitions to a knowledge-driven economy, Saudi Arabia is concurrently creating an ecosystem that will sustain growth. This ecosystem is based on five pillars: robust institutions, talented human resources, higher technology penetration, improved economic competitiveness, and ready funding. Efforts to strengthen these pillars are bound to result in a self-feeding and rewarding ecosystem. In our survey, the respondents cited the existence of research and educational institutes with external collaborations, policy framework to attract technology transfer, financing infrastructure for start-ups and development of incubation centers as the key priorities for the Kingdom to emerge as an innovation hub.

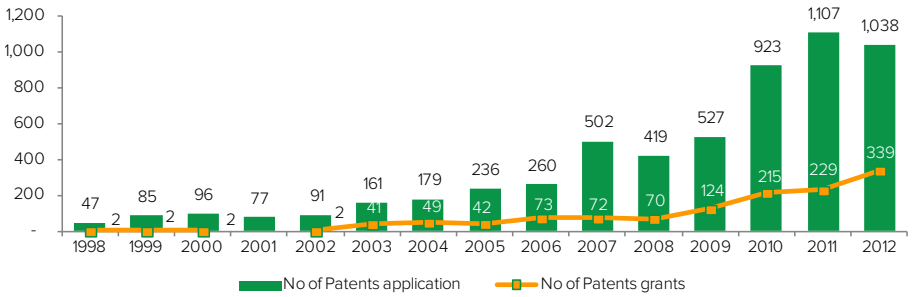
Figure 5: Five pillars of Saudi Arabia's innovation ecosystem

Infrastructure	Infrastructure entails the interplay of government, industry and academia	• A network of 24 public universities, 36 technological colleges for boys, 15 technical institutes for girls and 112 vocational training centers • Industry linkages such as KAUST's Innovative Industrial Collaboration Program • Increasing collaboration with international universities • Stronger intellectual property rights; Saudi Arabia also joined the Patent Cooperation Treaty to further develop its IP framework in 2013
Human Resources	A qualified and skilled labor force can drive the innovation engine	• Significant investments in building the human resource base • Enhancing skills through targeted programs such as Tatweer, Afaq, and the King Abdullah Scholarship Program • National Employment Strategy to hone skills and meet the needs of a diversified economy
Technology penetration	Access to technology facilitates innovation	• Programs such as the Home Computer Initiative, Dissemination of Digital Culture and Knowledge Lectures Initiative, Internet Awareness Project (Saleem Net) and the e-Training Caravans Initiative • 68% of households have access to internet; 54% internet penetration and amongst the top 5 mobile telecommunications markets
Economic competitiveness	To create employment and generate wealth	• Efforts led by Saudi Arabian General Investment Authority (SAGIA) • Doing Business Ranking improved from 67 in 2005 to 26 in 2014 • Industrial clusters have pushed KSA's economic competitiveness higher
Funding	Access to ready capital is essential to foster entrepreneurship	• Taqnia Ventures, The Centennial Fund, and Wa'ed Venture Arm are examples of public sector funding provided to innovative SMEs • Annual KAUST Seed Fund gives grants totaling USD250,000 to each winning student • For SME funding, the Kafala program has been successful • In the past decade, Saudi Arabia accounted for 23% of all deals in the Arab world.

Source: Aranca analysis

Saudi Arabia is already showing good progression in terms of creation of intellectual property. The number of patents applied by Saudi nationals has increased by 2x since 2007 and 22x in the last 15 years (since 1998). The number of patents granted to Saudi nationals has also increased substantially during the same period. Petrochemicals and chemicals sector is at the forefront of this progress, accounting for nearly 30% of all the patent application. Progress is also being made in some strategic sectors like ICT and healthcare.

Figure 6: Kingdom's creation of intellectual property (patent)



Source: World Intellectual Property Organization (WIPO) statistics database. Last updated: 03/2014

Going the extra mile to achieve goals

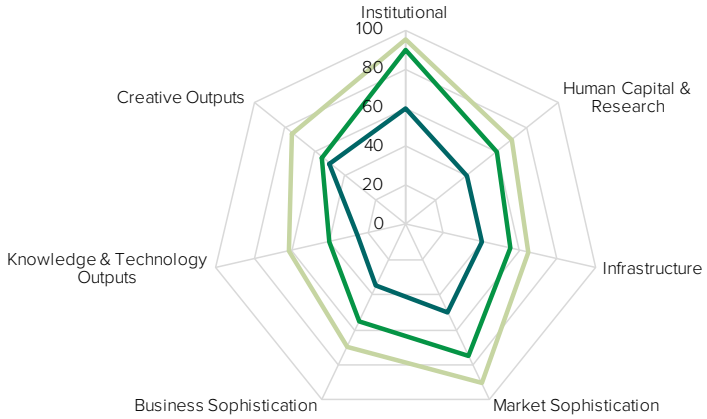
Saudi Arabia has made significant progress and is now at a crossroad. In our survey, 50% of the respondents felt that bridging the gap in skill set is the most crucial challenge for the current innovation ecosystem in Saudi Arabia. This factor is also linked to two other challenges accorded top priority: restricted access to talent and limited R&D capabilities compared to global innovation centers.

Bridging the gap in skill set is the most crucial challenge that Saudi Arabia currently faces.

With regard to the GII, there are some clear gaps that KSA needs to bridge. The Kingdom's current standing in each of the seven parameters that countries are measured on as compared to the top 10 innovative nations reveals that more needs to be done.

For example, R&D intensity, which influences the Human Capital and Research score, needs to increase. At USD1.8 billion, Saudi Arabia's R&D expenditure remains low. As a percentage of GDP, the outflow stands at just 0.8%, compared with Finland's 3.8%, Switzerland's 3.0%, the US's 2.85%, and Singapore's 2.65%.

Figure 7: Kingdom's comparison with the best and Top 10



Source: GII Index 2013

KSA will have to push forward in some areas to build on the momentum achieved so far. To bridge these gaps, it needs to implement the following measures at the earliest:

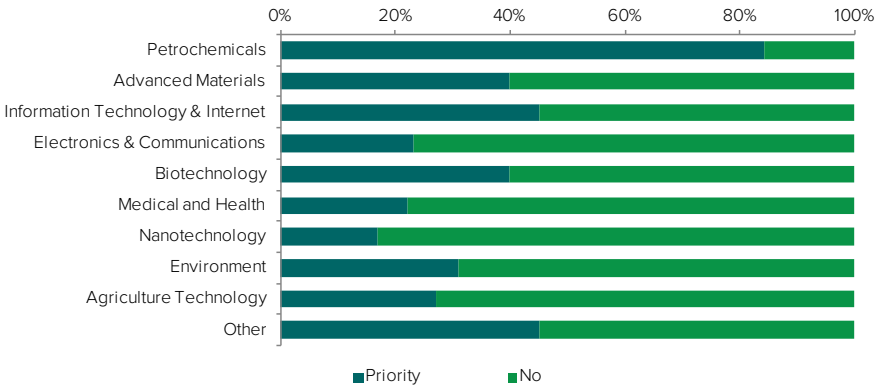
- Encourage academia-industry linkages and develop better frameworks for transfer of knowledge between various stakeholders;
- Focus on developing technology rather than importing technology to facilitate easier integration of technologies within the local economy;
- Revamp the education system to teach entrepreneurial skills and foster innovative thoughts among students; and
- Streamlining government processes to enhance swift implementation of development programs.

Sectors that could be at the forefront of innovation in KSA

The petrochemicals and advanced materials sector is likely to emerge as a potential innovation hub.

We identified key sectors that the Kingdom is nurturing and developing; these could emerge as pillars to support an innovation-driven economy. In response to our query on which areas in the Kingdom have the potential to emerge as an innovation hub, there was a strong consensus among respondents on petrochemicals and advanced materials due to natural advantages, strong infrastructure and an established expertise. Development of strategic priority sectors such as solar energy, water and ICT also received maximum responses

Figure 8: Sectors where KSA has the potential to emerge as an innovation hub

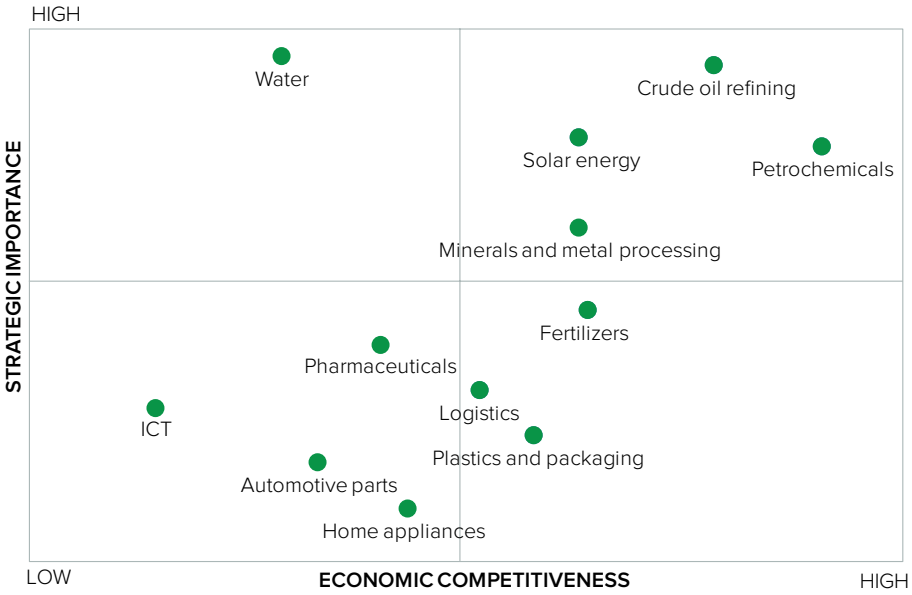


Source: Aranca research survey response (n=231)

The key considerations for our selection were: 1) economic competitiveness boosted by intrinsic resource wealth of the Kingdom; 2) the strategic importance that these sectors have for economic sustainability; and 3) the imperative for integration with the global technological advancement. While the ecosystem around sectors such as petrochemicals, fertilizers, minerals & metals is being driven by higher investments these sectors attract (supported by KSA's intrinsic resource wealth), the ecosystem around water and solar energy are being developed to support strategic priorities. The ecosystem around healthcare and information, communication & technology (ICT) sectors will strengthen human capital and make it easier for Saudi organizations to absorb and integrate technological advancements.

The ecosystem around sectors such as petrochemicals, fertilizers, minerals & metals is being driven by intrinsic resource wealth and higher investments.

Figure 9: Strategic sectors to be developed by KSA



Source: Aranca analysis

Figure 10: Key sectors where Saudi has potential to emerge as an innovation hub

Sectors with competitive advantage	
Petrochemicals, plastics and fertilizers	• The petrochemicals sector is the most important in the Kingdom, contributing about 90% to its total export earnings. • The Kingdom's move toward becoming the most significant global hub for petrochemicals and plastics continues unabated. While a reliable and affordable supply of feedstock provides the cost leadership advantage, huge investments for developing mega-complexes and attracting international joint ventures have propelled technological progress. • Saudi Arabia is now accelerating value-additive downstream industries, such as specialty chemicals, formulated products, performance polymers and engineering thermoplastics, by enhancing investments in R&D and innovation. • The government is at the forefront in terms of providing financing and creating world-class infrastructure. Large companies, such as SABIC, are actively helping industrial clusters to boost innovation and entrepreneurship. • Additional foreign investments in R&D as well as the use of foreign talent would help in sustaining the momentum.
Metals & Mining	• Saudi Arabia has one of the largest mineral deposits in the Middle East with well documented reserves of gold, copper, zinc iron, phosphate, bauxite, dolomite and gypsum. Therefore, the sector's development is of foremost importance in the Kingdom's diversification strategy. The government believes the sector would emerge as the third pillar of the economy. • To emerge as a fast growth sector over the next decade, a number of steps – infrastructure development, building human capabilities and investments in technology – need to be implemented. • While the government is focused on creating supporting infrastructure, industry-academia is collaborating to improve technical know-how across the value chain.

Strategic priority sectors for sustainable economy	
Renewable energy	• Renewable energy has been identified as one of the strategic national sectors to alter the Kingdom's energy dependence on fossil fuels. Saudi Arabia's location advantage, as well as committed efforts from public entities, bodes well for its long-term plans of sustaining energy. • To effectively diversify and simultaneously cater to the rising domestic consumption, the government allocated USD109 billion for solar projects, in line with plans to generate 50% of the domestic demand for electricity from non-fossil fuels by 2032. • The government, industry and academia have been focusing on establishing the requisite ecosphere for the sector's progress. Focus has been on localization across the technology value chain, thus supporting technology transfers and employment generation. • It has also supported the Kingdom's emergence as one of the most lucrative markets for renewable energies. In fact, Saudi Arabia topped the list of the most attractive markets for renewable energy in MENA, based on Ernst & Young's MENA Cleantech Survey 2013. • Though the foundation has been laid, the extent to which the government is able to materialize the impressive national project pipeline would decide the Kingdom's placement on the global map.
Water	• Water technology has been identified as one of the key strategic sectors in the Kingdom's national innovation plans given the limited availability of freshwater resources. • Rising per capita water consumption, coupled with an increase in industrial activities, necessitates the use of innovative technologies to bridge the water gap. Moreover, developing a robust water technology sector bodes well for the Kingdom's sustainable energy diversification plans. • Saudi Arabia's commitment to the sector's growth is evident from the current national strategies and the allocation of USD53 billion for water projects by 2022. • Initiatives such as privatization are boosting public-private partnerships and aiding the sector's move up the value chain. • Renewable water desalination supports the Kingdom's diversification strategy as it aims at reducing the current crude oil usage (~1.5 mboe/day) that is needed to generate water (through desalination) and electricity.
Other critical sectors	
Food processing	• The food processing sector is of strategic importance to the Kingdom as it currently imports an estimated 80% of the food requirements. • A rapidly growing population, steady inflow of tourists, and rising income levels would lead to further demand pressures in the long term. • To emerge as a leader in the Middle East, Saudi Arabia would need to implement strategies similar to successful food clusters (for example, Denmark). • Strong government support for cluster formation combined with sustained investments in R&D and technology developments would be the key success factors.
Information, Communication & Technology (ICT)	• As ICT sector is evolving as the core to bring efficiency and innovation across the sectors, the Kingdom is cognizant of the importance of this sector as a catalyst to boost economic development. • The Kingdom is the largest ICT spender in the Middle East with capital investment of over SAR135 billion in the past 10 years and ICT services spending of SAR94 billion in 2012 (compared to SAR21 billion spent in 2002). • The government is the biggest driver through initiatives such as the e-governance program, smart city initiatives and increasing IT spending on sectors such as health, transportation and construction. • There is also a strong impetus from corporate and SMEs which are adopting IT to enhance process efficiencies. • Growing IT penetration among the population will be another key factor driving the sector forward • Yet, skills gap and lack of favorable entrepreneurial ecosystem for technology led startups hinders the development of new technology companies.
Automotive	• The Kingdom serves as a hub for West-based auto companies seeking to benefit from the ever-increasing middle class in Asia and Africa, in addition to GCC markets. • The Saudi government has identified automotive sector as one of the potential industrial clusters for economic diversification and creating additional employment avenues. • The cluster, located at Yanbu Industrial City, aims to focus on the entire automotive chain, ranging from original equipment manufacturers (OEMs) to Tier 1, 2 and 3 suppliers. • The foremost advantage for the industry is the availability of low-cost raw materials - Saudi Arabia is endowed with rich bauxite resources and has access to inexpensive electricity. • Furthermore, companies such as SABIC are increasingly focusing on supplying downstream industry products (lightweight engineering thermoplastics and enhanced fuel additives, among others) to auto giants.
Healthcare – Pharmaceuticals & Biopharmaceuticals	• Saudi government has undertaken steps to encourage local production of generic drugs to restrain healthcare spending and improve employment. • Incentives such as faster entry of locally manufactured medicines, low tax rates and funding facilities are attracting FDI in the pharmaceutical sector thereby helping to enhance the skills of local companies • Multinational companies such as GlaxoSmithKline, Daiichi Sankyo and Pfizer have formed joint ventures with local firms to set up production units in the Kingdom. • The government has already spent SAR350 million on research projects in the field of biotechnology through the NSTIP and has launched a business incubator – Badir for Biotechnology – in March 2010 which is based in King Fahd Medical City.

Source: Aranca analysis

Conclusion

Innovation is critical for economic development, and social welfare. Saudi Arabia's policymakers have taken up the challenge to meet their economic goal of emerging as a knowledge-led economy. On this journey, they are laying the foundations of an ecosystem that can nurture a self-feeding cycle of innovation and entrepreneurship. Policymakers will have to persevere on the current path and accelerate efforts to close the gaps between Saudi Arabia and the leading innovative nations of today. It is also now imperative that the private sector participates wholly and together with the public sector will take the economy to the next stage.

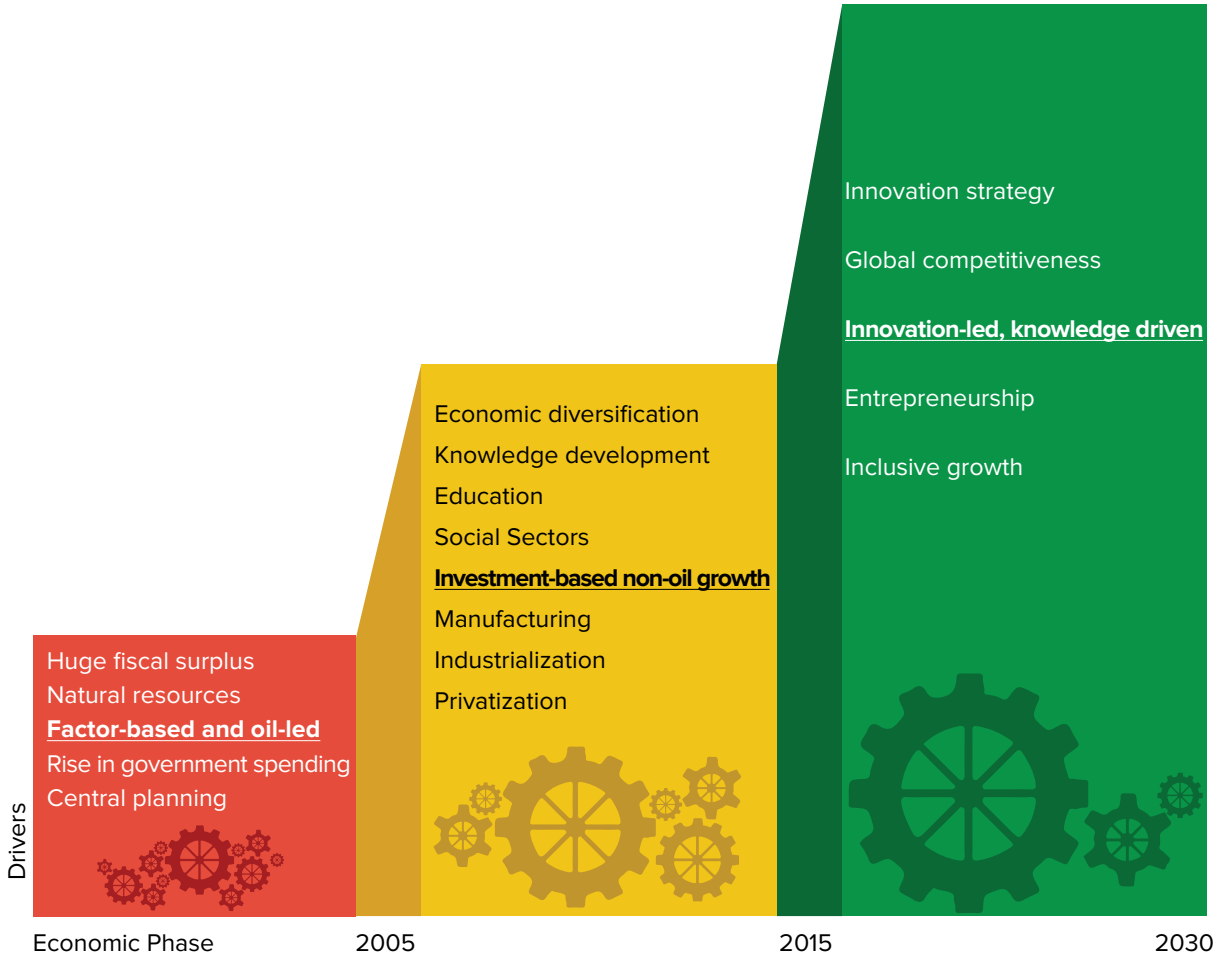
The private sector will essay a key role in leading the Kingdom into the next stage.

1

Saudi Arabia – Poised to Become Global Hub for Innovation

Innovation has been at the root of economic transformation and development across the world, fostering entrepreneurship and boosting productivity and employment. The realization that the creation and dissemination of knowledge creates immense economic value has led both companies and economies into building strategies with innovation at the core. Saudi Arabia, for instance, plans to become a knowledge-driven economy over the next two decades by building on its innovation and entrepreneurial ecosystem. The evolution of this ecosystem will create a strong foundation for cohesive synergies between the public and private sectors and unleash the economy's true potential. Saudi Arabia's robust performance over the past decades, as reflected in its socio-economic parameters, has set the Kingdom up for a metamorphosis of sorts, and it is now poised to become a leading global hub for innovation.

Figure 11: Historical shift in Saudi economy and the way forward



Source: Aranca analysis

The Saudi diversification experience so far

To achieve its goal, Saudi Arabia will enhance its innovation and entrepreneurial ecosystem over the next two decades.

The Kingdom is experiencing a nationwide strategic transformation. From a purely oil-driven economy to one boasting of state-of-the-art infrastructure, industrial and entrepreneurial ecosystem, Saudi Arabia has laid the cornerstone for a sustainable and vibrant economy. Oil-led booms, non-oil sector growth, strong macro fundamentals and a fertile business environment have all contributed to the Kingdom's steady growth.

Beyond oil

Development of human capital is increasingly becoming the key focus of Saudi Arabia's broad-based, investment-driven economy.

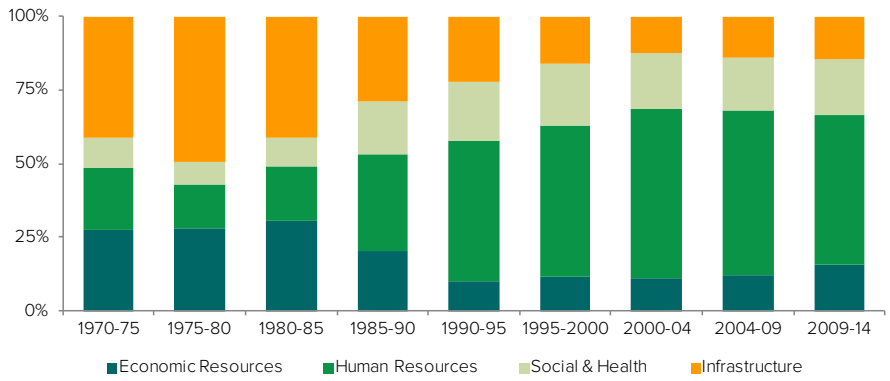
Broadening horizons has been the key priority for the Kingdom since the inception of its economic development plans in the late-1970s. The first two five-year economic development plans focused on essential infrastructure for the oil sector; however, every plan since the 1980s has emphasized on the development of a broad-based, investment-driven economy. The last seven five-year plans earmarked substantial sums for the development of human resource through education and training. Infrastructure spending fell to 14.7% in the ninth plan (2010–14) from 41% in the third plan (1980–84), whereas spending on human resource and social & health development increased to 50.7% (from 18.4% in 1980-84) and 18.9% (from 9.8%), respectively.

