OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

Ministry of Commerce and Industry

Kingdom of Saudi Arabia

INDUSTRY 2020

Industrial Strategies to Enhance Diversification and Competitiveness in the Kingdom of Saudi Arabia

Partners in Building a Promising Industrial Future

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna, December 2006

Contents

List of Tables

List of Figures

List of Boxes

Preface

"Industry 2020" has been prepared by the United Nations Industrial Development Organization (UNIDO) in cooperation with the Ministry of Commerce and Industry, Government of the Kingdom of Saudi Arabia within the framework of the Integrated Programme *Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia*.

The objectives of the project are to recommend strategies for diversifying the economy away from excessive reliance on resource-based oil and gas industries towards the accelerated development of a broader spectrum of globally competitive non-oil industries with employment-creating potential.

The present report is divided into three main parts:

- *Part A* reviews industry in the Kingdom of Saudi Arabia in the new global industrial setting, emphasizing the vision for industrial development (Chapter 1), the need for diversification and competitiveness in the new global industrial setting (Chapter 2), and the position of the country on the global map of competitive industrial performance (Chapter 3).

- *Part B* outlines strategies for diversification and competitiveness, with a special emphasis on principles and mechanisms (Chapter 4), the need to enhance domestic capability building (Chapter 5), improving the business environment (Chapter 6), creating a National and Regional Innovation System (Chapter 7), and promoting cluster-based industrial development (Chapter 8). These industrial strategies are intended to create sustainable development by improving welfare and generating employment opportunities. They are also intended to position the Kingdom in the global league table of industrial excellence in 2020 (Chapter 9).

- *Part C* presents an agenda for action in terms of governance of strategy implementation (Chapter 10) and detailed follow-up Industry 2020 action programmes (Chapter 11).

The report was prepared by a UNIDO team in close cooperation with a counterpart team from the Kingdom of Saudi Arabia, led by the Deputy Minister for Industry, Dr. Khalid M. Al-Sulaiman, and comprising the Director of the National Office for Industrial Strategy, Mr. Ahmed M. Al-Sadhan, and Mr. Khalid Al Baiz, consultant, under the overall guidance of the Minister of Commerce and Industry, H.E. Dr. Hashim Abdullah Yamani.

The UNIDO team contributing to the report comprised: Mr. Yuri Akhvlediani, Deputy to the Director, Private Sector Development Branch, UNIDO, Mr. Jebamalai Vinanchiarachi, Principal Advisor to the Director-General of UNIDO, Mr. Torben M. Roepstorff, former UNIDO senior official, Mr. Frederic Richard, former UNIDO senior official, Ms. Olga Memedovic, UNIDO Industrial Development Officer, Mr. Ricardo Seidl Da Fonseca, Industrial Development Officer, and Mr. Jaime Moll De Alba, Industrial Development Officer, as well as UNIDO experts Professor Lobna M. Abdel-Latif, Mr. Chris Rodrigo, Mr. Adnan H. Tameesh, Mr. Carlos Aguirre, Mr. Peter Heydebreck, Mr. Riad Houry, Mr. Diaa Noureldin, Mr. Christian Ketels, Mr. Philip Nicolas Cooke, Mr. Vadakkepat Padmanand and Mr. Paul Hesp. Editorial assistance was provided by Ms. Jane Kinnonmont, Ms. Georgina Wilde and Ms. Penelope Plowden. Mr. Michael Geyer prepared the artwork for the cover page. Ms. Turhan Donegan and Ms. Imelda Scallan produced the camera-ready copy.

In addition to writing several chapters, based largely on inputs from different team members, Mr. Torben M. Roepstorff has consolidated this document into an Industry 2020 strategy. Professor Lobna M. Abdel-Latif has made substantive contributions to the report, including an important Background Paper.

The report greatly benefited from a series of UNIDO working papers prepared specifically for this project. Some of these have been drawn upon in the drafting of the report, including in particular a UNIDO Diagnosis

of Industrial System and Sectoral Competitiveness prepared by a team under the guidance of the late Professor Sanjaya Lall of Oxford University.

The team wishes to take this opportunity to pay tribute to the pioneering research undertaken by the late Professor Sanjaya Lall in the context of his innovative diagnosis of the industrial sector in Saudi Arabia. His constructive vision on competitive industrial performance and his views on the importance of building industrial, and in particular technological, capabilities permeate most parts of this report, with its aim of positioning the Kingdom in the global league table of industrial excellence by 2020.

Explanatory notes

References to dollar ($) are to US dollars, unless otherwise specified.

Billion means 1,000 million.

References to tonnes are to metric tonnes, unless otherwise specified.

Totals may not add up precisely because of rounding.

Unless otherwise stated, region or regional in this document refers to sub-national regions. Where region or regional is used to signify a supra-national region (involving for example, the GCC region, the Arab region, the MENA region) it emerges from the text.

The following abbreviations are used in this report:

AAGR	Average Annual Growth Rate
AERI	Atomic Energy Research Institute
AGRI	Astronomy and Geophysics Research Institute
Bpd	Barrels per day
CBE	Competitive Business Environment
CIP	Competitive Industrial Performance
CPI	Consumer Price Index
DIP	Drivers of Industrial Performance
DLP	Digital Light Processing
ECRI	Electronics and Computers Research Institute
EPS	Expanded Polystyrene
ERI	Energy Research Institute
ERIS	Entrepreneurial Regional Innovation System
ESCWA	United Nations Economic and Social Commission for Western Asia
EU	European Union
FDI	Foreign Direct Investment
GAFTA	Greater Arab Free Trade Area
GCC	Gulf Cooperation Council; now officially named the Cooperation Council for the Arab States of the Gulf
GDP	Gross Domestic Product
GERD	Gross Expenditure on R&D
GIS	Geographic Information Systems
GNI	Gross National Income
GOSP	Gas Oil Separation Plant
GOTEVOT	General Organization for Technical Education and Vocational Training
HT	High Technology, as in the categories of “high-tech” industries
ICT	Information and Communications Technology
ICDB	Industrial Competitiveness and Diversification Board
ICTs	Information and Communications Technologies (used as a noun)
IDR	Industrial Development Report (UNIDO flagship report)
IICDB	Industrial Innovation Coordination and Development Board
IIPA	International Intellectual Property Alliance
ILO	International Labour Organization
IMD	International Institute for Management Development
IMF	International Monetary Fund

IPP	Innovative Platform Policy
IPRs	Intellectual Property Rights
IRIS	Institutional Regional Innovation System
ISO	International Organization for Standardization
IT	Information Technology
ITA	Information Technology Agreement
KACST	King Abdul Aziz City for Science and Technology
KSA	Kingdom of Saudi Arabia
KWh	Kilowatt-hour, or 1,000 watt-hours (Wh)
LPG	Liquefied Petroleum Gas
LT	Low Technology, as in the categories of 'low-tech' industries
MCI	Ministry of Commerce and Industry
MENA	Middle East and North Africa
MHT	Medium and High Technology, as in the categories of “medium and high-tech” industries, products, exports, or activities
MinPet	Ministry of Petroleum and Mineral Resources
Mn	Millions
Mn b/d	Millions of barrels per day
MT	Medium Technology, as in the categories of “medium-tech” industries, products, exports, or activities
MVA	Manufacturing Value Added
M&A	Mergers and Acquisitions
NGL	Natural Gas Liquids
NRERI	Natural Resources and Environment Research Institute
NIS	National Industrial Strategy
N(R)IS	National (Regional) Innovation System
NRIS	National Research and Innovation System
OCC	Operations Control Centre
OECD	Organisation for Economic Co-operation and Development
OJT	On-the-job training
PDC	Patent Documentation Centre
PMI	Project Management Institute
PPIRI	Petroleum and Petrochemical Industries Research Institute
PR	Primary Resources, as in the categories of “primary resource” industries, products, exports, or activities
RB	Resource-Based, as in the categories of “resource-based” industries, products, exports, or activities
RCA	Revealed Comparative Advantage
R&D	Research and Development
R&T	Research and Technology
SABCAT-1	A new catalyst used in the production of Butene-1, which is manufactured by SABIC
SABIC	Saudi Basic Industries Corporation
SAGIA	Saudi Arabian General Investment Authority
SAMA	Saudi Arabian Monetary Agency
SASO	Saudi Arabian Standards Organization
SCADA	Supervisory Control and Data Acquisition
SCFD	Standard Cubic Feet per Day
SEDC	Saudi Export Development Centre
SI	System Integration
SIDF	Saudi Industrial Development Fund
SITC	Standard International Trade Classification
SME	Small and Medium-sized Enterprise
SMEs	Small and Medium-sized Enterprises
SOICTZ	Saudi Organization for Industrial Cities and Technology Zones
SPS	Sanitary and Phyto-Sanitary measures

SR	Saudi riyals
SRI	Space Research Institute
SWCC	Saline Water Conversion Corporation
SWOT	Strengths, Weaknesses, Opportunities, and Threats (analysis)
TBT	Technical Barriers to Trade
TNC	Trans-National Corporation
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UAE	United Arab Emirates
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
US	United States
USA	United States of America
WEF	World Economic Forum
WITS	World Integrated Trade Solution
WTO	World Trade Organization

Executive Summary

Vision 2020

As embodied in its "Vision 2020", the Government of the Kingdom of Saudi Arabia (KSA) has pledged to strive for a diversified and prosperous economy that guarantees the existence of rewarding job opportunities and higher levels of economic welfare for Saudi citizens, and provision of education and health care for the population to equip the labour force with adequate skills, in addition to preserving the religious values and cultural heritage of the Kingdom.

The challenge which the Kingdom has set for itself involves ambitious targets in terms of transformation of the economic base from resource-intensive to knowledge-based industrial expansion triggered by innovation. The task is, however, achievable given an appropriate institutional and policy framework supported by stakeholder consensus and backed up by a detailed programme of actions based on a thorough assessment of the KSA's current capabilities and future needs.

An underlying premise of Vision 2020 is that manufacturing is critical to Saudi Arabia's future progress. Global experience shows that manufacturing is the main engine for deploying new technologies and increasing innovation, both of which are essential for success in the emerging world economy. Manufacturing is a dynamic force, crucial to enhancing exports and moving them from low-value-added products to higher value, skill and technology-intensive products that grow more rapidly in world markets and can sustain faster income growth. Manufacturing is vital to the creation of new skills as well as encouraging growth and technological change in other sectors, notably agriculture, finance, construction and modern services including the management of environmental quality. Manufacturing capability development and external linkages interact positively: skills and capabilities develop faster and better if they can draw on the knowledge, technologies and quality standards provided by FDI and export markets and if they are exposed to global competition. Moreover, manufacturing in general is a more attractive source of economic growth than the financial sector, which is far less labour-intensive.

Thus, the National Industrial Strategy aspires to develop Saudi industry as "a globally competitive industry based on innovation, acting as a base for transforming the Kingdom's natural and human resources into sustainable wealth and employment creation".

The challenge of diversification

During the last decade, GDP growth has been closely correlated with fluctuations in the price of oil, leaving the KSA economy vulnerable to the exogenous factors that influence it. There has been large-scale investment in oil-related industrial activities, but this highly capital-intensive sector offers limited opportunities for employment for a rapidly growing labour force. Exports are overwhelmingly dominated by the oil sector and markets are insufficiently diversified.

The challenge facing the KSA is to use oil revenues to stimulate sustainable growth in other productive sectors. The industrial sector – including mining, downstream oil-processing activities and industry-related services – should emerge as the key sector for sustaining high growth because of its dynamic interrelation with new technologies, innovation and knowledge, which are the key drivers of global economic growth. Indeed, international experience shows that industry-related services are one of the most dynamic growth sectors of most economies. In addition, the industrial sector is characterized by forward and backward linkages with other

critical sectors, including mineral processing, basic metals, agriculture and agro-processing, infrastructure, tourism and other related economic activities.

Implications of the new global industrial setting for Saudi industry

The new global environment for industry has the following major characteristics: industry is becoming more globalized as transnational corporations locate their operations not only in the most cost-efficient locations but also in those where there exists a pool of knowledge–intensive talent; building industrial capabilities is becoming the key driver for achieving competitiveness; sustained productivity growth represents the main source of industrial growth and competitiveness; technological innovation and upgrading are becoming increasingly important; the distinction between industry and services is becoming blurred; stricter global norms require compliance in the field of environment (Montreal and Kyoto Protocols), intellectual property rights, and international product and process standards; innovative enterprise structures, enterprise collaborations, networking and business practices are emerging within industry and in cross-border enterprise cooperation; and greater importance is attached to good public governance on the one hand and efficient corporate governance on the other hand. In this connection, importance is being placed on trust-based public-private partnerships for development including Corporate Social Responsibility arrangements (CSR); widespread liberalization of international trade, markets and capital flows, as well as deregulation and privatization, are enhancing the role of the private sector.

The intensity and pace of these multifaceted trends are increasing rapidly, posing formidable challenges to the Saudi industrial economy, especially after its entry to the WTO. Bilateral and regional trade agreements that the Kingdom plans to sign as part of the Gulf Cooperation Council (GCC), including the agreements being negotiated with the EU and Japan, will further increase competitive pressures. Saudi industry needs continuously to adapt to the new industrial realities in order to compete in the globalized industrial economy. This requires continuous improvement in the performance of Saudi industry in terms of accelerating manufacturing value added (MVA) in relation to GDP, expanding manufactured exports in relation to GDP and total exports, and deepening the technological content of MVA and of manufactured exports. It also requires investing in and continuously upgrading the industrial capabilities necessary to meet the new challenges in terms of skills, knowledge, technology, foreign direct investment and modern infrastructure, both digital and traditional.

The demands of the new situation

In these circumstances, industrialization strategies followed with considerable success in the past, especially in the East Asian Tiger economies, cannot be replicated in other countries. They relied on a top-down approach in which government agencies took the lead in picking winners and setting targets, often deliberately using market-distorting policies to favour selected sectors. They relied on competitiveness-building behind protectionist barriers. They often focused on economies of scale, creating large-scale “national champions” and designing the policy environment to favour these industrial giants without paying sufficient attention to the vital role that SMEs can play in building a dynamic industrial sector.

A contemporary competitiveness-building strategy requires a consensus-led, flexible set of evolving policies and strategies, adapted to changing circumstances. Successful adaptation requires a continuing dialogue between stakeholders within an institutional framework in which the results of dialogue can be played out. This needs to be informed by frequent evaluation of potential diversification opportunities, ways of pursuing them and assessments of their requirements. It calls for establishing an effective industrial governance system in which changing opportunities and needs are communicated to stakeholders, and responses are coordinated. This becomes a prerequisite for the design and implementation of appropriate policies. Continuous monitoring of the KSA’s performance in terms of both international and domestic benchmarks is of vital importance for policy flexibility. That is why the present report stresses the importance of the mediating role to be played by the Ministry of Commerce and Industry (MCI), at the hub of the KSA’s industrial nexus, in designing and implementing appropriate strategies, policies, programmes and packages.

Improved industrial performance

Saudi Arabia has achieved significant improvements in its position on the global map of industrial performance during the last 20 years, where it was among the world's winners in terms of improving its competitive industrial performance ranking, which rose by 18 places in the period 1980–2000. More recent data suggest that Saudi Arabia is well positioned in the UNIDO technology advance index, ranking 38 out of 99 countries, with the highest rank among regional comparators and above countries such as India and Indonesia among international comparators. However, the country's rank in the industrial advance index was lower and declining, confirming the need for accelerated diversification towards industrial development.

Despite a favourable level of MVA and manufactured exports per capita in the KSA, the degree of industrialization as measured by the share of MVA in GDP is low by regional and international standards, reflecting the dominance of the oil sector. Moreover, the favourable technological structure of MVA has yet to penetrate the export structure, as is evident from the small share of medium and high-tech (MHT) products in manufactured exports. Although the economy is going in the right direction, it is not moving fast enough in terms of research and innovation-induced products.

However, there is a fast-growing export base in dynamic groups of products such as organic chemicals, glass, pigments and paints, perfumery and cosmetics, and plastic products. Analysis of the KSA's manufactured exports structure as it now stands suggests that there are niche opportunities in several medium and low-technology product categories, which could foster the new course of industrial diversification.

Proactive diversification and strategic goals

Broad targets in terms of the growth and changing technological structure of MVA are set out in Industry 2020. The Saudi Arabia General Investment Authority (SAGIA) aims to position the country within the top ten best performers in the World Bank's "Doing Business" ranking of competitive business. In the light of past performance and current priorities, it seems reasonable for the KSA to aim to reach the top 30 countries in the league of industrial excellence over the next 14 years. The overarching goal is to accelerate the rate of growth of manufacturing value added and exports and to transform the structure of the sector towards medium and high-technology activities, with a target of 60 per cent for MVA and 30 per cent for manufactured exports by 2020. The goal implies that the Kingdom would need to improve all key industrial performance indicators, in particular MVA and manufactured exports per capita, the share of MVA in GDP, the share of manufacturing in total exports and the proportion of higher technology exports in total exports.

There are two major industry-sector scenarios to be considered. The first is to expand oil-related industries by building on existing resource endowments. The second, which is strongly favoured by this report in order to meet the goals and targets set for Industry 2020, is proactive diversification. This would involve diversification and technological upgrading based on in-depth assessments of the prospects for industrial growth and diversification, maximizing the benefits of regional integration, enhancing industrial capabilities, building industrial trade capacity, creating an enabling business environment, establishing a national and regional innovation system, promoting development of industrial clusters and integrating into global value chains.

Such a reorientation of economic strategy would also aim to generate new employment opportunities for the growing labour force and address the problem of unemployment, particularly among the younger generation of Saudi nationals. In the past, growth has been both too slow and too capital-intensive to absorb the rapidly growing number of new entrants into the labour force. Moreover, a proportion of the labour market is dependent on expatriates and migrant workers, partly reflecting an imbalance between the skills possessed by Saudi nationals and the skills that domestic private industry requires. Improving employment opportunities means not only creating jobs, but providing nationals with skills suitable for rewarding, high-value-added work and thereby correcting the imbalance in the Saudi labour market.

Industries promoted by existing public-private partnerships, particularly petrochemicals, have already reached high levels of competence based on technology and R&D resulting from comprehensive Government support. Strong private-public partnerships will enable private companies to lead future development. Therefore, the responsibility of the new generation of industries goes beyond achieving normal industrial growth and requires a combination of investment, utilization of natural resource wealth and the development of science and information technology, and rewarding entrepreneurship. This process needs to be inspired by a Government-led consensus and strategy.

Guiding principles and priorities of National Industrial Strategy – Industry 2020

The National Industrial Strategy – Industry 2020 – aims to achieve unprecedented growth in industrial value added and to position the Kingdom among the top 30 countries in the league of industrial excellence.

The Government has determined the following *parameters for the National Industrial Strategy:* The Strategy is a continuous process based on constructive dialogue between the public and private sectors; the Strategy should be flexible in order to ensure adequate industrial-sector response to the rapidly changing global realities; the Strategy should provide a framework for coordination of national policies and initiatives related to competitiveness, diversification and innovation of national industries; the Strategy should be nationally owned and driven by commitments from and partnerships with the major stakeholders; the Strategy implementation mechanism should be based on a modern system and tools of industrial governance; the Strategy should address intra-regional (GCC), national and particularly regional (within the KSA) levels of industrial innovative development and diversification. Following these major parameters, the following key strategic pillars were selected, based on extensive dialogue between national stakeholders and leading national and international experts:

- Enhancing domestic capacity building;
- Improving the business environment, especially for SMEs;
- Creating a national and regional industrial innovation system;
- Promoting cluster-based industrial development;
- Strengthening the system of industrial governance.

The combination of the selected strategies and a well-coordinated and managed implementation process will allow the Kingdom to achieve the ambitious development goals of Industry 2020.

Implementation of the Strategy will be at three major levels

At the *intra-regional (GCC) level*, the strategic initiative of the Kingdom will focus on enhancing cooperation between the member countries to strengthen intra-regional innovation platforms through the Regional Technology Foresight initiative. It will also initiate the development of a joint learning platform on cluster development for the sub-national regions (within the country) of the GCC member states.

At the *national level* implementation of the Strategy will focus on building domestic capabilities, improving the business environment, strengthening the National Innovation System and particularly the system of industrial governance.

Special attention will be given to *sub-national regions*, focusing on sustainable regional industrial development and growth through improving the local business environment, especially for SMEs, and promoting cluster-based development and regional industrial innovation systems to ensure vertical and horizontal diversification processes. The implementation of regional industrial development strategies will be organized on a pilot basis in five selected regions: Riyadh, Jeddah, Eastern Province, Gassim and Hail. Final selection of the regions, however, will be decided by the Government in the course of strategy implementation.

A major precondition of the successful implementation of Industry 2020 is establishing an effective system of industrial governance. Some elements of the system, such as the National Steering Committee for Industrial Strategy composed of national public and private stakeholders and the Office for National Industrial Strategy in the MCI, have been established in the course of the formulation of the National Industrial Strategy.

Strategies to enhance domestic capacity building

Five key drivers are instrumental in explaining the observed divergence in industrialization experience among developing regions of the world. These are:

- *Skills (human capital);*
- *Technological effort (R&D);*
- *Inward FDI;*
- *Royalty and technical payments abroad;*
- *Modern infrastructure, especially ICT.*

The KSA is in a generally unfavourable position compared with comparator countries in terms of skills, technology transfer and FDI inflows to non-oil activities. In contrast, it is relatively well positioned with regard to imports of capital goods as a source of technology transfer and modern digital and physical infrastructure, thanks to its record of large-scale investment in infrastructure. A comprehensive Government-inspired programme to build on existing strengths and address deficiencies is needed. The skills issue is perhaps the most important of all.

Skills for industrial development

Priority for the development of skills associated with specific industrial needs. This includes all stages of education and training and R&D. An assessment of skills needed by the industrial sector, both currently and in line with future perspectives for industrial diversification and competitiveness based on the National Industrial Strategy, is urgently required.

Strategies for enhancing human resources for accelerated industrial development will focus on the following objectives: raising the standards of technical and scientific education; enhancing managerial competence and the innovative capabilities of existing firms through industrial learning by producing for competitive markets; encouraging the expansion of technology-based skills needed by SMEs; developing a National Innovation System to support technological learning, innovation and the exchange of technological knowledge between R&D centres and private firms; providing support for firms to establish strategic alliances and networking with international technology leaders such as domestic technology centres, especially KSA universities, licensing providers, and the use of domestic and foreign consulting services.

A special priority area for human resource development is the need to enhance ICT skills for wider application in competitive industrial development in certain key areas: enhancing access to knowledge, technology, innovation and learning; introducing new management and organizational systems for improved industrial efficiency and productivity; and improving access to markets, distribution channels and global value chains.

To achieve these goals, the Government should also aim to broaden access to ICT facilities, particularly personal computers and the internet, from the current low levels. There is great potential to increase the use of ICT in schools.

Technological effort and trade capacity building

Technological efforts depend on the share of industrial R&D spending in GDP and the level of R&D by productive enterprises. The effectiveness of technological efforts can be measured from their outcome in accordance with international standards.

Patent applications (filed nationally) indicate a comparatively modest performance for the KSA both regionally and internationally. ISO certification covering ISO 9000 and ISO 14000 – an indication of increasing conformity to international quality and product-safety standards – showed a significant improvement from 2001 to 2005 and compares quite favourably with regional comparators. The position of the KSA in the Innovation and Technological Capabilities Index indicates an advantageous position vis-à-vis regional comparators.