Broad-based growth in the non-oil sector, private investments and FDI shielded the Saudi economy from economic volatility and recession.

This broad-based development framework adopted by Saudi Arabia not only decreased its dependence on the oil sector but also reduced economic volatility and shielded the domestic economy from the fallout of the global recession. Annual growth in GDP during 2000–13 averaged a strong 5.5%, with the economy touching USD0.7 trillion in 2013. With one-quarter of the world's hydrocarbon reserves, the Kingdom continues to rely heavily on oil. Hydrocarbons based sectors account for almost 90% of Saudi Arabia's exports and 75% of government income. Nevertheless, the strong emphasis on moving to a non-

oil economy is making an impact—non-oil activities accounted for 51.8% of the GDP in 2013 vis-à-vis 37.1% in 1980. Saudi Arabia is also benefitting from its decision to open its economy, becoming one of the most attractive destinations for FDI. To strengthen its position in the global investment forum, the Kingdom joined the WTO in 2005. This coupled with its collaborative market for manufacturing, trade and commerce acted as the lynchpin for private investments. The private sector's contribution to the nation's GDP increased to 58.7% in 2013 from 36.5% in 1980.

Figure 12: Budgetary allocations shifting towards human resource and social sectors



Source: Ministry of Finance, Kingdom of Saudi Arabia

Unlocking growth from stable macroeconomic fundamentals

Saudi Arabia's strong macroeconomic fundamentals have enabled it to outshine its peers. It is one of the fastest growing economies in the world and an influential member of the GCC, contributing more than 40% to the region's GDP. The sizeable fiscal space created by the Kingdom's expanding balance sheet shielded the economy during the Great Recession. Saudi Arabia's fiscal surplus rose from 5% of the GDP during 2003 to 7.4% in 2013. This surplus has been the backbone for investments in the non-oil economy and social sectors such as education and housing. The emphasis on social spending and improvement in quality of life has shielded the Kingdom from political unrest, which decelerated growth in other resource-intensive nations worldwide. Government finances have also improved—Saudi government debt fell to 3.7% of the GDP in 2013 from 96.9% during 2003, whilst the current account surplus has averaged approximately 20% of GDP over the past decade.

"Yes, for sure Saudi Arabia has the potential for transforming itself into a knowledge and innovation-driven economy.

Ossama El Batran
Director of New Investments,
Hadia Abdul Latif Jameel Co. (HALJ).

With regard to innovation, Saudi Arabia's well-publicized demographic dividend is likely to be its trump card. Saudi Arabia, home to about 29.5 million people, is among the youngest nations worldwide. More than 65% of Saudi Arabia's total population was below 35 years of age as of 2013. Also, Saudi Arabia's median age is 26 years vis-à-vis Qatar's 32.4 years, UAE's 30.3 years, China's 36.3 years, and Brazil's 30.3 years. This demographic dividend is a strong platform for continual growth, giving the Kingdom an edge over other developing and advanced countries.

The next wave of economic development

The next wave of economic growth is likely to come through emphasis on knowledge. Success of economic models adopted by several economies such as the US, South Korea, Finland, Japan and more recently China has underscored certain trends. Innovation, for example, has been the key factor driving knowledge transition in these economies. This approach could jumpstart Saudi's journey towards becoming a knowledge society and also instill an entrepreneurial spirit among its citizens. The expanded economic enterprise

The next economic wave will be driven by the creation of an innovation-led society.

would also facilitate absorption of Saudi nationals into the growing domestic job market. Dividends are also expected to be realized by way of improved productivity.

Key learnings from innovation-led models worldwide

Transition to a knowledge economy has strengthened the competitiveness and global position of many countries across the globe. For instance, the global powerhouse status enjoyed by the US has its root in the success of the information age. After transitioning from an agrarian economy to an industrial one, and then a service-based one, the US finally adopted the information route. It complemented this by implementing a national strategy named "Innovate America" in 2005. This strategy, which chiefly focuses on human resources, infrastructure and funding, has helped the US to maintain its position as a leading center for innovation. In 2013 alone, 48 US companies made it to the list of 100 most innovative companies in the world.

Advanced economies have espoused the knowledge and innovation route to enhance global competitiveness.

Likewise, Asian countries such as Japan, South Korea and Singapore have espoused the knowledge and innovation path to improve productivity and emerge as creative economies. Their journey to a knowledge economy has its roots in robust knowledge infrastructure, both physical (such as a strong digital network) and human (intellectual talent). The knowledge revolution also swept Nordic countries, with Finland and Sweden featuring among the five most innovative countries worldwide. The example of Finland fits well in the Saudi context as it showcases the successful transition of resource- and investment-driven economy to one led by technology and knowledge. Finland's economic transition was driven by factors such as increased R&D spending, domestic knowledge generation, new offerings, and entry into new markets.

Even economies that have so far remained estranged from innovation have begun to seriously consider their options. For instance, China, which is primarily an industrialization-led economy, has emphasized on knowledge and innovation in its 12th Five-Year Plan (2011-15). The plan aims to drive innovation-led growth across strategic sectors through robust spending on research and development. Saudi Arabia can reference these models as a broad roadmap for itself.

Innovation and entrepreneurship, the key ingredients

Innovation and entrepreneurship, both products of a single agent – the entrepreneur, are integral to building a knowledge society.

Innovation and entrepreneurship go hand-in-hand and should constitute the basis of any innovation strategy. Saudi Arabia can build a strong innovation- and entrepreneurship-led ecosystem by increasing spending on R&D and human capital, and minimizing hurdles for entrepreneurs. To leverage the close association between economic evolution and knowledge, the Kingdom should invest in creating a conducive environment and draft a prudent policy framework. Such a framework, if implemented correctly, can produce a self-sustaining environment and facilitate the nation's transition to a knowledge economy.

Experts' views: Responses to Aranca Innovation in KSA Survey

Does the Kingdom have the potential to emerge as an innovation-driven economy?

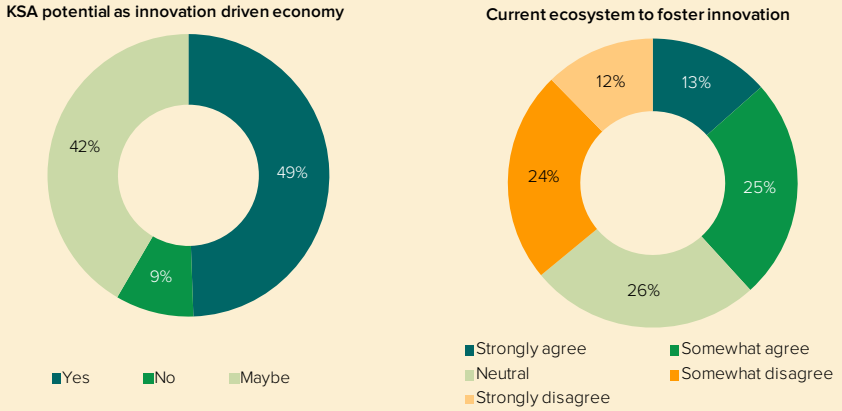
Nearly 49% of respondents are optimistic about KSA's potential to emerge as an innovation-driven economy.

We surveyed and interviewed 231 experts to understand how innovation is driving businesses in Saudi Arabia and how it could usher in the next wave of economic growth. The survey respondents included entrepreneurs, corporate and family groups, government agencies and investors in Saudi Arabia as well as global experts who track the Saudi economy very closely.

On whether KSA can emerge as an innovation-driven economy, 49% of the respondents believed the Kingdom was capable of this transformation. Approximately 42% of the

respondents were fence-sitters (these people said “maybe”); however, it is very likely that their optimism would improve in tandem with the ecosystem. Only 38% of respondents agree the Kingdom has the right ecosystem to foster innovation and entrepreneurship as of today.

Figure 13: Current innovation ecosystem and potential as an innovation-driven economy



Source: Aranca research survey response (n=231)

2

Kingdom's Commitment Towards Innovation Bearing Fruit

Saudi Arabia began investing towards building a holistic innovation and entrepreneurial landscape in the early 2000s. The Kingdom's Global Innovation ranking moved up 12 notches to the 42nd over 2011-13. Saudi Arabia has advanced in both knowledge & technology and creative outputs, as measured by the increasing number of patents and trademarks registered over the years. This improvement is rooted in government-led initiatives through five-year economic plans and long-term vision policies aimed at transitioning to a knowledge-driven economy. KSA's aim is to gradually evolve into a regional powerhouse, first in the GCC, then Asia and eventually globally.

The Kingdom ranked 42nd (out of 142 countries) in the Global Innovation Index 2013, a benchmarking tool that captures the role of innovation in a nation's economy.

The Kingdom's ranking in the Global Innovation Index (GII) is improving. The GII, a benchmark that measures the role of innovation in a country's economy, ranked Saudi Arabia 42nd among the 142 countries tracked in 2013. The country ranked 48th (out of 141 countries) in 2012 and 54th (out of 125 countries) in 2011. The 2013 GII consists of two sub-indices: innovation input and innovation output. The sub-index on innovation input is built around five pillars that enable innovative activities. These are: (1) institutions, (2) human capital & research, (3) infrastructure, (4) market sophistication, and (5) business sophistication. The sub-index on innovation output measures the results of innovative activities within the economy through two pillars: (1) knowledge and technology outputs, and (2) creative outputs. Overall, the pillars use 84 indicators under seven pillars to gauge a nation's innovation capabilities and measurable results.

Among innovation inputs, Saudi Arabia has witnessed considerable improvement in parameters such as human capital & research, infrastructure and business sophistication. With regard to human capital & research, the economy has climbed from the 53rd place in 2011 to the 39th in 2013, primarily due to a steady rise in investments in R&D infrastructure, education, and intellectual properties. The economy's ranking on infrastructure also advanced from 62nd in 2011 to 41st in 2013 due to higher use and easier access to information & communication technologies (ICTs). In terms of business sophistication, Saudi Arabia's rank improved from the 48th position to 46th in two years, due to increasing research collaboration between industries and universities, and the Kingdom's efforts towards development of innovation clusters.

The economy's standing on institutional framework, which evaluates its political, regulatory and business environment, fell from 60th to 77th. KSA's market sophistication rank also declined from 30th position to the 38th in 2013, primarily as domestic credit to the private sector (as a percentage of GDP) was lower compared to other countries. On a standalone basis, however, ease of getting credit as well as domestic credit improved significantly from 2011.

Progress in innovation inputs has bolstered KSA's ranking on knowledge & technology and creative outputs.

Better innovation input policies are resulting in higher rankings on innovation output measures. Innovation hubs serve as an excellent platform for this transformation by facilitating knowledge creation and sharing, and commercialization of ideas. This reflected in KSA's improved standing on both the output pillars. The economy's ranking on knowledge & technology outputs advanced from 93 in 2011 to 78 in 2013, and on creative outputs from 57 in 2011 to 24 in 2013. Better performance on both these parameters was driven by the creation of a higher number of patents and trademarks (in proportion to GDP at purchasing power parity).

Gains rooted in decades-long effort

The Kingdom began investing in building a holistic innovation and entrepreneurial landscape in the early 2000s. The government was the major agent in driving R&D by providing grants to universities and research centers, and setting up technology parks and incubation centers. Several public firms began to increasingly tie-up with such universities. With research activities gaining traction, private sector participation in the innovation process surged. Figure 16 illustrates the Kingdom's projected emergence as a global innovation powerhouse by 2025.

"It is evident that innovation and entrepreneurship is gaining ground in Saudi Arabia – there is more awareness, new ideas, and more incubators coming up to support commercialization of these ideas."

Musaab S. Al-Muhaidib
CEO, Al-Muhaidib Technical Supplies

These gains are rooted in the decades-long effort to increase the economy's innovation quotient. The Saudi government translated its long-term vision towards knowledge and innovation through its five-year development plans. Beginning from the 1970s, the focus of the five-year plans has gradually shifted from infrastructure and resources development to building a diversified knowledge-based economy. While the fifth (1990-94), sixth (1995-99) and seventh (1999-2003) development plans focused on enhancing employment,

infrastructure, and the private and social sector's competitiveness, subsequent plans have focused on diversifying and increasing the Kingdom's global footprint.

The government leveraged the five-year development plans to focus on building a diversified knowledge-based economy.

Apart from the five-year plans, Saudi Arabia designed a long-term strategy (Economic Vision 2024) in 2004. This vision policy spans 20 years and includes four five-year development plans, from the eighth development plan (2005–09) onwards to the eleventh development plan (2020–24). Under the Economic Vision 2024, the eighth development plan (2004-09) focused particularly on encouraging scientific and technological research. Also, emphasis was laid on improving information and communication technologies in order to cement the Kingdom's place in the global knowledge revolution.

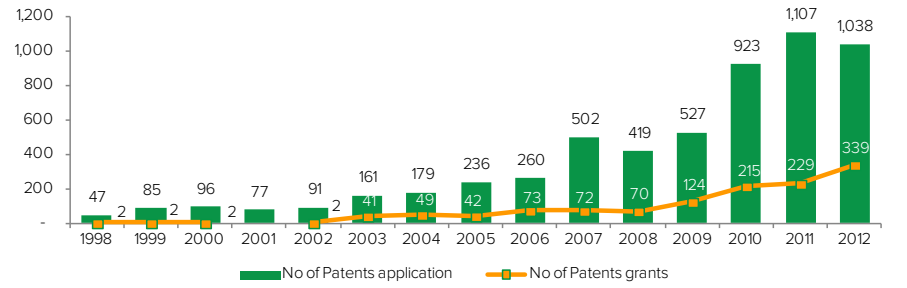
The ninth development plan (2010-14) focuses on strategic programs to enhance human capital and scientific innovation.

The ninth development plan (2009-14) has continued to focus on scientific capabilities and the creation of an innovative system focused on R&D. The plan earmarked USD240 million in grants to support innovative scientific research projects every year. It has planned 10 research organizations and 15 technological innovation centers in collaboration with King Abdullah City for Science and Technology (KACST), the national science agency. The plan also includes setting up at least eight technology incubators at KACST and similar educational institutions. Furthermore, to better prepare human capital for the knowledge age and reduce the dearth of skilled workers, the plan has outlined predetermined steps. The budgeted expenditure on human resources development has increased by 52.4% to USD195.1 billion as compared to the allocation during the eighth plan.

The number of patents applied by Saudi nationals has increased 2x since 2007 and 22x since 1998.

Saudi Arabia is showing good progress in terms of creation of intellectual properties, the number of patents applied by Saudi nationals have increased by 2x since 2007 and 22x in the last 15 years (since 1998). The number of patents granted to Saudi nationals has also increased substantially during the same period. Yet, this remains way below the number of patents being applied and granted to other fast developing countries like BRICS nations.

Figure 14: Kingdom's creation of intellectual property (patent)

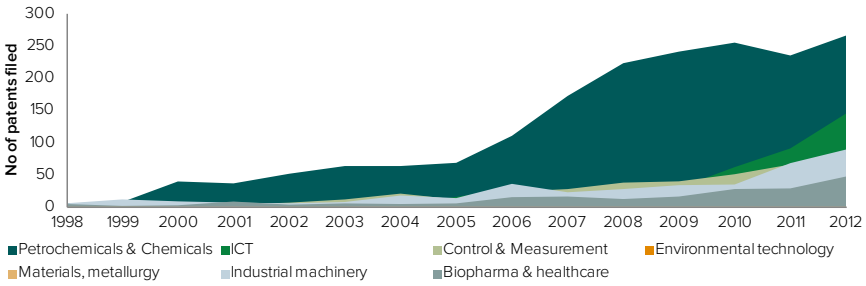


Source: WIPO statistics database. Last updated : 03/2014

Petrochemicals and chemicals sector accounts for almost 30% of all the patent application.

Petrochemicals and chemicals sector is at the forefront of this progress, accounting for nearly 30% of all the patent application. Progress on some strategic sectors like ICT and healthcare is also being made.

Figure 15: Kingdom's creation of intellectual property – patents filed by technology

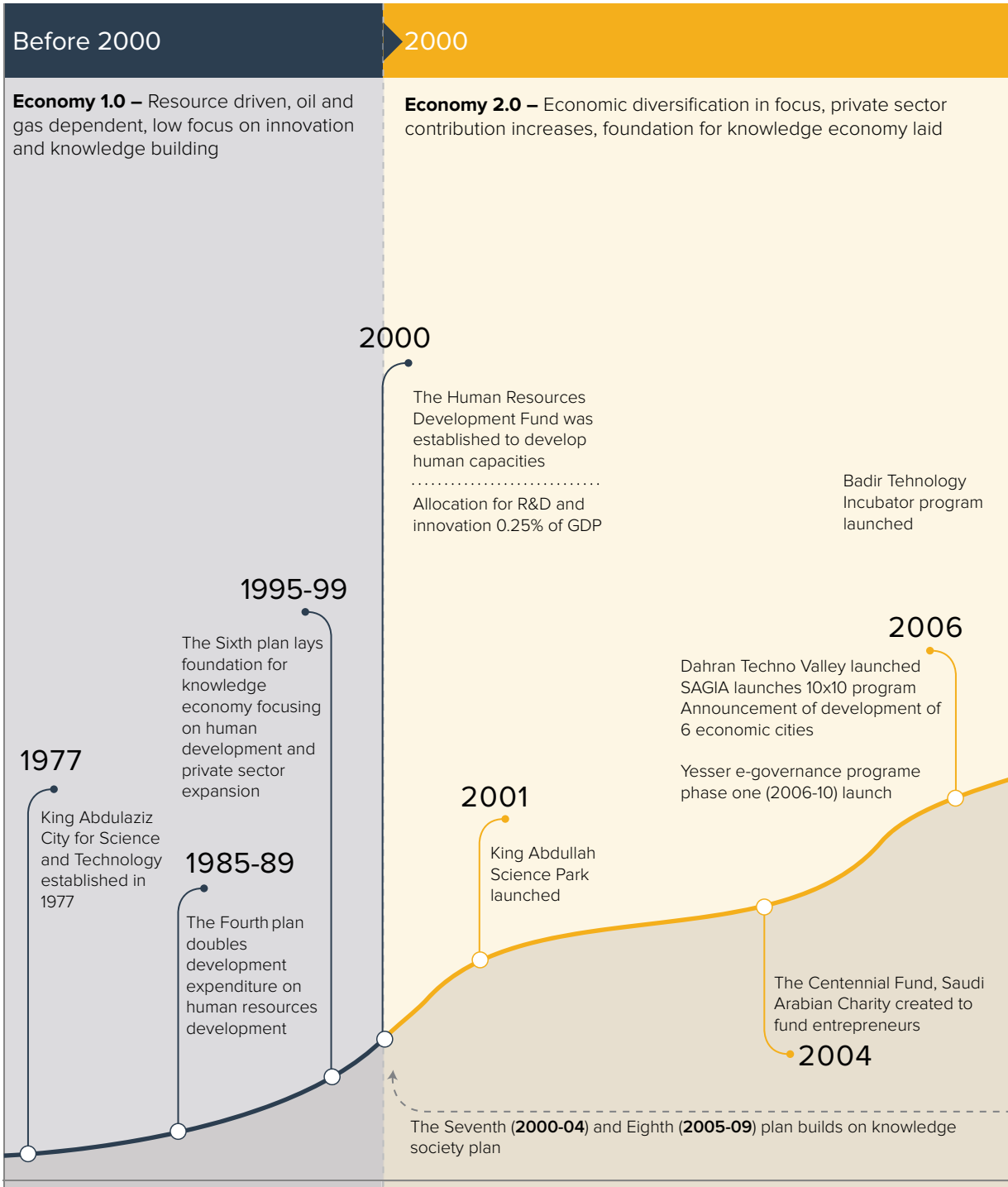


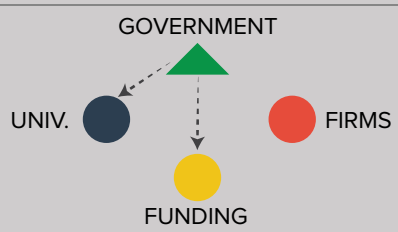
Source: WIPO statistics database. Last updated : 03/2014

Shifting gears with the National Science, Technology and Innovation Plan (NSTIP)

The Saudi government has introduced various policies, programs and plans for sector-specific growth. Of these policies, the National Policy for Science and Technology

Figure 16: Evolution of innovation in Saudi Arabia



EVOLUTION OF THE INNOVATION SYSTEM	
BACKGROUND	c High dependence on the oil economy to drive growth c Limited focus on private sector development c Scarce focus on innovation and entrepreneur development
POLICY FOCUS	c Partial government focus on developing the innovation ecosystem
PLAYER ACTIVITY	c Government investments drive innovation. Limited private participation in promoting innovation

Source: Aranca analysis

2015 2025

Economy 3.0 – Private sector dominates, the economy possesses the skilled manpower and research base to emerge as a knowledge powerhouse

2007

2008
Riyadh Techno valley technology cluster launched
Saudi Fast Growth 100 awards created to reward entrepreneurs

2009
KAUST – the Arabic MIT founded

2010
National Science and Technology Policy launched
National Industrial Strategy launched

2011
GII ranking 54
Taqnia, multistrategy technology development and investment company founded
Aramco establishes Saudi Aramco Entrepreneurship Company (Wa'ed)

2012
Yesser e-governance programe phase two (2012-16) launch

2013
GII ranking 42

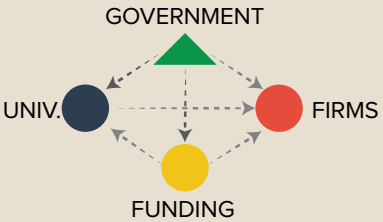
2015
Government plans to establish 20 technology incubators by 2015
Allocation for R&D and innovation to reach ~1% between 2010 and 2015

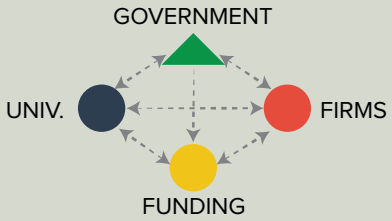
2017
KSA achieves Industrial strategy goals – GDP contribution 20%, industrial exports share 35%, technology exports 60%
KSA emerges as leading leading science and technology country in Asia as per NSTP goal
Allocation for R&D and innovation to reach ~2% by 2017

2020
ICT sector contribution to GDP 20%
Economic cities contribute 150 billion to KSA GDP & employment to 1.3 million people

2025
Government plans to establish 30 incubators by 2025
The culmination of the NSTP. KSA emerges as a leading science and technology country

The Ninth plan (**2010-14**) clearly lays down the goal of achieving a knowledge based society





- Shifting priorities of the government with greater focus on private sector development
- Developing innovation and entrepreneurship becomes priority due to realization of finite nature of oil reserves

- Focus on developing the country into a knowledge economy becomes overarching aim of the government
- The innovation and entrepreneurship ecosystem becomes self sustaining

- Government actively trying to develop the innovation ecosystem also seeks private sector participation