In order to convert comparative advantages into competitiveness, a major endeavour is needed to enhance industrial trade capacity building. This requires building industrial capabilities, removing supply-side constraints for increasing industrial exports and establishing the required infrastructure and facilities to meet global norms for product and process standards. In this regard, the WTO agreements on technical barriers to trade (TBT) and on sanitary and phyto-sanitary measures (SPS) play a critical role in international trade and require trade capacity building measures for competing successfully in international trade for industrial products

FDI and technology transfer

The KSA has the highest stock of foreign direct investment (FDI) in the Middle East and North Africa (MENA) region, but it is primarily directed to the energy sector. In comparison, very little FDI is attracted by export-oriented projects in the non-oil sector. Effective integration into global manufacturing value chains is yet to be realized, depriving the country of one of the most important drivers of successful industrial performance in the developing world. However, innovating firms will be ready to license their technology to the KSA in view of a strong intellectual property rights (IPR) regime. There is a need to enhance the KSA's capacity to absorb technology. Effective transfer of technology entails enhanced industrial capabilities to acquire, assimilate, adopt, adapt, learn and innovate.

It is also important to channel FDI into non-energy sectors and, probably, to take steps to increase KSA imports of non-energy related technologies, partly by improving institutional support for such aspirations for innovation based on technology transfer.

Modern infrastructure

The *physical infrastructure* base in the KSA compares favourably with regional comparators and represents a strong base for future industrialization initiatives. However, further development of industrial cities with modern infrastructure, gas and electricity networks will be important in fostering private-sector-led industrial growth.

In terms of the *digital infrastructure*, figures indicate that the KSA has a competitive edge vis-à-vis regional competitors pertaining to the number of telephone landlines, mobile telephones and the availability of personal computers. In relation to international comparators, the KSA also compares relatively well. But the ICT expenditure to GDP ratio compares unfavourably, which is also reflected in data on internet users, broadband subscribers and international internet bandwidth. Roughly one in five of the world's population now uses the internet, whereas Saudi Arabia is lagging behind with less than 7 per cent. In contrast, the KSA compares favourably with regard to secure internet servers both regionally and internationally.

Strategy for improving the business environment

The general objective is to bring the Saudi economy into line with current practice in OECD countries as regards domestic competition and the role of the public sector, subject to exceptions that relate to cultural and religious practices. The main issue is the efficiency and speed with which these objectives can be realized. That depends mostly on the ability of the leadership to carry through a transformation in the attitudes, motivations and mores of the various public sector organizations involved. As measured by World Bank's "Doing Business" survey, by comparison both with OECD averages and with most international comparators the KSA does reasonably well on dealing with licences, hiring and firing workers, registering property, getting credit, protecting investors and paying taxes.

Other strengths that the Kingdom can build on in terms of the business environment include: a positive macroeconomic outlook, with improving macroeconomic management; a Government that ensures continuity of policy; a low tax level; WTO entry and ongoing trade liberalization; and a relatively good physical and, to a lesser extent, ICT infrastructure. In addition to a relatively affluent domestic market, the KSA has an excellent geo-strategic location for trade with the rest of the Arab world

From World Bank and other sources it emerges that the KSA needs to improve the business environment in the following areas: starting a business; trading across borders; enforcing contracts; closing a business; the business environment for SMEs, especially in terms of access to industrial cities, business training and technological information; trade administration; industrial cities with sufficiently developed infrastructure; partnership between the Government and the private sector in the process of formulating policies and monitoring performance; ICT infrastructure to match the stated objectives of the Government; and macroeconomic data, where only a limited range of indicators are made public, making it more difficult for firms to assess the performance of the macroeconomy in order to plan their business strategies.

The strategies recommended for improving the business environment for enhanced industrial performance comprise the following.

Trade policy and administration, including industrial trade capacity building. The trade administration system should be modernized, streamlined and made transparent, to facilitate imports and exports, by cutting down unnecessary delays in customs etc; tariff reform should continue in line with WTO commitments; and the infrastructure and facilities to meet global norms for product and process standards need to be established. In this regard, the WTO agreements on technical barriers to trade (TBT) play a critical role in international trade and require industrial trade capacity building.

Ease of doing business. Regulations for starting and closing businesses need to be simplified and made transparent to bring the KSA into line with competitor nations. Other regulations pertaining to the operation of businesses could be modernized along the lines already identified within the KSA; business law relating to investment and the resolution of business disputes should also be streamlined and explicitly codified; and the ICT infrastructure needs to be upgraded and more e-governance introduced into the regulation and administration of business to further facilitate and improve the business environment. The Government has recently taken some positive steps by allocating a sum of some SR3bn (US$0.8bn) to introduce e-governance over the next few years; an Observatory for measuring the attractiveness of the national and regional business environment

for industrial investment should be set up, under the aegis of the MCI. This would measure the ability to attract industrial investment through global benchmarking. A project to facilitate the use of mineral resources and mining should be set up in order to enhance the formation of new industrial clusters. An industrial legislation package to review all laws relating to industry should be designed along with the activation of new industrial legislation in the areas of intellectual property, antitrust, competition and liberalization of the labour market; infrastructure should be further developed; and the network of industrial cities extended into different regions of the country.

Access to business information, services and collective learning. Public provision of business information and services should be improved; a strong public-private partnership would help in the identification of problems as they arise and in the expeditious working out of solutions; data collection and publication should be improved in line with international standards; and the capabilities and networking of providers of business development and sector-specific services should be strengthened.

SME development. Access to finance for SMEs should be improved by building on the steps already in place; a single authority for SME development should be set up; greater dialogue should take place within and between public agencies and SME institutions and associations; business and technical advice to SMEs should be improved; business partnerships between universities, large companies and SMEs should be set up to enhance horizontal and vertical linkages; programmes to support SME cluster development in the regions should be established; and innovative entrepreneurship training programmes should be promoted.

The initiative "10 by 10", led by SAGIA, has already addressed many of the above-mentioned issues and an implementation process is underway in close cooperation with the MCI and other relevant public and private-sector institutions to set up a competitive business environment at the highest international standards.

Strategies to promote national and regional (sub-national) innovation

National Innovation System

National and Regional Innovation Systems comprise the whole complex of public and privately owned physical infrastructure, institutions and systems that support and develop productive-sector innovation at the national or sub-national level. Innovation and technology development stem from a complex set of relationships among actors in the system, where knowledge and skills constitute factors of production, and the players include universities, research institutions, and enterprises. For policy and decision-makers, understanding of the National Innovation System can help identify leverage points for enhancing the innovative performance of firms, and the competitiveness of products.

There is great potential to enhance the scope and increase the effectiveness of the KSA's current innovation system. The role of the MCI in all matters related to industrial R&D and innovation should be defined. Stakeholders involved in fostering industrial development (SAGIA, the MCI, the Ministry of Petroleum and Mineral Resources, etc.) will need to reach consensus on the sectors that could potentially be promoted. The MCI should take the lead and build consensus on a specific vision for those sub-sectors. Importantly, the technical and economic feasibility of large projects should be ensured before they are approved for implementation. Any industrial strategy should specify criteria for screening viable projects.

The main institutional structure for science and technology policy in the KSA should be revamped as follows:

- **An Industrial Innovation Commission** should be set up within the Industrial Competitiveness and Diversification Board, to be coordinated by the MCI, with the task of coordinating the activities of all agencies involved in industrial innovation;

- **An Industrial Research Network and Consulting Centre**, operating as a "laboratory without walls", should generate and transfer industrial technology and network with international institutions and firms in order to enhance innovation capabilities;

- **Industrial Innovation financial mechanisms** should be provided for in the Industry 2020 Fund to support enterprise innovation and R&D;

- **An Industrial Innovation Branch** should be created within the Industrial Development Agency, affiliated to the MCI, to disseminate knowledge through seminars and workshops and other means of communicating with the broader community.

Strategic tasks for the National Innovation System include: facilitating knowledge dissemination and industry/university/institution linkages; promoting state-societal arrangements that promote international competitiveness, with public institutional arrangements to facilitate the upgrading of skills in cooperation with the private sector; encouraging multi-stakeholder partnerships; promoting venture capital; developing internal linkages and networking; establishing and managing regional industrial development agencies in the newly created Economic Zones; and increasing positive spillovers to local companies from foreign companies.

Increasing the supply of technically trained human resources

Long-term initiatives: The educational system will need to be continually restructured to provide a growing pool of skilled workers and technicians, as well as a rapid expansion of engineering, business and computer education at tertiary level. More university graduates should be trained in engineering and technical areas. Incentives may be offered to world-renowned universities and institutions, to encourage them to establish campuses in the Kingdom, offering courses that contribute to the strengthening of the national and regional industrial innovation systems. The KSA needs to formulate a long-term vision to create a strong skills base capable of supporting the country's industrial innovation system, which in turn is likely to contribute significantly to the process of industrial diversification.

Short-term initiatives: A graduate re-skilling programme should offer crash knowledge and skills-enhancement programmes for unemployed graduates. The KSA will have to acquire foreign technological capability and innovation capacities. The Government will need to put in place a whole host of essential support systems and instruments to foster some adaptive R&D, to adapt imported technology to local conditions.

Regional (sub-national) Innovation Systems

Regional Innovation Systems (RIS) acknowledge the important role of institutions and coordination mechanisms for knowledge creation and commercialization. Governance of regional innovation systems is usually based on a public-private coordinating body with policy responsibility and resources to facilitate system coherence by providing services and other mechanisms that facilitate interlinkages between various regional stakeholders.

Innovative firms and their clusters operate in regional networks. They cooperate and interact with suppliers, clients and competitors, and with research and technology resource organizations, innovation support agencies, venture capital funds, and local and regional government bodies.

Successful clusters in dynamic industrial locations seem to work well within well-established institutional contexts, which are formed by local institutions of education, training, research and the diffusion of technology. The capabilities of firms are strongly affected by local externalities. The policy approach should therefore favour convergence of factors that make the local environment conducive to facilitating networking both at local and transnational levels, with appropriate policy and institutional support to encourage the emergence of clus-

ters as a way of maximising spillovers and learning effects and maintaining an evolving consensus on goals and progress towards them.

The RIS stakeholders can be divided in three main groups: *The knowledge generation sub-system* – university leaders, research institutes (non-university) and other knowledge institutions; the *intermediaries between knowledge generation and knowledge commercialization* (or exploitation) – knowledge transfer experts, innovation lawyers (patents), investors (venture capital) and business services representatives, local politicians, etc; and the *knowledge commercialization* (or exploitation) sub-system – firms, both large and SME, possibly a foreign firm representative.

The KSA can strive to form a Regional Industrial Innovative Policy Platform (RIIPP), to move towards a more entrepreneurial, especially "knowledge entrepreneurial", open innovation system by creating attractive locations as unique places to work and live.

Strategies for cluster–based industrial development

The cluster–based industrial development strategy aims to contribute to the *diversification of the economy* away from its current focus on natural resource-related activities. The weak presence of clusters in the KSA economy is the result of the underlying weaknesses that exist in the business environment of the country. The cluster development strategy can contribute to the general business environment upgrading. This in turn will be able to seed clusters and to speed up their evolution, as these upgrading efforts will gradually remove the barriers to cluster development.

The strategy actively supports existing and new emerging clusters. Mobilizing and strengthening the potential of *existing clusters* that have not yet reached their full potential has the best likelihood of success because it can lead to a strengthening of existing industrial specialization. To achieve diversification it is also crucial to identify industrial areas where new clusters can emerge. Those areas could be ones that require similar technologies and skills, and therefore rely on the potential of existing absorptive capacity. This should serve to further KSA capability for knowledge creation, absorption and diffusion.

The co-existence of many regional clusters, both within and among countries, with various knowledge bases and different relationships with the regional (sub-national) innovation system will require more developed regional governance structures. This would imply the need for planned and systematic coordination between industry and knowledge-creating and diffusing organisations, which may imply a platform approach.

In order to stimulate diversification and thus the creation of dynamic comparative advantages collaborative, initiatives are called for. These can be pursued through the platform approach, which assumes using: *Industry platforms*: exploring related variety of industries; *Stakeholders' platforms*: pursuing planned and systemic co-operation and interaction between universities, industries and Government; and *Policy platforms*: targeting economic institutions, skills and infrastructure.

Some of the cluster and regional innovation system development will deliver results that will become visible quite rapidly while others will take longer. The availability of better information on the composition of economic activities in the different regions of the country, the more effective identification of existing business environment weaknesses and improvements in the efficiency of existing economic policy instruments, will be visible quite rapidly. Clusters serving local markets could become significant within a few years, while development of clusters with export potential unrelated to oil and gas will take longer.

To overcome the current constraints, industrial strategies and policies for promoting cluster-based industrial development would need to focus on five main avenues.

The first is the ***creation of a sound factual and knowledge base to guide cluster-based polices.*** The following areas are particularly important: mapping of existing clusters; evaluation of regional business environments; creation of an observatory to monitor competitiveness and cluster development over time; financial and technical support for cluster initiative administration.

The second avenue is ***defining a cluster development action agenda*** to set realistic objectives focusing on the following sectors: oil and gas clusters; emerging export-oriented clusters with an existing base (including oil-related sectors such as plastics, as well as transportation & logistics); clusters serving the domestic market (retail, finance, construction, health, agro-related, services etc); other emerging/potential clusters.

The third avenue involves ***benefiting from improving existing economic policy and programmes*** through a cluster focus. Four areas in particular have significant potential: foreign direct investment attraction; branding of clusters as industrial platforms, such as economic/industrial cities, valleys/industrial zones/technology zones; skills upgrading; SME support in terms of finance and technical assistance.

The fourth avenue is ***the creation of a business environment that is more supportive to cluster development.*** The following policy areas are particularly important: infrastructure and logistics capabilities; competition law; business regulations; financial market; and trade policy.

Finally, the fifth key avenue is the formulation of ***regional industrial development strategies*** to support regional diversification and build regional comparative advantages.

Implementation of the National Industrial Strategy

The implementation of Industry 2020 will require the commitment, efforts and contributions of the Government, the private sector and support institutions at national and regional level: the *Government* will have the overall responsibility to manage the implementation of the strategy and of the platform of policies and programmes; the *private sector* and the investment community will be directly involved in the development and formation of industrial clusters in the regions of the Kingdom; and the *institutions of the national and regional innovation systems* will be responsible for providing a range of services to firms and clusters, including (for example) training programmes, technology development, financing, and global links.

The **Ministry of Commerce and Industry (MCI)** will be the focal organization of the governance system responsible for the implementation of the National Industrial Strategy for Industry 2020. Its mission will be to promote and support the process of collaboration, based on consensus. The *MCI's role* will be:

- To promote Industry 2020 and to support collaborations and partnerships between the Government, the private sector and the institutions of the national and regional innovation systems for its implementation;

- To formulate and propose measures and policies to improve the framework conditions: industrial capabilities; business environment and private sector development; and to promote and support the process of development of competitive and innovative industrial clusters and of national and regional innovation systems;

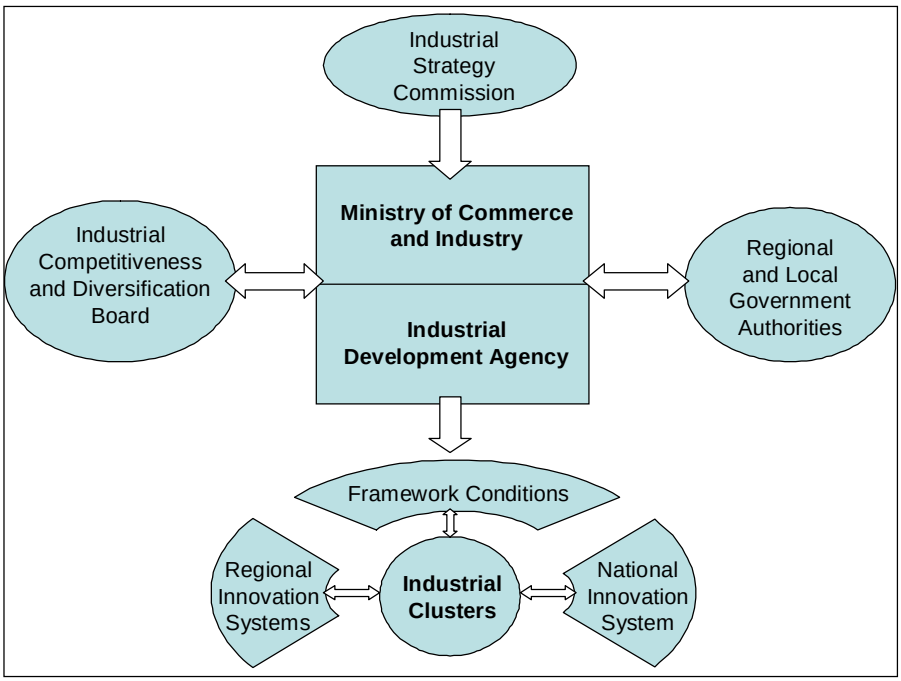
- To monitor and evaluate the overall implementation process of the industrial strategy and the platform of policies and programmes;

- To establish an *Industry 2020 Fund* to contribute to the financing of the programmes supporting the industrial strategy, and in particular to collaborative projects between the Government, the private sector and support institutions.

At the apex of the governance of the Industry 2020 will be the *Industrial Strategy Commission*. It will include core economic Ministries and other important Government agencies and institutions and be chaired by the Minister of Commerce and Industry. Its role will be: to monitor and decide measures to improve industry's contribution to the overall economic development of the KSA; to decide on policies and programmes; to decide on implementation of strategy; to decide on the Industry 2020 Fund; and to evaluate the implementation of Industry 2020.

Regional and local government authorities will collaborate with the private sector and support institutions for regional industrial development strategies. They will cooperate with the MCI and the Industrial Development Agency in the development of regional clusters and innovation systems.

Organization of the Governance System



Source: UNIDO.

The *Industrial Competitiveness and Diversification Board (ICDB)* will be co-chaired by the Minister of Commerce and Industry and a representative of the private sector. Its role will be:

- To identify and develop consensus between the private sector and the Government;
- To recommend measures to enhance industrial competitiveness, speed up the diversification process and support the development of industrial clusters;
- To advise on and recommend revisions to policies and programmes;
- To organize systems of consultations; and
- To contribute to regular reports on industrial performance and capabilities.

The Industrial Policy Office, which managed the formulation of Industry 2020, will be strengthened and become the **Industrial Development Agency**, with particular responsibility for implementing the Regional Industrial Cluster Development Programme and programmes to support the development of national and regional innovation systems and monitoring implementation of the Strategy. It will also cooperate with

innovation systems and monitoring implementation of the Strategy. It will also cooperate with agencies responsible for clusters and national innovation systems.

Process of implementation

The progressive implementation of Industry 2020 will include the following.

A *national campaign* will be organized by the MCI to promote and explain the strategic vision and goals, Industry 2020 and the platform of policies and programmes. It will aim at building awareness among the private sector, support institutions and regional governments and at encouraging their participation in the implementation process.

Then the MCI, in conjunction with the Industrial Development Agency, will start to *implement the programmes to develop the national and regional innovation systems* and will introduce the Industrial Cluster Development Programme in three or four regions. The Industrial Strategy Commission, on the basis of the presence of competitive regional industrial clusters and a good industrial capabilities base, will select the first group of regions. The Industrial Development Agency will help regional governments to formulate and implement a collaborative strategy with the private sector and support institutions for the development of a regional innovation system and of competitive and innovative industrial clusters.

The results will be assessed and the lessons learned used for improving implementation of the programme in other regions**.** After one year, the implementation of the Industry 2020 Industrial Strategy and the platform of policies and programmes will be evaluated and the lessons learned used for the overall improvement and development of the Industry 2020 Industrial Strategy and the platform of policies and programmes.

Industry 2020 – Agenda for Action

Given the paramount importance of industrial diversification and the dynamics of global development, the Strategy proposes a programmatic framework to guide and drive the strategy implementation process. To this end, five clearly defined programmes, each containing a number of project concepts, are coined with a view to highlighting the expected outcome of respective project activities and budgetary guesstimates. The ideas contained in the programme and project concepts are subject to a thorough review by Saudi authorities and industrial stakeholders in the course of Strategy implementation. The duly approved project concepts will be developed into fully fledged project documents for implementing a three-year fast-track programme. Based on the lessons learned from the implementation of the fast-track programme, substantive industrial sector inputs will be prepared for the Five Year Plan starting in 2010. The programmes will be financed by the Industry 2020 Fund and managed by the Industrial Development Agency under the supervision of the MCI and with guidance from the Industrial Strategy Commission and the Industrial Competitiveness and Diversification Board, with a unique blend of vision and action as embodied in the Programmatic Framework for Industry 2020 in Chapter 11 of the present report.

Overview

Part A: Industry in the Kingdom of Saudi Arabia in the new global industrial setting

A vision for industrial development in the Kingdom of Saudi Arabia

The challenge for the Kingdom of Saudi Arabia (KSA) is to shift the economic basis of prosperity away from excessive reliance on natural resource endowments to mastery over knowledge-based technologies over the next 10–15 years. This challenge was recognized in "Vision 2020", an expression for a comprehensive set of strategies for diversifying and modernizing industries in the KSA to the year 2020. The strategies emerged as a broad consensus at a Symposium held in October 2002, organized by the Saudi Ministry of Economy and Planning in collaboration with other Ministries and Public Authorities.

An industrial development strategy needs to address the specific situation of each country and the KSA is unique on account of its history, culture and resource endowments. The initial conditions of each country and the increasingly rapid evolution of global economic challenges require – indeed demand – country-specific strategies for optimal industrial development conducive to achieving rapid economic growth. The KSA has already made some progress in diversifying its economy and stimulating industrial development. But at this crucial juncture – now that the Kingdom has achieved WTO entry and is stepping up its efforts to integrate into the increasingly globalized world industrial economy – it is imperative to build a new framework for the future.

Key development goals

The KSA's key development goals can be specified as follows:

- To ensure stable and high growth rates and achieve balanced growth and prosperity for different regions;
- To diversify the economies in the regions of the Kingdom;
- To involve the private sector in economic and social development;
- To strengthen the economy's capacity to respond to domestic and international changes in a flexible and effective manner;
- To reduce reliance on the extraction and export of oil and to maximize the value added of natural resources;
- To diversify the sources of national income through the expansion of other productive sectors such as industry and services;
- To improve employment opportunities for Saudi nationals and reduce the private sector's dependence on expatriate labour;
- To expand investment in infrastructure;

- To integrate Saudi industry into the global industrial market following the KSA's entry to the WTO at the end of 2005;
- To keep up with scientific and technological developments and promote scientific research and development, innovation, education and training and the dissemination of knowledge and technology;
- To increase private and public investment in research and development, building on the proud history of science in the Islamic world;
- To create a talented, entrepreneurial industrial community capable of facing challenges and seizing opportunities;
- To preserve the environment against pollution and ensure the optimal use of natural resources so as to guarantee prosperity for future generations;
- To achieve regional economic integration with the Gulf Cooperation Council (GCC) member states as well as with the region and the world in general.

Manufacturing as the main engine of growth

An underlying premise of Vision 2020 is that manufacturing is critical. It is the main engine for deploying new technologies and raising innovation. It is crucial to enhancing exports and moving them from low-value-added products to higher value, skill and technology-intensive products that grow faster in world markets and can sustain faster income growth. Manufacturing is also vital to create new skills and induce growth and technological change in other sectors. Moreover, manufacturing in general is a more attractive source of economic growth than the financial sector, because the latter is far less labour-intensive.

Global experience highlights that industrial development requires collaborative efforts, involving both the private and public sectors, to bring about a significant industrial leap in a short period of time as a base for sustainable economic development. Moreover, given the KSA's high rate of population growth, maintaining growth in per capita income requires drastic increases in investment in high-growth industries. Furthermore, it entails targeting a major change in the structure of industrial value added, in the direction of industries with higher technological content.

Diversification and competitiveness in the new global industrial setting

A number of oil economies have been using oil revenues to diversify, focusing on the development of export-based manufacturing and related services with attendant benefits for competitiveness and employment. The new international environment poses new challenges for industrialization strategies.

Fluctuating oil prices and volatile economic performance

Between 1975 and 2005, real GDP in the KSA grew by 2.7 per cent a year. With population growth of 3.9 per cent a year, real GDP per capita therefore declined by an average of 1.2 per cent a year. The KSA's reliance on oil means growth and living standards are vulnerable to unpredictable external factors outside the domain of national economic policy. In years of decline in oil prices, non-oil growth has not been strong enough to prevent the economy from experiencing negative growth rates. Moreover, in the years where growth in the oil sector was negligible, GDP was almost stagnant despite the fact that the non-oil sector experienced some growth.