- Sustaining the innovation juggernaut becomes a key priority for the government

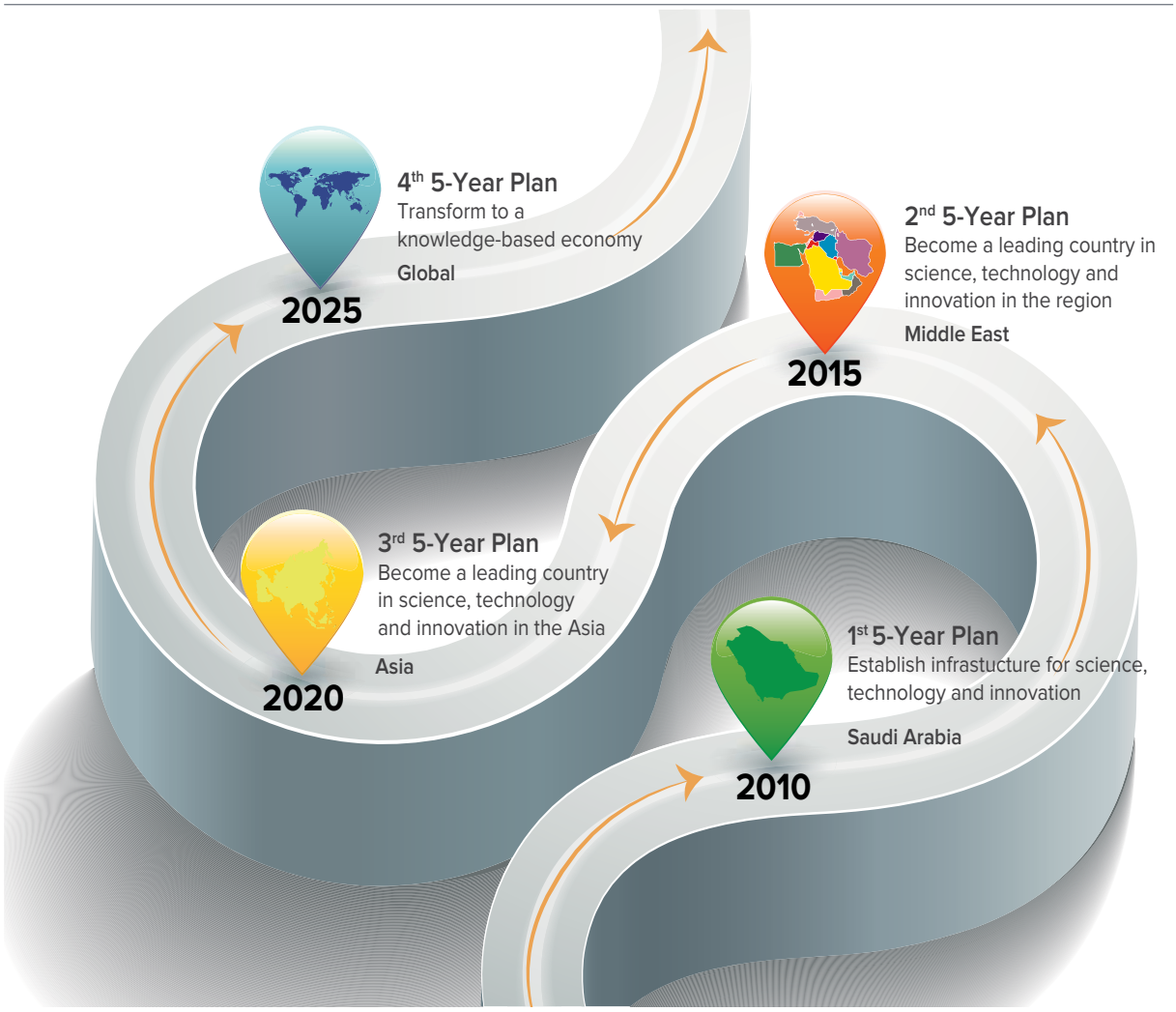
- Government still the leading player but growing private sector participation and linkages being established

- Govt. is an integral part of the ecosystem but private companies and universities become more interlinked creating a vibrant ecosystem

(NST), launched in 2002 through the joint efforts of KACST and Ministry of Economic Planning (MoEP), is considered to be the cornerstone for the Kingdom's vision of science, technology and innovation to create a knowledge economy. The strategic objective of this policy was to bring Saudi Arabia at par with other advanced economies in terms of science, technology and innovation.

KACST chalked out the National Science, Technology and Innovation Plan (NSTIP) to accomplish the NST's vision. The 20-year plan aims to develop local strategies for key technology areas across fields ranging from oil & gas to space and aeronautics. The plan is jointly executed by KACST with support from several other STI organizations, including 17 ministries, 10 universities, and 13 national agencies and commissions. The NSTIP framework is divided into four distinct stages of five years each (from 2005–25).

Figure 17: NSTIP framework to take KSA's economy to the next level in a staged manner



Source: NSTIP website, Aranca analysis

Collaboration among government, public enterprises and foreign universities led to success of the first 5-year (2005-10) plan.

During the first five-year stage, the basic infrastructure needed to boost innovation and entrepreneurship was laid through the implementation of the Technology Incubators & Parks Program (for example, Badir) and Technology Innovation Centers. Since its inception, Badir has successfully supported and developed over 70 companies until 2013. The program aims to establish 80 incubators, which will create 2,000 jobs in the Kingdom by 2025. Likewise, to increase the number of high-quality patents, three TICs have been established by KACST in partnership with universities by investing SAR150 million. Also, to bridge the funding gap faced by Saudi businesses, the SBIR program was launched (under NSTIP). This program seeks to finance firms at every stage in their lifecycle, right from idea generation to marketing and dissemination. A similar program called Tawteen was launched in collaboration with the MCI to support small and medium enterprises (SMEs) in the Kingdom.

Views from Experts: Survey Response

What are the most important factors that need to be in place for the Kingdom to emerge as an innovation hub?

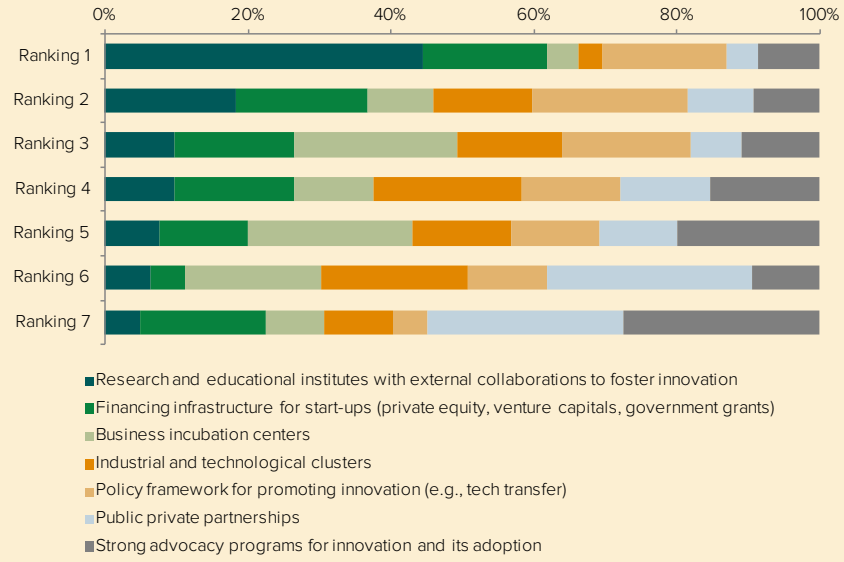
Given the key role human capital plays in fostering innovation in any economy, it is not surprising that 90% of respondents feel existence of research and educational institutes with external collaborations is one of the five most important factors that will determine whether or not the Kingdom emerges as an innovation hub. Almost 45% of respondents ranked it as the top driver. Policy framework such as technology transfer to promote innovation emerged as one of the five most important factors for 79% of respondents. Our internal research is in sync with the survey results. This underscores the significance of foreign collaboration and technology transfer for the development of internal human capital and technological base, especially since these tie-ups would ensure that things get done faster than they would have if the Kingdom had to develop everything internally.

Research and educational institutes with external collaborations will be a key determinant for the Kingdom to emerge as an innovation hub.

The other key drivers, as per the respondents, include those that help entrepreneurs to commercialize their innovation. These are:

- **Financing infrastructure for start-ups** (availability of private equity, venture capitals, government grants) – This is one of the five most important factors for 77% of respondents.
- **Business incubation centers** – Nearly 63% of respondents considered this as one of the top five drivers of innovation.
- **Industrial and technological clusters** – This figured among the five most important factors for 59% of respondents.
- **Strong advocacy programs for innovation and its adoption** – Approximately 57% of respondents said this was among the five most important factors.

Figure 18: Key drivers for innovation in the Kingdom



Source: Aranca research survey response (n=231)

Survey respondents also came out with some interesting suggestions to boost the effectiveness of these key drivers. Some of these include:

- Focus on improving the availability and quality of statistical data about businesses in the Kingdom to help investors make informed decisions;
- Developing a legal regime in line with global standards to protect intellectual property rights and facilitate technology transfers;
- Special training courses to support first-time entrepreneurs; and
- Easier visa processing for foreign technical talent and the creation of Free Zones for full foreign ownership.

3

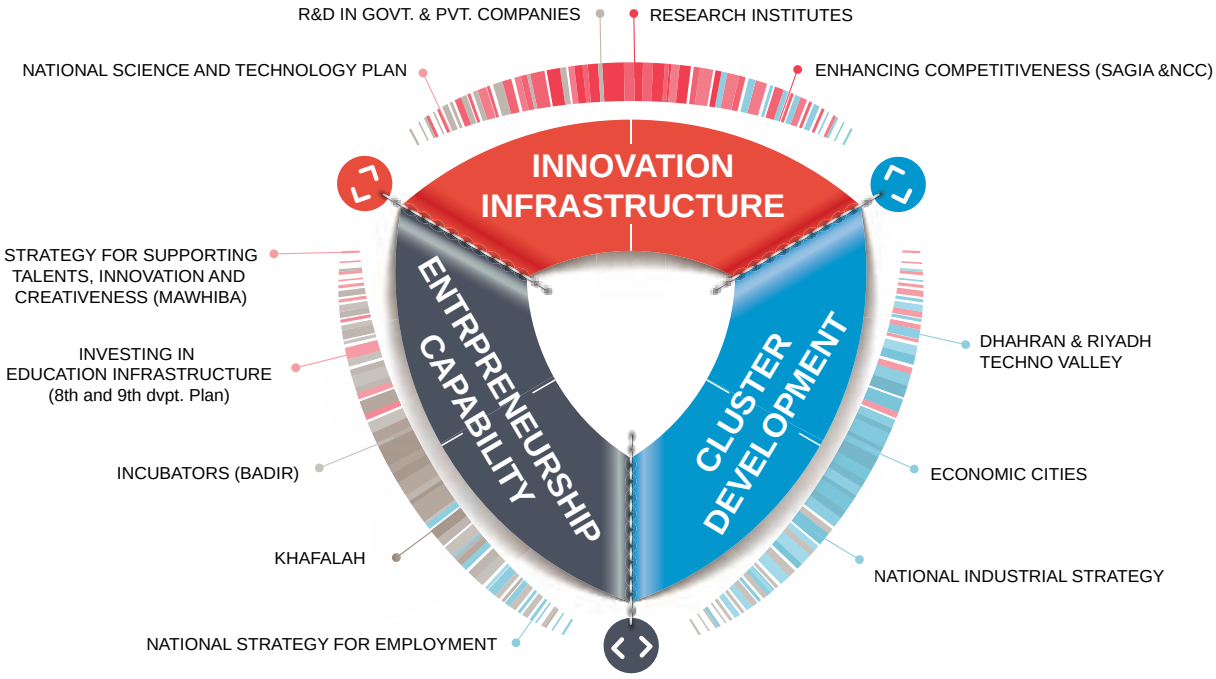
Ecosystem in Place for an Innovative and Entrepreneurial Society

Saudi Arabia has put in place an ecosystem that will facilitate its transition to an economy with a strong innovation and entrepreneurial base. This dynamic ecosystem is based on five pillars: infrastructure, human capital, economic competitiveness (as a result of nation's focused investments in innovation inputs) human capital & research, infrastructure and business sophistication. Though Saudi Arabia has made significant progress, the country has a long way to go before it is considered an innovation powerhouse. KSA can catch up with the leaders in innovation by leveraging its inherent strengths and replicating successful innovation models across the world.

The Kingdom is in the process of developing an entire innovation ecosystem, one that is self-feeding and dynamic in nature.

A wide network of government-established institutes providing the requisite environment (research centers, hubs and clusters) is ushering a new crop of entrepreneurs into the ecosystem. The potential success of these entrepreneurs would help feed the virtuous cycle. Their success would encourage new entrepreneurs, attract funding, create jobs for skilled workers and increase demand for further collaboration between universities and industry. These universities are paving the way for more entrepreneurs, thereby creating a prolific, self-feeding and rewarding ecosystem.

Figure 19: Virtuous cycle of innovation



Source: Aranca analysis

Saudi innovation ecosystem: Five pillars

The Kingdom's virtuous ecosystem of innovation rests on five pillars. In the long term these factors are expected to generate positive externalities which will reverberate across the economy and create a self-sustaining cycle for knowledge led growth.

1. Infrastructure

Infrastructure in the form of a well-developed network of government agencies, incubators, research institutes, and private companies is very crucial to innovation and entrepreneurship in any country. Anticipating this need, the government of Saudi Arabia created several centers of excellence that act as innovation hubs and serve as model institutes for public and private sector companies. This set-up supplemented by several incentives has encouraged domestic companies and multinationals to invest in innovation. The government is also encouraging partnerships between companies and universities to enhance the quality of research and economic viability. All said, Saudi Arabia is well on track to achieve the triple helix model of government-industry-academia wherein each of the three agents has a strategic role to play.

"There is a growing improvement in the innovation environment in the Kingdom in terms of systems and processes that are allowing businesses to think effectively and improve efficiency

Musaab S. Al-Muhaidib
CEO, Al-Muhaidib Technical Supplies

Large companies such as Aramco and SABIC are leading efforts to drive innovation in the fields of energy and petrochemicals, having established R&D centers across Saudi Arabia (Thuwal, Dhahran and Riyadh). These agencies have even established successful relationships with universities (for example, Aramco and King Faisal University).

Beside government agencies, the Kingdom's focus on human resource development since the early 1980s has led to a surge in universities. Saudi Arabia currently has 24 public universities, 36 technological colleges for boys, 15 technical institutes for girls and 112 vocational training centers. The table below lists the achievements of KSA's best institutions.

Government is fuelling innovation and entrepreneurship by establishing research centers and educational institutions.

Figure 20: Agency network to promote innovation and entrepreneurship in Saudi Arabia

Source: Aranca analysis

Figure 21: Leading universities in KSA and their achievements

Universities	Achievements
The King Fahd Institute of Petroleum and Minerals	• Established the King Abdullah Bin Abdulaziz Science Park in 2001 to foster technological innovation and development through industry university collaborations • Set-up Dhahran Techno Valley, one of the leading petroleum knowledge cluster globally
King Abdullah Institute for Science and Technology	• Gained the status of the only varsity in the Arab world with a top 100 rating in its discipline in the 2013 QS World University rankings • One of the fastest growing research and citation records globally
King Saud University	• Established the Riyadh Techno valley, an industry cluster focused on Chemical Technology and Materials, Biological, Agricultural, and Environmental Technologies and Information and Communications Technologies
King Abdulaziz University	• Established Wadi Jeddah, a fully owned joint stock company that aims to monetize the university's human, technical, and intellectual resources

Source: Aranca analysis

Universities are boosting creative energies among young students by collaborating with industry players and foreign universities.

Apart from promoting standalone innovation centers in the country, building industry linkages is another key focus area for universities. KAUST's Innovative Industrial Collaboration Program (KICP), as well as the Riyadh and Dhahran Techno Valley (DTV) are focusing on building and fostering relationships with companies. For instance, through KICP, KAUST aims to tie-up with local, regional and global businesses interested in nurturing entrepreneurship and strengthening the link between academic research and economic growth. US firms such as GE, Boeing, IBM, Dow Chemical and Schlumberger are part of this program. Three companies have also tied up with DTV's business incubators.

These universities have also entered into international collaborations with foreign universities to further their research agenda. King Saud University has signed about 54 agreements with universities and research centers in France, the United States, Italy, India, China, Germany, Sweden, and Singapore. The King Fahd University of Petroleum &

> *"The KAUST is a world class institution which is emerging as the MIT of the Arab world. However there is a need for this model to be replicated across the education system"*
>
> *Ossama El Batran*
> *Director of New Investments, HALJ*

Minerals, on the other hand, has developed collaborative and strategic relations with international institutions and local centers. Emphasis is also being laid on developing university endowment programs to fund research. King Saud University, King Fahd University and King Abdul Aziz University have successfully launched such programs. Private entities such as GE, 3M and Emerson are also partnering with government agencies and universities to establish innovation centers in the country.

The Saudi government is building a favorable IP framework to nurture, sustain and develop an entrepreneurial culture in the nation.

Besides physical infrastructure, there is need for a favorable intellectual property (IP) framework to nurture, sustain and develop this entrepreneurship and innovation culture. An IP framework that rewards and incentivizes innovation would help Saudi Arabia emerge as an innovation-driven economy in the long term. Since KSA's accession to the World Trade Organization, IP laws have been revised and updated to ensure an effective legal framework that encourages innovation and creativity and protects IP rights. The government has also been sensitizing the population through annual IP forums, exclusive IP websites, and IP awareness workshops targeting universities, research centers, and the industrial sector, with the support of the World Intellectual Property Organization (WIPO). Saudi Arabia also joined the Patent Cooperation Treaty to develop its IP framework in 2013.

The IP environment has improved significantly due to intensive efforts by the government. KSA is ranked a respectable 27th in the 2013-14 Global Competitiveness Report published by the World Economic Forum. It held the same position the previous year. However, the country has some distance to cover before it surpasses its peers in the Middle East such as Qatar (ranked 4th), UAE (20th) and Oman (24th).

Case study: Going the Silicon Valley Way

The US, home to the four largest innovation ecosystems worldwide, is among the top five leading innovating economies globally. Silicon Valley is the largest innovation ecosystem in the world, followed by Los Angeles, Seattle, New York City and Boston (all in the States). London, the biggest ecosystem outside the US, is ranked sixth globally.

Silicon Valley, the largest innovation ecosystem in the world, ranks first across all parameters in Global Startup Ecosystem Index Report 2012.

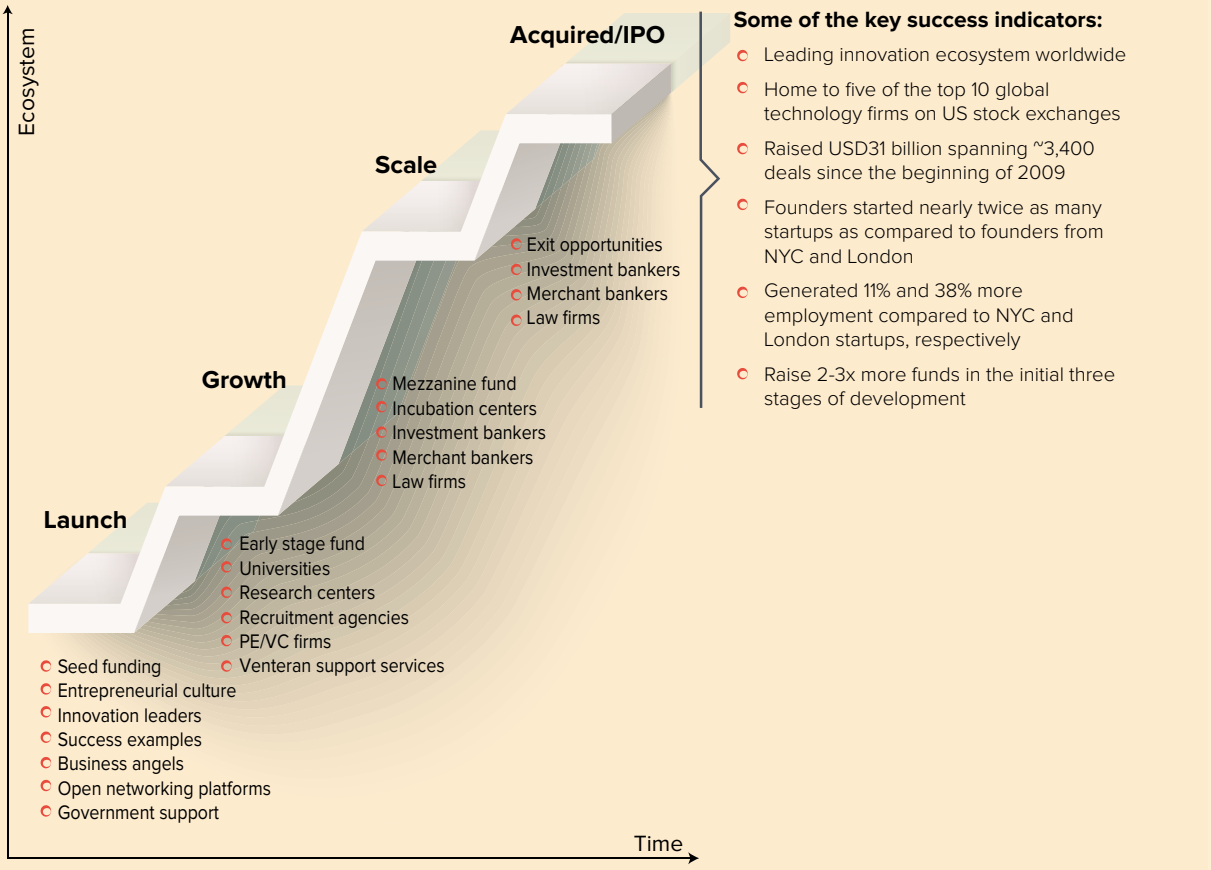
Figure 22: Silicon Valley leads the Global Startup Ecosystem Index

Ecosystem	Ranking	Startup output	Funding	Performance	Talent	Support	Mindset	Trendsetter
Silicon Valley	1	1	1	1	1	1	1	1
Los Angeles	3	4	6	2	3	13	11	4
Seattle	4	19	7	6	2	4	6	11
New York City	5	3	4	8	12	9	8	7
Boston	6	10	1	7	7	8	7	5
London	7	7	5	10	9	2	3	14
Toronto	8	6	9	3	10	3	15	12
Vancouver	9	13	12	9	4	14	2	9
Chicago	10	8	15	5	14	7	13	18
Paris	11	14	13	4	17	6	12	15
Sydney	12	5	14	16	6	12	16	1
Sao Paulo	13	9	10	15	19	11	5	16
Moscow	14	16	19	18	11	10	14	8
Berlin	15	15	11	13	13	20	18	5
Waterloo	16	11	16	14	16	17	17	10
Singapore	17	18	8	19	8	16	20	19
Melbourne	18	12	17	20	15	18	19	3
Bangalore	19	17	18	17	18	15	10	20
Santiago	20	20	20	11	20	19	4	13

Source: Global Startup Ecosystem Index Report, 2012

Silicon Valley, the perfect blend of innovation and entrepreneurial culture, offers a prospective model for the Kingdom, which is looking to carve a niche for itself on the global innovation map. Founded in an agrarian region in the 1950s, semiconductor companies were the first to set shop in Silicon Valley, with an early boost coming from public sector contracts. The Valley developed into a technology-driven innovative cluster by nurturing entrepreneurs, creating breakthrough technologies and underpinning new industrial domains.

Figure 23: Strong support for startups in Silicon Valley



Source: Global Startup Ecosystem Index Report by Startup Genome, 2012

The differentiating ingredient in the Silicon Valley's success as an innovation cluster is its multifaceted network, with all the agents – entrepreneurs, VC firms, consultants, angel companies, law firms, bankers, recruitment agencies and universities – operating under one roof. Interestingly, there more than 30 elite universities, over 40 research centers, ~329 recruitment firms, 1,913 CA firms, 311 PR companies, ~700 merchant banks and 47 investment banks devoted to the high-technology Silicon Valley setting[1]. Each of these agents plays a crucial role across different phases in a startup's lifecycle.

Silicon Valley's success ingredient is the multifaceted network of agents essential for a company's smooth functioning.