Thanks to robust oil prices in 2000–2005, overall GDP grew by an average of 4.2 per cent per year, and per capita GDP recorded annual growth of 1.7 per cent. However, the economy's recent performance would have been considerably weaker without the global economic developments that pushed oil revenues to record nominal highs.

Need for new growth strategy from non-oil sector to maximize value added from oil wealth

The main development dilemma facing the KSA is how to conceive a new growth strategy that is sustainable under the dominance of oil. In this new growth strategy, oil revenues are expected to remain an important contributor to the economy, but will be used to stimulate sustainable growth in other productive sectors that maximize the added value from the oil wealth. Investment in human capital will be key. The challenges facing the KSA economy now, in the age of WTO membership, are very different from those encountered in the past. A proactive strategy for industrial diversification and competitiveness is therefore needed.

New employment opportunities must be generated

Such a reorientation of economic strategy would also aim to generate new employment opportunities for the growing labour force and address the problem of unemployment, particularly among the younger generation of Saudi nationals. In the past, growth has been both too slow and too capital-intensive to absorb the rapidly growing number of new entrants into the labour force. Moreover, a proportion of the labour market is dependent on expatriates and migrant workers, partly reflecting an imbalance between the skills possessed by Saudi nationals and the skills that domestic private industry requires. Improving employment opportunities means not only creating jobs, but providing nationals with skills suitable for rewarding, high-value-added work.

However, human capital and technological infrastructure are areas needing attention, and levels of research and development (R&D) spending are low by world standards. Oil revenue could potentially be used to help address these weaknesses through new investment. Moreover, the abundance of oil and gas also offers Saudi industry a comparative advantage in terms of the availability of energy, which can be further exploited by harnessing more of the Kingdom's natural gas reserves and improving electricity output and distribution.

Integrating the KSA economy into global value chains

Oil revenue can play an enhanced role in developing the non-oil economy to foster the KSA's integration into the international industrial economy and the international knowledge system. This requires integrating domestic industry into global value chains, creating competitive and dynamic clusters, and generating synergies between the non-oil sector, research and development institutions, and the National Innovation System (NIS), for the development of private-sector, small and medium-scale industry.

Industry as a main vehicle for achieving sustainable economic growth

The industrial sector – including mining, downstream oil-processing activities and industry-related services – should emerge as the key sector for sustaining high growth thanks to its dynamic interrelations with new technologies, innovation and knowledge, which are now the key drivers of global economic growth. Indeed, international experience shows that industry-related services represent one of the most dynamic growth sectors of most economies. In addition, the industrial sector enjoys various forward and backward linkages with other economic sectors, which are critical for overall economic growth. These include mineral processing, basic metals, agriculture and agro-processing, infrastructure, tourism and other related economic activities.

Implications of the new international setting for Saudi industry

- Industry is becoming more internationalized.
- Building industrial capabilities is becoming the key driver for achieving competitiveness.
- Sustained productivity growth represents the main source of industrial growth and competitiveness.
- Technological innovation and upgrading are becoming increasingly important.
- The distinction between industry and services is becoming blurred.
- Stricter global norms require compliance in the field of environment (Montreal and Kyoto Protocols), intellectual property rights and international product and process standards, including the WTO agreements on technical barriers to trade (TBT) and on sanitary and phyto-sanitary measures (SPS).
- Innovative enterprise structures, enterprise collaboration, networking and business practices are emerging within industry and in cross-border enterprise cooperation.
- Greater importance is being attached to good public governance on the one hand and efficient corporate governance on the other hand. In this connection, importance is being placed on trust-based public-private partnerships for development.
- Widespread liberalization of international trade, markets and capital flows, as well as deregulation and privatization, are enhancing the role of the private sector.

Saudi Arabia on the global map of industrial performance

The internal and external challenges facing industrial growth in Saudi Arabia are increasing rapidly and while important steps towards industrialization have been undertaken in the past, they have not yet managed to meet their full objectives.

Improved industrial performance

Saudi Arabia has achieved significant improvements in its position on the global map of industrial performance during the last 20 years, where it was among the world's winners in terms of improving its competitive industrial performance rank, which rose by 18 places in the period 1980–2000. More recent data (UNIDO 2005c) suggest that Saudi Arabia is well positioned in the UNIDO technology advance index, ranking 38 out of 99 countries, with the highest rank among regional comparators and above countries such as India and Indonesia among international comparators. However, the country's rank in the industrial advance index was lower and declining, confirming the need for accelerated diversification towards industrial development.

Despite a favourable level of MVA and manufactured exports per capita in the KSA, the degree of industrialization as measured by the share of MVA in GDP is low by regional and international standards, reflecting the dominance of the oil sector. Moreover, the favourable technological structure in MVA has yet to penetrate the export structure, as is evident from the small share of medium and high-tech (MHT) products in manufactured exports. Although the economy is going in the right direction, it is moving neither far nor fast enough.

Product and market diversification

The considerable technological upgrading in terms of MVA has not yet permeated export performance and exports remain dominated by oil and oil-related products, although there is a small but rapidly growing export base of other dynamic groups, especially other organic chemicals, glass, pigments and paints, perfumery and cosmetics, and plastic products. Although the Kingdom's market share is still small, there are signs of increasing export competitiveness in the medium and low-tech and resource-based sub-groups.

The KSA is dependent on three main export markets: the United States of America, Japan and the Republic of Korea, which accounted for nearly 42 per cent of exports in 2003. However, the KSA is gaining ground in other Asian and some European markets, which reduces its vulnerability to a downturn in any one economy. Moreover, the Asian countries in question are growing more rapidly than the USA.

Manufacturing employment, wages and labour productivity

Manufacturing's share of total employment in the KSA is the lowest among its comparators and the average wage is high. Overall labour productivity fell in 1980–2001 and KSA competitiveness has declined significantly, which is a serious drawback both for non-oil export performance and attracting investment. The issue needs to be addressed urgently. Labour productivity in manufacturing has also declined in absolute terms, leading to concerns about the skills base.

Main constraints on industrial competitiveness and diversification

Previous industrialization efforts, which focused on the development of heavy industry because of the Kingdom's abundant cheap energy sources, have not met their goals. This has created structural problems and failed to address the issue of unemployment. The focus on capital-intensive, heavy industries has meant that the industrial sector has been unable to absorb the increasing numbers of Saudi entrants to the labour force.

The current industrial structure and performance in the KSA face the following constraints to industrial diversification and competitiveness.

- Relative weakness of the industrial base.
- Relatively low capacity of the manufacturing sector to create value added.
- A high technological gap, preventing industries from moving into higher-valued-added activities.
- Dominance of basic industries.
- Lack of technological capacity.
- The KSA is at the periphery of integration into global value chains (GVCs) and international production networks.
- Relatively high wages and falling labour productivity.
- As a high wage, capital and energy-intensive economy, suitable market niches need to be found.

Opportunities and action

Although the challenges, both internal and external, to industrial growth are multiplying, the opportunities are also increasing. The private sector's industrial experience, accumulated both within the Kingdom and through large industrial investments in developed and newly industrializing countries, in addition to the considerable efforts being made to formulate an industrial vision and accompanying political support, are all critical elements for creating a new, sustained growth path based on raising industrial competitiveness and diversification.

This implies a leap forward towards 2020 for Saudi society and the national economy to improve public and private efforts to operate in harmony, and the development of a National Industrial Strategy that represents the core of the overall national vision towards sustainable development. This emerges from action plans that intersect with other industrial strategies for improving the diversification and competitiveness of the Kingdom.

Part B: Industry 2020: Industrial strategies for diversification and competitiveness

Principles and mechanism for industrial strategies

How to achieve the objective of industrial development

Long-term industrial development can be achieved by positioning the Kingdom as a:

- Manufacturing and exporting centre for key industries;
- Distinguished technological centre;
- Global hub for investment with a central position in the Arab world within global value chains.

In order to achieve this, the Government will need to establish a strong partnership with the private sector to accelerate industrial growth, manage natural and human resources, absorb the growing demand for jobs, reach a high technological level and achieve balanced regional industrial development. It must adopt an industrial strategy as part of a national strategy for economic and social development and ensure that state institutions have integrated action plans.

This will require creating an enabling environment for private-sector industrial development and establishing partnerships between the public and private sectors. There are three possible levels of partnership – minimum, deep and strategic. Whichever is chosen, Government assistance should be limited to helping industries start up and develop in their early stages, rather than long-term support through subsidies, which would be a burden on fiscal policy.

Once the roles of the partners and key stakeholders are identified, the targeted industries must be decided. Several scenarios could be used in the process of industrial targeting. These include: targeting industries based on natural resources and the value-added chain; targeting a range of industries that have potential in the dynamic global market; targeting industries with a high technological and skill content; and building industrial clusters for integration into the international production process. The latter scenario aims at achieving a distinguished industrial position with a strong knowledge base.

Mechanisms of industrial strategy

The National Industrial Strategy (NIS) includes the following components: vision; message; path; strategic goals; strategic tasks; implementation mechanisms; and strategic leadership.

Strategic goals

- To promote industries based on the comparative advantages of the Kingdom.
- To reorient industrial development towards products with high-value-added content.

- To reorient the industrial structure towards industries with high technological content.
- To develop human resources through skills upgrading in the education and training system to meet the needs of industry for competing in a globalized industrial economy.
- To improve the business environment for industrial competitiveness covering regulations, procedures and policies.
- To build a strong, national innovation system for technological upgrading.
- To adopt industrial clusters as a new source of industrial growth opportunities, benefiting from economies of agglomeration.
- To support and promote small and medium-sized industrial enterprises.
- To develop and provide the required physical and ICT infrastructure.
- To build trade capacity for enhancing the industrial competitiveness of domestic products in terms of international product specifications and standards.
- To build and support balanced regional industrial development.
- To strengthen regional and global industrial linkages and networking.

Strategic tasks

To enable the successful implementation of the industrial strategy, there are a number of tasks that must be fulfilled. These include: establishing a globally competitive business environment; facilitating the transfer of improvements in the business environment to all types and sizes of companies; stimulating the participation of all segments of society to share the benefits of industrial growth; diversifying towards medium and high-tech as well as R&D-intensive activities; and mobilizing different geographic levels to achieve higher competitiveness and diversification.

Strategic scenarios

The National Industrial Strategy – Industry 2020 – aims to achieve unprecedented growth rates in industrial value added through partnerships between the Government and the private sector. The Government would be responsible for creating an encouraging environment for investment, production and global transactions that matches the most competitive environments existing worldwide, whereas the private sector's responsibility would be to make effective use of every opportunity for building a diversified and globally competitive industrial base.

Strategic industrial diagnosis and preliminary sectoral analysis of Saudi industry show that:

- The bulk of manufacturing activities are in the resource-based group, such as refined petroleum products, iron and steel scrap, cement, glass and mineral manufactures;
- Several low-tech groups seem open to regional competition, such as further-processed iron and steel products, paper and paper board, furniture, office supplies, etc;

- Medium-tech groups could constitute a target market in such areas as petrochemicals, synthetic fibres, cosmetics, fertilizers, plastic materials and high-end iron and steel products;

- Modest exports in medium-tech, non-petrochemical products may support diversification.

A choice of two scenarios

In this context, there are two major industry sector scenarios to be considered. The first is to expand oil-related industries by building on existing resource endowments. The second, which is strongly favoured by this study in order to meet the goals and targets set for Industry 2020, is proactive diversification. This would involve diversification and technological upgrading based on in-depth sectoral assessments of prospects, maximizing the benefits of regional integration, building industrial capabilities, creating an enabling business environment, establishing a national and regional innovation system, promoting development of industrial clusters and integrating into global value chains.

Industries promoted by existing public-private partnerships, particularly petrochemicals, have already reached high levels of competence based on technology and R&D resulting from comprehensive government support. Strong private-public partnerships will enable private companies to lead future development. Therefore, the responsibility of the new generation of industries goes beyond achieving normal industrial growth and requires a combination of investment, use of natural resource wealth and the development of science and information technology.

Four main pillars of the industrial strategy

The National Industrial Strategy for Industry 2020 comprises four main interrelated pillars.

- Enhancing domestic capability building for accelerated industrialization.

- Improving the business environment for enhanced industrial performance, especially for SMEs.

- Creating a national innovation system for technological upgrading.

- Promoting cluster-based industrial development for improved competitiveness.

Enhancing domestic capability building for accelerated industrialization

The availability and competitiveness of the drivers of industrial competitiveness help in the diffusion of new technologies and ensure the continued expansion of the potential capabilities of an industrial sector. The key structural drivers affecting competitive industrial performance are:

- Domestic drivers comprising human resources, domestic technological effort and finance support for industrial establishments;

- External drivers comprising FDI and technology transfer; and

- Supportive drivers such as digital infrastructure and ICT indicators.

Domestic drivers: skills

A major effort is needed in this area in the KSA. The main concerns are the skill base of available human resources, and the domestic technological effort. Other issues of concern refer to further strengthening the funding of small and medium-sized enterprises (SMEs) and the need to increase the use of ICT for industrial operations.

In the KSA, despite high literacy rates relative to the Arab world, improvements in secondary and tertiary enrolment ratios remain low relative to both regional and international comparators. Enrolments in technical and vocational programmes at the secondary level are modest in comparison with other comparator countries and available indicators indicate a preference for specialization in studies related to education and humanities, and a relative neglect of technical and business-related fields. The latter two are of paramount importance in equipping the labour force with the capability to undertake indigenous technological effort and nurture the entrepreneurial spirit in the private sector. Saudi industry cannot compete in low-tech market segments where labour costs are the main source of competitive advantage. Focusing on technology-intensive and innovation-driven industries in the long term requires a significant overhaul of both education and training systems, as well as labour market institutions, to send the right signal to educational establishments.

Need to balance supply of and demand for industrial labour with advanced skills

The quality of education and its relevance to job opportunities is another key issue. Recent studies suggest that a major problem in the Middle East and North Africa (MENA) region in general is a sharp disconnect between the outputs of the education and training systems and the demands of the labour market. This imbalance is the case in the KSA as well, as evidenced by the relatively high unemployment level of Saudi nationals despite the existence of sizeable labour demand, which is instead supplied by non-nationals.

There is an ever-rising need for advanced technical skills, particularly those required in new technologies such as ICT and biotechnology. Educated workers are essential for the introduction of new technologies. Modern business organizations increasingly need multi-skilled workers able to operate in teams and take responsibility for improving quality and raising productivity.

Technological effort and trade capacity building

Data on overall R&D spending are not available, but business enterprise expenditure on R&D, both in absolute terms and as a percentage of GDP, compares unfavourably with most regional comparators. Patent applications (filed nationally) also indicate a comparatively modest performance both regionally and internationally. ISO certification covering ISO 9000 and ISO 14000 – an indication of increasing conformity to international quality and product-safety standards – showed a significant improvement from 2001 to 2005 and compares quite favourably with regional comparators. The position of the KSA in the Innovation and Technological Capabilities Index is advantageous vis-à-vis comparators such as Egypt, Syria and Oman, but the fact that it scored lower than other comparators suggests that more investment is needed in domestic capabilities supporting technology and innovation.

In order to convert comparative advantages into competitiveness and to enhance domestic capacity to absorb imported technology and skills, a major endeavour is needed to enhance industrial trade capacity building. This requires building the required industrial capabilities, removing supply-side constraints for increasing industrial exports and establishing the required infrastructure and facilities to meet global norms for product and process standards. In this regard, the WTO agreements on technical barriers to trade (TBT) and on sanitary and phytosanitary measures (SPS) play a critical role in international trade and requires trade capacity building measures for competing successfully in international trade for industrial products.

Domestic financing for small and medium enterprises

The Saudi Industrial Development Fund (SIDF) provides financing to meet the needs of the private manufacturing sector, and extends subsidized credit facilities that can reach up to 50 per cent of total project costs. The growth and liberalization of the banking sector should facilitate greater lending from private banks to private-sector manufacturing firms in the coming years. However, most finance has been directed towards large-scale enterprises, often public, and there is a need to ensure that the private sector, especially SMEs, is further strengthened.

External drivers: FDI and technology transfer

The KSA has the highest stock of foreign direct investment (FDI) in the MENA region, but this is primarily directed to the energy sector. In comparison, very little FDI is attracted by export-oriented projects in the non-oil sector. Effective integration into global manufacturing value chains is yet to be realized, depriving the country of one of the most important drivers of successful industrial performance in the developing world. Innovating firms will be readier to license their technology to KSA firms if the intellectual property rights (IPR) regime is strengthened. There is a need, as noted above, to enhance the KSA's trade capacity in order to better absorb cutting-edge technology. It is also important to channel FDI into non-energy sectors and, probably, to take steps to increase KSA imports of non-energy related technologies, partly by improving institutional support for such imports.

Supportive drivers such as digital infrastructure and ICT indicators

The *physical infrastructure* base in the KSA compares favourably with regional comparators and represents a strong base for future industrialization initiatives. The digital infrastructure is also relatively strong overall, but levels of internet access and ICT spending as a proportion of GDP both remain low, which means the KSA is missing out on potential productivity gains. The extent and quality of the digital infrastructure is becoming crucially important in shaping overall competitiveness, especially in export-oriented economies relying on innovation and technology-intensive sectors. It also provides access to information and statistical data, which are key inputs into the decision-making processes of modern business organizations. After the oil price boom, most Government expenditure went into the development of the transportation network, housing facilities, water, electricity, schools and hospitals.

In terms of the *digital infrastructure*, figures indicate that the KSA has a competitive edge vis-à-vis regional competitors pertaining to the number of telephone landlines, mobile telephones and the availability of personal computers. In relation to international comparators, KSA also compares relatively well. However, the ratio of ICT expenditure to GDP compares unfavourably, which is also reflected in data on internet users, broadband subscribers and international internet bandwidth. Roughly one in five of the world's population now uses the internet, whereas Saudi Arabia is lagging behind with less than 7 per cent. In contrast, the KSA compares favourably with regard to secure internet servers both regionally and internationally.

Industrial strategies for enhancing industrial capabilities

Industrial strategies for enhancing industrial capabilities are needed in the following areas:

- Improving human resources and the skills base;
- Innovation and technological upgrading;
- Channelling FDI and domestic financing towards the private manufacturing sector, especially private SME sector industrial development; and

- Enhancing industrial trade capacity building.

These will be reinforced by strategies for cluster-based industrial development.

Strategies for skills for industrial development

The strategy for the development of skills for industrial development consists of five axes.

1) Priority for the development of skills associated with specific industrial needs. This includes all stages of education and training and R&D. An assessment of skills needed by the industrial sector, both currently and in line with future perspectives for industrial diversification and competitiveness based on the national industrial strategy, is urgently required.

2) Developing skills consistent with the overall vision for the industrial sector proposed in the national strategy in order to maximize the use of such skills in industry.

3) Skills development should be characterized by long-term continuity, requiring the building up of an institutional structure to enhance the skills of employees in a flexible way to meet the emerging needs of existing and future industrial activities.

4) Developing of training opportunities and programmes to meet the requirements of industry in the short term.

5) Establishing a two-way process of public-private sector dialogue and partnership to dovetail industry's need for human resources with output of the education and training system through an assessment of skills needs by the private industrial sector.

Strategies for enhancing human resources for accelerated industrial development will focus on the following objectives:

- Raising the standards of technical and scientific education;

- Enhancing managerial competence and the innovative capabilities of existing firms through industrial learning by producing for competitive markets;

- Encouraging the expansion of technology-based skills needed by SMEs;

- Developing a National Innovation System to support technological learning, innovation and the exchange of technological knowledge between R&D centres and private firms;

- Providing support for firms to establish strategic alliances and to network with international technology leaders, domestic technology centres (especially KSA universities), licensing arrangements, and the use of domestic and foreign consulting services.

A special priority area for human resource development is the need to enhance ICT skills for wider application in competitive industrial development in four key areas:

- Enhancing access to knowledge, technology, innovation and learning;

- Introducing new management and organizational systems for improved industrial efficiency and productivity; and

- Improving access to markets, distribution channels and global value chains.

To achieve these goals, the Government should also aim to broaden access to ICT facilities, particularly personal computers and the internet, from the current rather low levels. There is great potential to increase the use of ICT in schools.

Improving business environment for enhanced industrial performance, with special reference to SMEs

The general objective is to bring the Saudi economy into line with current practice in OECD countries as regards domestic competition and the role of the public sector, subject to certain exceptions that relate to cultural and religious practices. The main issue is the efficiency and speed with which these plans and objectives can be realized. That depends mostly on the ability of the political leadership to carry through a transformation in the attitudes, motivation and mores of the various public sector organizations involved. In the longer term, the speed of adjustment to the globalizing world economy will also depend on the alacrity with which reforms in the educational system are implemented, among other factors.

Current business environment

Although Saudi Arabia compares favourably with regional averages, it is seeking to compete on the world stage and analysis based on the World Bank's "Doing Business" considers other successful emerging-market economies as international comparators. By comparison with both OECD averages and most of the international comparators chosen**,** Saudi Arabia does reasonably well on the following indicators, which the report therefore does not discuss further:

- Dealing with licences;
- Hiring and firing workers;
- Registering property;
- Obtaining credit;
- Protecting investors;
- Paying taxes.

Physical infrastructure in the KSA is advanced, by both regional and international standards, and constitutes a key source of strength.

Activities for which it compares less favourably with OECD countries and Singapore and Malaysia include:

- Starting a business;
- Trading across borders;
- Enforcing contracts;
- Closing a business.

The business environment and SME development

SME development is crucial to rapid job creation and the diversification of industry in general, with the potential to support innovation and economic activity in the regions as well. The rationale for supporting SMEs is therefore based on their potential contribution to economic growth and new job creation. However, special policies for SME development are needed to ensure the realization of this potential. Access to finance is being improved and further, necessary, policies could be organized along the following major axes:

- Improving the business environment;
- Enhancing business development services;
- Facilitating access to business and technological information;
- Further improving access to finance.

Government and private sector strategies for SME development should involve:

- Facilitating SMEs' access to markets;
- Enhancing information flow and developing instruments for risk management for investment capital and operating finance;
- Investing in public goods that improve SME competitiveness, including infrastructure, education and technology development;
- Reconsidering regulations that result in higher costs for SMEs and setting up e-governance regulation of SMEs;
- Mobilizing the private sector to provide entrepreneurship and general business training.

Strength, Weakness, Opportunity and Threat (SWOT) analysis of the business environment

A SWOT analysis of the collected data and information summarizes the findings above as follows.

The Kingdom's *strengths* lie primarily in the following areas:

- A positive macroeconomic outlook, with improving macroeconomic management;
- A Government that ensures continuity of policy;
- A low tax level;
- WTO entry and ongoing trade liberalization;
- A relatively good physical and, to a lesser extent, ICT infrastructure. In addition to a relatively affluent domestic market, the Kingdom has an excellent geo-strategic location for trade with the rest of the Arab world.

The Kingdom's *weaknesses* are as follows:

- There are serious shortcomings in the existing business environment relating to the starting of a business, closing a business, obtaining licences, commercial dispute resolution and the enforcement of contracts. SAGIA and the MCI are working to reduce some of these;
- Trade administration is perceived to be in need of improvement;
- There is an unfavourable business environment for SMEs, especially in terms of access to industrial cities, business training and technological information;
- Lack of industrial cities with sufficiently developed infrastructure;
- Lack of a strong partnership between the Government and the private sector in the process of formulating policies and monitoring performance;
- Insufficient ICT infrastructure to match the stated objectives of the Government;
- A serious shortage of macroeconomic data, with only a limited range of indicators made public, which makes it more difficult for firms to assess the performance of the macroeconomy in order to plan their business strategies.