The cohesive set-up aids combined learning through collaboration and interaction on informal platforms and offers a flexible industry-academia arrangement for companies operating in the cluster. This vertical integration among regional firms increased productivity and output in the Valley. On the regulatory front, to remain inclined towards driving technological advancements in the region, California introduced a noncompeting law.

The knitted business environment is supported by boundary free culture and entrepreneurial spirit.

Silicon Valley's boundary-free culture encourages experimentation and enterprising attitude, fueling constant flow of innovative ideas within the cluster and around the world. This is evident in that the early movers into Silicon Valley have also made their mark in the global arena—for instance, 33% of all entrepreneurs in Singapore were formerly based in Silicon Valley. A favorable funding environment also supports firms in the early stages of growth. For instance, tech startups in the cluster have raised more than USD34

Tech startups have been able to raise over USD34 billion since 2009. The Valley has recorded more than 160 exits annually over 2010-13.

[1] *The role of venture capital firms in Silicon Valley's complex innovation network by Economy and Society, 2009*

billion through ~3,680 deals since the beginning of 2009[2]. The Valley has also built a strong record in exit activities, averaging more than 160 exits each year during 2010-13. Interestingly, Silicon Valley exits account for more than 50% of the top 50 largest VC-led tech exits since 2012[3].

"Through foreign scholarship programs there is a need to provide international exposure and experience to the Saudi youth so that they can develop the country in the future"

Ossama El Batran
Director of New Investments, HALJ

These factors led to the creation of a self-supporting dynamic ecosystem that has nurtured some of the most successful technology companies in the world such as Hewlett Packard, Intel, AMD, Oracle, Apple, Cisco Systems, Yahoo!, eBay, and Google. The market cap of these companies, all of which are headquartered within a 10-mile radius, exceeds USD1.1 trillion.

2. Human capabilities

Establishing an institutional framework to foster innovation and entrepreneurship is just one part of the structure. If an institution does not have skilled individuals to man research positions and guide policy making, the sustainability of any knowledge-based economy would take a hit. Realizing the importance of building human capital given the current high reliance on an expatriate workforce (accounting for 30% of the total workforce), the Saudi government has made significant investments in building human resources. Each of the five-year development plans focused on building human capabilities and increasing the number of new entrants in the Saudi workforce.

The ninth development plan has also laid emphasis on education to facilitate knowledge generation, accumulation and transfer, which will enhance capabilities across sectors. Some of the key goals of the plan are:

- Increasing the capacity of primary, intermediate, and secondary schools to over 5.3 million students;
- Raising the capacity of universities to 1.7 million students;
- Establishing new facilities, including 25 technology colleges, 28 technical institutes, and 50 industrial training institutes; and
- Increasing the amount of post-graduate students to 5% of all university students.

Tatweer, Afaq, the King Abdullah Scholarship Program and the National Employment Strategy are aligned to government's efforts towards enhancing human capabilities.

The government has introduced various plans, such as the King Abdullah Program for Improving Public Education (Tatweer), Afaq (a plan for the university educational system over 2005–30), and the King Abdullah Scholarship Program, to enhance human capabilities. These initiatives are aligned with the National Employment Strategy that aims to strategically match the skills of the domestic workforce with the needs of a diversified economy.

However, the current Saudi education system falls far short of imparting all the requisite skill-sets required for a modern workplace. This can be attributed to factors such as insufficient classroom infrastructure, untrained teachers, and irrelevant curricula. The dearth of qualified employees has compelled employers to recruit foreign nationals with matching skills.

3. Technological penetration

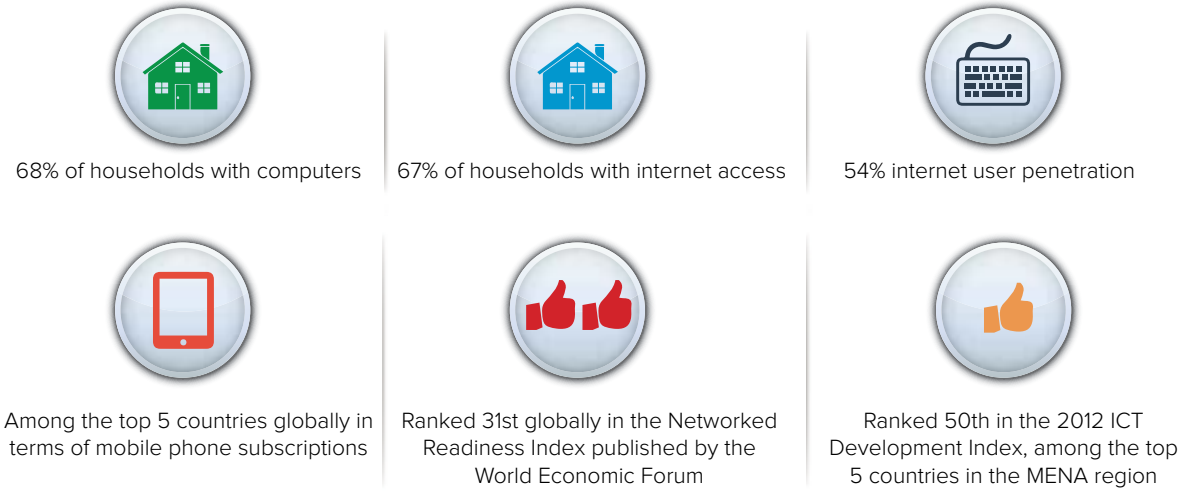
The Kingdom has been implementing schemes and strategies to enhance ICT penetration

[2] *Based on survey conducted by PricewaterhouseCoopers, Thomson Venture Economics and the National Venture Capital Association in conjunction with the Mercury News, 2013*
[3] *Silicon Valley Tech Venture Capital Report by Almanac, 2013*

across the ecosystem to help improve productivity and growth. Programs such as the Home Computer Initiative, Dissemination of Digital Culture and Knowledge Lectures Initiative, Internet Awareness Project (Saleem Net) and the e-Training Caravans Initiative have enhanced computer literacy among students, individuals and SMEs. Initiatives such as the Integrated Education Management System, JUSUR system for management of e-education, Saher System, Safa Project and the SaudiEDI aim to enhance usage and application of technology across the education, financial and transportation sectors. The Yesser e-government program also bears testimony to the increasing ICT percolation within the country.

Saudi Arabia is investing heavily through programs such as Saleem Net, SaudiEDI and Yesser, among others, to increase technological penetration.

Figure 24: KSA rankings with regard to ICT connectivity



Source: World Economic Forum report (2013-14), International Telecommunication Union Report (2013)

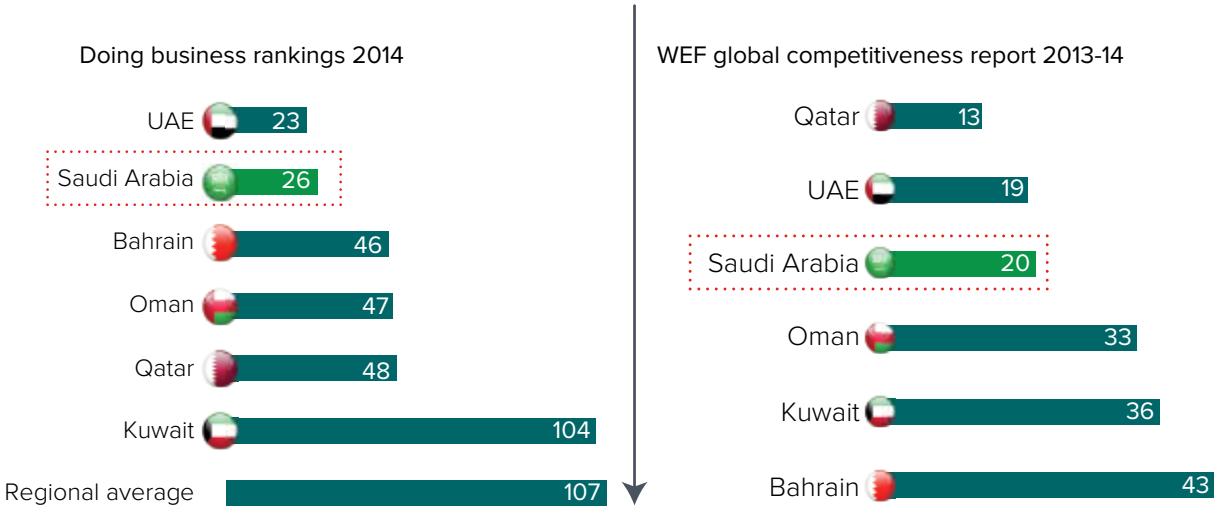
These initiatives have bolstered Saudi Arabia's position (globally and in the MENA region) in terms of ICT readiness and the country is now poised to emerge as a knowledge-intensive economy.

4. Economic competitiveness

The government is working to enhance the country's economic competitiveness to ensure it can support and complement innovation-led growth in the future. Economic competitiveness is a necessary condition to create employment and generate wealth. Both public and private sector bodies are making impressive strides in their quest for global competitiveness.

Saudi Arabia's ranking improved to 26 in 2014 from 67 in 2005 due to implementation of over 40 competitiveness reforms over the past five years.

Figure 25: Comparison of Doing Business ranking across Middle East countries



Source: Doing Business Ranking 2014, WEF global competitiveness Report 2013-14

The Saudi Arabian General Investment Authority (SAGIA) has been at the forefront of this effort. It established the National Competitiveness Centre (NCC) in 2006 on focus on two main areas: improving the ease of doing business, and enhancing the microeconomic fundamentals of competitiveness. The country's Doing Business Ranking improved from 67 in 2005 to 26 in 2014 due to implementation of over 40 competitiveness reforms over the past five years.

Economic cities focusing on different industries are expected to become pockets of competitiveness, emerging as focal points for innovative firms.

Besides competitive reforms, KSA is focusing on hard infrastructure development. Economic clusters are an integral part of the country's competitiveness strategy. The government's four economic cities – The King Abdullah Economic City, The Prince Abdulaziz bin Musaid Economic City, The Knowledge Economic City, and The Jazan Economic City – will focus on different competitive industries (logistics, heavy industry, and agribusiness) to promote economic diversification, employment and innovation. They are expected to become pockets of competitiveness, emerging as natural focal points for innovative firms. By 2020, the economic cities are estimated to contribute an estimated USD150 billion to KSA's GDP and provide career opportunities for nearly 1.3 million people.

Figure 26: Economic cities – Saudi Arabia

The Economic Cities of Saudi Arabia

At a cost of more than $100 billion, Saudi Arabia has begun construction on four new economic cities designed to accommodate up to 5 million residents. By 2020, these economic cities are projected to contribute $ 150 billion to Saudi Arabia's GDP and create jobs for 1.3 million people.

King Abdullah Economic City

Location: North of Jeddah, Red Sea Coast
Cost: USD27 Billion
Soze: 168 Million SM
Jobs: 1 Million
Population: 2 Million
Focus: Ports, Logistics, Light Industry

Jazan Economic City

Location: Jazan
Cost: USD8 Billion
Size: 100 Million SM
Jobs: 100,000
Population: 300,000
Focus: Heavy Industries, Agro Industries

Knowledge Economic City

Location: Medina
Cost: USD7 Billion
Soze: 4.8 Million SM
Jobs: 20,000
Population: 150,000
Focus: Knowledge-Based Industries

PABMEC

Location: Hail
Cost: USD8 Billion
Size: 156 Million SM
Jobs: 55,000
Population: 300,000
Focus: Logistics, Agribusiness, Minerals

Source: Various sources

Case Study: Lessons from Singapore's biomedical cluster

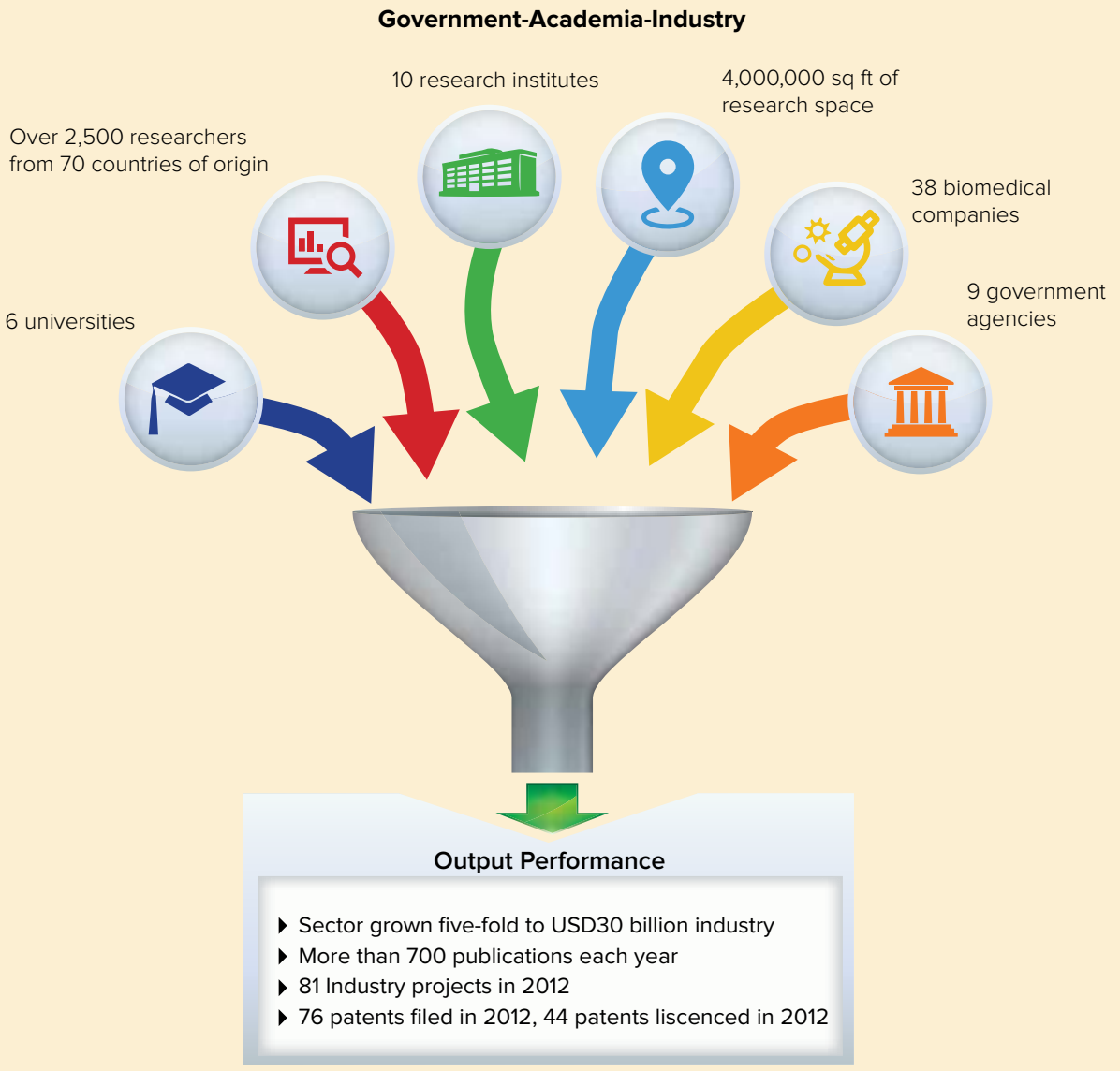
Singapore's impressive progress from a third world nation to a first world country without any natural resources is unsurpassed. The country, once called "a little red dot" on the globe, has emerged as one of the top 10 innovative nations globally, as per the GII Index. Singapore's evolution can be partially attributed to its emergence as a world-class research centre in the field of biosciences. Establishment of the entire biomedical healthcare chain ranging from R&D to manufacturing to delivery has created a viable model for countries aspiring for a leading position in the world of scientific research.

Singapore's lead in the biomedical industry across the value chain positions it well on the global scientific roadmap.

The Singaporean government has been the sole driving force behind its world-class biotechnology cluster. In the late 1990s, the government prepared a Strategic Economic Plan that underlined the importance of erecting high-tech industrial clusters. Following this, biomedical sciences became Singapore's fourth pillar of high value clusters (after electronics, chemicals, and engineering). The government's visionary thinking coupled with coordinated action by the Economic Development Board of Singapore, the Agency for Science, Technology and Research (A*STAR), and The Ministry of Health played a key role in the cluster's success.

Singaporean government's vision is the major force in the success of its biomedical industry.

Figure 27: Concerted efforts of government-industry-academia in Biopolis



Source: Aranca analysis, Biopolis brochure, 2012

As a first step, in 2000, the government launched a USD1 billion fund to promote R&D and establish the requisite foundation in terms of human, intellectual, and industrial capital for basic biomedical research in Singapore. Strategic research capabilities were developed

across bio-processing, chemical synthesis, genomics and proteomics, molecular and cell biology, bioengineering and nanotechnology, and computational biology in five of the A*STAR's research centers. Furthermore, heavy infrastructure investments were made to develop two biomedical hubs: Biopolis and the Tuas Biomedical Park. While the Tuas Biomedical Park has developed into a top-notch manufacturing hub for the industry, Biopolis is an integrated set-up fostering domestic and global links by encouraging interdisciplinary research. It is the perfect example of how a triple helix framework (government-industry-academia) can foster the innovation and entrepreneurial climate in the country.

This was supplemented by a second round of funding in 2006, which fortified biomedical competency across translational and clinical research aimed at developing an efficient healthcare delivery model. Efforts to create a concerted cluster environment were complemented by thought leadership, a robust venture capital market, dedicated biotechnology and biomedical device startups, public-private partnerships and growing domestic and foreign investments.

In its quest to make Singapore one of the most research-centric, innovative and entrepreneurial nations globally, A*STAR plans to enhance the value chain by fostering integration among public and private sector firms, hospital groups and government bodies through the third phase (2011–15). The Singaporean government aims to leverage the Biomedical Science cluster to achieve its Research, Innovation & Enterprise 2015 Vision. Towards this end, the country has committed SGD16.1 billion to support research, innovation and enterprise-related activities.

The cluster's success is evident from its increasing contribution to the nation's manufacturing output and employment generation.

The success of the cluster has encouraged several leading pharmaceutical companies such as Sanofi-Aventis, GlaxoSmithKline, MSD, Novartis, and Sanofi to set base in the country. The country's biomedical manufacturing output has also increased nearly fivefold to SGD29.4 billion from SGD6 billion over 2000-12, contributing ~5% to the country's GDP. In addition, the government has earmarked SGD1.49 billion for biomedical R&D each year. With more than 100 biomedical sciences companies and 30 research institutes based out of Singapore, the sector showcases strong employment potential. Biomedical R&D offered employment to 5,427 people as of 2012, doubling from 2,150 in 2002. Also, employment in biomedical manufacturing grew 2.5 times to 15,700 as of 2012.

These developments hold several interesting lessons for countries interested in creating sustainable clusters within their territories:

Establish the necessary infrastructure: Government should play a key role in establishing the necessary infrastructure to encourage the domestic private sector in the medium-term, generate externalities and attract foreign investments in the long term.

Stable political framework: There has to be a consistent policy framework to attract and retain FDI in the country. Inconsistent government decisions and policies will affect growth of the cluster.

Strong integration among innovation agents: Strong collaboration needs to be established between government-industry-academia to fully capture the sector's potential.

Focus on niche sectors: Singapore's success as a biomedical cluster emerged from the fact that there were no potential threats to the cluster from other nations.

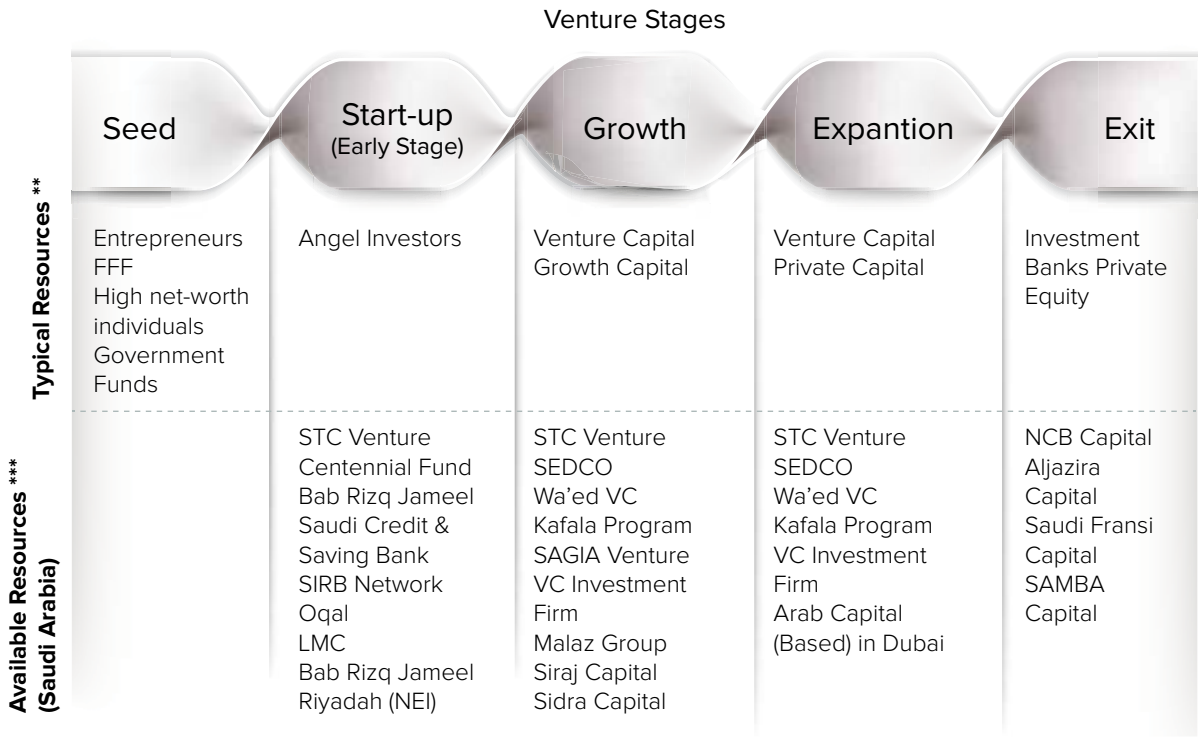
5. Funding

Government, with the support of various programs and funds, remains a major contributor to entrepreneurs' financing needs.

Government has been the key contributor in bridging the funding needs to encourage innovation in the Kingdom. Agencies such as SAGIA, SIDF, Saudi Credit and Savings Bank (SCSB), Human Resources Development Fund (HRDF), KAUST and KACST, among others, have been playing a significant role in this regard. This established government-funded R&D arrangement has created a favorable atmosphere for innovation agents such as entrepreneurs, universities, startups and SMEs.

Besides these agencies, government-backed funds have been launched to support technology-based companies. For example, Saudi Company for Technological Development and Investment (TAQNIA) started TAQNIA Ventures to focus on the transfer of energy, biomedical and ICT technologies to Saudi Arabia. Saudi Aramco started Wa'ed venture arm to promote promising ICT startups in the Kingdom. The Centennial Fund, a Saudi Arabian charity created under the royal charter, provides loans ranging from SAR50–200,000 and is the first fund of its kind in the Middle East. Since its inception in 2004, the fund has granted USD667 million to young entrepreneurs and has already created more than 6,000 of the total 28,000 jobs targeted by 2020.

Figure 28: Financing Options over the venture lifecycle



Source: Navigating Saudi Arabia's Entrepreneurial Ecosystem, 2013

To cultivate an entrepreneurial culture at the university itself and eliminate early-stage funding barriers faced by young entrepreneurs, funds such as KAUST Seed Fund have been started. Grants totaling USD250,000 have been sanctioned to each winning student with a view to convert their ideas into feasible commercial business opportunities. The Fund has so far awarded grants aggregating USD1.6 million to 13 student entrepreneurs.

The KAUST Seed Fund provides early-seed capital to student entrepreneurs and Kafala program is majorly focused on bridging SME's financing needs.

Apart from these, there is the Kafala Program (managed by the SIDF) which subsidizes loans to SMEs by commercial banks. Over the last few years, the Kafala Program has emerged as one of the key drivers of Islamic finance for SMEs. It allows a bank to offer financing up to USD400,000 for a maximum repayment term of seven years to SMEs, supported by a guarantee covering up to 80% of the financing need. Banks are increasingly in favor of extending financing to SMEs, given the lower credit risk offered by the program. By current estimates, more than 60% of SME funding by banks is guaranteed through the Kafala Program.

Since the launch of the Kafala Program, 6,757 guarantees have been issued; about 2,909 enterprises had benefitted from the program towards the end of 2013. Nearly 1,670 of these guarantees were issued to 918 enterprises in 2012 alone. The total value of financing for the sector through this program has been ~USD1.28 billion, of which USD614 million (48%) has been guaranteed. The net clean exposure of banks for financing through this program aggregated USD675 million at the end of 2012. Among banks participating in the program, NCB was the leader in 2012 in terms of the number as well as value of guarantees.

Figure 29: Kafala Exposure by Region and Industry Sectors

Provinces	# of guarantees
Riyadh	768
Eastern	374
Makkah Al-Mukarrama	269
Al-Qasim	67
Najran	65
Others	127

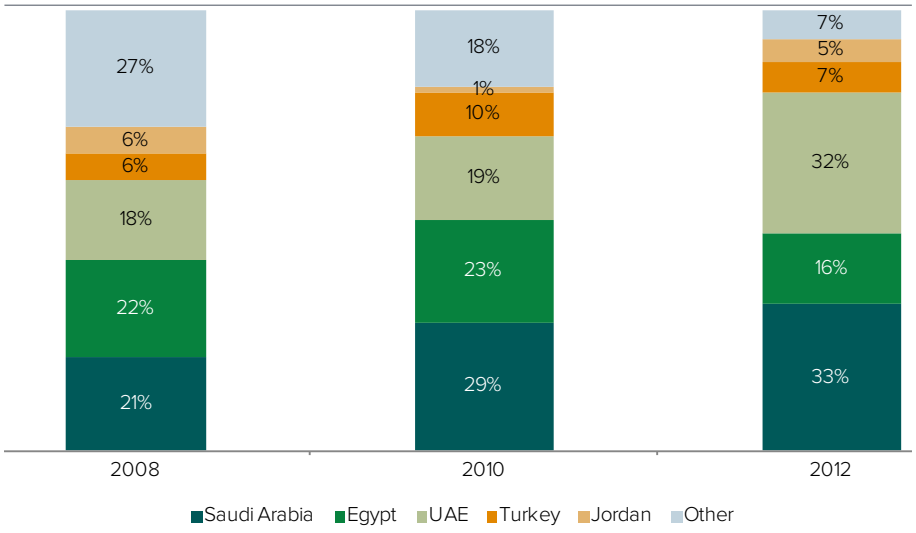
Sector	# of guarantees
Contracting	922
Industrial	219
Commercial	225
Finance and Business	145
Public & Individual Social Services	80
Transportation, Storing & Cooling	62
Agriculture and Fishing	8
Electricity, Gas & Water	6
Mining & Petroleum	3

Source: Kafala website

Saudi Arabia's funding landscape is witnessing increasing participation by both local and global PE/VC players.

Most government programs comprise debt-based funding; however, there are various PE/VC funding avenues in the Kingdom. The Saudi Private Equity industry is developing steadily and is expected to become the most important market for PE firms in the region. In the past decade, Saudi Arabia accounted for 23% of deals in the Arab world. The relatively new domestic PE industry has been attracting the biggest names in the PE world. Amwal AlKhaleej was the first Saudi Arabia-based PE firm to set up shop in 2004 and begin operations in 2005. However, the climate appears to have turned positive, with global PE firms increasingly taking to by the vibrancy of the domestic market. As global firms drop anchor in Saudi Arabia, they are likely to require local teams to help them build relationships, understand the local culture, and navigate the Kingdom's evolving legal landscape. Apart from players such as Amwal, Sedco, and ICT Ventures, global majors, including Standard Chartered (PE unit), Carlyle Group and KKR, are also active in the Saudi PE space.

Figure 30: PE deal activity comparison



Source: MENA Private Equity Confidence Survey 2012, Deloitte

Anecdotal evidence suggests that venture capital funding is catering to some of the equity needs of frontier industries such as ICT. On the demand side, the impetus provided by the Saudi government is encouraging entrepreneurship in the domestic market, a move that is likely to shape the future of business in the Kingdom. VC funding is expected to become increasingly acceptable, as unlike bank financing, VC funding is usually equity based and, hence, more in line with Islamic principles. In the coming decade, we expect a large chunk of the SME sector's financing needs to come from VC firms.

Nevertheless, despite the presence of this extensive network of institutions, SMEs in Saudi Arabia find it difficult to secure funding vis-à-vis other countries in the MENA region, such as Jordan and the UAE.

According to Citi-Shell Foundation report on SME sector in MENA, nearly 92% of surveyed respondents believe that it is difficult to access funding in Saudi Arabia; in comparison,

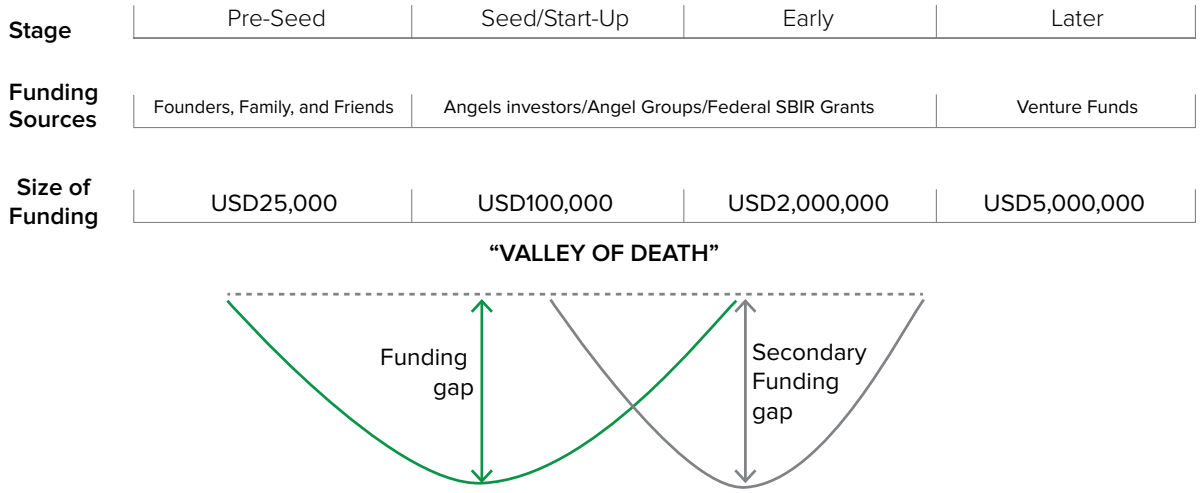
only 58% of respondents felt the same about Jordan and 49% felt so about UAE. Lending by Saudi banks to the SME sector accounted for just 0.7% of total lending, compared to 12.5% in Jordan, 15.4% in Lebanon, 15.2% in Tunisia and about 27% in Morocco.

Saudi Arabia ranks below its peers in terms of ease of funding access. SME sector accounts for a meager 0.7% of total lending.

Timely access to funding is a critical aspect for the success of SMEs. Despite running the highest number of support programs in the Middle East, Saudi Arabia is not able to effectively channelize funds to the SME sector. The figure below summarizes the two critical points where SME funding is crucial for development.

Figure 31: Funding requirements at various stages

The innovation capital "valley of death"
Commercializing innovation products and services is where investment money is most needed but least available



When seed/start-up and early-stage companies cannot entice investors due to longer time tables for commercialization and lack of an upside in investiong early

Source: Creating a National Innovation Framework: Building a Public-Private Support System to Encourage Innovation, 2009

Inadequate funding at both these stages prevents SMEs from growing effectively and is therefore critical for economic diversification. Currently, just about ~18% of MSMEs in Saudi Arabia are estimated to be in operation for more than 10 years, whereas ~43% of them have been operational for less than five years.

If the country has to realize its goal of becoming an innovation and entrepreneurial hotspot, then it has to enact a number of crucial steps to ensure companies are well capitalized across all stages of growth. This would entail restructuring government programs so that they are able to serve entrepreneurs better. Banks and financial institutions have to be incentivized to lend to SMEs. There is also a need to create a support system similar to what Singapore and the US (refer to case studies) have created to support SMEs so as to reduce the failure rate of businesses and improve sustainability.

Fostering entrepreneurship

Entrepreneurship and innovation go hand in hand. Innovation is the purpose, which the entrepreneur helps accomplish. So far, the Saudi government has played an integral role in promoting innovation; it is now investing in creating a favorable environment for entrepreneurship. The following chart illustrates the support mechanism for entrepreneurs provided by the Kingdom's public and private sectors.

Saudi government and private agencies are investing to create a favorable environment for entrepreneurs.

Besides the government's efforts, the Council of Saudi Chambers of Commerce and Industry has established the Development Center for SMEs. Its primary objectives include educating Saudis about the importance of entrepreneurship in Saudi Arabia and strengthening regional chambers of commerce as mentors for SMEs. The center also offers startups easy access to funding, prepares studies on the emerging SME sector, and cooperates with the Saudi Exports Development Center to enhance the export capacity of SMEs.

Figure 32: Support mechanism for entrepreneurs

SAGIA	Saudi Fast Growth 100 for recognizing entrepreneurs	Established the National Competitiveness Forum	Business Startup training		
HRDF	Financial assistance	Training and development			
SIDF	Financial assistance	Workshops & seminars			
SCSB	Financial assistance	Workshops & seminars			
ARAMCO	Prefunding and post funding support to entrepreneurs through WA'ED	Financial assistance			
MINISTRY OF LABOR / **MINISTRY OF INDUSTRY**	Law for Saudization, training and skills development	Laws for reforming and regulating the business environment	Laws for reforming and regulating the business environment	Business support regulations	
CENTENNIAL FUND	Financial assistance	Business startup training			
KAUST	Incubator	R&D	Training & Education	Financial assistance	Coaching and mentoring
KACST	Incubator	R&D	Training & Education	Financial assistance	Coaching and mentoring

Source: World Journal of Entrepreneurship, Management and sustainable Development (2013)

Academia is committed to driving entrepreneurship by including the subject in the curriculum and encouraging tie-ups with international universities.

Universities are playing an active role in promoting entrepreneurship. The Ministry of Higher Education is looking to include entrepreneurship in the curriculum. The King Saud University is a leader on this front. The university is home to the Riyadh Technology Incubation Center, one of the leading incubator centers in the Middle East, as well as the Entrepreneurship Center, which organized the first international conference on entrepreneurship in the Kingdom in October 2009. An agreement between the King Saud University and the Kent State University in 2009 led to the creation of an entrepreneurship curriculum in Riyadh, the first to be accredited by a Saudi university. The KAUST also hosts an entrepreneurship center in its campus that offers incubation support and advisory services. KFUPM, on the other hand, has partnered with Aramco to launch a business incubator Waaed. The Fahd Bin Sultan University and Taibah University are some of the others that offer entrepreneurship courses.

One of the most important private sector programs to support entrepreneurship and job creation is Bab Rizq Jameel (BRJ). Implemented as a part of the Abdul Latif Jameel Community Services Programs, BRJ provides employment training, direct employment, taxi and truck ownership, micro-project financing, SME financing, work-from-home and franchise programs to individuals. The program generated 68,139 jobs in the Kingdom during 2013. Furthermore, the Saudi Entrepreneurship Development Institute, a non-profit establishment, aims at fostering entrepreneurial thinking among the youth.

"There has been a lot of improvement in the entrepreneurial environment in the country. There have been many success stories (such as Gloworks) over the past few years.

Ossama El Batran
Director of New Investments, (HALJ).

The Prince Sultan Bin Abdulaziz Fund for Women Development (under the Prince Mohammad Bin Fahd Foundation for Humanitarian Development) provides funding support to female entrepreneurs in order to enable them to contribute actively to the country's economy. Through the Center for Financing and Projects Support, the fund launched the Intilaqati Program,

which offers integrated training to young female entrepreneurs to help them set up small businesses. The fund also trains women and helps them build the required skills. It has three centers: the Center for Financing and Funding Women Projects, the Prince Mohammad Bin Fahd Center for Youth Leadership and the Princess Jawaher Bint Nayef for Studies and Research on Women.

Programs to encourage entrepreneurship among women, accounting for 50% of the country's population, have been implemented.

Recognizing and highlighting the achievements of entrepreneurs is vital. The Saudi Fast Growth Awards, given annually to the fastest-growing companies in the country, were launched in 2008. In addition, the Prince Salman bin Abdul Aziz Young Entrepreneur Award is given to budding entrepreneurs across various categories.

Low taxes make Saudi Arabia entrepreneur-friendly. According to the World Bank, business taxes in the country stand at just 14.5% of profits, less than a third of the rate in most G20 countries. Furthermore, regulatory hurdles and constraints in establishing business are few. It now takes only 21 days to set up a business compared to 74 in 2003.

"Large companies including SABIC and ARAMCO, have capabilities to promote innovation. They also need to further increase the support they are extending to SMEs.

Abdulrahman Al Ubaid
Advisor for National Industrial Clusters Development Programs, NICDP.

Due to the government's efforts to build a favorable environment and encourage entrepreneurial spirit, the number of SMEs has increased. SMEs constitute ~92% of the Kingdom's businesses and account for around 43% of the private sector. The segment generates 25% of total employment and contributed about 33% to the GDP in 2012. SMEs are expected to play a vital role in the country's economic diversification, providing support services to large companies, generating employment and channeling productive investments in the economy. SMEs stand to benefit from the availability of adequate finance, support and guidance as well as their effective relationships with local and international companies.

Figure 33: Measures undertaken to promote the SME sector in Saudi Arabia

Agency	Measures undertaken
The Saudi Credit and Savings Bank	Launched the MASARAT program aimed at small businesses and projects that require investments of less than ~USD80,000, including financing to Saudi nationals for buying heavy machinery and trucks.
Saudi Industrial Development Fund (SIDF)	Initiated the Kafalah program, a credit guarantee scheme. Through the program, SIDF issued 4,765 guarantees with a value of USD614 million for total financing worth USD1.28 billion (as of 2012). In addition, SIDF supports SME development through provision of financial assistance in form of short-term loans to industrial investment along with technical, administrative, financial and marketing advices to borrower enterprises.
The Ministry of Communications and Information Technology	Launched a five-year plan to develop government financing mechanisms for SMEs.
Saudi Arabia Monetary Agency	Launched a new system to assess SME performance so as to ease bank financing.
Human Resource Development Fund	Trains and supports individuals who want to establish small-scale establishments.
Shoura Council	Approved establishment of a general authority for SMEs in KSA.
The KSA and Kuwaiti governments	Partnered to establish a fund to support small- and medium-sized enterprises.
SAGIA	SAGIA' launched the Saudi Fast Growth 100 to measure growth in the smaller-sized corporate segment in 2008. The program awards and highlights fast-growing Saudi companies.

Source: Aranca analysis

Saudi Arabia at an innovation crossroad

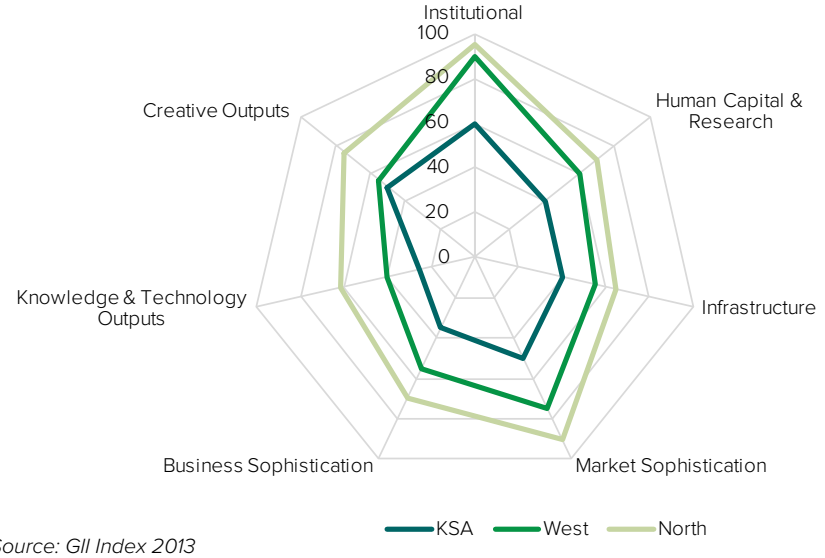
GII top 10 innovators are geographically dispersed; have consistently bagged the top 10 positions.

KSA needs to address gaps on the GII front. The progress of innovation leaders shows that success in innovation creates a virtuous circle where inputs and outputs reinforce each other, ensuring sustained progress. Interestingly, the top rankings have been stable. The top 10 innovators (Switzerland, Sweden, the UK, the Netherlands, the US, Finland, Hong Kong, Singapore, Denmark and Ireland) have consistently featured in the list, albeit swapping positions year to year. Also, most of these top 10 innovative economies have common strengths in terms of human capital and research, and a strong institutional framework. These countries have a well-developed innovation ecosystem with increasing investments in human capital which provides high quality output.

Innovation is picking up, but the Kingdom has a long way to go before it joins the top 10 innovators' league.

According to the 2013 GII report, Saudi Arabia's several innovation parameters have improved; these include greater focus on human capital and R&D activities, advanced infrastructure and higher business sophistication. The level of education is improving markedly, institutions are opening up to newer businesses, the depth of financial markets is increasing and innovation is gaining traction. The recent developments notwithstanding, the country has a long way to go before it emerges as an innovation leader. The chart below shows the country's current standing on each of the seven parameters compared to its Top 10 and BRIC counterparts.

Figure 34: Kingdom's comparison with the best and top 10



Source: GII Index 2013

Saudi Arabia – progress on key innovation drivers

This section elaborates on Saudi Arabia's position on each GII pillar vis-à-vis its top 10 peers. It also explores practices the country could adopt to build a strong ecosystem that supports and encourages innovation.

"Collaboration with international universities would definitely help. Partnership with leading colleges such as Babson, which is a leader in entrepreneurship, would bring in best practices such as learning through case studies, and simulation exercises and help developing capabilities of students.

Musaab S. Al-Muhaidib
CEO, Al-Muhaidib Technical Supplies

1. Institutions

A major common thread among the world's top 10 innovators is the presence of a strong institutional framework, represented by the political, regulatory and business environments. Saudi Arabia's score on this parameter declined from 67.5 in 2011 to 58.4 in 2013, even as the top 10 innovators averaged a staggering 91.0 (out of 100.0) in 2013. Within the parameter, the index suggests that Saudi Arabia's political

and regulatory landscape has improved over the past two years; however, it needs to get better to facilitate innovations. To develop a favorable business environment, the government must increase focus on formulating and implementing sound policies and regulations that promote private sector development. Saudi Arabia fares well in the ease of doing business rankings, but has a relatively low score on the ease of starting a business index and an extremely low score on the resolving insolvency index. This indicates that the country needs to take concrete steps to simplify these processes to increase the rate of new business creation. Saudi Arabia's existing insolvency framework focuses on the dissolution and liquidation of companies, in addition to placing harsh and at times criminal penalties on the insolvent individual or company. The Kingdom would do well to learn from the 'rescue culture' promoted by the US and UK, under which companies in financial difficulty are increasingly being rescued or reorganized based on an underlying belief that recoveries for creditors will likely be higher if the business is rescued or restructured rather than dissolved and liquidated.

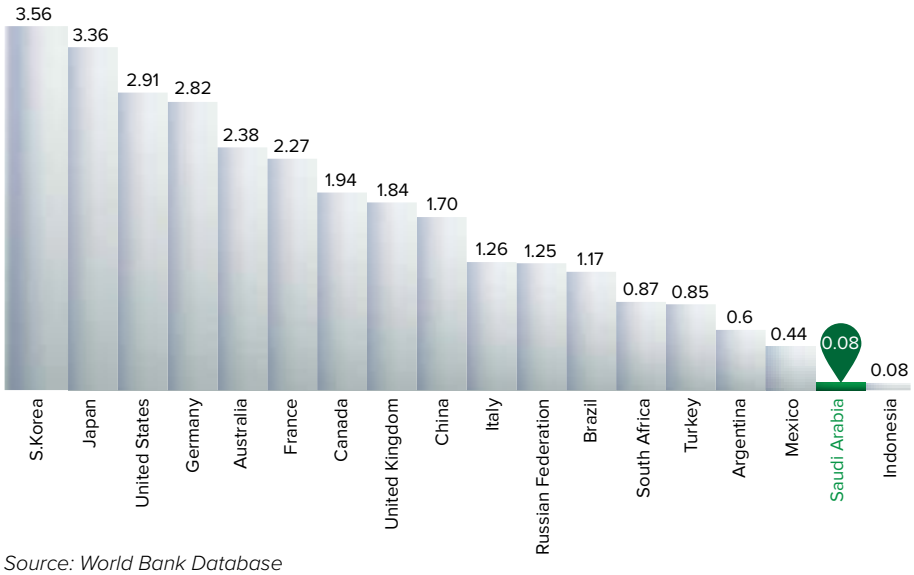
The Kingdom needs to invest significantly in building a strong institutional framework and human capital in order to be an innovation-driven economy.

2. Human capital & research

This is the second pillar GII uses to measure innovation in a country. The standard of education and research activity in a country chiefly determines its innovation capacity. The Kingdom scores 39.8 in this category vis-à-vis the average score of 58.8 of the top 10 countries. The importance of development of human capital is evident in the progress made by relatively resource-poor countries such as Singapore and Finland. Both grew rapidly between 1990 and 2007 due to a long-term growth strategy based on human capital and technology. This enabled these countries to put up an effective, globally networked learning and innovation system that generated high-quality skills, and build the institutions needed to support such a system. Saudi Arabia also intends to become a knowledge-based economy. Therefore, the money allocated to the education sector has increased dramatically over the last four years, rising from SAR105 billion in 2008 to a record high of SAR204 billion in 2013 (accounting for 25% of the state's total budget).

Saudi Arabia needs to promote R&D and foster partnerships with international research institutes to mark its presence on the global R&D map.

Figure 35: The Kingdom R&D spending as a % of GDP remains low



Source: World Bank Database

Saudi Arabia's R&D expenditure, at USD1.8 billion, remains low. As a percentage of GDP, outflow stands at 0.8% compared to 3.8% in Finland, 3.0% in Switzerland, 2.85% in the US and 2.65% in Singapore. The country scores just 15.4 on GII's R&D indicator; in comparison, the top 10 economies averaged 61.0. The importance of R&D activities for sustained economic growth can be gauged from the continued increase in R&D expenditures globally since 2010, despite adverse economic conditions and constrained budgets. China, for instance, has implemented a strategic initiative targeted at emerging industries; it hopes to surpass Western leaders in seven sectors, including clean energy, information technology, biotechnology, advanced manufacturing and new materials. Under the program, aided by state funding of USD1,500–2,000 billion over five years, China aims to increase R&D spending from about 2% of GDP currently to 2.5% by 2020. Saudi Arabia also needs to put in place mechanisms to promote R&D and foster

partnerships with overseas research bodies in order to create a place for itself on the global R&D map. The country plans to increase spending on R&D to about 1.0% of GDP by 2010–15 and around 2.0% by 2017.