Present *opportunities* comprise:

- The general climate of business expectations engendered by WTO entry creates a window of opportunity to rationalize and liberalize the trading regime and trade administration;
- Continuing high oil prices would facilitate heavy investments needed in a number of critical areas;
- The Kingdom could benefit from existing regional integration initiatives – especially the Gulf Cooperation Council (GCC) agreements and the eagerness of the private sector for further industrial expansion;
- The attraction of FDI and initiatives to help link domestic enterprises to global value chains could be crucial drivers of knowledge and technology transfer, if the business environment could be made more attractive in a short space of time;
- As a member of the GCC, the Kingdom is negotiating free trade agreements with the EU and Japan, and is likely to have the opportunity to sign other such deals, for example with emerging Asian economies.

The most obvious *threat* is that the KSA risks being marginalized in terms of FDI inflows and trade integration, on account of slow diversification and weaknesses in the business environment.

Government initiatives to improve the business environment

This section reviews the main conclusions from individual interviews with key Saudi industrialists and business analysts, conducted in October 2006 in Riyadh. The Government has already taken some measures to promote the business environment and others are in train.

Ongoing initiatives

SAGIA reports the following measures, which address some of the above needs and shortcomings identified in the previous sections.

- Judicial reforms are in progress.
- The KSA is committed to reducing customs duties on a large number of goods, particularly industrial products. Plans are also underway to exempt a range of raw materials and intermediate imports from customs duty.
- Laws relating to commercial policy, state participation in the economy, capital flows, foreign investment and the financial sector are being reviewed.
- Plans are being prepared for the privatization of ports, the upgrading of operational capacity, the use of state-of-the-art security procedures, the simplification of port entry-permit procedures and the extension of railroads.
- Measures are being implemented for simplifying the regulatory procedures related to inward investment.
- Special incentives are being set up to encourage investments in the less-developed regions.
- Intellectual property rights (IPR) protection is being streamlined, with patent applications being adjudicated in under two and a half years.

Expected initiatives

The private sector expects the following additional initiatives to improve the business environment.

- *Industrial cities*: Further development of industrial cities in different parts of the country.
- *Rental rates*: Industrialists requested that rental rates for such new developments do not exceed rates for existing sites such as Jubail and Yanbu.
- *Infrastructure*: Industrialists believe that investment in infrastructure by the Government as an enabling condition for private investment does not contradict WTO regulations; however, to be certain, specific plans would need to be checked against WTO regulations.
- *Labour legislation*: Industrialists would like the Government to ease Saudization regulations, especially for industries that are labour-intensive or high-technology-based.
- *Logistics*: Industrialists would like the Government to promote a better business environment by completing infrastructure development in the transport sector, gas networks and railroads, throughout all industrial areas. This will boost mining, downstream activity and many other industries.

Industrial strategies for improving the business environment

The strategies recommended for improving the business environment for enhanced industrial performance comprise the following.

1. Trade policy and administration

- The trade administration system should modernized, streamlined and made transparent, to facilitate imports and exports, by cutting down unnecessary delays in customs, etc.

- Tariff reform should continue in line with WTO commitments.

2. Ease of doing business

- Regulations for starting and closing businesses would need to be simplified and made transparent, to bring the KSA into line with competitor nations. Other regulations pertaining to the operation of businesses could be modernized along the lines already identified by SAGIA.

- Business law relating to investment and the resolution of business disputes should also be streamlined and explicitly codified.

- The ICT infrastructure would need to be upgraded and more e-governance introduced into the regulation and administration of business to further facilitate and improve the business environment. The Government has recently taken some positive steps by allocating a sum of some SR3 billion (US$0.8 billion) to introduce e-governance over the next few years.

- An observatory for measuring the attractiveness of the national and regional business environment for industrial investment should be set up. This would measure the ability to attract industrial investment through global benchmarking.

- A project to facilitate the use of mineral resources and mining, in order to enhance the formation of new industrial clusters, should be set up.

- An industrial legislation package to review all laws relating to industry should be designed, along with the activation of new industrial legislation in the areas of intellectual property, antitrust, competition and liberalization of the labour market.

- SAGIA has already launched the 10 by 10 project, which is being implemented in cooperation with major public and private stakeholders.

- Infrastructure should be further developed and the network of industrial cities extended into different regions of the country.

3. Access to business information, services and collective learning

- Public provision of business information and services should be improved.

- A strong public-private partnership would help in the identification of problems as they arise and in the expeditious working out of solutions.

- Data collection and publication should be improved in line with international standards.

- Capabilities and networking of providers of business-development and sector-specific services should be strengthened.

4. SME development

- To improve access to finance for SMEs, building on the steps already in place.
- To set up a single authority for SME development along the lines described above.
- To establish a mechanism and foster greater dialogue within and between public agencies and SME institutions and associations.
- To improve business and technical advice to SMEs.
- To promote business partnerships between universities, large companies and SMEs to enhance horizontal and vertical linkages.
- To launch programmes to support SME cluster development in the regions.
- To promote innovative entrepreneurship training programmes.

The recommendations for the above strategies are translated into concrete plans for follow-up actions in Chapter 11 of the main report.

Creating national and regional (sub-national) industrial innovation systems for technological upgrading

The role of Innovation Systems

National and Regional Innovation Systems comprise the whole complex of public and privately owned physical infrastructure, institutions and systems that support and develop productive-sector innovation at the national or sub-national level. National systems for technology development and innovation emphasize that innovation and technology development stem from a complex set of relationships among players in the system, where knowledge and skills constitute factors of production; the players include universities, research institutions and enterprises. For policy- and decision-makers, understanding of the NIS can help identify leverage points for enhancing the innovative performance of firms and the competitiveness of products. Sustained efforts for strengthening science and technology systems can convert industrial operations into horizontally and vertically integrated manufacturing, with ever-increasing development of manufacturing-complementary service activities. The process enables developing countries to integrate the local value chain into the global value chain. In addition to the creation of a pool of technically trained personnel, the state should formulate and implement strategies and policies that encourage intense innovation at institutions and enterprises.

The new industrial geography is characterized by integrated international sourcing, technology, manufacturing and services networks, which together comprise the spatial distribution of production. This system is governed by large international firms and multifaceted sub-contract linkages between large and small enterprises, and enables countries to insert their industrial sectors into local and global value chains.

Successful clusters in dynamic industrial locations seem to work well within well-established institutional contexts, which are formed by local institutions of education, training, research and the diffusion of technology. The capabilities of firms are strongly affected by local externalities. The policy approach should therefore be in favour of the convergence of factors that make the local environment conducive to facilitate networking both at local and transnational levels.

Existing framework offers potential

There is great potential to enhance the profile and effectiveness of the country's industrial innovation system as shown by the existing institutional framework in selected fields:

- Universities, especially those with engineering, science and business schools;
- Research institutes and laboratories, of which King Abdul Aziz City for Science and Technology (KASCT) and the Saudi Arabian Basic Industries Corporation (SABIC) are leading institutions;
- Service institutions, including the Saudi Organization for Industrial Estates and Technology Zones, the Saudi Arabia Standards Organization (SASO), and the National Patent Office;
- Funding organizations. Today almost 90 per cent of funding is provided by the public sector, either by the Government or by public enterprises;
- Private and public enterprises and organizations. These include SABIC and Saudi Aramco, which both carry out in-house R&D, as well as private foundations such as the Saudi Foundation for the Gifted. However, with some exceptions, most industrial firms (whether large or SMEs) are not yet part of the national research and innovation system, as generally they are not innovators;
- Scientific societies. A relatively large number exist in KSA in all areas of knowledge. These are particularly important for creating a more favourable environment for the diffusion of concepts and visions of innovation.

Current challenges for industrial innovation

The role of the Ministry of Commerce and Industry (MCI) should be strengthened in all matters related to industrial R&D and innovation. Stakeholders involved in fostering industrial development (SAGIA, the MCI, the Ministry of Petroleum and Mineral Resources, etc) will need to reach consensus on the sectors that should be promoted. The MCI should take the lead and build consensus on a specific vision for those sub-sectors. Importantly, the technical and economic feasibility of large projects should be ensured before they are approved for implementation. Any industrial strategy should specify criteria for screening viable projects. An institutional mechanism to create an effective innovation system and related policies needs to be established.

Government agencies can act:

a) As a promoter, providing:

- Tax incentives;
- Financial incentives;
- Protection of intellectual property rights;
- Commercial channels for the transfer of goods, processes and technologies.

b) As a producer:

- Carrying out or contracting industrial research;
- Guiding public (and private) industrial research institutions.

c) As a user:

- By procurement.

d) As a facilitator, acting as:

- Antenna for industrial technology, and all related information activities;
- Guiding and supporting the financial mechanisms for industry-related research and innovation.

It is also important for industrial strategy formulation and implementation to be strictly controlled by one entity, preferably the MCI, which is currently in charge of industrial licensing. The new Industrial Policy Board at MCI should be involved in more than the process of licensing industrial projects. New initiatives should include a component for the restructuring of the MCI within the framework of a long-term vision, based on consensus. It is important to identify the core capabilities and potential of the KSA; a notable source of comparative advantage is the Kingdom's ability to benefit from foreign expertise. In addition to energy-intensive industries, the potential for developing products through industrial clusters is also important.

Addressing other key issues

Another key issue is how to take better advantage of the interrelationship between science and technology. The NIS in the KSA should become a creative space in social learning for the exchange of knowledge and information flows among national, sub-national and sectoral agents. The main institutional structure for science and technology policy should be revamped. All major policies with respect to industrial innovation will need to be formulated and implemented by a specialized agency, namely an Industrial Innovation Coordination and Development Board (IICDB). The chief strategies are summarized below.

Increasing the supply of technically trained human resources

Long-term initiatives: The educational system will need to be continually restructured, with an accent on technical and vocational education below tertiary level to provide a growing pool of skilled workers and technicians, as well as a rapid expansion of engineering, business and computer education at tertiary level. More university graduates should be trained in engineering and technical areas. The proportion of students enrolled in engineering, science, management and mathematics at the universities should be targeted to reach at least 60 per cent of university enrolment by 2010**.**

Incentives may be offered to world-renowned universities and institutions, to encourage them to establish campuses in the Kingdom, offering courses that contribute significantly to the strengthening of the national and regional industrial innovation systems.

When the density of scientists and engineers engaged in R&D and innovation has been increased, efforts should be initiated to disseminate scientific information with commercial potential and to generate commissioned research projects. A strong acknowledgement of the necessity of developing linkages between basic research, applied research, industrial activities and national objectives should be encouraged among scientists and technical personnel, as well as among policy-makers.

The Government will need to adopt an incentive system that unleashes entrepreneurial zeal. Currently, the country is not creating sufficient jobs for Saudis. This is largely owing to the system failure in meeting the type of skills and knowledge needed for rapidly changing production systems. The KSA needs to formulate a long-

term vision to create a strong skill base capable of supporting the country's industrial innovation system, which in turn is likely to contribute significantly to the process of industrial diversification.

Short-term initiatives: A graduate re-skilling programme should offer crash knowledge and skills-enhancement programmes for unemployed graduates. High-quality vocational training and quality learning can boost technical and vocational specialization, while focusing on meeting the skills needs of many sectors. In order rapidly to acquire technological capacity and innovation capabilities, the first task is to reduce the gap between best local practice and best international practice. The KSA will have to acquire foreign technological capability and innovation capacities. The Government will need to put in place a whole host of essential support systems and instruments to foster some adaptive R&D, to adapt imported technology to local conditions.

Regional (sub-national) innovation systems (RIS)

In the context of the KSA Eighth Development Plan, regional innovation systems alongside clusters can be used as policy frameworks for achieving long-term regional development. The key to the success of RIS is in institutional innovations (governance) that facilitate the creation of dynamic comparative advantage. These institutions promote cooperative practices among actors in the economic and industrial system; they promote the building of collective entrepreneurship, which can result in collective gains in terms of regional economic development. For the KSA, as for developing countries in general, the importance of a "public goods" role for state intermediation means that a hybrid model of RIS is best. Institutional support is needed for appropriate talent formation in the tertiary education sector "platform" and an Innovative Policy Platform (IPP), moving regions towards a more entrepreneurial, especially "knowledge entrepreneurial", profile is required.

Summary of key proposals

A number of new agencies and strategies are proposed. Key agencies are listed below.

An Industrial Innovation Commission should be set up within the Industrial Competitiveness and Diversification Board, to be coordinated by the MCI, with the task of coordinating the activities of all agencies involved in industrial innovation.

An Industrial Research Network and Consulting Centre, operating as a "laboratory without walls", should generate and transfer industrial technology and network with international institutions and firms in order to enhance innovation capabilities.

Industrial innovation financial mechanisms should be provided for in the **Industry 2020 Fund** to support enterprise innovation and R&D.

An Industrial Innovation Branch should be created within the Industrial Development Agency, affiliated to the MCI, to disseminate knowledge through seminars and workshops and other means of communicating with the broader community.

Strategic tasks:

- Facilitating knowledge dissemination and industry/university/institution linkages;
- Encouraging state-societal arrangements that promote international competitiveness, with public institutional arrangements to facilitate the upgrading of skills in cooperation with the private sector;
- Encouraging multi-stakeholder partnerships;

- Promoting venture capital;
- Developing internal linkages and networking;
- Establishing and managing regional industrial development agencies in the newly created Economic Zones;
- Increasing knowledge spillovers to local companies from foreign companies;
- Establishing Innovative Policy Platforms (IPPs).

Promoting cluster-based industrial development for improved competitiveness

What is the role of clusters, how could they contribute to the industrial diversification of the KSA and what steps would be needed to achieve this?

Regional and cluster-based industrial innovation systems: conceptual issues

Clusters and regional innovation strategies

Clusters are groups of companies linked by geographic proximity and the production of related products or services. They can improve competitiveness and productivity through sharing best practices, labour and management pools and training as well as driving the direction and pace of innovation. Clusters can thus become a source of regional competitive advantage. In regional innovation systems, innovative firms and their clusters operate in regional networks, cooperating and interacting with suppliers, clients and competitors, and with research and technology resource organizations, innovation support agencies, venture capital funds, and local and regional government bodies.

Clusters, regional comparative advantage and related variety

Cluster initiatives are often joint initiatives, involving companies, educational and research institutions and relevant government agencies. The evidence suggests that mobilizing and strengthening the potential of existing clusters that have not yet reached their full potential has the best likelihood of success. However, focusing only on existing clusters is not a viable strategy for diversification. It is crucial to identify industrial areas where new clusters can emerge.

The goal of RIS is promoting new economic activity based on industries with a similar analytical knowledge base. The co-existence of many intra-regional clusters with various knowledge bases and different relations to the RIS will require more-developed regional governance structures to secure planned and systematic coordination between industry and other institutions that create and diffuse knowledge. Creating regional comparative advantages requires purposive activity through the platform approach, namely:

a) *Industry platforms*: exploring a related variety of industries;

b) *Stakeholders' platforms*: pursuing planned and systemic cooperation and interaction between university, industry, and government; and

c) *Policy platforms*: targeting the economy, skills and infrastructure.

Creating clusters through an improved business environment

Many locations aim to launch completely new clusters. An appropriate regional strategy to stimulate entirely new clusters is to improve the overall business environment, for example by upgrading the skills, finance and infrastructure available in the region, streamlining Government rules and regulations, supporting more sophisticated local demand and opening up to foreign investment and competition.

Attracting FDI becomes more effective by following a cluster approach. Clusters provide a better environment for companies to operate in and, for many of them, a market for their products and services. Other important instruments for the promotion of cluster activities are the creation of various kinds of economic zones, parks and cities. But accession to the WTO has limited the potential to use various special incentive packages, such as tax holidays. Incentives must be in line with the WTO Agreement on Subsidies and Countervailing Measures (ASCM).

Role of the Government in cluster development

The Government has an important role to play in cluster development. Experience suggests the following:

- A successful cluster policy builds on sound overall economic policies targeting areas such as education, labour market regulation and competition law;
- The Government should be open to support all clusters that show willingness for cooperation and have some objective strengths to build on;
- The Government should be engaged in cluster initiatives as a facilitator and participant. The most successful cluster initiatives are public-private partnerships;
- The Government should not provide subsidies, protection, or relaxation of competition laws in order to develop clusters.

Regional cluster-based industrial development in the KSA

The current situation

The KSA faces a number of challenges in terms of improving the business environment conditions affecting cluster development, of which the most important is probably the need to upgrade human skills. Another issue is the existence of large business groups. Over the last few decades, the business environment has not provided a supportive context for clusters to be developed and there is little evidence of functioning clusters outside the oil and gas sector. However, there is some geographic agglomeration, suggesting scope for future clusters.

There may be particular scope for clusters to emerge producing relatively non-tradable goods and services, i.e. those that tend to serve the local market. These products and services could include retail, finance, construction, health and agro-related services, alongside other products targeting domestic or regional demand. Furthermore, oil and gas-related intermediates and downstream chemical and speciality chemicals, as well as agro-business, inorganic chemicals, cosmetics, pharmaceutical and knowledge-based industries may also offer scope for cluster-based development. The nexus between competition in the domestic market and export-oriented industrial development is particularly important following the KSA's accession to WTO membership.

Cluster-based strategies and policies in the KSA currently suffer from a number of weaknesses that undermine their potential to move the economy towards a more-diversified industry structure. Firstly, many efforts are largely focused on real-estate development and the creation of physical infrastructure. Secondly, where a specific industry focus exists, there is insufficient clarity on the specific value that the regional cluster or the cluster-specific business environment will provide. Thirdly, there are competing, or at least insufficiently coordinated, cluster efforts by a number of different agencies. Fourthly, there is a limited appreciation of the different roles of the private and public sectors in a cluster.

Strategies for cluster-based industrial development

To overcome the current constraints, industrial strategies and policies for promoting cluster-based industrial development would need to focus on five main avenues.

The first is the ***creation of a sound factual and knowledge base to guide cluster-based policies.*** The following areas are particularly important:

- Mapping of existing clusters;
- Evaluation of regional business environments;
- Creation of an observatory to track competitiveness and cluster development over time;
- Financial and technical support for cluster initiative administration.

The second avenue is ***defining a cluster development action agenda*** to set realistic objectives focusing on the following sectors:

- Oil and gas cluster;
- Emerging export-oriented clusters with an existing base (including oil-related sectors such as plastics, as well as transportation & logistics);
- Clusters serving the domestic market (retail, finance, construction, health, agro-related, services etc;
- Other emerging/potential clusters.

From the point of view of industrial strategies, ***emerging industrial clusters*** should be viewed in the context of the following industry categories:

- Oil & gas industries;
- Traditional oil-related industries;
- Strategic industries;
- High-tech industries;
- Emerging knowledge-based industries;
- Other non-oil-related industries.

The third avenue involves ***benefiting from improving existing economic policy programmes*** through a cluster focus. Four areas in particular have significant potential:

- Foreign direct investment attraction;

- Branding of clusters as industrial platforms, such as economic/industrial cities/valleys, industrial zones, technology zones, etc;
- Skills upgrading;
- SME support in terms of finance and technical assistance.

The fourth avenue is ***the creation of a business environment that is more supportive to cluster development.*** The following policy areas are particularly important.

- Infrastructure and logistics capabilities;
- Competition law;
- Business regulations;
- Financial market;
- Trade policy;
- National Cluster Development Plan.

Finally, the fifth key avenue is the formulation of ***regional strategies and policy instruments*** to support economic diversification and build regional comparative advantages.

The way forward

The industrial strategies proposed for cluster-based industrial development for improved competitiveness in this chapter include three major programme components for follow-up action:

- Technical and financial support for regional cluster initiatives;
- Development of regional industrial clusters (beginning with five pilot regions);
- Replication of cluster-based approach in other regions of the Kingdom.

Positioning the Kingdom of Saudi Arabia in the global league table of industrial excellence by 2020

Transforming comparative advantages based on natural resources to competitive strength based on knowledge and skills

The KSA has ambitious, but nonetheless achievable, targets for accelerating the growth of MVA as a whole and reconfiguring the structure of MVA towards more technology and knowledge-intensive sectors. Positioning the Kingdom at a distinguished place in the global league table of industrial excellence will be determined by a combination of the aspirations of Saudi society and enhanced industrial performance towards accelerated industrial diversification and improved industrial competitiveness.

International developments need to be monitored

The efficient implementation of Industry 2020 for the KSA will greatly accelerate the development of a more diversified and competitive industrial economy, leading it into new industrial horizons and prosperity. Efficient industrial governance for implementing the strategy will be vital for positioning Saudi Arabia in the global league table of industrial excellence in the context of Vision 2020.

This will be determined by a combination of the aspirations of Saudi society and enhanced industrial performance towards accelerated industrial diversification and improved industrial competitiveness. This, in turn, will result from the effective implementation of the Industry 2020 strategy. However, it will be vital for the Kingdom to monitor international developments in order to benchmark its own performance against that of key comparators – both in the region and further afield – and to learn from relevant experiences in other countries.

To that end, the strategy aims to position the country at a distinguished place among the world's leading industrial economies. There is inevitably some uncertainty over the precise extent of future progress in the rankings, as a country's relative position is also affected by changes in the performance of other countries. SAGIA aims to position the country within the top ten best performers in the World Bank's "Doing Business" league table of competitive business environments. This index is based on different criteria to the UNIDO Competitive Industrial Index, focusing on the business environment in general and not specifically on industrial competitiveness, although a more competitive business environment will also bring benefits for the industrial sector.

This ambitious but achievable target calls for a commitment to excellence in terms of improving industrial capabilities, creating a sustainable business environment, establishing a dynamic innovation system and promoting cluster-based industrial development (the four principal pillars of the Industry 2020 strategy). It also requires substantial investment in follow-up programmes and institutional efficiency in the plan of action. The Kingdom is fortunate in being in a near-unique position, enjoyed only by a few other countries, to stimulate economic diversification and competitiveness and to leapfrog in the global competitiveness race, because of the substantial financial resources available to help it achieve industrial excellence.

Transforming all these challenges into a working agenda requires a two-step procedure. Firstly, success features of international experience have to be styled to the Saudi context to reveal the required targets for both the level and growth of industrial value added. Secondly, the resultant targets should be converted into sub-targets regarding the structure of the sector.

Restructuring the industrial sector

The second task is to identify the accompanying package related to the structure of the industrial sector. This should shift towards activities that have higher technological content yet remain related to the country's natural and created comparative advantages. This would transform comparative advantages based on natural resources to comparative advantages based on knowledge and skills and create a new developmental context.

The strategy is therefore to restructure the sector towards activities at a higher position in the value chain through the adoption of the concept of clustering, founded on both natural and technological bases. The suggested target is to achieve a ratio of MVA to production of at least 45 per cent. To reach this, the level of higher technology activities (involving medium to high technology) is to rise to 60 per cent, accompanied by a 30 per cent share of these activities in the structure of industrial exports. For this purpose, the restructuring of production should rely on both local innovation efforts and industrial trade capacity building. Therefore, establishing a working national and regional system of innovation is crucial to fulfilling all the targets.

The recent history of industrial performance in the KSA suggests that the economy can join the success stories of industrialization through a fast-track, albeit arduous, strategy that is tailored to fulfil the national will for excellence. Key "buzz words" that the strategy is to promote are *skills*, *capabilities*, *framework conditions*,

business environment innovation, clusters, entrepreneurship and trade capacity building. Programmes embodying these key concepts are to be framed. These follow-up programmes are presented in Chapter 11 of the main report.

Positioning the KSA on the scale of industrial excellence in 2020

Over a 20-year period between 1980 and 2000, the KSA improved its position on the UNIDO Scoreboard of industrial performance by 18 places. (Data constraints prevent updating its score to 2006.) In the light of past performance and current priorities, it seems reasonable for the KSA to aim to be among the top 30 countries on the scale of the UNIDO industrial-cum-technological advancement index (ITA) over the next 14 years. The ITA index is intended as a proximate assessment of the part that industry and technology play together in production and trade. The ITA value for a given economy is expected to help gauge the impact that industrial-cum-technological advance is likely to have on its development. While assessing the compound weight of industry and technology is of prime interest here, another goal of the analysis is to disentangle the contributions made separately by industrial advance and technological advance, as well as to appraise the respective parts of production and trade. In 2002, the KSA stood in 66th place on the ITA index, but it was reasonably close to the average for the top 30 on the technological-advance index and the speed and spirit with which the Kingdom is creating the required capabilities to improve its industrial and technological performance suggest that a much better positioning is within reach.

In terms of strategic targets for Saudi Arabia, the following benchmark indicators may serve as a point of reference, based on the data in the table below.

KSA Industry 2020: International benchmarking of key manufacturing performance indicators, 2002

	Average of top 30 countries	Rank 30 (Poland)	Saudi Arabia
Manufacturing value added (MVA) per capita ($)	4,480	885	846
Manufactured exports per capita ($)	6,390	782	723
Share of manufacturing in GDP (%)	23.5	21.0	8.7
Share of manufacturing in total exports (%)	89.7	89.6	20.0
Share of medium and high-tech in MVA (%)	57.3	38.7	65.3
Share of medium and high-tech in manufacturing exports (%)	64.2	64.2	18.7

Source: UNIDO.

This suggests that the Kingdom would need to launch a major strategic effort to improve all indicators, in particular the share of MVA in GDP, the share of manufactured exports in total exports and the share of medium and high-tech manufactured exports in total exports.

Additionally, a new set of guiding parameters could encompass emerging trends in the sphere of industrial development:

1) Sound macroeconomic preconditions;

2) An enabling business environment;

3) Domestic, regional and global market potential;

4) Global mind-set by which entrepreneurs think globally and act locally in order to face the emerging challenges of competitive pressures for efficiency gains and seize new opportunities;

5) Propensity of non-oil enterprises to export to coveted markets;

6) Emergence of a vibrant entrepreneurial class and technocrats;

7) Investment plans for industrial cities and economic zones;

8) Plans to reorient the educational system to meet corporate needs;

9) Fast-track graduate re-skilling programme to reduce the supply-demand gap;

10) Enhanced role for the Kingdom in the Arab regional industrial development and innovation system;

11) Enhanced role for the Kingdom in South-South industrial cooperation;

12) Determination to use FDI flows for domestic capability building;

13) Creating new sources for enhancing R&D and the commercialization of research findings by productive sectors and related service enterprises;

14) Acquiring knowledge-based and innovative companies;

15) Improving the industrial governance system in the light of new industrial realities and significantly enhanced capabilities of civil servants and the labour force.

With a buoyant economy, sound macroeconomic fundamentals, an enabling business environment, availability of finance at low interest rates, a strong infrastructural base, a maturing stock market, a growing population contributing to effective demand, membership of the WTO and the determination to play a key role in regional industrial development, the KSA is well positioned to secure a much better ranking on the scale of industrial performance by 2020.

A promising product mix that could contribute to the above endeavour includes poultry and fishing, electrical appliances, automobiles, biotechnology, construction materials, food processing, packaging, an array of hydrocarbon-based downstream products, pharmaceuticals, energy-intensive heavy industries and equipment for exploiting renewable sources of energy. Additional product areas will need to be identified within the framework of the Kingdom's lead role in the industrial development of the region and the sphere of South-South cooperation for industrial development.

Part C: Industry 2020: Agenda for action

The governance of strategy implementation

The implementation of the National Industrial Strategy for Industry 2020 and the platform of policies and programmes will have three main characteristics:

- An integrated and regional approach;
- Collaboration and partnerships between the Government, the private sector and innovation institutions;
- Continuous monitoring, evaluating and improving.

Two key determinants of success will be the development and formation of competitive and innovative industrial clusters in the different regions of the Kingdom, and the organization of National and Regional Innovation Systems that will provide these clusters with information, knowledge, skills, technology and global links.

Mission and objectives

The MCI will be the focal organization of the governance system responsible for the implementation of the National Industrial Strategy. Its mission will be to promote and support the process of collaboration, which will contribute to the following objectives.

1) To strengthen the national framework conditions: development of industrial capabilities; improvement of the business environment; and support for private-sector development.

2) To promote and support the development and formation of competitive and innovative industrial clusters in different regions.

3) To develop and strengthen the national and regional systems of institutions which will support the development and formation of industrial clusters.

Functions and activities

The governance of the implementation of the NIS includes three related functions:

- Steering the process of implementation;
- Managing the implementation of the platform of programmes;
- Evaluating implementation and recommending revisions and new programmes.

Organization of the governance system

The ***MCI*** is the focal organization of the governance system. Its role will be:

- To promote the NIS and to support collaborations and partnerships between the Government, the private sector and the institutions of the innovation systems for its implementation;
- To formulate and propose measures and policies to improve the framework conditions, industrial capabilities, business environment and private-sector development;
- To promote and support the process of development of competitive and innovative industrial clusters and of national and regional innovation systems;
- To monitor and evaluate the overall implementation process of the NIS and the platform of policies and programmes.

The Industrial Strategy Commission will include core economic Ministries and other important Government agencies and institutions. It is chaired by the Minister of Commerce and Industry. Its role will be:

- To monitor and decide measures to improve industry's contribution to the overall economic development of the KSA;
- To decide on policies and programmes;
- To decide on the Industry 2020 Fund;
- To decide on implementation of strategy;
- To evaluate the implementation of the NIS.

Regional and local government authorities will collaborate with the private sector and support institutions for regional industrial development strategies. They will cooperate with the MCI and the Industrial Development Agency in the development of regional clusters and innovation systems.

The ***Industrial Competitive and Diversification Board*** *(ICDB)* will be co-chaired by the Minister of Commerce and Industry and a representative of the private sector. Its role will be:

- To identify and develop a consensus position between the private sector and the Government;
- To recommend measures to enhance industrial competitiveness, speed up the diversification process and support the development of industrial clusters;
- To advise on and recommend revisions to policies and programmes;
- To organize systems of consultations;
- To contribute to regular reports on industrial performance and capabilities.

The Industrial Policy Office, which managed the formulation of the NIS, will be strengthened and become the ***Industrial Development Agency***, with particular responsibility for implementing the Regional Industrial Cluster Development Programme and programmes to support the development of national and regional innovation systems. It will also cooperate with the agencies responsible for clusters and national innovations systems.

The Agency has four divisions – Information and External Relations, Regional Industrial Development, Industrial Cluster Development and Innovation Systems – and an Observatory, which will monitor global trends, assess the competitive performance of national industries and evaluate the results and impact of the National Industrial Strategy.

Process of implementation

Implementation of the National Industrial Strategy will include the following steps.

1) A national campaign by the MCI to promote and explain the strategic vision and goals, the NIS and the platform of policies and programmes. It will aim at building awareness of the private sector, support institutions and regional governments and at encouraging their participation in the implementation process.

2) Then the MCI, in conjunction with the Industrial Development Agency, will start to implement the programmes to develop the national and regional innovation systems and will introduce the Regional Industrial Cluster Development Programme in three or four regions. The first group will be selected by the Industrial Strategy Commission on the basis of the presence of competitive regional industrial clusters and a good industrial capabilities base. The Industrial Development Agency will help the regional governments to formulate and implement a collaborative strategy with the private sector and support institutions for the development of a regional innovation system and of competitive and innovative industrial clusters.

3) The results will be assessed and the lessons learned used for improving implementation of the programme in other regions.

4) After one year, the implementation of the NIS and the platform of policies and programmes will be evaluated and the lessons learned used for the overall improvement and development of the NIS and the platform of policies and programmes.

Follow-up programmes

By keeping pace with the rapidly changing facets of new industrial realities, with critical pre-conditions, any country can leap into industrial deepening and diversification. With an efficient national industrial innovation system, resource-poor Singapore encompasses a dynamic industrial sector and tops the list of countries on the industrial performance and capabilities scales coined by UNIDO. Given the financial resources and determination of the Kingdom, KSA Industry Vision 2020 is not just a utopian aspiration if the right programmes are in place.

The process of industrialization today is not driven by resource endowments alone, but by technology, knowledge, skills, innovation and networking. Given these critical factors, the Kingdom can embark on a massive programme of industrial diversification within the sub-regional perspective in a win-win scenario for enhancing its position on the global league of industrial excellence**.**

Agenda for Action – Industry 2020 is composed of five programmes. These are: Private Sector and SME Development; Regional and National Innovation Systems; Cluster Based Industrial Development; Domestic Capabilities Building; and Industrial Governance System. The programmes are designed to strengthen the major drivers of the Strategy and organize the process of implementation. The programmes also address the national and regional dimensions of competitive development and diversification. Each programme is composed of specific project concepts that represent actions to reach the strategic objectives of Industry 2020: *"To develop a globally competitive industry based on innovation and acting as a base for transforming the KSA's natural and human resources into sustainable wealth and employment creation."*

Five programmes

The five clearly defined programmes, each containing a number of projects, are coined with a view to highlighting the expected outcome of respective project activities and budgetary guesstimates. The ideas contained in the programme and project proposals are subject to a thorough review by Saudi authorities and industrial stakeholders. The duly approved project concepts will be developed into fully fledged project documents for implementing a three-year crash programme. Based on the lessons learned from the implementation of the crash programme, substantive industrial sector inputs will be prepared for the Five Year Plan commencing in 2010.

The objectives of the programmes

The country's industrial objectives: To develop a globally competitive industry based on innovation and acting as a base from which to transform the KSA's natural and human resources into sustainable wealth and employment creation.

Private sector SME development (PSD)

The programme's objectives: To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting.

Industrial Cluster Development Programme (ICDP)

The programme's objectives: To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020.

National and Regional Innovation Systems (NRIS)

The programme's objectives: To build up the KSA's National Industrial Innovation System, so that institutions, financial resources, human resources and political determination combine to promote industrial excellence.

Domestic Capabilities Building (DCB)

The programme's objectives: To enhance industrial capabilities for industrial diversification and competitiveness, particularly in terms of skill development, FDI flows, infrastructure and linkages to the global market through industrial capacity building.

Industrial Governance System (IGS)

The programme's objectives: To organize the system of governance which will enable the Ministry of Commerce and Industry and the Industrial Development Agency to implement the National Industrial Strategy for Industry 2020 in cooperation with the private sector and other relevant ministries, Government agencies and institutions supporting enterprises, innovation and learning.

Part A

Industry in the Kingdom of Saudi Arabia
in the new global industrial setting

Chapter 1. A vision for industrial development in the Kingdom of Saudi Arabia

Rationale for long-term industrial development

This document outlines an integrated programme for realizing "Vision 2020", which is a comprehensive set of strategies for diversifying and modernizing industries (Endnote 1) in the Kingdom of Saudi Arabia (KSA) up to the year 2020. Vision 2020 emerged as a broad consensus at a symposium held in October 2002, organized by the Saudi Ministry of Economy and Planning in collaboration with other Ministries and Public Authorities.

Vision 2020 sees Saudi Arabia emerging as *"a diversified and prosperous economy that guarantees the existence of rewarding job opportunities and higher levels of economic welfare for the Saudi citizens, and provision of education and health care for the population to equip the labour force with adequate skills, in addition to preserving religious values and cultural heritage of the Kingdom"*.

The strategies of Vision 2020 are organized into five distinct categories: (i) economic diversification; (ii) development of human resources; (iii) expansion of public services needed to support these objectives; (iv) the expansion of the private sector as a key partner in the implementation of Vision 2020; and (v) streamlining and modernizing the governance structures of the public sector to meet the challenges of implementation. The implications of these strategies for industrial development are spelled out below, starting with the nature of the current international context and the fundamental challenge that underpins the formulation of Vision 2020.

Vision 2020 proposes "a diversified and prosperous economy that guarantees the existence of rewarding job opportunities and higher levels of economic welfare for the Saudi citizens….".

Saudi Arabia is well aware of the challenge that faces nations in this era of accelerating global change. Developing countries such as China, India and Brazil are rapidly emerging as major industrial powers, building impressive capabilities in knowledge-intensive technologies such as Information and Communication Technologies (ICT), biotechnology, pharmaceuticals and aerospace. The challenge for the KSA is to shift the economic basis of prosperity from excessive reliance on natural resource endowments to mastery of knowledge-based technologies in the next 10–15 years. This shift is not envisaged simply as an insurance policy against the decline of oil revenues from depletion or technological obsolescence. A nation's self-confidence and security depend heavily on its ability to master and use contemporary technology.

The ability of the country as a whole to deploy modern technologies is the only basis for long-term economic security, as inherited comparative advantage, built on natural resource endowments, could vanish as the technologies that impart value to particular resources are displaced. The most reliable way to build on comparative advantage, as it exists now, is to use windfall resource rents to build long-term technological capability as a safeguard against the uncertain evolution of global technologies.

Principles of the industrial vision

Saudi Arabia needs its own industrial strategy to take account of its unique history, culture and resource endowments. There is no "one size fits all" model for industrial development. The initial conditions of individual countries and the increasingly rapid evolution of global economic challenges require – indeed demand – country-specific strategies for optimal industrial development conducive to achieving rapid economic growth. Changes in the external environment (such as rapid globalization of trade and production, capital and financial market liberalization, the emergence of selected developing countries as major economic powers, and the digital revolution) and the initial conditions of a given country (such as resource endowment, stages of development, socio-economic, cultural and political systems) all determine the optimal type of industrialization strategy to be pursued.

An attempt to design an industrial vision for the Kingdom of Saudi Arabia should draw on the country's endeavours to develop a globalized, entrepreneurial and diversified economy. Such a vision should encompass the potential to break out of the high-risk status of a largely oil-based mono-economy, exploit commercially hitherto unexploited mineral resources and foster a pattern of diversified industrial development driven by knowledge, skills, technology, innovation – in particular – and partnerships. The vision should also enhance the empowerment of the Saudi people in the process, leading to an improvement in their welfare and standards of living.

Key development goals

Therefosre, the Kingdom's key development goals can be specified as follows:

1. To ensure stable, high growth rates and achieve balanced growth and prosperity for different regions within the Kingdom;

2. To diversify the economies of the sub-national regions in the Kingdom (see Annex 1.1);

3. To involve the private sector in economic and social development;

4. To strengthen the economy's capacity to withstand domestic and international changes in a flexible and effective manner;

5. To reduce reliance on the extraction and export of oil and to maximize the value added of natural resources;

6. To diversify the sources of national income through the expansion of other productive sectors such as industry, services and agriculture;

7. To improve employment opportunities for Saudi nationals and reduce the private sector's dependence on expatriate labour;

8. To expand investment in infrastructure;

9. To integrate Saudi industry into the global industrial market following the KSA's entry to the WTO at the end of 2005;

10. To keep up with scientific and technological developments and promote scientific research and development, innovation, education and training and the dissemination of knowledge and technology;

11. To increase private and public investment in research and development, building on the proud history of science in the Islamic world;

12. To create a talented entrepreneurial industrial community capable of facing challenges and seizing opportunities;

13. To preserve the environment against pollution and ensure the optimal use of natural resources so as to guarantee prosperity for future generations;

14. To achieve regional economic integration with the Gulf Cooperation Council (GCC) member states as well as the wider Arab region and the world in general.

Manufacturing as the main engine of growth

An underlying premise of Vision 2020 is that manufacturing is critical to Saudi Arabia's future progress. Manufacturing is the main engine for deploying new technologies and stimulating innovation, which are both essential for success in the emerging world economy. Manufacturing is crucial to enhance exports and transform them from low value added products to higher-value, skill and technology-intensive products that grow more rapidly in world markets and can sustain faster income growth. Manufacturing is also vital for creating new skills and encouraging growth and technological change in other sectors, notably agriculture, finance, construction and modern services, including the management of environmental quality. Manufacturing capability development and external linkages interact positively: skills and capabilities develop faster and better if they can draw upon the knowledge, technologies and quality standards provided by export markets and if they are exposed to global competition. Moreover, manufacturing in general is a more attractive source of economic growth than the financial sector, because the latter is far less labour intensive.

Global experience highlights the fact that industrial development requires collaborative efforts, involving both the private and public sector, to bring about a significant industrial leap in a short period of time as a base for sustainable economic development. Moreover, given the KSA's high rate of population growth, maintaining growth in per capita income requires drastic increases in investment in high-growth industries. Furthermore, it entails targeting a major change in the structure of industrial value added, in the direction of industries with higher technological content.

Industrial vision, private sector development and partnerships for world class competitiveness

Thus, the National Industrial Strategy is based on the following vision for Saudi industry:

"A globally competitive industry based on innovation and acting as a base for transforming the Kingdom's natural and human resources into sustainable wealth and employment creation."

Private enterprise competitiveness will define the ability of Saudi industry to grow, create new jobs and increase exports. Now that the Kingdom has achieved membership of the WTO, competitiveness is crucial for all enterprises – not just exporters – because firms face intensifying competition in the domestic market. This means that the entire industrial value chain, from input and service suppliers to final producers, must become competitive for firms to survive. Becoming "sustainably competitive" does not mean taking the "low road", i.e. cutting wages or environmental standards, avoiding taxation or subsidizing uncompetitive firms. It means implementing long-term industrial strategies to improve efficiency and quality, raise skill and technology levels and move into higher-value products and services.

The National Industrial Strategy foresees "A globally competitive industry based on innovation and acting as a base for transforming the Kingdom's natural and human resources into sustainable wealth and employment creation".

Together with most other countries, the KSA believes that the vehicle for building global industries is the private sector. The aim is for all firms to produce goods and services competitively for domestic and international markets; some would join global value chains (Annex 1.2). Research shows that participation in internationally competitive markets is the best way of building economically significant human capital because it leads to faster technological learning and innovation through cluster networks. Hence the establishment of partnerships and international linkages, through networking with foreign firms and international research and development (R&D) centres, is essential for faster domestic innovation and technological learning.

Public goods necessary for industrial capability building

For firms to access the high-quality factor inputs needed to reach world-class competitiveness, the Government will need to build industrial capabilities through the supply of skills, finance, technological support and infrastructure and other support institutions. A major effort is needed to build up the right types of human resources and skills needed by industry to compete successfully in the rapidly changing global industrial stetting. This represents the overarching challenge for industrial strategies outlined in Chapter 5: "Enhancing domestic capability building for accelerated industrialization".

Building a competitive business environment

At the same time, private firms will not be able to upgrade technology and build industrial competitiveness without the provision of the public support necessary to develop a competitive business environment. This public support comprises the rules and institutions within which industrial firms operate: key factors are macroeconomic management, tax policy, trade policy, competition policy and a stable legal and regulatory environment for business (transaction costs, business regulations and labour laws). These determine the investment climate for private enterprise and are outlined in Chapter 6: "Improving the business environment for enhanced industrial performance, with special reference to SMEs".

Macroeconomic management is already effective in the Kingdom, but it is widely felt that many regulatory procedures are excessively bureaucratic, cumbersome and riddled with delays and inefficiencies in many governance structures relating to the regulation of business. While significant progress has been made by some organizations, it is essential that such streamlining and modernization be extended to all Government institutions.

Vital importance of innovation for technological upgrading

Manufacturing brings economic and social benefits by inducing faster accumulation of human capital – skill and capability – in individuals, firms and even society as a whole. In short, economic progress and human capital development are two sides of the same coin, as is shown by the experience of most advanced countries. The creation of a number of world-class industries and the building of human capability through sustained learning are mutually reinforcing processes that are the defining feature of all advanced economies today, ranging from Europe and the United States of America to the Republic of Korea, China and Finland. The accumulation of human capital means raising the technical, managerial and innovative capabilities of the working population through various learning processes, as outlined in Chapter 7: "Building up national and regional innovation systems".

Developing world-class industrial clusters

The creation of economically significant human resources as outlined above can only be realized by a sustained drive to position a select set of national industrial clusters at internationally competitive levels, similar to the petrochemicals industry today. Clusters – not industries – should become the main unit of policy analysis and delivery. The Kingdom needs to support the most viable clusters – those which promise the fastest growth of exports and offer the largest spillover benefits for technology and skill development. This would also reverse the secular declines in industrial productivity and boost per capita income growth. A strategy for developing and sustaining world-class industrial clusters is outlined in Chapter 8: "Promoting cluster–based industrial development for improved competitiveness".

A strategic framework for future industrial development

The KSA has already made some progress in diversifying its economy and stimulating industrial development, but at this crucial juncture – now that it has achieved WTO entry and is stepping up its efforts to integrate into the increasingly globalized world industrial economy – it is imperative to build a new framework for the future. Just as the KSA invested windfall wealth from previous oil booms in the creation of an excellent physical infrastructure, it should now harness its natural resource earnings to stimulate the development of a top-class human resource base and technological infrastructure and an investment-friendly business environment to support the development of dynamic industrial clusters capable of achieving sustainable growth.

Global changes are rapidly reshaping the world industrial map and constantly altering production features, making it more challenging to catch up in the global race for industrial competitiveness and innovation. Thus, rapid progress towards more complex technological paths and more diversified industries is crucial.

Structure of document

The industrial strategy of the Kingdom of Saudi Arabia for achieving the industrial vision presented in this document is structured as follows.

1. Part A: "The Kingdom of Saudi Arabia in the new global industrial setting" outlines the country context for industrial competitiveness and diversification in the new global industrial setting, together with an assessment of the KSA's position on the global map of industrial performance.

2. Part B: "Industrial strategies for diversification and competitiveness" presents, after a broad outline of the main principles and mechanisms, the four principal pillars of the industrialization strategy in terms of: i) enhancing domestic capacity building, ii) improving business environment and SME development, iii) developing the national innovation system and iv) building industry cluster-based development.

3. Part C: "Agenda for action" assesses the fifth, related pillar, and highlights recommendations for the governance and organizational structure for the implementation of the industrial strategies and concrete follow-up programmes.

Endnotes

1. Throughout this report, the term "industry" is used to refer to the broadly defined industrial sector – including mining and downstream oil-processing activities as well as industry-related service.

Chapter 2. Diversification and competitiveness in the new global industrial setting

2.1 Transforming oil revenues into sustainable economic growth

Given the importance of economic growth and its impact on living standards, the KSA must focus on economic strategies that create an environment that enables the economy to grow both rapidly and sustainably. Real GDP growth needs to be maintained at levels above population growth, in order to ensure sustainable growth in per capita income and in employment, both of which are overarching development objectives for the Kingdom (Endnote 1).

Fluctuating oil prices and volatile economic performance

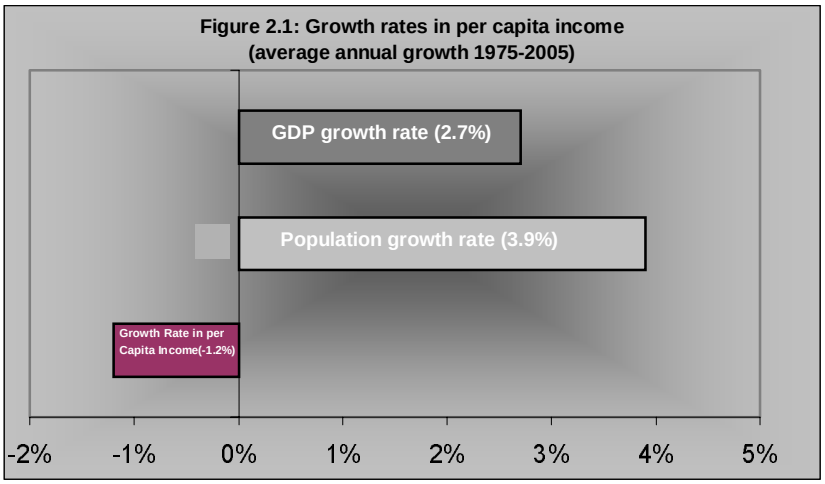
The windfall revenues from the oil wealth enjoyed by the KSA in the past have helped to improve living standards, develop infrastructure and attract investment. However, fluctuations in international oil prices have led to significant fluctuations in economic growth. The oil-related volatility that the Kingdom has experienced in the past has highlighted the dangers of relying on a single sector as the primary vehicle for growth, which at times subjected the economy to a decline in per capita GDP, as well as straining the State budget and hindering plans for financing infrastructure projects at times of lower oil prices. During the three decades from 1975 to 2005, annual real GDP growth was 2.7 per cent while the population grew at an average annual rate of 3.9 per cent; thus real GDP per capita declined by an average of 1.2 per cent annually during this period (Figure 2.1). Essentially, the reliance on oil means growth and living standards are vulnerable to unpredictable external factors, but there are ways in which national economic policy can reduce the dependence on oil and therefore lessen this vulnerability.