3. Infrastructure

Saudi Arabia would do well to leverage its ICT proficiency to support SMEs' growth and productivity.

Scores on the infrastructure parameter are determined based on a country's performance on the information and communication technologies (ICT) and general infrastructure fronts. Saudi Arabia has done well in this regard, with scores improving from 27.8 in 2011 to 40.6 in 2013. The average score for the top 10 countries is 56.4. To do even better, the Kingdom should adopt projects and programs focused on facilitating innovation and entrepreneurship by developing the ICT sector. For instance, Singapore is aiming at transforming its economy by providing greater incentives to support noteworthy efforts in business innovation and upgrading. Towards this goal, the government, along with its other projects, introduced a USD500 million ICT for Productivity and Growth (IPG) program in February 2014. Through this initiative, the country seeks to accelerate the adoption of ICT solutions among SMEs at subsidized costs and boost SMEs' productivity and growth over a three-year period from 2014 to 2016. The IPG comprises three key initiatives. The first one promotes the adoption of ICT-based sectoral solutions that have been proven to help SMEs raise productivity, while the second initiative encourages enterprising SMEs to pilot emerging technology solutions that can transform their businesses such as innovations in the areas of sensor, data analytics and robotics. The third initiative promotes high-speed connectivity for SMEs. Besides Singapore, the US and several developed countries in the European Union have run ICT adoption programs to boost the growth and productivity of SMEs.

4. Market sophistication

The Kingdom surpasses its top 10 peers on trade & competition parameter, but there is room for improvement in factors such as fund availability.

The top 10 countries have clear strengths compared to others as far as market sophistication is concerned. Saudi Arabia scores 53.5 in market sophistication vis-à-vis the average of 76.7 for the top 10 innovators. Market sophistication includes factors such as availability and access to credit, and trade & competition. While the Kingdom's score on trade & competition surpasses the average score of the top 10 countries, its performance on the credit front can improve. Recently, China's cabinet, the State Council, took steps to increase credit support for small businesses in the country. It urged that lending to small firms (with credit lines less than CNY5 million) should grow at a rate no lower than the average loan growth of the country's banks. It attempted to incentivize smaller financial institutions by stating that they may be subjected to lower reserve requirements (than the current rate of 21%) if they meet the loan growth target for small businesses. The State Council also offered more financing channels for small businesses, such as collective banknotes, bonds and short-term papers involving two to ten firms. Such initiatives to increase access to finance would contribute significantly to creating more new businesses and jobs in the economy.

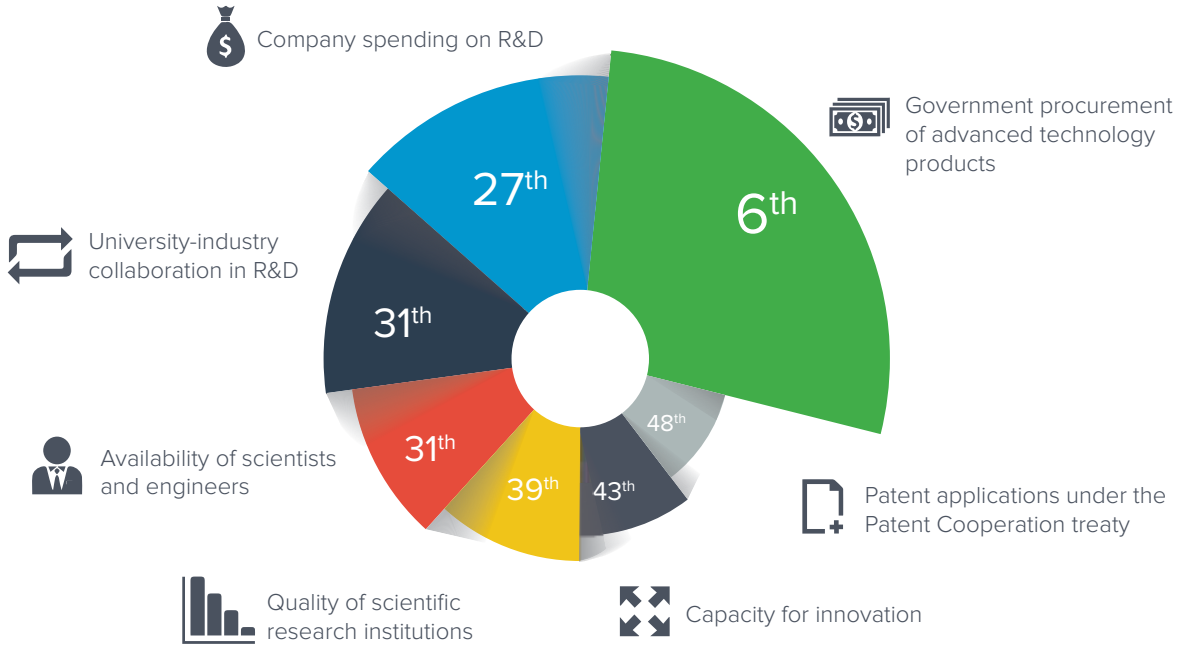
5. Business sophistication

The top 10 innovators performed better in terms of business sophistication, which is determined by factors such as the number of knowledge workers, knowledge absorption and innovation linkages. The Kingdom scores 37.2 in this category vis-à-vis the average score of 55.0 for the top 10 countries. Furthermore, the country's scores with regard to the number of knowledge workers and innovation linkages have remained almost flat over the last two years, indicating little progress. The number of engineers and scientists in the country has increased, but remains low when compared to that in other industrialized countries. Saudi Arabia also needs to work on improving research collaboration between universities and industries. On the other hand, the state of cluster development in Saudi Arabia bodes well for the economy. It scores 60.6 on this parameter, only marginally lower than the average score of 66.2 for the top 10 countries.

6. Knowledge, technology and creative output

The Kingdom's scores on knowledge & technology output and creative output have improved over the last two years, primarily due to increased knowledge creation, facilitated by improvements in innovation inputs. A report by Thomson Reuters, The Research and Innovation Performance of the G20, stated that Saudi Arabia achieved the highest percentage of growth (+373%) in output of science papers during the last decade among G20 members. Filing of patents and trademarks also surged, supported by a superior IP rights and enforcement policy. Saudi Arabia acceded to the Patent Cooperation Treaty (PCT) in May 2013, allowing nationals and residents to file international patent applications. The following chart displays parameters where the Kingdom has shown notable growth:

Figure 36: Saudi Arabia's ranking




Patent applications have increased ~130% over 2001-11


Chemical engineering, Organic fine chemistry & Basic materials chemistry account for more than a third of patent applications


Patent grants have increased from 8 in 2000 to 464 in 2011


Scientific and technical journal articles published have more than doubled from 711 in 2009 to 1,491 in 2011

Source: World Economic Forum report (2013-14), WIPO and World Bank database

The country's performance on creative output, measured by the creation of intangible assets, creative goods and services and online creativity, has improved considerably from 2011, driven mainly by an increasing number of trademark registrations and creative goods exports.

Saudi Arabia scores 24.8 in knowledge & technology output and 48.2 in creative output, much lower than the top 10 innovators' average scores of 50.5 and 56.4, respectively. While knowledge creation has improved markedly, the Saudi economy now needs to focus on knowledge impact and diffusion. Saudi Arabia would do well to continue encouraging innovation and entrepreneurship as this will increase new business density, ISO 9001 quality certificates, royalties and license fees receipts, exports of hi-tech as well as creative goods & services and FDI net outflows; consequently, its ranking in the sub-index on innovation output would improve.

4

More can be Done to Bridge Current Gaps

Saudi Arabia's innovation policy aims at breaking into the club of nations that are innovation leaders globally. The Kingdom made progress, but as noted in the previous chapter, it now stands at a crossroad. Measures such as nurturing an entrepreneurial culture and infusing the workforce with the right skills will help bridge the current gaps.

The Kingdom needs to overcome several roadblocks to emerge as an innovation powerhouse by 2030.

While developing countries would assimilate, modify and improve foreign technologies, advanced economies (at the top of the value chain) create new technologies, products and services. Saudi Arabia is currently at the lower end of the global technology value chain, but can move up, considering the rapid strides it has made in recent years. For instance, it ranked as a leading innovator in the MENA region as per the 2013 Global Innovation Index. Furthermore, the World Economic Forum 2012-13 ranked the Kingdom as one of the easiest countries to secure capital for innovative projects. The country has also moved up on the World Bank's Knowledge Economic Index(KEI) [advanced 26 spots from 76 to 50 between 2000 and 2012].

Despite the significant progress made by the government in creating a favorable environment for entrepreneurship and innovation, the country needs to address a number of gaps to ensure the innovation juggernaut is self-sustained.

"A challenge is that as a society there is still some way to go before parents and teachers actively encourage students to choose entrepreneurship rather than a job as a career aspiration.

Musaab S. Al-Muhaidib
CEO, Al-Muhaidib Technical Supplies

Private investment and loans for startups are limited with no access to equity-backed financing. Low funding to businesses is a problem and the IMF has recommended the government to make amendments in its collateral regime to facilitate lending to SMEs (which is among the lowest in the MENA region and globally).

Existing linkages for technology transfers between foreign and local stakeholders are weak due to the lack of an efficient framework. This hampers the progress towards diversification and makes the economy dependent on foreign inputs. Industry academia linkages should also be strengthened.

Despite the existence of a comprehensive framework to develop innovation and entrepreneurship, **coordination and cohesion between various departments** is lacking; this is adversely affecting the effective execution of programs. In addition, there are the problems of bureaucracy and red tape. Entrepreneurs and SMEs cite this as a key issue which prevents them from benefiting from government schemes.

The country lacks a **vibrant entrepreneurship culture**. The Saudi government needs to heavily subsidize entrepreneurship by adopting a top down approach; however, this must be complemented by a growing breed of Saudi entrepreneurs which have the drive, capabilities and capacity to develop innovative ideas and take risks. Currently, the country lacks a large network of such likeminded individuals. It needs to encourage entrepreneurial mindset among the youth. Amending the current bankruptcy law, which criminalizes failure, is critical to fostering entrepreneurship.

According to the World Bank's Innovation Policy: A Guide for Developing Countries report, Saudi Arabia, Saudi Arabia can follow four roads to drive innovation in the country. These are incubation, incremental improvement, research and acquisition. While the first three strategies have long gestation periods, the last strategy (technology acquisition) will yield faster results, as evident from the opinions of several industry experts on the economy (*please see box below*).

Weak linkages in the country are preventing the effective realization of advantages from the acquisition of technology via transfers (covered in the box below, "Views from Experts: Survey Response").

Views from Experts: Survey Response

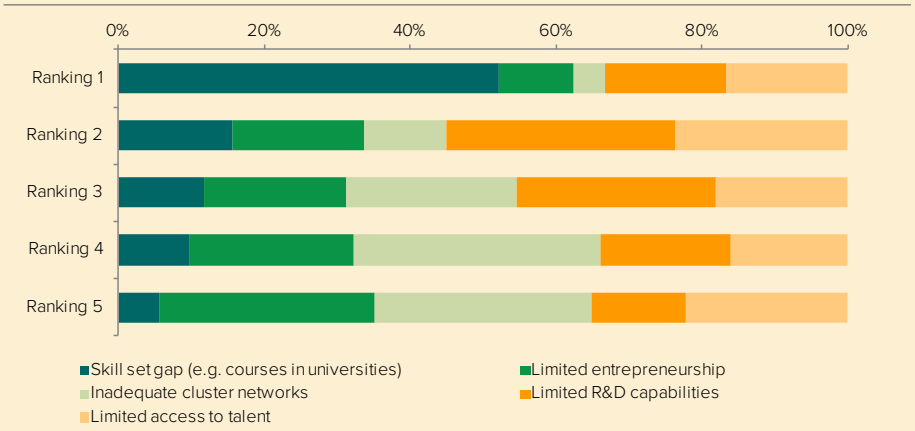
Key challenges in fostering innovation and entrepreneurship in Saudi Arabia

To emerge as a leading knowledge-driven economy, the Kingdom needs to give top priority to bridging the gap in skill set. About 50% of the respondents have ranked this as the topmost challenge for the current innovation ecosystem in Saudi Arabia. They

also came up with relevant suggestions such as the need to review the basic education system so as to make it more stimulating for young minds and conducive to innovative thinking. This factor is also linked to two other challenges accorded top priority: restricted access to talent and limited R&D capabilities compared to global innovation centers.

The survey highlights gap in skill set as the biggest hurdle in fostering innovation and entrepreneurship in the Kingdom.

Figure 37: Key challenges in fostering innovation and entrepreneurship in the Kingdom



Source: Aranca research survey response (n=231)

The challenges highlighted can be addressed. Coordinated efforts (by the government and private sector), commitment and execution of a well-framed plan can help tackle these challenges and (consequently) enable Saudi Arabia to achieve its long-term goal.

To bridge the gaps, the following measures need to be implemented at the earliest:

- Improving academia industry linkages further and developing better frameworks for the transfer of knowledge between various stakeholders
- Focusing on developing technology rather than importing it to ensure easier integration of technologies in the local economy
- Revamping the education system to disseminate entrepreneurial skills and foster innovative thinking
- Streamlining government processes to ensure swift implementation of development programs.

Views from Experts: Survey Response

How will technology transfers help Saudi Arabia?

- **An environment conducive for technology transfer will bridge the gap.** "Technology transfers would assist in improving processes/services and products of the domestic economy."
- "Saudi Arabia is in great need for linking its small and medium enterprises to the global network so as to bridge the demand supply gap. Technology transfers present an attractive investment opportunity from different perspectives."
- "This will help Saudi Arabia to get the necessary expertise to build a solid foundation, and move to the next level. Many countries such as Germany and South Korea have very successful records; we need to learn from their experience."
- "Technology development would enable KSA to create more local jobs, thereby bolstering the economy. Moreover, nurturing and developing local technology-based talent would enable the Kingdom to depend lesser on foreign talent to augment the

economy. Technology development would also foster the Saudi Arabia economy to look at renewable/sustainable energy resources, thereby diversifying its energy potential and reducing the economic risks."

- "Technology transfers can drive exports where it replaces imports through value-added domestic manufacturing/services. However holders of IP technologies will ask themselves why they should license competitive advantages into KSA, unless the country can deliver and add value to the process. Otherwise, KSA will remain a "buyer" and not an "exporter"."
- The focus needs to be on changing the traditional "agency", "representation" of "buying and selling at a margin for a quick buck" mindset which is what most large family owned enterprises have done to succeed. There needs to be advocacy to show the importance of making a profit by adding value."
- "The government should provide funding for a private sector investment program that would invest in and control medium size foreign technology companies and build a bridge between them and strong local demand through a local unit. This will create commercially viable platforms for technology transfer."
- "Technology transfers won't help much because local manpower is not skilled enough or ready to handle technology transfer. Saudi Arabia needs to attract talent from other countries and ensure the environment in the country is conducive."
- "A strong cadre of young, energetic Saudi nationals imbued with creative and entrepreneurial spirit is essential if technology transfers are going to be effective to transform the Saudi economy. Absent this key human element, any technology that is transferred will be left on the shelf to deteriorate."

5

Saudi Arabia – Innovation Landscape Across Sectors

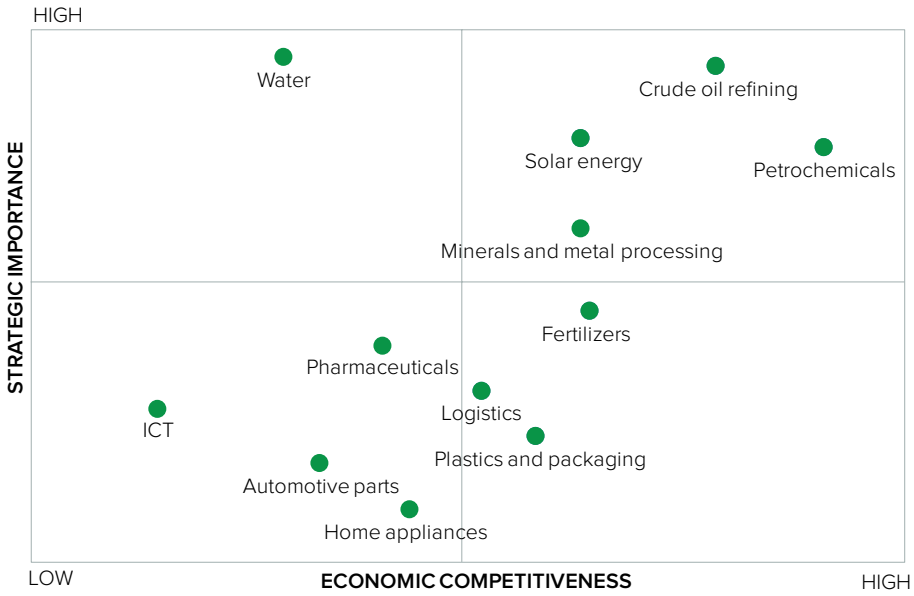
The NSTIP identified 15 technological areas as priorities. Considering these technological priorities as well as factors such as natural competitive advantages and strategic importance, we identified key sectors that would be at the forefront of innovation in Saudi Arabia. The government, industry and academia have been increasing focus to establish the requisite ecosphere across these sectors and attract the best technical collaborations to the Kingdom, thereby propelling innovation-driven progress as well as bolstering productivity and employment.

Sectors at the forefront of innovation

Competitive advantage, strategic importance and integration with global technological advancements key criteria for selection of sectors.

We identified some key sectors the government is developing so as to aid the innovation-led economy. These sectors have been selected based on: 1) competitive advantage supported by intrinsic resource wealth; 2) strategic importance for economic sustainability; and 3) imperative integration with global technological advancements. While the ecosystem around petrochemicals, fertilizers, and mineral & metals is being driven by the Kingdom's intrinsic resource wealth; the ecosystem around water and solar energy is being developed to assist strategic priorities. Furthermore, the focus on information, communication and technology (ICT) sectors is to strengthen human capital and its integration with global technological advancements.

Figure 38: Strategic sectors to be developed by KSA



Source: Aranca analysis

"The future sectors of innovation should be based on the advantages we possess (minerals, solar and petrochemicals) as well as the areas where we are facing scarcities (water).

Abdulrahman Al Ubaid
Advisor for National Industrial Clusters Development Programs, NICDP.

It is essential to develop sectors of strategic importance such as renewable energy, water and food processing—irrespective of their capabilities or advantage—as they are critical to the Kingdom's socio-economic progress. With population growth projected at 2.1% per year for the next couple of decades, food, water and energy security essentially need to be considered in future plans. Sectors with a natural advantage are a safe bet. By piggybacking on the established expertise, these sectors can shorten their learning curve and emerge as fast growth sectors within a very short span of time. New frontier sectors, on the other hand, have high potential, but the Kingdom would have to expend significant resources and efforts to emerge as a leader.

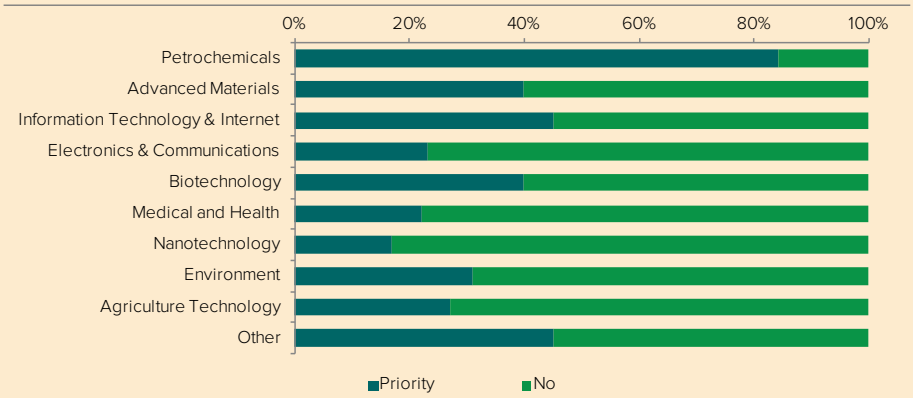
Views from experts: Survey response

Areas where KSA has the potential to emerge as an innovation hub

In response to our query on which areas does the Kingdom have the potential to emerge as an innovation hub, there was a strong consensus among respondents on petrochemicals due to natural advantages, strong infrastructure and an established expertise.

Petrochemicals is the most sought-after sector for the Kingdom to emerge as a global innovation hub, followed by ICT, biotechnology and solar energy .

Figure 39: Key focus areas for the Kingdom



Source: Aranca research survey response (n = 231)

Under the 'other' category, maximum responses were for solar energy, reflecting the Kingdom's location advantage and planned investments of USD109 billion for capacity additions of 54 GW to cater to nearly 30% of the domestic requirements.

Petrochemicals and plastics

The Kingdom's move towards becoming the most significant global hub for petrochemicals and plastics continues unabated. While a reliable and affordable supply of feedstock provides the cost leadership advantage, huge investments for developing mega-complexes and attracting international joint ventures have propelled technological progress. Saudi Arabia is now accelerating value-additive downstream industries, such as specialty chemicals, formulated products, performance polymers and engineering thermoplastics, by enhancing investments in R&D and innovation. The government is at the forefront in terms of providing financing and creating world-class infrastructure. Large companies, such as SABIC, are actively helping industrial clusters to boost innovation and entrepreneurship. The Kingdom's location advantage will likely bolster the petrochemicals sector, thereby enabling the government to cater to the fast growing Asian and developed European markets; additional foreign investments in R&D as well as the use of foreign talent would help in sustaining the momentum.

Key drivers

1

Raw materials advantage

- The Kingdom has the world's largest oil reserves and fourth largest gas reserves, which are key inputs in the plastics and packaging process
- There is adequate supply of energy to ensure high capacity production

2

Strong petrochemicals base

- Saudi Arabia has a well established petrochemical base and is a major producer of feedstocks used for plastics production and next-stage intermediaries.
- SABIC, the world's fourth largest petrochemical company, is the largest producer of ethylene glycol and methanol, third largest producer of polyethylene and fourth largest producer of polypropylene and polyolefin.

3

Government support

- The Ministry of Commerce & Industry and Ministry of Petroleum and Minerals Resources are closely involved in sector development through the Industrial Clusters program.
- The Human Resources Development Fund provides financial support for training and employment, and innovation grants.

4

Growth in domestic industries

- Pharmaceutical sales were estimated at USD5.1 billion in 2012 with domestic manufacturing accounting for ~15%. With the government planning to develop local capabilities, demand for packaging is expected to increase.
- With the development of the domestic food processing sector, Saudi Arabia would account for a larger share of the USD22.6 billion market by 2016.

5

Growing demand from Asian countries

- Asia, the biggest export destination for Saudi, is expected to account for 60% of the global petrochemical demand by 2015, with China accounting for 50%.

The petrochemicals sector is the most important in the Kingdom contributing about 90% to its total export earnings. Supported by its large petroleum reserves, which account for 25% of the petroleum reserves worldwide, Saudi Arabia has established robust petrochemical hubs in the industrial cities of Jubail, Yanbu and Dammam, and around the

Red Sea. Through its plastics and packaging clusters strategy, the government believes the Kingdom would rank among the top-10 plastics exporters worldwide by 2020 as well as create and sustain 17,000 additional jobs in the plastics and packaging sector.

Key success factors

Realizing the importance of enhancing the sector's technological profile and effectively competing on a global level, the government and industry players are jointly establishing the requisite ecosphere for progress, i.e., collaboration with global and domestic academia, technology transfer through joint ventures, development of industrial clusters and promoting start-ups.