Reliance on oil means growth and living standards are vulnerable to external factors; there are ways in which economic policy can reduce dependence on oil and lessen this vulnerability.

During the period 2000-2005, overall GDP grew by an average of 4.2 per cent per year, and per capita GDP recorded annual growth of 1.7 per cent, as a result of robust international oil prices. However, the economy's recent performance would have been considerably weaker without the global economic developments that pushed oil revenues to record nominal highs. Indeed, if the effects of the oil price rise are taken out of the picture, and an alternative hypothetical scenario for 2003–2005 where each economic sector grew by its long-term trend growth rate is considered, real growth would have averaged only 2.9 per cent per year. This scenario is based on the following trend growth assumptions, based on the average annual growth of each sector from 1975–2002: production of crude oil and natural gas would have increased by 1.6 per cent annually during 2003–2005, while production of refined oil would have risen by 4.1 per cent, manufacturing by 7.1 per cent and other sectors (primarily services) by 2.8 per cent. It should be noted that with the exception of services, these growth assumptions are, in fact, relatively high compared with the real performance of these sectors since 1998. Yet, even under these relatively sanguine assumptions, without the surge in oil prices, per capita GDP would have risen by only 0.4 per cent per year between 2003 and 2005 – compared with the average of 4 per cent that was actually experienced as a result of the oil price boom.

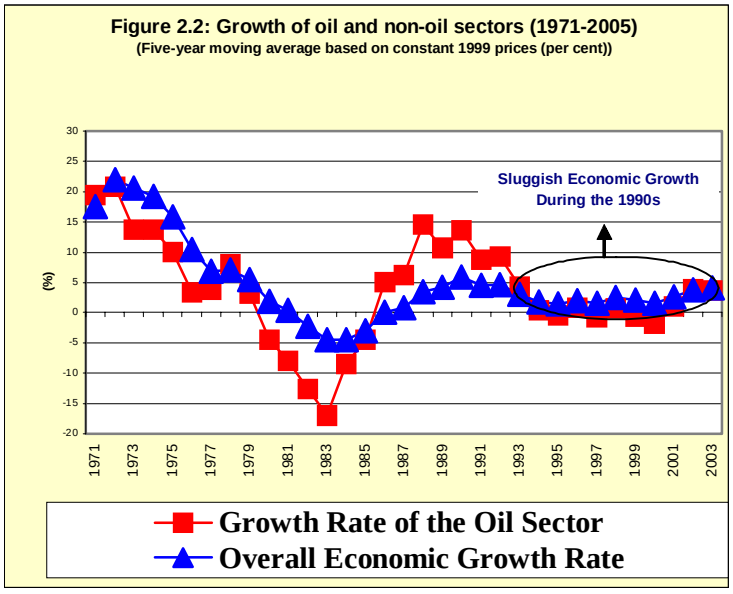
Need for new growth strategy from non-oil sector to maximize value added from oil wealth

Historically, the negative impact of fluctuations in oil revenues has been compounded by the inability of the non-oil sector to achieve high sustainable growth rates that would counter the negative effects on per capita income growth. Fluctuations in the rates of growth of output and, hence, income are highly correlated with the fluctuations in the oil sector.



Source: UNIDO 2006a, based on data provided by the Saudi Arabia Monetary Agency (SAMA).

As Figure 2.2 shows, in years when oil prices fell sharply, non-oil growth was not strong enough to prevent the economy from experiencing negative growth rates. Moreover, in the years when growth in the oil sector was negligible, GDP was almost stagnant despite the fact that the non-oil sector experienced some growth.



Source: UNIDO 2006a, based on data provided by the Saudi Arabia Monetary Agency (SAMA).

It is therefore argued that the main development dilemma facing the Kingdom, based on its historical growth experience, is how to develop a new growth strategy that is sustainable under the dominance of oil (Endnote 2). In this new growth strategy, oil revenues are expected to remain an important economic contributor, but they will be used to stimulate sustainable growth in other productive sectors that maximize the added value from oil wealth. Investment in human capital will be key, as is discussed in depth in Chapter 5.

In the new strategy, oil revenues will be used to stimulate sustainable growth in other productive sectors.

Traditionally, non-oil growth has been highly dependent on growth in the oil sector, which is in turn vulnerable to unexpected shifts in global prices. It is now critical for the KSA to develop the potential of the non-oil sector through an overhaul of its competitiveness to enable it to open up new horizons in international markets. In addition, the potential for future growth will be greater if the Kingdom can improve its non-oil exports to non-regional overseas markets, where purchasing power is less affected by oil market developments. These aims require a growth strategy that dovetails the interrelationships between the oil and non-oil sectors, to create a virtuous circle of sustainable growth based on economic diversification and competitiveness.

Need to generate new employment opportunities

Such a reorientation of economic strategy would also aim to generate new employment opportunities for the growing labour force and address the problem of unemployment, particularly among the younger generation of Saudi nationals. In the past, economic growth has been insufficiently rapid and too capital-intensive to absorb the fast-growing number of new entrants into the labour force. Moreover, a significant proportion of the labour market is dependent on expatriates and migrant workers, partly reflecting a mismatch between the skills possessed by Saudi nationals and the skills that domestic private industry requires. While the public sector has in the past absorbed much of the national labour force, this is not a sustainable strategy in the medium and long term. Improving employment opportunities means not only creating jobs, but providing nationals with skills suitable for rewarding, high value added work.

Table 2.1 Economic growth trends in key sectors of Saudi non-oil economy, 1971–2005 (per cent average annual growth rate)

Annual rate of growth in average/sector	1971-1975	1976-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005
Agriculture and fisheries	5.5	10.1	11.6	10.4	2.2	2.0	2.0
Manufacturing industries (excluding oil refining)	22.3	8.3	12.4	0.4	7.3	7.5	6.5
Trade, restaurants and hotels	22.9	17.7	5.8	(1.3)	2.2	6.6	4.6
Transport, storage and communication	12.0	9.1	6.0	(0.1)	3.3	3.5	7.4
Finance, insurance and real estate	27.8	7.7	0.3	(3.2)	(0.9)	3.3	4.3

Note: Numbers in parentheses indicate negative growth rates.
Source: Based on data provided by the Saudi Arabia Monetary Agency (SAMA).

Limitations of higher oil revenues for stimulating growth

The challenges facing the Saudi economy now, in the age of WTO membership, are very different from those encountered in the past and cannot be met by relying on oil as the main vehicle of growth. A proactive strategy for industrial diversification and competitiveness is therefore needed. Economic diversification in this context, however, does not imply reducing the contribution of oil in absolute terms, but rather developing a framework in which this important sector can be used to restructure the economy towards a more sustainable and more broadly based growth pattern.

This requires the promotion of non-oil economic activities as the main vehicle for multi-channel economic growth. The oil sector will remain important, but less through its impact on increasing production and purchasing power than to finance the creation of non-oil-sector production activities. One of the Kingdom's key strengths is its excellent physical infrastructure, the result of prudent public investments financed by past oil booms. However, human capital and technological infrastructure are weaker areas and levels of R&D spending are low by world standards. Oil revenue could be used to help address these weaknesses through new investment. Moreover, the abundance of oil and gas also offers Saudi industry a comparative advantage in terms of the availability of energy, which can be further exploited by harnessing more of the country's natural gas reserves and improving electricity output and distribution.

The need for diversification also applies to the energy sector. Developing alternative renewable energy is an area that the Kingdom could pay more attention to in the coming years, building on its existing experience and wealth of sunlight. Given the forecast for electricity demand growth in the next few years, it may be economically prudent to use more solar power for water desalination and where possible as a source of industrial power. This would leave more oil and gas to be used for exports, refining, petrochemicals and related processing industries.

Domestic industry needs to be integrated into global value chains, creating competitive and dynamic clusters, and generating synergies between the non-oil sector, research and development institutions, and the national innovation system.

Oil revenue can play an enhanced role in developing the non-oil economy to foster integration into the international industrial economy and the international knowledge system. This requires integrating domestic industry into global value chains, creating competitive and dynamic clusters, and generating synergies between the non-oil sector, research and development institutions, and the national innovation system, for the development of private-sector, small and medium-scale industry.

Such diversification strategies are being pursued by a number of other oil economies (Box 2.1).

Box 2.1 Diversification experience of selected oil-based economies, 1980–2004

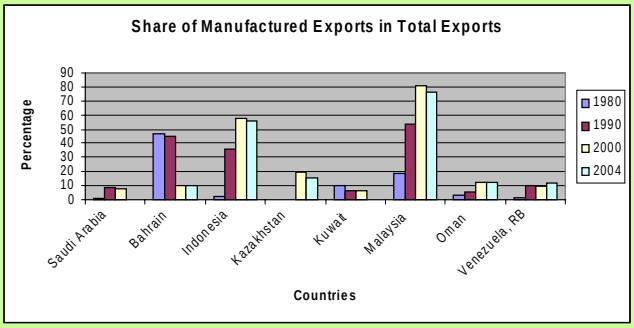
Bahrain: This country has the fastest-growing economy in the Arab world and has assigned high priority to diversification of the production base through development of the service sector, energy-intensive heavy industries, retail and tourism and as a main banking hub for the Gulf and centre for Islamic finance. Bahrain used modest oil revenues to build advanced infrastructure in transportation and telecommunications. As a result of diversification efforts, the financial sector now accounts for a greater proportion of GDP than oil. Aluminium is also a major export product.

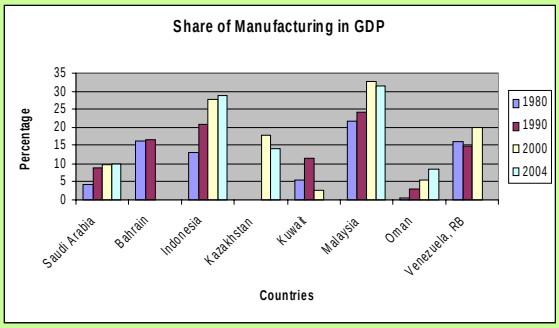
Indonesia: This country has successfully diversified away from heavy reliance on petroleum exports. At the same time, Indonesia has achieved a high level of refining and processing of petroleum, focusing on the production of high value added products for export. Much industrial development has been based on increased domestic processing of oil and gas and non-traditional manufactured exports. In the wake of declining oil reserves, the country has embarked on massive investment in the exploitation of renewable sources of energy. Product and export diversification marks the new era of diversification in Indonesia.

Kazakhstan: This country has adopted a strategy for industrial diversification and innovation development with emphasis on: diversifying from extraction-based development; fostering transition to a service, innovation and technology-based economy in the long term; creating a business environment that encourages the private sector to improve competitive advantage; increasing productivity in processing industries; promoting science-intensive and high-tech export industries; prioritizing manufactured exports that target the highest value added products in the value chain; developing international quality standards; and enhancing integration into the regional and global economy.

Kuwait: Accelerated diversification through development of the country's relatively small petrochemical sector is a key policy priority. So far, Kuwait has mainly manufactured low-value products such as urea, ammonia and fertilizers for export, but is now beginning to move upmarket with the production of higher-value products.

Malaysia: The economy has successfully diversified away from primary production and exports through the promotion of resource-based production, including new uses for crops, such as palm oil refining, and the development of export-oriented manufacturing, particularly electronics from enclave-type operations, using cheap labour.





Oman: This country has assigned top priority to the diversification of its oil-dominated economy. As part of a strategy to move to higher value added activities, it is proceeding with plans for large-scale, joint-venture, petrochemical investment projects for the production of polyethylene and fertilizers.

United Arab Emirates (UAE): The country has invested oil revenues in developing industries, services and human capital. Manufacturing activities include chemicals, basic metals and machinery. The country's dependence on oil has decreased but still remains relatively high. Oil revenues have also been used to share prosperity between emirates; although the vast majority of oil reserves are in Abu Dhabi, this revenue has helped to stimulate rapid growth in Dubai's non-oil economy, though other emirates have not achieved such dramatic expansion.

Venezuela: This country is promoting investment in support of economic diversification and liberalization in the natural resource sector. A key strategy is the modernization of the public sector and stimulating private-sector-led economic growth. However, dependence on oil has fallen only marginally as the country has not developed a diversified export base.

Note: Where data points are zero, figures are not available.
Source: Compilation by UNIDO.

Benefits of economic diversification

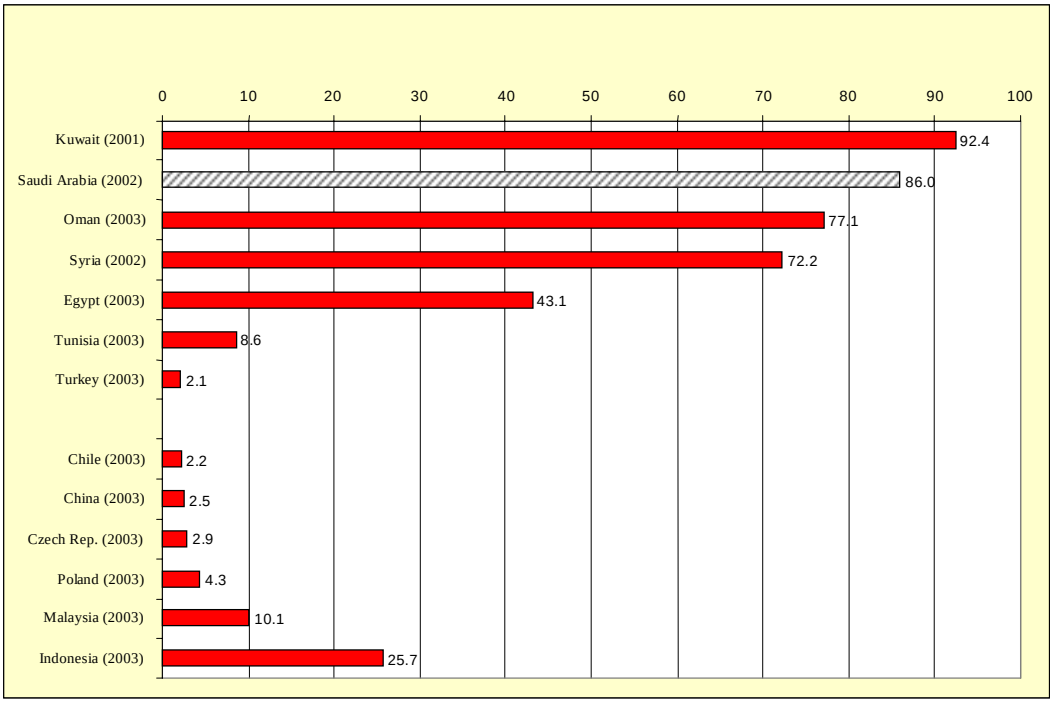
The benefits of reorienting the national strategy towards economic diversification and competitiveness would be manifold. They include the following.

1. Reducing the risk of relying on a single volatile sector as the main source of economic growth and income. A more diversified economic structure and production pattern would spread the risk from external shocks on the oil sector. Currently, the country has the highest dependency on oil exports in the Middle East and North Africa after Kuwait and possibly Iraq (Figure 2.3 and Endnote 3).
2. Promoting alternative development opportunities as sources of sustainable economic growth and development is necessary because of the volatility of oil prices and, in the longer term, the depletion of oil resources.
3. Unfolding new economic growth opportunities and investment prospects, with higher growth potential than traditional resource-based economic activities, will improve the overall economic and investment benefits.
4. Generating new employment opportunities for the growing labour force and addressing the problem of increasing unemployment, particularly among young people.

A wide range of new activities will be introduced to stimulate growth and expand the absorptive capacities of all sectors of the Saudi economy.

Economic diversification involves a structural shift in the economy towards a modern industrial sector, potentially serving as a dynamic source of growth and a major catalyst for sustaining future prosperity. The new strategy involves a novel system through which a wide range of new activities will be introduced to stimulate growth and expand the absorptive capacities of all sectors of the Saudi economy. This is discussed in the next section.

Figure 2.3: Share of oil exports in total exports in MENA and comparators (per cent), various years



Source: UNCTAD, Handbook of Statistics (2003).

2.2 Industry as a main vehicle for achieving sustainable economic growth

Industry as the strategic choice for sustainable economic diversification and growth

Despite the diverse economic structures in developing countries, the industrial sector has always been the engine for fostering economic structural change and serving as a catalyst for economic growth and sustainability. The industrial sector – including mining, downstream oil processing activities and industry-related services – should emerge as the key sector for sustaining high growth thanks to its dynamic interrelation with new technologies, innovation and knowledge, which are now the principal drivers of global economic growth. Indeed, international experience shows that industry-related services represent one of the most dynamic growth areas of most economies. In addition, the industrial sector enjoys various forward and backward linkages with other sectors, which are critical for overall economic growth. These include: mineral processing; basic metals; agriculture and agro-processing; infrastructure; tourism; and other related economic activities.

The pivotal role of industry as a potential engine of growth for the Saudi economy is reflected in its role in:

1. Applying new technologies to production;
2. Fostering and diffusing innovation;
3. Developing new skills and attitudes;
4. Promoting institutional development;
5. Generating industry-related services;
6. Creating dynamic comparative advantages;
7. Facilitating internationalization of the economy;
8. Modernizing enterprises; and
9. Creating beneficial spillovers for the economy as a whole thanks to extensive forward and backward linkages.

The role of industry as an engine of growth is described in greater detail in Box 2.2.

Diversified growth paths of various sectors linked to industry

The Kingdom needs an intelligent industrial strategy, not only to convert the proceeds of national wealth into investments that support industrial growth, but also to promote activities and partnerships through which such investments can accelerate growth in the broader economy. The potential for such growth to originate from different sectors varies greatly.

Industry-related services: The service sector is expanding rapidly in most economies and there is great potential for strengthening those services needed to meet the requirements of industry in the KSA. They include engineering consultancy, management consultancy, technology advisory services, computer application services, accountancy, marketing, distribution and logistics, all of which are crucial for the efficient operation of industrial enterprises. A strengthening of such industry-related services is of critical importance, both for promoting industrial diversification and for achieving greater competitiveness in the global economy, especially keeping in mind the intensified competitive pressures for efficiency gains and the associated need to draw on highly specialized industrial services with a high technological and innovative content. This is particularly important now that the Kingdom has entered the WTO.

Box 2.2 Industry as an engine of growth

Industry has long been the main source, user and diffuser of technical progress and associated skills and attitudes. No other productive activity comes close. Industry's special role can be understood only in a world of dynamic learning and technical change, where large enterprises strive to increase their size and capabilities to realize economies of scale and societies constantly transform their structures and habits. In this world, manufacturing is not just one ingredient of development – it is the essential ingredient.

Applying technological progress to production: Manufacturing is the main vehicle for applying technological progress to production. Agriculture also benefits from technical progress, but at a much slower pace. Manufacturing can apply a limitless variety of inputs and equipment. Moreover, many industrial technologies involve increasing returns to scale and offer enormous potential for further learning and incremental improvements. This is why the shift from low to high productivity activities always involves a shift from agriculture and traditional services to industry. In recent years, information and communication services have also attracted innovative activity, but this was only possible because of technological advances in the hardware of information processing and telecommunications.

Driving innovation: Manufacturing is the main source of innovation. Research and development (R&D) by private industrial enterprises accounts for the bulk of innovation in industrialized countries; these enterprises also finance significant R&D in universities and other laboratories. Moreover, formal R&D is only part of the technology development process. A significant portion occurs in the engineering, production, procurement, quality management and other departments of enterprises. The scope for such innovation is enormous in manufacturing, perhaps more so than in other activities.

Diffusing innovation: Manufacturing is often the hub for diffusing innovation to other activities, providing capital goods and transmitting new technical and organizational knowledge. Historically, the capital goods sector served as such a hub; today, the electronics industry is the hub. In particular, the use of information technologies by all activities involves the spread of new technologies, accompanied by close interaction between suppliers and users.

Developing new skills and attitudes: Manufacturing is a vital source of new skills and attitudes, transforming traditional economic structures. It creates an industrial work ethic, spreading the discipline and organization required in modern societies. It fosters entrepreneurial capabilities, with small enterprises as the springboard, and it develops new managerial and technological capabilities, the core of modernization and competitiveness.

Leading institutional development: Manufacturing has led the development of modern institutions and legal structures such as joint stock companies, accounting standards and corporate governance norms.

Producing beneficial externalities: The innovation and skills created by manufacturing provide benefits for other activities. Agriculture gains from richer consumers, better equipment and inputs, and improved storage, transport, distribution and processing facilities. Services gain from better equipment and skills.

Stimulating modern services: Manufacturing provides the direct demand that stimulates the growth of many modern services. It is often the largest customer for banking, transport, insurance, communications, advertising and utilities. It creates markets for new services and skills, particularly important for finance, education and logistics. It is also the source of new service enterprises, many of them originally part of manufacturing enterprises and hived off to provide design, logistics, maintenance, training and other services.

Generating dynamic comparative advantage: Manufacturing is the main source of dynamic comparative advantage, the shift from primary to more advanced – and generally more dynamic and higher value – manufactured exports. Manufacturing accounts for about 90 per cent of global visible trade, a share that has grown steadily over time. Terms of trade for manufacturers have also improved steadily. Although modern service exports are also growing, much of this growth comes from industrialized countries that have built modern skills and capabilities through manufacturing. Few countries are able to sell high-value services (excluding tourism) without first undergoing industrial development.

Internationalizing economies: The internationalization of an economy often follows the spread of transnational manufacturing corporations, banks, transport providers, advertisers and so on around the world to serve their customers. The current phase of globalization, with integrated facilities across countries, is led by manufacturing enterprises.

Modernizing enterprises: The exposure to foreign markets, enterprises, skills and practices that manufacturing brings can be the catalyst for modernizing national industrial enterprises, as in the Tiger economies of East Asia. Without industrial development, such modernization would not have been possible.

Source: UNIDO 2003.

Natural resource sector: With the Kingdom's great diversity of natural resources, including oil, gas and minerals, the real challenge is industry's ability to process these resources into competitive products through high value added activities that support and promote growth. In particular, the KSA's mineral wealth will benefit from a vibrant industrial sector capable of maximizing its value added through the manufacture of high-value exportable goods. The availability of the "inherited prosperity" of raw materials, however, may be either a blessing or a curse for competitiveness in the globalized industrial economy; there are many examples of countries with abundant natural resources that have been less successful in their industrialization efforts than those with fewer. What matters today in international competitiveness is "created prosperity" in the form of enhanced industrial capabilities using skills, knowledge, information and other drivers of industrial growth.

Agriculture: The agricultural sector in the Kingdom has been a major recipient of investment in the past. However, its continued development will depend crucially on success in developing new mechanisms for water desalination, which is a key issue for the whole economy. This in turn implies developing technologies for more efficient water desalination plants and for cheap energy, possibly including renewable energy sources such as solar energy (which the Kingdom has already begun to develop, drawing on its abundant sunlight). In addition, maximizing the value added of agricultural production depends on the development of technologies that allow its products to be used in the manufacture of high value added goods.

Tourism and transit trade: Tourism is a key sector in the Kingdom, with a positive impact on growth in the service sector. Saudi tourism has achieved prominence, both in terms of generating domestic value added and in terms of the enormous cultural and religious significance of the Hajj and Umrah pilgrimages for the whole Muslim world. There are opportunities for domestic industries to gain a greater role in serving the needs of the expanding sector, notably through construction, engineering and potentially the supply of building materials, which could generate more value added for the Kingdom. The challenge of generating sustainable growth requires effective industrial governance, both corporate and public, in a way that ensures the integration of different parts of the economic system, whereby industry will collaborate with other activities to ensure that the Saudi private industrial sector seizes all viable opportunities.

Such new opportunities for KSA industry are greatly influenced by the new global industrial realities for competitiveness. This is discussed in the next section.

2.3 The new global setting for industrial competitiveness and implications for Saudi Arabia

The new international setting for industrial competitiveness

Diversifying the economy of the KSA through industrial development in order to achieve greater competitiveness involves new and more complex challenges and opportunities. Specifically, the following trends in new global industrial realities stand out (see Yumkella 2005).

- *Industry is becoming more international* through the rapid globalization of production, trade, knowledge and finance. Worldwide, exports are growing faster than production. This has resulted in greater competition for markets, both domestic and export, and for resources and has led to greater pressures for productivity gains. Today, many industrial products are based on a network of decentralized production systems in different developing countries.
- *Building industrial capabilities is becoming the key driver for achieving competitiveness* based on the availability of skills, knowledge, technology, information, effective support institutions and R&D, as well as the ability to attract foreign direct investment (FDI) or engage in mergers and acquisitions (M&A), establish an efficient physical infrastructure, and create an enabling business environment, especially for small and medium-scale industries (SMEs).

- *Sustained productivity growth is the main source of industrial growth and competitiveness* and determines the scope for economically, environmentally and socially sustainable industrial development.
- *Technological innovation and upgrading* in such fields as information and communication technologies (ICT), bio-technologies, new materials technologies, nano-technologies and energy technologies, are assuming increasing importance for enterprise productivity, competitiveness and market access.
- *The distinction between industry and services is becoming blurred*. Specialized service companies are increasingly providing industry-related services, such as management, consultancy, engineering, export marketing, advertising, distribution, accountancy and insurance, previously undertaken by industry. Today, the service sector is one of the most rapidly growing sectors worldwide. In this context, the rapidly growing tradability of services with high skills-content is reshaping the global division of labour through specialization and outsourcing.
- *Stricter global norms* require compliance in *the field of environment* (Montreal and Kyoto Protocols), *intellectual property rights* and *international product and process standards*. Two main WTO agreements on technical barriers to trade (TBT) and on sanitary and phyto-sanitary measures (SPS) play a critical role in international trade and imply a need for trade capacity-building measures.
- *Innovative enterprise structures, enterprise collaboration, networking and business practices* are emerging within industry and in cross-border enterprise cooperation, such as clusters, global value chains, outsourcing, flexible manufacturing, just-in-time delivery and the use of ICT for enhancing enterprise productivity and competitiveness.
- *Greater importance is being attached to good public governance* on the one hand and *efficient corporate governance* on the other. In this connection, importance is being placed on trust-based *public-private partnerships* for development.
- *Widespread liberalization of international trade, markets and capital flows* is occurring, as well as *deregulation, privatization* and the dominance of the *private sector* as the lead actor for industrial development. A continued suspension of the *Doha global trade negotiations* is likely to lead to an increase in bilateral and regional trade agreements.

Implications of the new international setting for Saudi industry

These multifaceted trends in the international setting for industrial development are not all new. However, the intensity and speed of change is accelerating rapidly, posing formidable challenges to the Saudi industrial economy, especially after its entry to the WTO. The bilateral and regional trade agreements that the Kingdom plans to sign as part of the Gulf Co-operation Council, including the agreements negotiated with the EU and Japan, will further increase competitive pressures.

These formidable challenges indicate that Saudi industry needs to adapt continuously to the new industrial realities in order to compete in the globalized industrial economy. This requires, firstly, constant improvement in the performance of Saudi industry in terms of accelerating manufacturing value added (MVA), expanding manufactured exports in relation to GDP and total exports and deepening the technological content of MVA and of manufactured exports. Secondly, it requires investing in and continuously upgrading the industrial capabilities necessary to meet the new challenges in terms of skills, knowledge, technology, foreign direct investment and modern infrastructure.

These issues are discussed in the next chapters. First, a survey of Saudi Arabia's industrial performance in an international perspective is presented in Chapter 3. A statement of principles and mechanisms of the national industrial strategy for Industry 2020 is presented in Chapter 4 followed by analysis in Chapters 5–8 of the four principal pillars of the industrial strategy: capabilities, the business environment, innovation and cluster development. Chapters 10 and 11 consider the fifth, related, pillar of how to apply new forms of industrial governance for the implementation of the strategy.

Endnotes

1. Parts of Section 2.1 of this Chapter draw on UNIDO 2006a.

2. The share of KSA oil-based sectors (comprising crude petroleum, natural gas and petroleum refining) in GDP oscillated between 26.6 per cent in 1998 and 51.2 per cent in 2005, based on current prices (see: http://webserver.planning.gov.sa/I-mop/home).

3. According to the IMF, oil made up 97.5 per cent of Iraq's exports in 2004. However, data on the Iraqi economy should be treated with caution as the poor security situation and large informal economy mean data collection is very weak. Oil dependence was nearly as high in Yemen as in Saudi Arabia, with crude oil accounting for 85.4 per cent of exports in 2002, based on Central Bank figures. However, these figures are likely to understate the level of non-oil exports, as there is a large informal economy and a lot of cross-border smuggling.

Chapter 3. Saudi Arabia on the global map of competitive industrial performance

3.1 Measuring industrial performance

There are various ways of measuring a country's industrial performance. These include: the intensity of industrialization; the technological structure of exports; industrial deepening over time; productivity growth; and product and market diversification. The rapid pace of globalization and the internationalization of production processes mean that export performance needs particular emphasis when considering overall industrial competitiveness. The following six indicators are especially important for assessing competitive industrial performance (Endnote 1 and Annex 3.1):

(i). MVA per capita;
(ii). Manufactured exports per capita;
(iii). Share of MVA in GDP;
(iv). Share of manufacturing in total exports;
(v). Share of medium and high-tech products in MVA;
(vi). Share of medium and high-tech products in manufactured exports.

While it is important to trace improvements in Saudi industrial performance over time, it is also necessary to benchmark its performance in comparison with other countries, to shed further light on the relative strengths and weaknesses of Saudi industry and its support factors. For the purpose of this report, Egypt, Jordan, Morocco, Tunisia and Turkey were chosen as regional comparators and Brazil, Chile, China, Czech Republic, India, Indonesia, Malaysia and the Republic of Korea as international comparators. These countries represent a balanced mix of emerging economies in terms of their level of development, resource base and market size, as well as level of competition, offering some guidance on possible development paths for the Kingdom.

Improved position on the global map of industrial competitiveness

The KSA has achieved significant improvements in its ranking on the global ladder of industrial performance during the last 20 years, where it was among the world's winners in terms of improving its competitive industrial performance. Its rank on the UNIDO Competitive Industrial Performance Scoreboard rose by 18 places in the period 1980-2000 (Table 3.1).

In the period 1980–2000, the greatest gains on the (UNIDO 2005d) scoreboard were made by Indonesia (37 places), Malaysia (25 places), Thailand (24 places), Egypt (24 places), Costa Rica (22 places), Nepal (19 places) and Saudi Arabia and Jordan (18 places). Many successful economies have achieved rapid rises in manufactured exports and substantial upgrading of the technological structure of exports through export-oriented FDI. The main determinant of sustained success appears to be the ability to develop exports by tapping into global value chains. This can be achieved either by building strong domestic capabilities or by attracting export-oriented FDI. Both these strategies have been used extensively, in some cases as alternatives; the Republic of Korea and Taiwan Province of China chose to build domestic capabilities while Malaysia chose the FDI route, but over time there has been a convergence between the two strategies.

Table 3.1 Changes in Competitive Industrial Performance Index rankings of core group (arranged by 2000 ranks), 1980, 1990 and 2000

2000 rank	*Economy*	*Change in rank*			*2000 rank*	*Economy*	*Change in rank*		
		1990-2000	*1980-1990*	*1980-2000*			*1990-2000*	*1980-1990*	*1980-2000*
1	Singapore	0	1	1	47	Mauritius	-6	3	-3
2	Ireland	7	10	17	48	Egypt, Arab Rep.	4	20	24
3	Switzerland	-1	-1	-2	49	Pakistan	-2	6	4
4	Finland	3	1	4	50	Uruguay	-10	5	-5
5	Sweden	0	-1	-1	51	Cyprus	-5	-9	-14
6	Japan	-2	1	-1	52	Morocco	-7	17	10
7	Germany	-4	0	-4	53	Trinidad and Tobago	14	-19	-5
8	Belgium-Luxembourg	-2	0	-2	54	French Guiana	-1	11	10
9	Taiwan Province of China	6	3	9	55	Zimbabwe	-13	-7	-20
10	Korea, Rep. of	8	5	13	56	Bangladesh	1	-8	-7
11	United States	3	-1	2	57	Reunion	-6	0	-6
12	Austria	-4	3	-1	58	Dominica	-2	-10	-12
13	Netherlands	-3	-3	-6	59	Guatemala	-4	2	-2
14	France	-2	-3	-5	60	Senegal	9	-6	3
15	Malaysia	8	17	25	61	Colombia	-3	0	-3
16	Italy	-5	-1	-6	62	Sri Lanka	17	-1	16
17	United Kingdom	-4	-1	-5	63	**Saudi Arabia**	0	18	18
18	Canada	-1	0	-1	64	Chile	-2	-12	-14
19	Denmark	-3	-2	-5	65	Peru	3	-27	-24
20	Hungary	4	6	10	66	Venezuela	-6	8	2
21	Israel	0	-1	-1	67	Bolivia	10	-17	-7
22	Spain	-3	2	-1	68	Fiji	-7	-9	-16
23	Thailand	9	15	24	69	Nepal	3	16	19
24	China	2	13	15	70	Martinique	-5	0	-5
25	Philippines	18	-1	17	71	Syrian Arab Republic	-21	27	6
26	Mexico	3	2	5	72	Algeria	2	10	12
27	Hong Kong, China	-7	-4	-11	73	Oman	9	-12	-3
28	Portugal	-3	0	-3	74	Libyan Arab Rep.	13	4	17
29	Poland	-1	-6	-7	75	Honduras	10	2	12
30	Norway	-8	-7	-15	76	Ecuador	5	-14	-9
31	Brazil	-4	-3	-7	77	Seychelles	-6	19	13
32	Costa Rica	27	-5	22	78	Jamaica	-5	-2	-7
33	Turkey	2	-9	-7	79	Kenya	-13	0	-13
34	New Zealand	-4	-2	-6	80	Haiti	-16	5	-11
35	South Africa	9	-8	1	81	Togo	9	-1	8
36	Australia	-5	-4	-9	82	Papua New Guinea	-6	4	-2
37	Argentina	-3	-1	-4	83	Madagascar	5	-2	3
38	Indonesia	16	21	37	84	Panama	-9	1	-8
39	Iceland	-6	-1	-7	85	Nicaragua	-2	-4	-6
40	India	-4	2	-2	86	Paraguay	0	-4	-4
41	Greece	-4	-3	-7	87	St. Lucia	-3	-11	-14
42	Kuwait	28	-27	1	88	Cameroon	-8	3	-5
43	Jordan	-5	23	18	89	Malawi	-11	-4	-15
44	Barbados	-5	-10	-15	90	Yemen	2	-33	-31
45	El Salvador	3	8	11	91	Ethiopia (incl. Eritrea)	2	-1	1
46	Tunisia	3	6	9	92	Central African Rep.	-1	-6	-7
					93	Mali	-4	4	0

Source: UNIDO Industrial Scoreboard database.

The KSA has achieved significant improvements in its ranking on the global ladder of industrial performance during the last 20 years.

More recent data, for 2002, (UNIDO 2005a) suggest that Saudi Arabia is well positioned on the UNIDO *technology advance index*, ranking 38 out of 99 countries (Table 3.2), and has the highest rank among regional comparators such as Turkey, Jordan, Oman, Egypt, Morocco, Tunisia, Algeria, Qatar, Kuwait and Bahrain. As compared with international comparators the KSA ranked above countries such as India and Indonesia. However, its rank on the *industrial advance index* was lower than on the *technology advance index* and declined between 1990 and 2002, confirming the need for accelerated diversification towards industrial development. Unfortunately inter-country comparative data are unavailable for later years.

Table 3.2 Industrial-cum-technological advance (ITA) (2002)

	ITA index		Industrial advance (ι)		Technological advance (τ)	
	Value	Rank	Value	Rank	Value	Rank
Singapore	0.520	1	0.625	6	0.832	1
Malaysia	0.457	2	0.646	2	0.707	3
Japan	0.456	3	0.590	13	0.772	2
Korea, Rep.	0.439	4	0.652	1	0.674	7
Taiwan Province of China	0.410	5	0.632	3	0.649	10
Germany	0.407	6	0.589	14	0.690	6
Hungary	0.396	8	0.626	5	0.633	13
Ireland	0.389	9	0.593	12	0.657	8
Switzerland	0.389	10	0.604	9	0.644	12
United States	0.371	11	0.529	27	0.702	4
Sweden	0.370	12	0.570	18	0.649	11
Philippines	0.362	13	0.602	10	0.601	14
United Kingdom	0.353	14	0.509	35	0.694	5
Finland	0.334	15	0.597	11	0.560	21
China	0.324	16	0.631	4	0.515	27
Mexico	0.320	17	0.533	26	0.599	16
France	0.315	18	0.525	28	0.600	15
Thailand	0.311	19	0.605	8	0.514	28
Austria	0.311	20	0.550	22	0.565	20
Netherlands	0.308	21	0.515	34	0.599	17
Italy	0.308	22	0.586	16	0.527	26
Israel	0.307	23	0.564	20	0.545	24
Spain	0.297	24	0.522	29	0.568	19
Belgium	0.291	25	0.522	31	0.558	22
Canada	0.284	26	0.484	39	0.587	18
Brazil	0.252	27	0.478	42	0.528	25

Table 3.2 Industrial-cum-technological advance (ITA) (2002)						
	ITA index		Industrial advance (ι)		Technological advance (τ)	
	Value	Rank	Value	Rank	Value	Rank
Denmark	0.250	28	0.451	51	0.555	23
Hong Kong SAR	0.247	29	0.518	33	0.477	30
Poland	0.236	30	0.554	21	0.426	36
Costa Rica	0.218	31	0.461	46	0.473	32
Portugal	0.209	32	0.548	23	0.382	42
South Africa	0.206	33	0.419	54	0.491	29
Turkey	0.199	34	0.546	24	0.365	44
India	0.198	35	0.508	36	0.391	41
Indonesia	0.194	36	0.519	32	0.374	43
Romania	0.171	37	0.581	17	0.295	54
Jordan	0.159	38	0.460	48	0.347	47
Argentina	0.153	40	0.362	63	0.423	37
Greece	0.137	41	0.455	50	0.302	52
Pakistan	0.129	42	0.570	19	0.226	63
El Salvador	0.129	43	0.468	45	0.275	56
Tunisia	0.127	44	0.522	30	0.244	61
New Zealand	0.127	45	0.405	57	0.313	51
Australia	0.125	46	0.275	77	0.454	34
Egypt	0.124	47	0.483	41	0.257	59
Morocco	0.115	50	0.460	49	0.249	60
Cyprus	0.114	51	0.435	53	0.263	58
Zimbabwe	0.107	52	0.272	78	0.395	40
Norway	0.106	53	0.225	87	0.471	33
Senegal	0.104	54	0.370	62	0.281	55
Guatemala	0.104	55	0.301	70	0.344	48
Colombia	0.097	56	0.280	75	0.347	46
Uruguay	0.093	57	0.461	47	0.202	67
Grenada	0.079	58	0.387	60	0.204	66
Bangladesh	0.072	60	0.541	25	0.134	91
Bolivia	0.070	61	0.359	64	0.197	68
Chile	0.070	62	0.237	83	0.297	53
Venezuela	0.067	63	0.277	76	0.243	62
Sri Lanka	0.065	64	0.477	43	0.137	90
Trinidad and Tobago	0.063	65	0.477	44	0.133	92
Saudi Arabia	0.060	66	0.144	96	0.420	38
Peru	0.057	69	0.307	69	0.184	72

Table 3.2 Industrial-cum-technological advance (ITA) (2002)

	ITA index		Industrial advance (ι)		Technological advance (τ)	
	Value	Rank	Value	Rank	Value	Rank
Nepal	0.056	70	0.405	56	0.139	88
Mauritius	0.054	71	0.587	15	0.092	102
Algeria	0.053	72	0.327	66	0.163	77
Honduras	0.046	73	0.247	80	0.187	70
Kenya	0.044	74	0.240	82	0.184	73
Bahrain	0.043	75	0.483	40	0.088	103
Oman	0.040	76	0.116	100	0.341	49
Qatar	0.038	77	0.289	73	0.131	93
Togo	0.038	78	0.250	79	0.150	82
Kuwait	0.037	79	0.373	61	0.100	98
Jamaica	0.035	81	0.233	84	0.151	81
Fiji	0.034	82	0.445	52	0.077	105
Ecuador	0.033	83	0.222	89	0.149	83
Panama	0.031	84	0.217	90	0.142	86
Madagascar	0.028	85	0.301	71	0.094	100
Nicaragua	0.026	86	0.193	91	0.138	89
Cameroon	0.026	87	0.222	88	0.119	96
Papua New Guinea	0.026	88	0.314	67	0.083	104
Central African Republic	0.025	89	0.158	93	0.159	80
Malawi	0.024	90	0.151	94	0.162	78
Libyan Arab Jamahiriya	0.024	91	0.191	92	0.127	95
Paraguay	0.022	92	0.229	85	0.097	99
Syrian Arab Republic	0.021	93	0.225	86	0.094	101
Haiti	0.018	94	0.414	55	0.045	108
Nigeria	0.012	96	0.025	105	0.474	31
Yemen	0.009	97	0.056	103	0.161	79
Ethiopia	0.005	98	0.093	101	0.051	107
Mali	0.002	99	0.058	102	0.041	109

Note: The 90 countries shown in this table meet two criteria. Firstly, data are available for both 1990 and 2002. Secondly, their population size exceeded 5 million in the year 2000.
Source: UNIDO 2005a.

The *Industrial-cum-Technological Advancement (ITA) index*, intended as a proximate assessment of the part that industry and technology play together in production and trade, is a compound of four structural indicators first combined into two partial indicators and then into a single structural index. *The industrial advance indicator* is defined as the arithmetic mean of the share of manufacturing in GDP and the share of manufactures in total exports. *The technological advance indicator* is obtained as the arithmetic mean of the share of medium or

high-technology activities in MVA and the corresponding share in exports. The indicators reflect not the level but the orientation of industrial activity, which is best described by the ITA. The ITA value for a given economy is expected to help gauge the impact that industrial-cum-technological advance is likely to have on its development. While assessing the compound weight of industry and technology is of prime interest, another goal of the analysis is to disentangle the contributions made separately by industrial advancement and technological advancement, as well as to appraise the respective parts of production and trade.

The ranking of the KSA in the subcomponents of the UNIDO Competitive Performance Index (CIP) shows that it is well positioned in both MVA per capita and manufactured exports per capita, ranking 49 and 51 respectively out of 156 countries in 2002 (Table 3.3). The very high ranking of 5 on the share of medium and high-tech products in MVA is a remarkable achievement and is mainly due to petrochemicals. This is in sharp contrast to the two subcomponents that deal with the share of MVA in GDP and the share of manufactures in total exports, where the KSA's rankings are 117 and 128, respectively. Moreover, the advanced technology structure of MVA, as reflected in the share of medium and high-tech production in MVA, has not permeated the technology structure of manufactured exports where the KSA is positioned at rank 91. These subcomponents are discussed in more detail below.

Table 3.3 Rankings of the KSA in the subcomponents of the UNIDO Competitive Industrial Performance Index, 1990 and 2002 (out of 156 countries)

Indicator	Rankings UNIDO CIP subcomponents	
	1990	2002
MVA per capita	53	49
Manufactured exports per capita	38	51
Share of MVA in GDP	127	117
Share of manufacturing in total exports	82	128
Share of medium and high-tech prod. in MVA	20	5
Share of medium and high-tech products in manufactured exports	64	91

Note: The 2002 rankings are based on provisional calculations and contain informal estimates (unofficial data).
Source: UNIDO Industrial Scoreboard database.

3.2 MVA and manufactured exports per capita

In 2003, MVA per capita amounted to US$941 in 1995 prices compared with US$676 in 1993. The absolute level was the highest among regional comparators and compares very favourably with comparators outside the region, exceeded only by the Republic of Korea, Czech Republic and Malaysia. The average real annual growth rates (AAGR) of MVA per capita over 1993–1998 and 1998–2003 were 7.3 per cent and 5.8 per cent, respectively. The latter growth rate compares favourably with both regional and international comparators, being exceeded only by Republic of Korea, Malaysia, Jordan and Egypt (Table 3.4).

Manufactured exports in the KSA have grown rapidly since 1985 and reached an average annual growth rate of 11.6 per cent during 1995–2005, exceeded only by Czech Republic, Turkey and India, and similar to the growth rate achieved by Egypt. Manufactured exports per capita reached US$1,476 in 2005, which is higher than the corresponding level in all comparators except the Republic of Korea, Czech Republic and Malaysia.

Table 3.4 MVA and manufactured exports per capita, 1993, 1998, 2003 and 2005

	MVA per capita (1995 US$)			MVA		Manufactured exports per capita (US$)			Total manufactured exports	
	1993	1998	2003	A.A.G.R. 1993-1998 (%)	A.A.G.R. 1998-2003 (%)	1985	1995	2005	A.A.G.R. 1985-1995 (%)	A.A.G.R. 1995-2005 (%)
Saudi Arabia	676	805	941	7.3	5.8	369	649	1,476	9.8	11.6
Jordan	190	204	242	4.2	6.7	164	293	622	11.0	10.6
Morocco	217	233	257	3.2	3.7	56	121	272[a]	10.3	10.9[a]
Egypt	148	189	236	7.3	6.2	9	33	75[a]	16.0	11.6[a]
Tunisia	345	420	515	5.7	5.3	115	538	856[a]	19.2	6.5[a]
Turkey	489	574	583	6.4	1.5	115	301	800[a]	12.4	13.4[a]
Brazil	838	849	850	1.8	1.7	129	219	458	7.2	9.2
Chile	687	767	758	4.2	1.3	102	500	947[a]	19.3	8.7[a]
Czech Republic	978	1,357	1,736	7.9	5.2	--	1,879	6,077[a]	--	13.8[a]
India	50	67	82	8.2	5.6	8	27	64[a]	14.9	12.0[a]
Indonesia	205	246	285	6.5	4.4	24	151	247	22.4	6.5
Malaysia	978	1,202	1,608	8.8	7.5	550	3,183	4,683	22.4	6.2
Republic of Korea	2,638	3,278	5,062	6.1	9.1	712	2,643	5,747	15.2	8.8

Note: A.A.G.R. refers to the average annual real growth rates of total MVA (based on constant 1995 prices) and the real growth rates of total manufactured exports (based on 2000 constant prices).
a) Data refer to 2004 instead of 2005, and 1995–2004 as opposed to 1995–2005.
Sources: UNIDO Database (2005); World Bank, WDI Online (accessed 20 October 2006); and UNIDO calculations based on data from the UN Comtrade Database, accessed via World Integrated Trade Services (WITS), World Bank, October 2006.

Industrialization intensity

The degree of industrialization (Endnote 2), measured by the share of MVA in GDP, in the Kingdom rose modestly from 8.8 per cent in 1970 to 10.1 per cent in 2004 (Annex 3.2). However, it remains lower than the level reached in all comparator countries. This low share reflects the dominance of the oil economy.