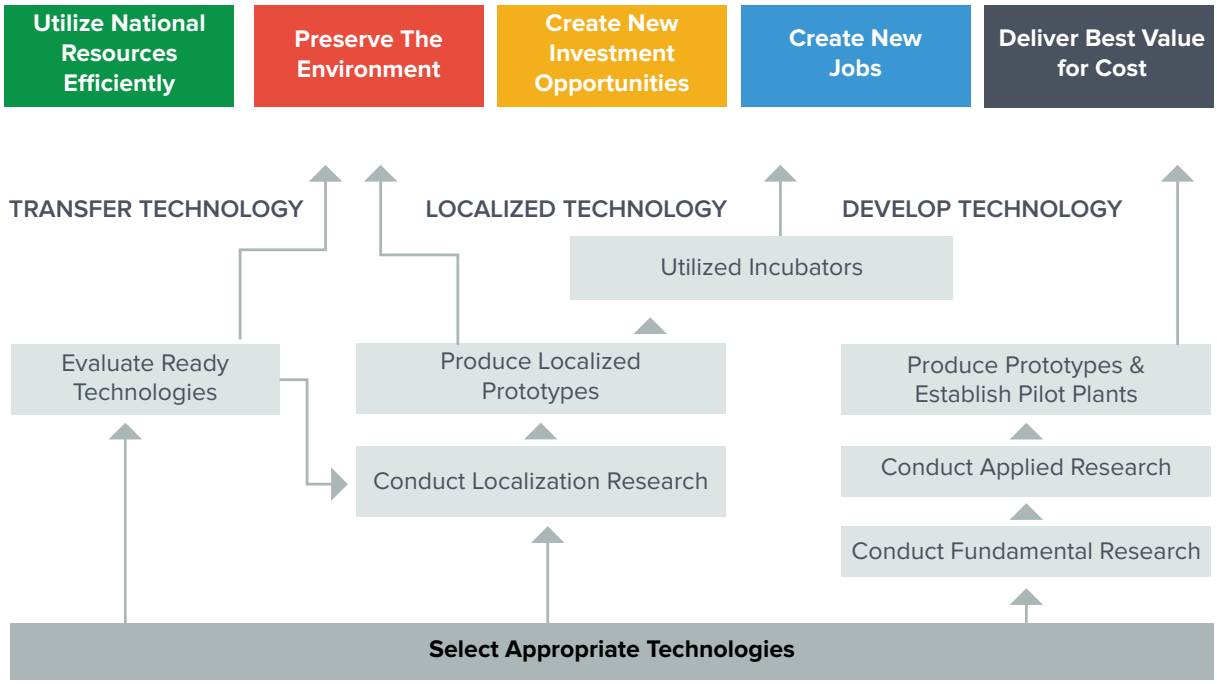
Petrochemicals Technology Strategic Plan

The plan focuses on transforming the Kingdom into one of the leading innovation hubs for petrochemicals and refining technologies. While KACST has the overall responsibility for this plan, various stakeholders, such as universities, industry players, and the government, are closely involved in its successful development and implementation. This plan has three pillars:

- **Technology development** that is either non-existent or not available in Saudi Arabia;
- **Technology localization** to integrate and absorb leading global technologies by developing local technical and human resources; and
- **Technology transfer** to buy off-the-shelf technologies and reduce future dependence.

As a short-term strategy, technological expertise can be developed through technology licensing and entering into joint ventures with multinational companies. However, over the long term, developing indigenous capabilities would be imperative to ensure sustainability and growth.

Figure 40: Petrochemicals Technology Strategic Plan



Source: "Strategic Priorities Plan for Petrochemical Technology Program" Ministry of Economy and Planning, Kingdom of Saudi Arabia

Enhancing R&D capabilities through collaboration with academia

- Establishment of KAUST, a postgraduate research institution, to undertake research collaboration partnerships with leading global and domestic companies including

Schlumberger, Boeing, Halliburton, Dow Chemical, SABIC and Saudi Aramco; Plastics Application Development Center set up by SABIC at the Riyadh Techno Valley research complex at King Saud University (part of the 2020 strategy of emphasizing on scientific research and innovation)

- King Fahd University of Petroleum and Minerals
- Specialized training institutions by various universities and corporates
- Government focus on developing new plastics parks as part of building downstream capabilities.

Step-up R&D focus by the private sector

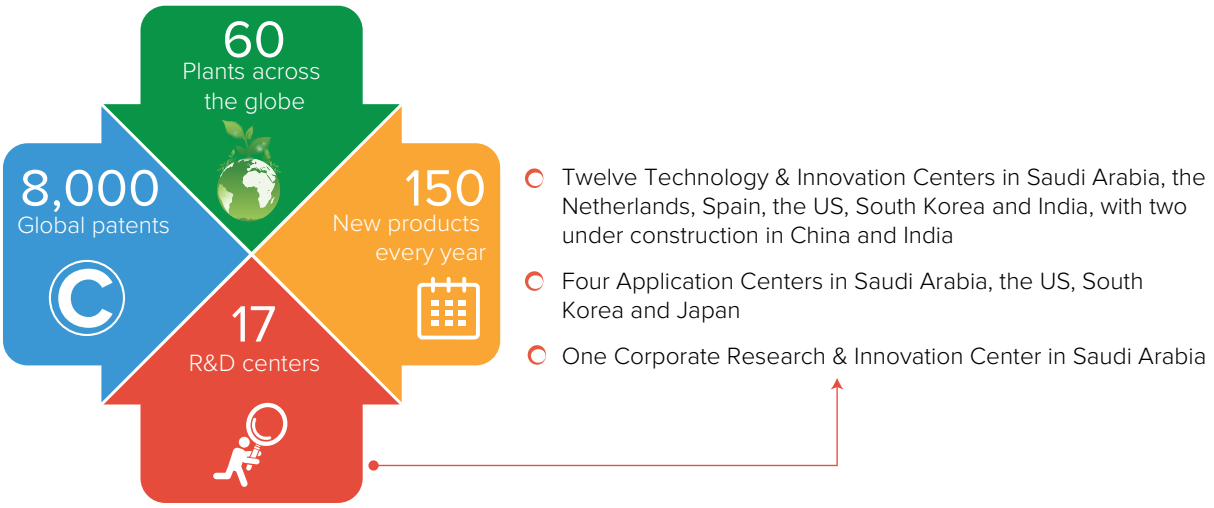
Developing an innovation-led competitive advantage is required for the Kingdom to realize its true potential as a global petrochemicals major. At the recent Gulf Petrochemicals & Chemicals Association Conference held in Dubai during March 2014, Mohammed Al Mady, CEO of SABIC, captured this succinctly in his remarks: "To catch up we have to really do more. We have to go after start-ups, we have to open up innovation with universities and collaborative innovation, we have to localize our innovation capabilities around the world and try to get the best knowledge in the regions we operate in."

Given the growing demand for advanced downstream products and the fact that new chemicals can take several years to be developed, Saudi companies are adopting a four-pronged approach:

- Expanding in-house R&D capabilities; SABIC has 17 R&D centers worldwide, with the latest set up in Bangalore, India;
- Technology transfers through joint ventures with global petrochemical giants;
- Adopting the inorganic route by acquiring global petrochemical companies and promoting start-ups in industrial clusters to plug technology gaps; and
- Supporting advance research in key areas by academia; for instance, Saudi Aramco's collaboration with KACST for advance research in oil and gas technology, and clean fuel production.

Use of upgraded technology has been an important factor in the petrochemicals sector. Currently, there are plans to build a plant at Yanbu that would directly convert crude oil into petrochemicals (ethylene and propylene), without first refining the oil. The plant would be constructed through collaboration between the government and SABIC. The latter's breakthrough success in advanced materials for automotives such as Noryl GTX, Xenoy iQ and STAMAX helped lower the weight of the new Range Rover Evoque by 35%, thereby setting new standards for fuel economy and CO2 emissions.

Figure 41: SABIC (in numbers)



Source: SABIC corporate brochure

Renewable energy industry

Renewable energy has been identified as one of the national strategic sectors to alter the Kingdom's energy dependence on fossil fuels. To effectively diversify and simultaneously cater to the rising domestic consumption, the government allocated USD100 billion for solar projects, in line with plans to generate 50% of the domestic demand for electricity from non-fossil fuels by 2032. Saudi Arabia's location advantage, coupled with its placement on the equatorial sun belt as well as committed efforts from public entities, bodes well for its long-term plans of sustaining energy. Furthermore, traction has been witnessed in the wind and nuclear industry. Nevertheless, though the foundation has been laid, the extent to which the government is able to materialize the impressive national project pipeline would decide the Kingdom's placement on the global map.

Key drivers

Key drivers for the adoption of renewable energy remain strong. Harnessing one of the most easily available resources, sunlight, is considered the best solution for the Kingdom's diversification program and the ever increasing domestic energy consumption. Demand-side drivers supplemented with committed efforts of the public-private sector are expected to accelerate the sector's growth.

1 Need for sustainable energy mix

- Renewable energy is a focus area of the economic diversification plans for modification in the existing energy mix, predominantly dependent on fossil fuels.

2 Natural advantage

- Located on the equatorial sunbelt – receiving one of the highest direct normal irradiation (DNI) resources in the world - an average of 2,200 thermal kilowatt-hours (kWh) of solar energy per square meter of land area every day.
- Fine wind energy potential, with an average of nearly 4.9 hours of full-load wind per day, one of the highest in the MENA region.

3 National Renewable Energy ambition plans

- Saudi has plans of producing 50% of its domestic electricity needs from non-fossil fuels by 2032; the K.A.CARE was established in April 2010 to oversee the country's strategy for alternative sources of energy.
- K.A.CARE's target is to procure 23.9GW of renewable energy by 2020 and 54GW of renewable energy by 2032.

4 Growth in domestic energy consumption

- The Kingdom's economic boom coupled with rising population has fuelled energy demand. Energy consumption, estimated by K.A.CARE at 3.4 mboe per day in 2010, is projected to increase 2.4 times to 8.3 mboe per day by 2028.
- Likewise, electricity demand is projected to grow to 120 GW in 2028 up from 40 GW over 2010-28.

5 Financing plans in-place

- The Kingdom has earmarked USD109 billion for solar development plan in a bid to support one third of the nation's electricity production by 2032.
- K.A.CARE incentives for localization, training, funding and research activities.

Commitment to environment

- The use of renewable energy as a source of electric generation would lessen greenhouse gas emissions and support the Kingdom in meeting its Kyoto Protocol and other international commitments.

6

7

Cost and energy efficiency

- An important focus of Saudi's energy policy is to encourage energy efficiency measures. The plan aims at cutting electricity intensity by 30% over 2005-30
- The cost of solar production is expected to reduce by 50% to USD0.10 per kWh over 2010-20, cheaper than diesel-fired fuel and at par with gas, as per Saudi Aramco estimates.

Key success factors

"The country is among the most exposed in terms of solar power, there have been large investments that have been made in solar energy historically.

Ossama El Batran
Director of New Investments, (HALJ).

Considering the importance of renewable energy for achieving Saudi Arabia's strategic goals, the government, industry and academia have been focusing on establishing the requisite ecosphere for the sector's progress. It has also supported the Kingdom's emergence as one of the most lucrative markets for renewable energies. In fact, Saudi Arabia topped the list of the most attractive markets for renewable energy in MENA, based on Ernst & Young's MENA Cleantech Survey 2013.

Growth in renewable energy has been ascribed to a **triple helix framework** and international collaborations that are expected to continue driving the sector in the future.

National ambition – Government initiatives

- Creation of the King Abdullah City for Atomic and Renewable Energy (K.A.CARE) to focus on a national energy plan and bridge the gaps in funding, infrastructure, human capital, R&D, and regulatory;
- Localization across the value chain, thus supporting technology transfers and employment generation;
- Planned investments of USD109 billion for capacity addition of 54 GW to cater to nearly 30% of the domestic demand; and
- K.A.CARE's preference for projects with a minimum of 60% local content to necessitate joint ventures with high-tech firms and establishment of local manufacturing plants.

Industry-academia initiatives and collaboration

- Saudi Aramco has been at the forefront in this domain and implemented various projects to develop new and cleaner energy technologies. The company has either fully or partly developed three solar PV projects with a total capacity of more than 17 MW.
- King Abdullah University of Science and Technology (KAUST) built a new solar facility (2 MW) in line with its green technology program.
- Mecca's municipal government plans to set up 100 MW, 50 MW and 25 MW solar power plants. The authority has received bids from ACWA Power and a consortia led by EDF.

- Saudi Electricity Company plans to build an integrated solar combined cycle plant (550 MW) to enhance fuel efficiency.

Search for better world-class technology – International collaborations

To develop the requisite expertise across the value chain, several players are collaborating with domestic and foreign companies.

- For its 2 MW solar plant, KAUST entered into an agreement with a regional subsidiary of Germany-based Conergy AG for engineering, designing and commissioning purposes.

- In 2009, Saudi Aramco signed an agreement with Japan-based Showa Shell (15% stake held by the former) for building small-scale pilot solar power facilities in the Kingdom; this includes a 10 MW solar PV electricity generation facility at Dhahran and a 500 KW solar project on Farasan Island. Through this collaboration, the company aims to begin production of solar cells by 2015, in line with the Kingdom's strategy to strengthen presence in the technology value chain.

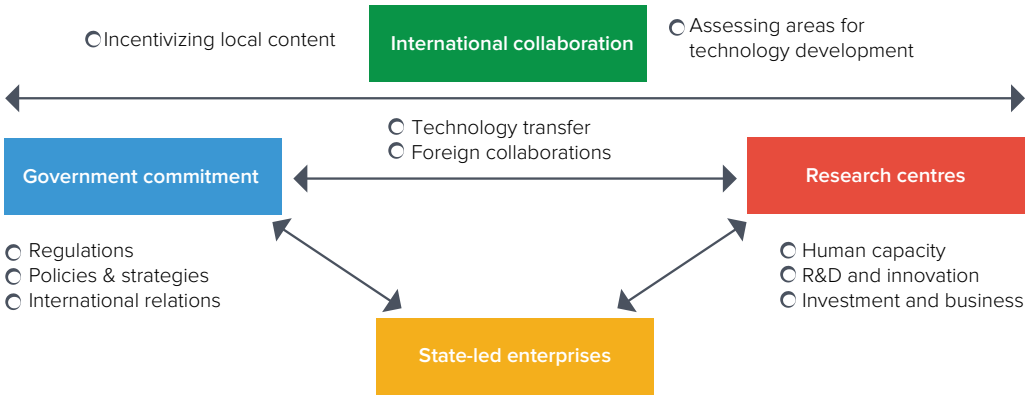
- Showa Shell, through a partnership with SEC, set up a 500 KW solar power plant.

- ACWA Power International, a Saudi Arabia-based project developer, investor, and operator, was awarded the tender to build and control a 160 MW CSP plant in Ouarzazate by the Moroccan Agency for Solar Energy.

- SABIC and K.A.CARE signed an R&D accord to identify areas of collaboration for joint technology development.

- Conergy AG, along with Modern Times Technical Systems (a local partner), is building a solar installation.

Figure 42: Strong ecosphere for renewable energy

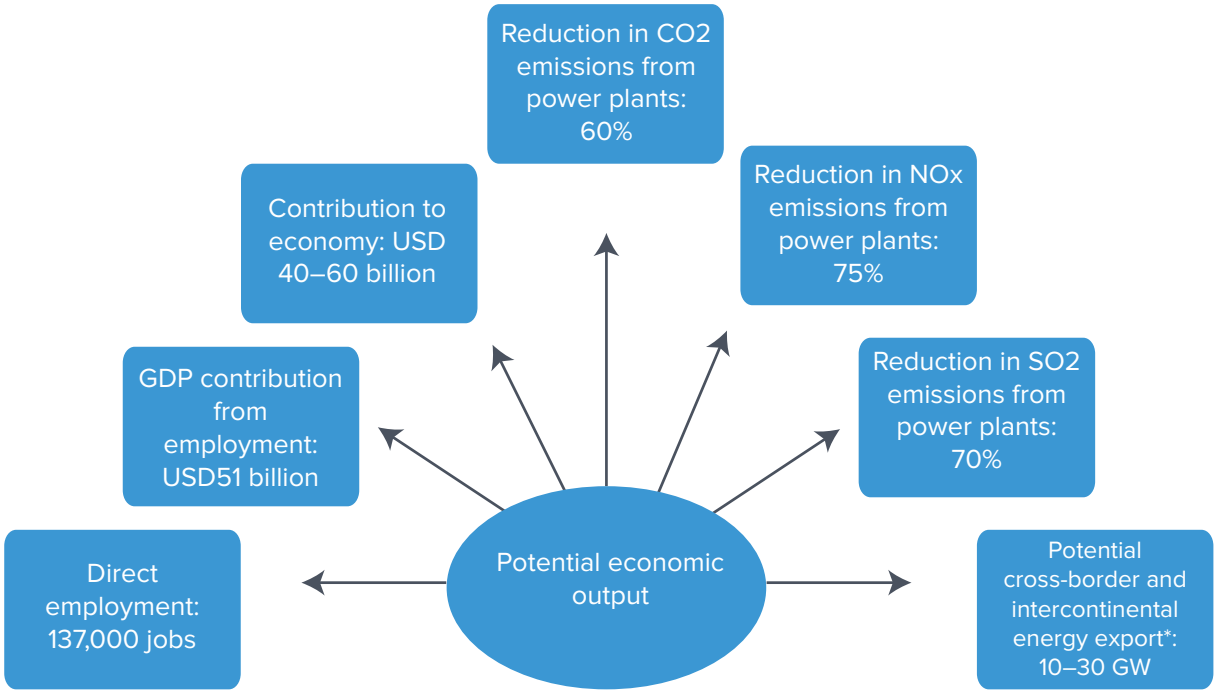


Soure: Aranca analysis

Emergence as the most attractive market for cleaner technologies

The ecosystem, mentioned above, led by the government, industry and academia as well as international collaborations will likely assist the sector's rapid progress. An investment of more than SAR500 billion is required in power projects over the next 10 years, as per Mr. Abdullah Al-Hussayen, Minister for Water and Electricity. Yet, the potential economic benefits, as depicted below, make investments compelling.

Figure 43: Potential economic benefits



*DESERTEC Industrial Initiative (DII)

Source: Aranca analysis, K.A.CARE Research

Water technology industry

Water technology has been identified as one of the key strategic sectors in the Kingdom's national innovation plans given the limited availability of freshwater resources. Rising per capita water consumption, coupled with an increase in industrial activities, necessitates the use of innovative technologies to bridge the water gap. Saudi Arabia's commitment to the sector's growth is evident from the current national strategies and the allocation of USD53 billion for water projects by 2022. This, coupled with initiatives such as privatization, is boosting public-private partnerships and aiding the sector's move up the value chain. Moreover, developing a robust water technology sector bodes well for the Kingdom's sustainable energy diversification plans. As much as the government has been emphasizing on efficient management of water resources, the extent to which it would be successful would depend on how well the Kingdom assimilates innovative technologies.

Key drivers

Saudi Arabia, with limited water resources, would need to adopt innovative techniques to bridge the water gap created by rising economic, industrial and agricultural activities. Realizing the strategic importance of water in the Kingdom's development, the government has outlined national policies, acts and allocated significant funds for the sector's progress.

1 Rise in population and per capita consumption

- Saudi Arabia's population grew at an average annual rate of 3% over 2005–13; growth is expected to remain constant at 2.1% and reach 32.7 million in 2018.
- The Kingdom is the third largest water consuming nation globally, with an average per capita consumption of 200–250 liters per day.

2 Widening demand-supply gap

- There is limited water supply due to low average annual rainfall and high evaporation rate
- Demand for water is expected to reach 8.5 million m3/day in 2025 from 6.8 million m3/day in 2010.
- The water gap for Saudi Arabia is estimated at 12.8 km3 per year in 2040–50, according to the World Bank.

3 Economic and industrial development

- The Kingdom's economy grew at an annual average rate of 6% over 2005–13; growth is projected to be 4–5% in the next 15 years, translating into an increase in industrial activity and thus high water usage.

4 Expanding infrastructure budget

- Government spending on water, agriculture, and related infrastructure increased 5.7% y/y to USD16.3 billion in 2014; approximately 50% of the budgetary allocations have been earmarked for new projects to augment water resources.

5 National policies focused on water resources

- A National Water Strategy and National Comprehensive Water Act were launched to outline the regulatory framework for balanced water use, water rights, and allocation, protection and sustainable supervision of water resources in the Kingdom.

Domestic and international financing

- The Saudi government allocated USD53 billion for various water projects up to 2022.
- According to Samba Financial Group, the utilities sector (electricity and water supply) is currently the fifth largest recipient of FDI in Saudi Arabia which is expected to rise further.

6

7

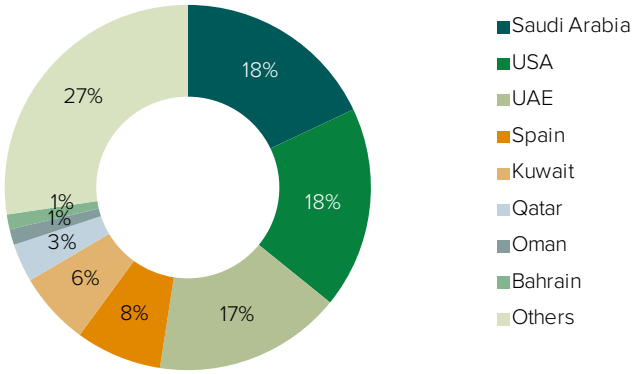
Diversification through renewable water desalination

- Renewable water desalination supports the Kingdom's diversification strategy as it aims at reducing the current crude oil usage (~1.5 mboe/day) that is needed to generate water (through desalination) and electricity.

Key success factors

Realizing the Kingdom's water usage is unsustainable over the long term, continued group efforts were undertaken by research, industrial, and governmental societies to safeguard the long-standing viability of water resources. As a result, the Kingdom hosts a number of the world's largest and most efficient plants. Saudi Arabia is home to the first commercial seawater desalination plant to be built in the MENA region and the world's largest independent water and power project (IWPP), Marafiq complex (Jubail). Notably, the Kingdom's desalination water output is the largest across the globe. Also, there has been tremendous progress in local expertise. For example, at the state-owned Saline Water Conversion Corporation (SWCC), locals execute 91% of all operational work.

Figure 44: Global desalination and Saudi share: 18% of world output



Source: Saline Water Desalination Research Institute (SWDRI) by Dr. Ibrahim AR Altisan, 2013

Growth in water technology has been ascribed to a **triple helix framework** and international collaborations that are expected to continue driving the sector in the future.

Basic framework – Government initiatives

- Launched Water and Wastewater Authority as an independent body under the Ministry of Rural and Municipal Affairs to supply drinking water, and gather and treat wastewater across cities and towns
- Established Ministry of Agriculture and Water (MAW) in 1953 with an aim to cater to the demand for water in terms of quantity and quality
- Launched National Water Strategy in the 1980s for sustainable development and management of water resources
- Formulated policies and allocated funds under various five-year development plans; also identified as one of the NSTIP's strategic areas; allocation of USD9.2 billion and USD11.1 billion, respectively, for water (including irrigation) under the 7th and 8th development plans

- Established the Ministry of Water and Electricity in 2011 to control matters related to water; Ministry signed 24 water and sewage projects valued over USD96 million.

- Adopted an ambitious program to bolster the water and wastewater sector within five years through privatization; set up Water & Electricity Company to supervise the private sector's construction of cogeneration plants.

Industry-academia initiatives and international collaborations

- Saline Water Conversion Corporation (SWCC), the world's largest water desalination entity, operates 27 desalination stations with a capacity of over three million cubic meters(m3) a day of potable water.

- Renewable energy desalination is considered as an emerging solution to bridge the water gap. SWCC, in partnership with KACST, is building the world's largest solar-fuelled desalination plant with a capacity of 30,000 m3 of desalinated water per day catering to 100,000 people. The desalination plant is being built with the support of a new water-filtration technology that KACST developed in partnership with IBM.

- SWCC, in collaboration with Water Re-use Promotion Center (Japan) and Sasakura Company, carried out a joint study and research on fully integrated desalinated technology that led to a reduction in the water production cost per unit. Several patents have been listed in Saudi Arabia, Japan and China.

- SWCC entered into a partnership with Saudi Aramco and State Electric Company in a bid to conduct a study and undertake feasible projects integrating water and electricity production.

- SWCC is currently building the world's biggest desalination plant with a capacity to pump 600,000 cubic meters (158 million gallons) of desalinated water per day; the plant is scheduled for completion by 2018.

- National Water Company aims to earmark USD560 million to bridge the water shortage in Riyadh under the Riyadh Water Supply Enhancement Program. It entails drilling 44 new wells and building 25 groundwater treatment plants, each with a capacity of 5,000–25,000 m3 per day. The company also plans to build three treatment plants that would recover reject water from existing water treatment plants in the capital city. National Water is expected to spend USD66 billion on plants and upgrades in the next 10 years.

- In addition to state-owned companies, the water technology sector has attracted investments from foreign entities such as Dow Chemical Company, Veolia Environment Research & Innovation, GS Construction and Engineering, and Toray Membranes.

Saudi Arabia would continue to remain one of the most lucrative markets in GCC, led by the rising number of contracts in water desalination, water supply and wastewater management sectors. With the requisite ecosystem and future funding plans, the Kingdom is well positioned to emerge as the leading water market in the world.

Minerals and mining

Saudi Arabia has one of the largest mineral deposits in the Middle East with well documented reserves of gold, copper, zinc iron, phosphate, bauxite, dolomite and gypsum. Therefore, the sector's development is of foremost importance in the Kingdom's diversification strategy. However, to emerge as a fast growth sector over the next decade, a number of steps – infrastructure development, building human capabilities and investments in technology – need to be implemented.

Key drivers

The mining sector would be primarily driven by the government's strong focus on: (a) infrastructural investments to connect mining centers and industrial cities; (b) development of downstream capabilities; and (c) maintaining a favorable regulatory environment.

1

Strong government focus

- The Kingdom plans to increase the mining sector's contribution from 2% in 2012–13 to 8% in 2020.
- In the long term, the government believes the sector would emerge as the third pillar of the economy

2

Natural advantage

- The Kingdom has large reserves of phosphate, tantalum and bauxite. There are also commercially viable deposits of silver, zinc, copper, magnesite and kaolin.
- According to a 2012 International Mining research report, more than 40 types of identifiable mineral deposits with at least 15 industrial minerals have been assessed as being economically feasible for extraction.

3

Favorable regulatory environment

- The liberalization of mining laws in 2004
- There are no mineral royalties; however, there are low tax liabilities and legal protection for foreign companies and import incentives
- The government shares its extensive knowledge base of geological information to facilitate exploration

4

Infrastructure investments

- Saudi Arabia plans to link the industrial cities of Jubail, Yanbu and Al Khair to mining centers through a North-South railway link.
- The Kingdom has operationalized the railway network between phosphate mines at AL-JALAMAID and a bauxite mine at Az-Zabirah (in the north) to processing facilities at the industrial hub of Ras Azzour (near the Persian Gulf).

5

Developing downstream capabilities

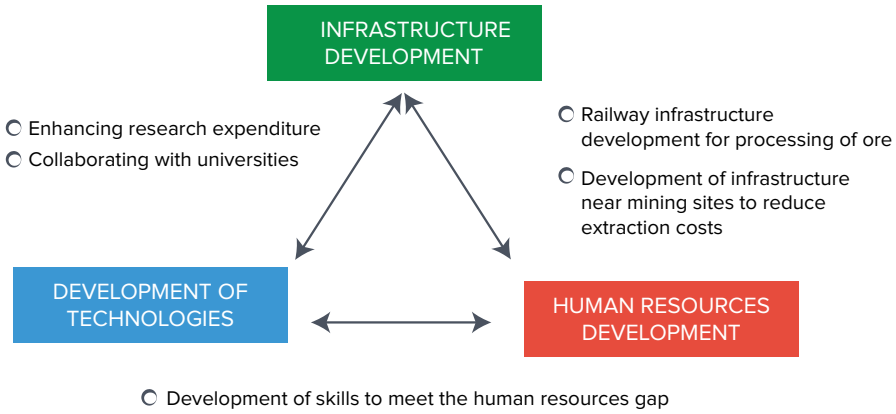
- The Kingdom's industrial cluster program lays strong emphasis on sector development
- In 2014, the government announced plans to invest USD6.9 billion in a mining industrial zone situated in the northern region.
- On completion, the project is expected to contribute about SAR15 billion per year to GDP
- Development of downstream capabilities for aluminum-bauxite (Alcoa-Ma'den's USD10.8 billion aluminum complex) is part of a strategy to develop such capabilities.

Key success factors

Currently, the infrastructure around mineral sites is suboptimal, thereby increasing extraction costs. Also, there is a shortage of skilled workers. Furthermore, absence of technological knowhow to tap future opportunities (for example, application of minerals in advanced technology materials) would hinder growth.

The government, which is the primary growth driver for the sector, has undertaken several initiatives. Infrastructural investments are already in motion to connect mine sites to industrial towns. Ma'aden also partnered with Technical Vocational Training Corporation to create the Saudi Mining Polytechnic Institute, the first institution within the Kingdom whose goal is to train young Saudis to join the mining industry. The government also partnered with the KAUST Industry Collaboration Program to enhance access to pivotal research in minerals exploration and extraction technology.

Figure 45: Minerals & mining ecosphere



Soure: Aranca analysis

Market development

Over the medium term, the mining market would witness rapid growth with the government's investments in infrastructure development and skill creation. Construction of the North-South railway link would increase processing times and reduce the mine to market time lag. Development of personnel to man jobs in mining would be instrumental in ensuring the sector's sustainability and mitigating risks. These key factors are expected to lead to the entry of a number of international mining companies. The existing favorable regulatory framework would be an added advantage. Development of downstream capabilities through the creation of economic cities will likely increase the sector's contribution to GDP. Greater research and development collaborations are expected to drive patenting and application of technologies in exploration and extraction.

Other key sectors

Saudi Arabia as ICT hub

Adoption of Information, Communication and Technology (ICT) is evolving as the core to bringing efficiency and innovation across sectors. Saudi Arabia is aware of the importance of the ICT sector as a catalyst for economic development. **The Kingdom is the largest spender on ICT in the Middle East,** with capital investment of over SAR135 billion in 10 years and ICT services spending of SAR94 billion in 2012 (compared with SAR21 billion in 2002). **The government is the biggest driver for the sector** through initiatives such as the **e-governance program**, **development of smart cities**, and **higher IT spending** on sectors such as health, transportation and construction. There is also strong impetus from corporates and SMEs that are looking at adopting IT to enhance process efficiencies. Growing IT penetration among the population would be another key factor driving the sector forward.

According to IDC, the public sector would witness the highest growth over the 2013–17 forecast period. The enterprise sector, especially SMEs, is also projected to grow. Increasing need for ERP, CRM or disaster recovery from SMEs, and need for more sophistication and customization of traditional requirements by large corporates would boost capital investments on ICT as well as spending on ICT services. On the consumer front, market fundamentals such as a large young technologically literate population would be a growth factor for the ICT sector. In addition, greater technology (PC, mobile and tablet) penetration and easier access to broadband & telecommunication networks would drive ICT spending.

KSA's government is one of the biggest proponents of IT adoption and has launched several measures:

- **The Yesser e-governance** program has entered the second phase (2012–2016) after completing the first (2006–2010)
- Programs such as **Home Computer Initiative**, **Internet Awareness Project** and **e-Training Caravans Initiative** to enhance IT penetration across the Kingdom
- Strong impetus at central and local government levels for creation of smart cities (green field and brown field). The four planned economic cities will be the first step in the process of rolling out this concept. Projects such as the Makkah Smart City project and the **Information Technology Communications Complex (Riyadh)** would complement this strategy
- Development of entities such as **Riyadh Technovalley**, **Badir Technology incubator**, and **STC ventures** that promote IT-based industries are aimed at establishing technology-based startups.

The key ingredient to successfully develop the domestic ICT sector is to build a strong human resource base. Currently, there is absence of a sizable mass of individuals with IT skills within the Kingdom. Consequently, companies are facing issues such as rising costs related to acquiring and retaining staff. The skills gap also hinders development of new technology companies.

There is also a need to establish a favorable entrepreneurial ecosystem that will lead to creation of innovative startups. Successful innovative technology startups (Yatooq and Glowork) are far and few in Saudi Arabia. Although there is a growing network of support systems (incubators, VCs and government agencies covered in the earlier section), their reach needs to be expanded.

Saudi Arabia as food processing industry hub

The food processing sector is of **strategic importance to the Kingdom as it currently imports an estimated 80% of the food requirements.** A rapidly growing population, steady inflow of tourists, and rising income levels would lead to further demand pressures in the long term. **To emerge as a leader in the Middle East, Saudi Arabia would need to implement strategies similar to successful food clusters (for example, Denmark).** Strong government support for cluster formation combined with sustained investments in R&D and technology developments would be the key success factors.

Key success factors

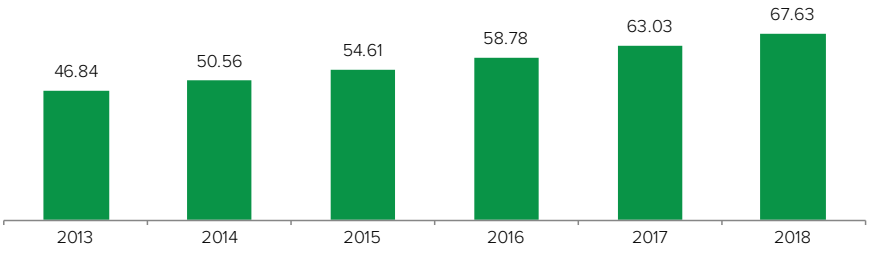
The Kingdom can adopt and implement strategies similar to countries such as Denmark that have established sustainable food clusters. To successfully emulate these examples, **Saudi Arabia needs to lay emphasis on technology development and integration, sustained investments in R&D as well as stronger government support.**

Government support would need to be the major influence, through the formulation of a coherent cluster policy and establishment of necessary infrastructure to generate positive externalities. As a first step, it needs to attract leading domestic and foreign companies to set up operations. This would be complemented by government investments in R&D and policies to incentivize private R&D investments. In parallel, collaborations between universities/research agencies and international food manufacturing companies would enhance sector-based research, and lead to transfer of best practices and commercialization of newly developed technologies. To complete the loop, SMEs could be integrated into the value chain to provide support services to large companies operating in the cluster.

Market development

Saudi Arabia is the single largest food consumer in GCC, accounting for 62% of the region's total food consumption. According to BMI, in the overall MENA region, the Kingdom has the best sector prospects. Over 2013–18, food consumption has been projected to register a CAGR of 7.63%, driven by demand- and supply-side factors. Within this lucrative market, several opportunities exist across sub-segments such as health food, organic food, bottled water, soft drinks and fruit juices.

Figure 46: Food consumption in Saudi Arabia 2013-18 (USD billion)



Source: BMI Food and Drink Report Q2 2014

Government subsidies are expected to continue safeguarding the margins of food manufacturing companies in the short term. In addition, agricultural investments in African countries to secure stable supply of inputs would provide some succor to food manufacturers, which are highly dependent on imports for inputs. Though import dependency is unlikely to wane due to insurmountable natural constraints, supply-side volatility is expected to be mitigated to a certain extent.

Saudi Arabia as an automotive hub

The Saudi government has identified automotive as **one of the potential industrial clusters for economic diversification** and creating additional employment avenues. **The cluster, located at Yanbu Industrial City, aims to focus on the entire automotive chain, ranging from original equipment manufacturers (OEMs) to Tier 1, 2 and 3 suppliers.** The foremost advantage for the industry is the availability of low-cost raw materials. Car manufacturers are increasingly using aluminum over steel to build car bodies, and the Kingdom offers a significant competitive advantage in this sphere. Saudi Arabia is endowed with rich bauxite resources, which are used to produce aluminum. Also, it has access to inexpensive electricity needed to fire the smelters. Furthermore, companies such as SABIC are increasingly focusing on supplying downstream industry products (lightweight engineering thermoplastics and enhanced fuel additives, among others) to auto giants such as Volkswagen, Land Rover and Mitsubishi.

From a geographical standpoint, Saudi Arabia is well located. The Kingdom serves as a hub for West-based auto companies seeking to benefit from the ever-increasing middle class in Asia and Africa, in addition to GCC markets. The six GCC countries are in a single customs zone, and the region has signed free trade agreements with Singapore and the European Free Trade Association (consists of Switzerland, Norway, and Iceland). GCC is also negotiating similar agreements with East Asian countries such as China and South Korea.

Government support

- Given the auto market in Saudi Arabia is fragmented, the government plans to begin with a shared services and facilities (such as stamping and paint shop) model to reduce the initial capital investments.
- The concept of an auto cluster would provide economies of scale to Tier 1 suppliers and a superior return on investment.
- The government is also helping companies fulfill their funding requirements by offering loans at discounted rates.
- Furthermore, it aims to increase in-country passenger vehicle assembly to 400,000 units over the next 10–15 years. In line with this, the government is strengthening infrastructure by adding rail lines, expanding shipping ports, investing in workforce education and providing other incentives to attract a greater number of auto companies.

Saudi Arabia's manufacturing sector is witnessing a gradual pick up. Isuzu and Jaguar Land Rover, which commenced the assembling of passenger vehicles, signed Letters of Intent to build vehicle manufacturing plants in 2012. Isuzu produced 600 medium-duty trucks in 2013 at its second industrial city in Dammam and plans to extend its model offerings to include heavy- and light-duty trucks. The company has estimated a combined production of 25,000 vehicles per year by 2017, with supply of parts from manufacturing facilities in the Kingdom.

Suppliers to the auto industry are developing various mega projects. KEMYA Al-Jubail Petrochemical Co., a joint venture between ExxonMobil and SABIC, is investing USD3.4 billion in the first synthetic elastomers project in the Middle East. The company, which would have three plants engaged in the production of the three largest synthetic rubber types (butadiene, EPDM, and butyl rubber) and a unit for carbon black, is expected to commence production in the second half of 2015. KEMYA expects to supply synthetic rubber used for automotive (including tires, weather seals, and hoses) and non-automotive applications primarily to customers in Asia, Europe and the Middle East. Meanwhile, Saudi Arabian Mining Co and Alcoa are building the world's largest integrated aluminum complex with a bauxite (aluminum ore) mine, refinery, smelter, and rolling mill. While the smelter became operational in 2012, the rolling mill is scheduled to commence the production of aluminum auto sheet by the end of 2014. The mine and refinery are also expected to come online in 2014.

Overall, Saudi Arabia's efforts toward laying the foundation for the auto cluster seem to be on track, and the consequent economic benefits make the investments more attractive.

Saudi Arabia as pharmaceuticals and biotechnology hub

Saudi Arabia has the largest pharmaceutical market in GCC which was valued at USD3.7 billion in 2013. The total pharmaceutical expenditure accounts for 2% of the GDP and comprises 18% of the total health expenditure. The government's free medical and healthcare services to citizens constitute about 35% of the value of pharmaceuticals sold. Yet, domestic pharmaceutical production is extremely low and a major part of the demand is met through imports. Imported drugs comprise almost 85% of the total drugs sold in Saudi Arabia. Given the favorable demand and supply dynamics, along with factors such as rapid growth in population, rising instances of chronic diseases and healthy income levels, the Kingdom's pharmaceutical industry presents an attractive investment proposition.

The government has undertaken **steps to encourage local production of generic drugs** to restrain healthcare spending and improve employment. It has **facilitated faster entry of locally manufactured medicines into the market**, with only imported pharmaceuticals required to be tested before registration. Additionally, the government is offering several incentives such as low tax rates and funding facilities. Also, it is focusing on **promoting FDI in the pharmaceutical sector, particularly to enhance the skills of local companies** and enable them to manufacture patented medicines. Multinational companies such as **GlaxoSmithKline, Daiichi Sankyo and Astellas Pharma** have formed joint ventures with local firms to set up production units in the Kingdom. **Pfizer**, a drug giant, announced plans to set up factories throughout Saudi Arabia. In March 2013, the company commenced the construction of its first facility in King Abdullah Economic City (KAEC). The 32,000-square-meter facility would have an output capacity of 18 million packs per year when it starts production in 2015.

The government is making concerted efforts toward the development of biotechnology. It has already spent **SAR350 million on research projects in the field of biotechnology through the NSTIP** in the last three years. KACST, King Saud University, King Abdulaziz University, King Khalid Hospital, Ministry of Agriculture and King Fahad Medical City are some institutes involved in biotechnology research and its applications. Saudi Arabia also launched **a business incubator – Badir for Biotechnology** – in March 2010. **The incubator is based in King Fahd Medical City,** Riyadh, and aims to encourage and support the establishment and development of new biotechnology companies that have the potential to be the basis for high-growth businesses in the Kingdom

6

Appendix: About Aranca Survey

To understand how innovation is driving businesses in Saudi Arabia and how it could catalyze the next wave of economic growth, we surveyed and interviewed over 200 experts. The respondents included entrepreneurs, corporate and family groups, government agencies and investors in Saudi Arabia as well as global experts who track the Saudi economy very closely. The objective of this exercise was to gain insights into the innovation landscape in Saudi Arabia, the key drivers and inhibitors for innovation, and the role the government and private sector should play to aid the Kingdom's transition to an innovation-driven economy.

The survey comprised two streams:

- An exclusive online survey of 1,149 Saudi and global experts, of which we received 231 complete responses; and
- Personal interviews with leading entrepreneurs and think tanks in Saudi Arabia.

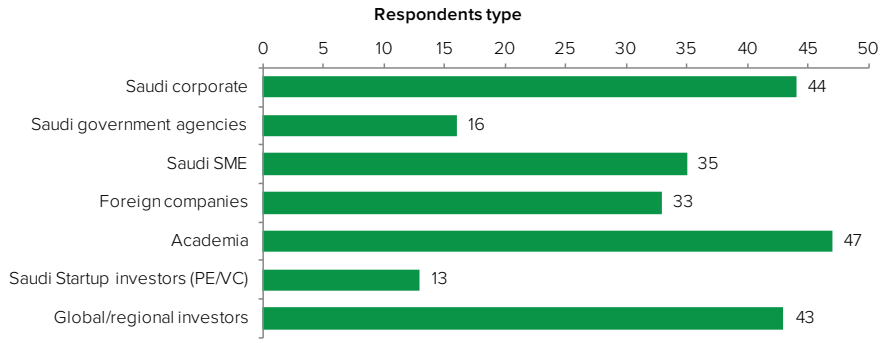
A. Online Survey

Aranca conducted the fieldwork for the online survey during March–April. The detailed breakup of survey respondents (total 231) is given below:

Figure 47: By location

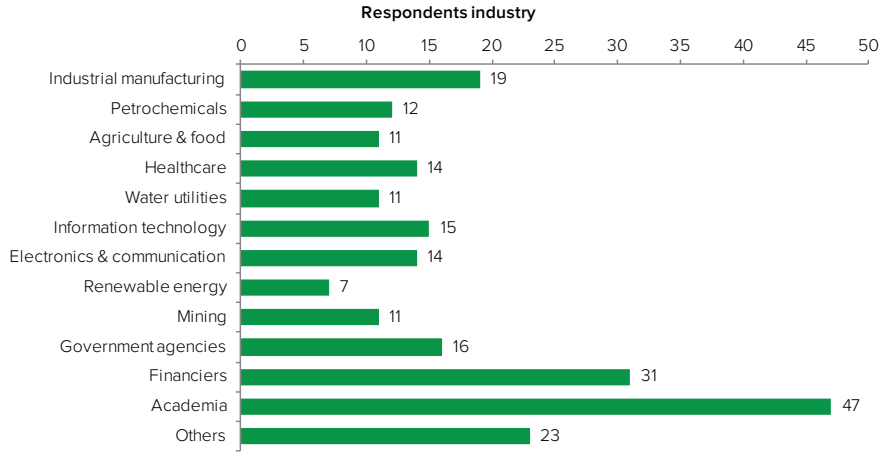
Source: Aranca research survey response (n = 231)

Figure 48: By type



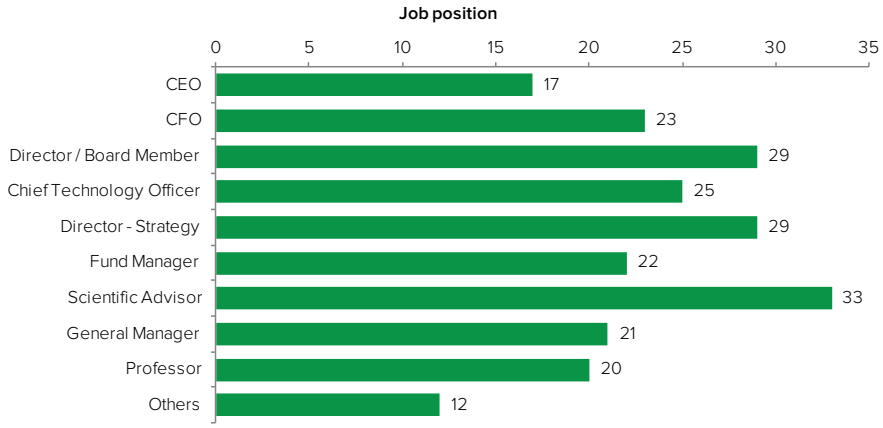
Source: Aranca research survey response (n = 231)

Figure 49: By industry



Source: Aranca research survey response (n = 231)

Figure 50: By job position



Source: Aranca research survey response (n = 231)

B. Personal Interviews

We conducted a series of interviews (18) with leading entrepreneurs and business think tanks in April. These interviews were focused on understanding the current innovation and entrepreneurship ecosystem in Saudi Arabia, the role played by different stakeholders to improve the ecosystem, the key challenges and how these could be addressed. The interviews also touched upon key sectors where Saudi Arabia is at a competitive advantage to emerge as an innovation hub as well as the strategic areas where the Kingdom needs to invest to achieve food and energy security and partake in the global technological progress.

About Aranca:

Founded in the UK in 2003, Aranca is a leading provider of high quality research and advisory services to global clients. As a trusted knowledge partner to over 1700 clients including global financial institutions and Fortune 500 firms, we have built a strong reputation for our insightful and actionable research. Aranca has a global presence including in the US, Europe, Middle East and India, and employs over 450 highly qualified and talented professionals.

تأسست شركة ارانكا في المملكة المتحدة عام 2003، كشركة رائدة في تقديم أفضل خدمات الأبحاث والاستشارات للعملاء من كافة أنحاء العالم، وأصبحت اليوم شريكاً ومصدر موثوق للمعرفة لأكثر من 1700 من المؤسسات المالية العالمية بما فيها شركات من قائمة مجلة فورتشن 500. لقد تمكنا من بناء سمعة ممتازة في مجال تقديم خدمات الأبحاث ذات المصداقية المرجعية. إن لشركة ارانكا حضور دولي يغطي دول الولايات المتحدة، أوروبا، الشرق الأوسط، والهند، كما تتمتع بكوادر مؤهلة ذات كفاءة مهنية عالية تتألف من أكثر من 450 موظف.

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