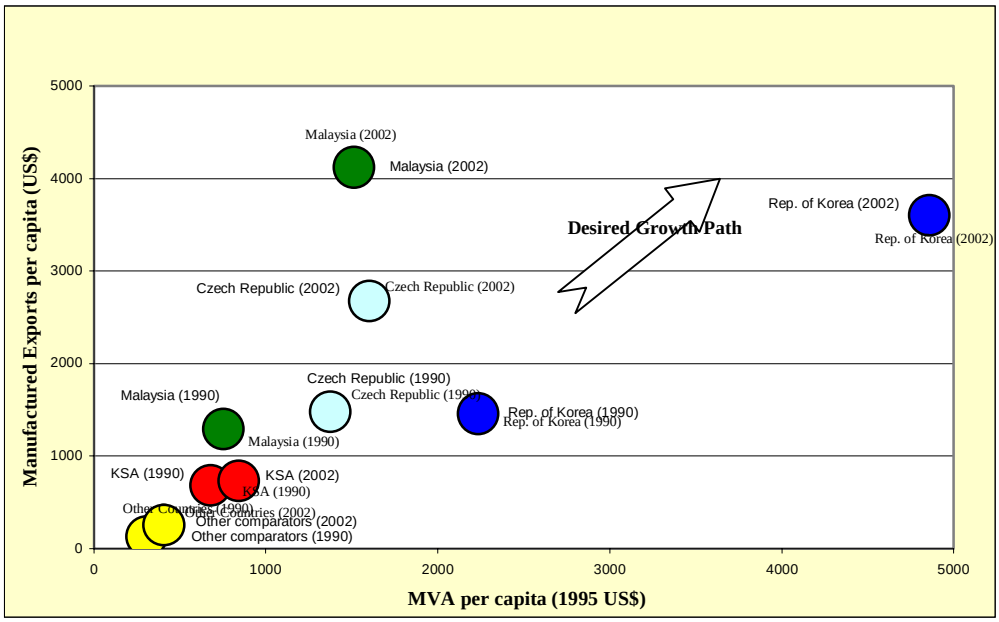
MVA per capita compares very favourably with comparators outside the region in absolute value.

Unlike the impressive developments in countries such as Indonesia and Malaysia, which were able significantly to deepen their industrialization process and expand the share of MVA in their GDP, the share of MVA in GDP in the KSA has expanded very slightly since 1970. Indonesia and Malaysia have successfully diversified their economies through industrialization, increasing their respective shares of manufacturing in GDP from 10.3 per

cent and 12.4 per cent in 1970 to 28.7 per cent and 31.4 per cent in 2004. In countries with a deeper industrialization drive, the share of MVA in GDP in 2004 was typically in the range of 14 to 19 per cent in regional comparators and 18 to 31 per cent in the group of international comparators. Another notable feature of the KSA is the large proportion of non-manufacturing, industrial value added stemming primarily from activities in the mining sector, in addition to construction and utilities such as electricity, water and gas.

Figure 3.1 indicates that the Saudi economy is moving along the right industrialization path, but neither far nor fast enough. Greater industrial deepening is needed both via rapidly rising MVA per capita and manufactured exports per capita, to lift the KSA into the upper reaches of the group of comparators.

Figure 3.1: MVA and manufactured exports per capita, 1990–2002, selected comparators



Note: Manufactured exports per capita are based on constant 2000 prices.
Source: UNIDO Industrial Scoreboard database.

Slow diversification means the share of MVA in GDP in the KSA has stagnated since 1970; but the share of medium and high-tech activities in MVA is high.

To assess the intensity of industrialization and the extent of the technological sophistication of the industrial base, it is worth noting that the KSA has managed to more than triple the share of medium and high-tech activities in MVA since 1980, reaching 65.3 per cent by 2002, which is the highest share among all regional and international comparators (Table 3.5).. This means that most of the improvement in MVA was driven by a rise in medium and high-tech activities. The achievement of such competitive strength is mainly attributed to industries based on cheap energy resources. The increase in the share of medium and high-tech industries (MHT) activities in MVA – currently surpassing all included comparators – is still unmatched by a corresponding increase in the share of MVA in GDP because of the slow pace of economic diversification.

Figure 3.2 below traces the development of industrialization intensity and reflects the peculiarity of the Saudi industrial structure. The Kingdom has the lowest share of MVA in GDP, but at the same time it has the highest share of medium and high-tech activities in MVA. This reflects the dominance of energy-intensive, medium-tech industries such as petrochemicals, iron and steel and fertilizers in the industrial structure. The KSA's competitive edge in these industries stems primarily from the abundance of cheap energy resources.

By comparing its performance with those of other countries such as Indonesia, Egypt, Turkey and China, Figure 3.2 clearly indicates the desired direction of Saudi industrialization efforts. The KSA needs to increase the share of MVA in its GDP by diversifying away from primary oil and oil-related activities as rapidly as possible.

Export structure and technological upgrading

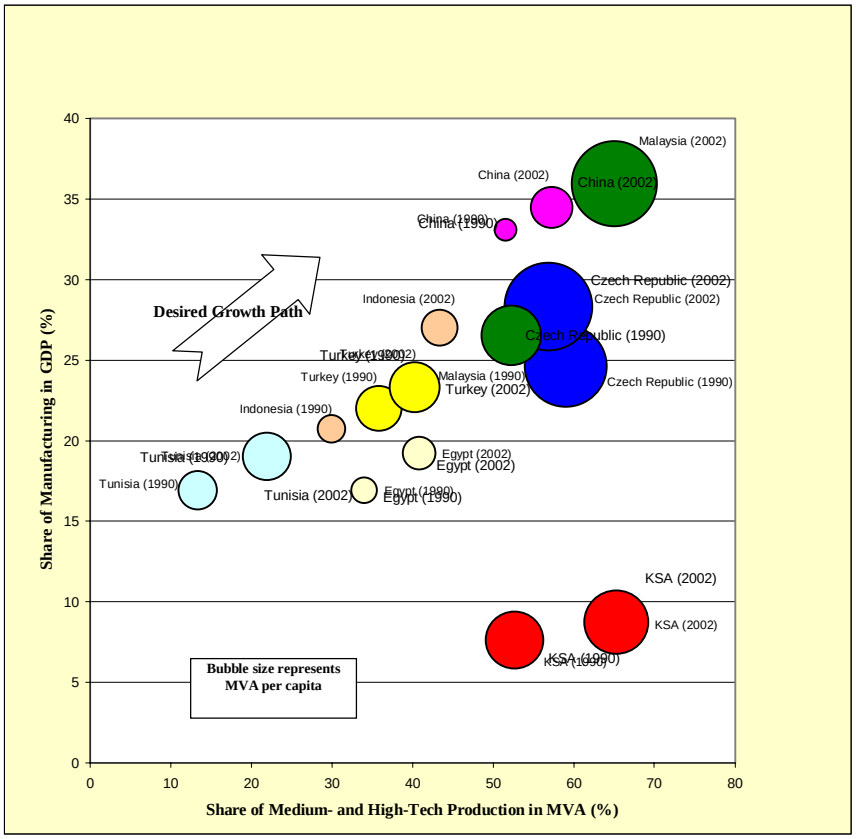
In the KSA, despite minor technological upgrading, the overall share of manufacturers in total exports declined from 23.8 per cent in 1990 to 20 per cent in 2000. In sharp contrast, the share of manufactured exports in total exports typically exceeded three-quarters in the comparator group, with the exception of Chile (Table 3.5).

Table 3.5 Indicators of industrial performance for the KSA and comparators, 1990 and 2002

	Share of manufacturing in total output (GDP) (%)		Share of manufacturing in total exports (%)		Share of medium and high-tech production in MVA (%)		Share of medium and high-tech products in manufactured exports (%)	
	1990	2002	1990	2002	1990	2002	1990	2002
Saudi Arabia	**7.6**	**8.7**	**23.8**	**20.0**	**52.7**	**65.3**	**16.6**	**18.7**
Jordan	16.1	17.7	52.4	74.4	29.5	28.8	59.1	40.5
Morocco	18.4	17.5	65.8	74.5	28.7	24.1	25.9	25.7
Egypt	16.9	19.2	63.3	77.5	34.0	40.9	10.2	10.4
Tunisia	16.9	19.0	76.9	85.4	13.4	22.0	24.0	26.8
Turkey	22.0	23.3	76.8	85.9	35.9	40.3	22.4	32.7
Brazil	22.5	18.8	75.1	76.8	51.6	54.1	40.0	51.5
Chile	18.5	14.1	24.0	33.2	42.5	39.0	15.2	20.4
China	33.1	34.5	76.0	91.6	51.6	57.3	34.4	45.6
Czech Republic	24.6	28.3	--	94.4	59.0	56.9	--	56.2
India	16.6	15.8	79.6	85.8	55.3	58.4	17.9	19.7
Indonesia	20.7	27.0	58.6	76.9	30.0	43.4	10.5	31.3
Malaysia	26.5	35.9	78.0	93.3	52.3	65.1	50.6	76.2
Rep. of Korea	28.8	33.9	96.2	96.5	55.1	64.1	52.9	70.6

Notes: The 2002 data for the share of medium and high-tech production in MVA refer to 2000 data. For the share of manufacturing in total exports and share of medium and high-tech products in manufactured exports, data for the year 2002 contain the following exceptions: Chile (2000); Czech Republic (2000); Egypt (2000); India (2000); Indonesia (2000); Jordan (2000); Rep. of Korea (2000); Malaysia (2000); Turkey (2001).
Source: UNIDO Industrial Scoreboard database.

Figure 3.2: Development of industrialization intensity, 1990-2002, selected comparators



Source: UNIDO Industrial Scoreboard database.

The share of manufactures in total exports has declined from 23.8 per cent in 1990 to 20 per cent in 2000.

Table 3.6 presents a technological breakdown of manufactured exports of the KSA and the group of comparators. The table displays the ratios of resource-based, low, medium and high-tech exports to total exports, but excludes the ratio of primary exports, which represent 80 per cent of total exports in the KSA (Endnote 3). The KSA's manufactured exports are dominated by resource-based exports (12.4 per cent of the total). The share of medium and high-tech exports is only 6.4 per cent, the lowest among all comparators with the exception of Chile. This is far below the world average of 31.7 per cent for medium and 22.3 per cent for high-tech manufactured exports. Many comparator countries, such as Malaysia, the Republic of Korea, Brazil, China, Indonesia, Turkey and Jordan, have succeeded in significantly upgrading their technological export structure since 1985.

Table 3.6 Evolution of the technological structure of manufactured exports (share of each group in total exports, per cent)

	1985				1995				2005			
	RB	LT	MT	HT	RB	LT	MT	HT	RB	LT	MT	HT
Saudi Arabia	13.6	0.6	2.9	0.1	16.0	1.7	6.8	0.1	12.4	1.2	5.9	0.5
Jordan	10.3	13.7	16.6	14.4	22.4	8.1	25.6	13.3	14.1	35.5	17.4	11.8
Morocco[a]	30.6	15.9	8.5	0.4	30.3	24.3	12.4	0.5	24.0	37.1	13.0	7.5
Egypt[a]	15.4	8.8	0.4	0.3	20.5	31.2	6.0	1.2	45.4	13.2	9.3	0.9
Tunisia[a]	14.1	22.2	14.0	1.1	16.6	53.6	14.7	3.2	15.9	46.4	20.9	4.6
Turkey[a]	15.9	38.6	17.1	1.2	16.5	47.9	19.2	2.4	11.8	40.6	31.7	6.9
Brazil	30.2	14.7	20.5	3.4	31.6	14.4	26.5	3.5	27.4	9.9	28.2	8.1
Chile[a]	29.7	0.7	2.2	0.1	38.0	2.8	4.1	0.4	41.9	1.9	5.1	0.5
China	9.2	10.0	2.9	1.2	11.1	46.3	18.9	13.0	8.3	31.5	22.0	33.2
Czech Republic[a]	--	--	--	--	18.8	29.4	33.1	8.3	12.5	21.9	41.5	18.5
India[a]	28.0	31.4	7.1	3.0	26.5	37.0	11.0	4.5	34.4	31.3	15.8	5.4
Indonesia	15.6	3.2	1.3	0.6	26.8	22.1	11.0	3.9	25.2	16.6	13.3	8.5
Malaysia	29.6	4.4	6.3	14.8	17.5	10.0	19.4	41.0	13.5	8.5	18.3	43.9
Rep. of Korea	8.2	39.7	35.7	12.2	7.6	20.9	36.1	30.7	11.5	11.0	39.6	35.4
World	**17.6**	**13.7**	**31.9**	**13.4**	**15.3**	**16.3**	**32.4**	**19.6**	**15.2**	**13.7**	**31.7**	**22.3**

Notes: RB stands for 'resource-based', LT for 'low-tech', MT for 'medium-tech', and HT for 'high-tech'.
Categories do not add up to 100% due to exclusion of the share of primary products in total exports.
a) Data refer to 2004 instead of 2005.
Source: UNIDO, calculated from the UN Comtrade Database, accessed via World Integrated Trade Services, World Bank, October 2006.

Between 1995 and 2005, there was no significant change in the technological structure of the Kingdom's exports. The shares of resource-based, low and medium-tech exports witnessed a mild decline, while that of high-tech exports increased only slightly. In other comparators, such as Tunisia, Turkey, China, Czech Republic and Poland, there is evidence of technological upgrading with a noticeable shift away from primary and resource-based exports, as well as a gradual shift from low-tech to both medium and high-tech exports.

The significant technological upgrading in terms of MVA, described earlier, has therefore not permeated Saudi export performance. KSA exports remain dominated by resource-based exports, reflecting heavy dependence on oil and oil-related products. Thus, the increase in the intensity of industrialization in medium-tech industries, which are mostly dominated by the public sector, has not been matched by an equally marked change in export orientation. Most production is consumed domestically, except for petrochemicals, which have a clear outward-oriented production strategy.

The worrying signs for Saudi industrial performance do not stem so much from the intensity of industrialization as from the structure and level of technological upgrading. Available indicators suggest that Saudi exports rely heavily on primary products and resource-based manufacturing activities and are largely failing to make use of the technological capabilities that exist in the domestic economy. These technological capabilities represent a largely untapped resource for the export sector and could be used with a little more strategic planning.

Technological upgrading in terms of MVA has not permeated export performance. KSA exports remain dominated by resource-based exports, reflecting heavy dependence on oil and oil-related products.

The growth rates of different technology categories of manufactured exports, in comparator countries and the world in general, with a few exceptions, have tended to fall between the periods 1985–1995 and 1995–2005. In both periods, high-tech exports witnessed the highest growth rates for the world as a whole. Comparatively, growth rates for KSA medium and high-tech exports have been rather strong in both periods (Annex 3.3), but their share in total exports remains negligible.

During the 1990s, the KSA did not make rapid progress on the desired growth path as the share of manufactured exports in total exports declined while that of MHT products in manufactured exports witnessed only a modest increase.

With regard to technological upgrading, Figure 3.3 shows that the Asian Tigers, China, Malaysia, Indonesia and Turkey are on a progressive industrial path. In a decade, they managed both to increase the share of manufactured exports in total exports and to embark on significant technological upgrading in manufactured exports**.** Tunisia has managed to expand its manufactured exports base, but is still facing competition entering niche markets for high-tech exports.

3.3 Product and market diversification

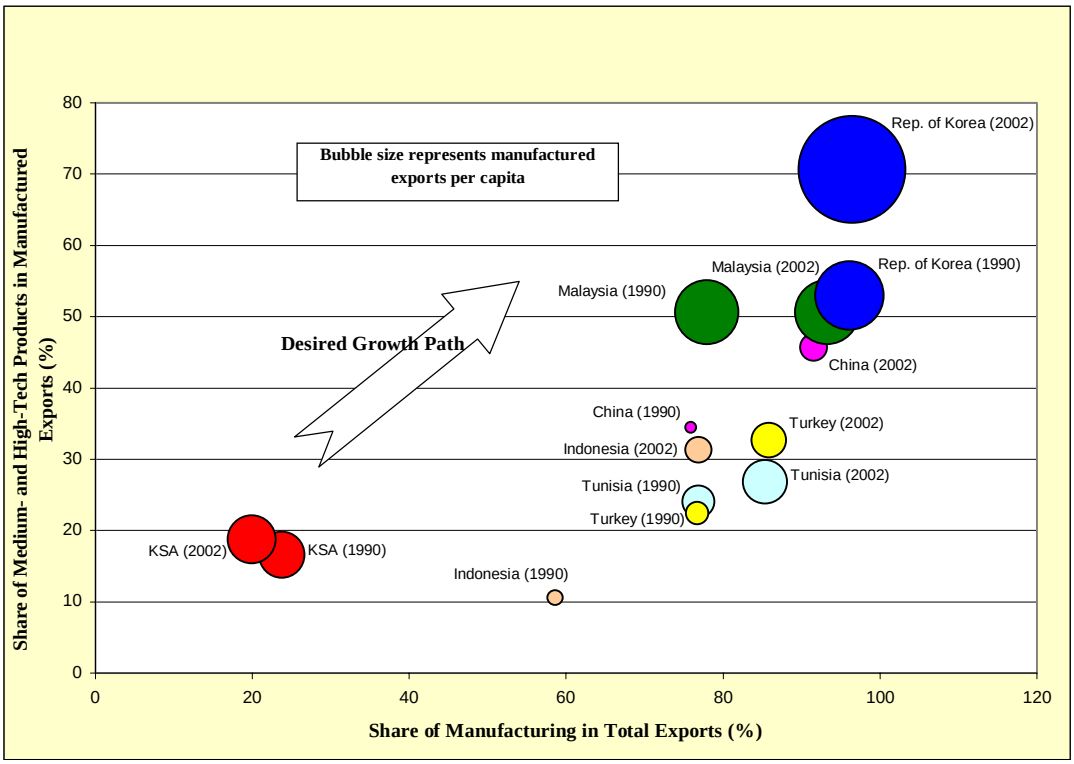
As indicated earlier, KSA exports are heavily dominated by primary and resource-based goods and remain highly dependent on international oil prices. The export concentration ratio declined from 0.942 in 1980 to 0.735 in 1990, reflecting some progress in economic diversification. However, the export concentration level in 2003 was still the highest among all comparators, followed by Egypt at less than half the level of the KSA. Thus, in spite of some progress between 1980 and 1990, the export structure of the KSA has not undergone any significant diversification since 1990 (Annex 3.4), indicating continued export concentration in a few commodity groups (mostly oil and oil-related products). The export value of resource-based products increased from US$6.4 billion in 1990 to US$11.8 billion in 2000, taking the Saudi world market share of resource-based products from 1.2 per cent in 1990 to 1.4 per cent in 2000.

As a percentage of total exports, oil and oil-related products are by far the single most important export category for most oil-dependent regional comparators. The ratio reached a high of 86 per cent for the KSA in 2002, second only to Kuwait, which recorded a ratio of 92.4 per cent. As discussed in Chapter 2, this is a major source of risk to the economy. The dangers of high export concentration are manifested in terms of both trade and income volatility, with the effect being more acute if exports are concentrated in commodities characterized by high price volatility, such as oil.

Annex 3.5 displays the top ten KSA-manufactured exports in terms of average value during the period 1992–2002. The figures show that the most important export group is refined petroleum (in the resource-based subgroup), which accounts for 13.3 per cent of total merchandise exports. Other resource-based, oil-related products include hydrocarbons derivatives and organic and inorganic chemicals, which have shares of only 1 per

cent or less. From the petrochemical industry (medium-tech sub-group), polymers and copolymers, and alcohols and phenols rank in the second and third position, respectively. In this context, it should be noted that the share of refined and processed products in total petroleum exports was relatively low in the KSA in 2000 compared with other oil economies, such as Venezuela, Algeria and Trinidad (Roepstorff and Yumkella 2004). Although the petrochemical industry has developed significantly during the last few years, refining is still limited. Some efforts have been made to address this; for example Saudi Aramco has signed contracts with two international oil companies to build two refineries producing a total of 0.8mn b/d of refined petroleum from 2011.

Figure 3.3: Technological deepening in the export structure of the KSA and comparators, 1990–2002



Source: UNIDO Industrial Scoreboard database.

The share of the top five export groups in manufactured exports increased from 76.4 per cent in 1992 to 81.1 per cent in 2002, an indication of higher export concentration as indicated earlier. However, when considering the share of the top ten export groups in manufactured exports, there is a mild decline from 87.4 per cent to 86.9 per cent over the same period.

The high export concentration does not imply that prospects for manufactured exports are gloomy for the KSA. Despite heavy dependence on oil, there is a small but rapidly growing export base of other dynamic groups. As indicated in Annex 3.6, the KSA seems to have performed favourably in some of the world's most dynamic export groups, i.e. those that grew at the highest rates during the period 1992–2002, especially other organic chemicals; glass; pigments and paints; perfumery and cosmetics; and plastic products.

The main problem is the KSA's small world market share in some of these dynamic groups in comparison with its share in traditional oil-related products. However, its recent export performance suggests signs of increasing export competitiveness in some product groups in the medium-tech sub-group, which provides an encouraging sign for capitalizing on those sectors in the future. Rising stars are mainly perfumery and cosmetics (world share of 0.22 per cent), products of condensation (world share of 0.14 per cent), and pigments and paints (world share of 0.27 per cent). Exports of perfumery and cosmetics grew at an annual average rate of 26.4 per cent

between 1992 and 2002, more than three times the world average growth rate for this sector over the same period. As regards products of condensation, exports grew at an average annual rate of 18.1 per cent during the same period, compared with an average growth rate in world condensed-product exports of some 6.5 per cent.

There are signs of increasing export competitiveness in some product groups in the medium-tech sub-group, which provides an encouraging sign for the future.

Furthermore, among dynamic sectors in the low-tech sub-group, articles of plastics (world market share of 0.2 per cent) have grown significantly at 14.6 per cent per annum compared with an average of 6.4 per cent for world exports in this category. Finally, in the resource-based sub-group, glass exports seem to be a winner. KSA glass exports grew at 14.5 per cent per annum over the period 1992–2002, compared with a world growth rate of 6.3 per cent. Thus, the KSA was able to expand its world market share to 0.37 per cent by 2002.

In terms of export market diversification, the KSA remains heavily dependent on three main markets: the USA, Japan and the Republic of Korea, which accounted for nearly 42 per cent of total exports in 2003 (Annex 3.7). During the 1990s, the structure of Saudi export markets was subject to two major changes: (i) more orientation towards Asian markets, especially Japan, the Republic of Korea, India, Singapore, China and Taiwan Province; and (ii) gaining ground in some European markets such as France, Italy, the Netherlands and Spain (Annex 3.8). This is positive because it reduces vulnerability to the risk of a downturn in any single economy. In addition, the Asian states in question are growing much more rapidly than the USA.

3.4 Sectoral assessment of comparative advantage

A starting point for the sectoral analysis is an investigation of the revealed comparative advantage (RCA) of the KSA in product sub-groups with varying degrees of technological sophistication. Annex 3.9 displays RCA indices based on the Balassa formula. These indices show the share of a certain commodity sub-group in a country's total exports in relation to the respective world share. Hence, an RCA index above 1 indicates relative specialization in this group, serving as a crude indicator of comparative advantage (Endnote 4). The technological breakdown in Annex 3.9 corresponds to that used in Annex 3.1. Only figures exceeding 1 are highlighted as they indicate specialization in the respective group relative to the global structure of exports.

The revealed comparative advantage (RCA) for specific manufactured products in the export profile of Saudi Arabia highlighted in the table may be summarized as follows:

- *Resource-based activities (RB2),* comprising refined petroleum products, mineral manufactures, basic metals, cement and glass, represent the bulk of Saudi manufacturing activity. Regional competition appears to be high in this sub-group, especially from Egypt and Tunisia.

- *Low-tech 1 category (LT1)* comprises textiles, apparel and footwear, where KSA is one of the least competitive countries in the region. Regional comparators, especially Egypt, Tunisia and Turkey, appear significantly in LT1 activities, because of sizeable activities in the labour-intensive textile and apparel industries.

- *Low-tech 2 category (LT2*), comprising further-processed iron and steel products, paper and paperboard products, furniture, tools and wires, office supplies etc., appears to be open to regional competition. This could become a niche market for further industrial specialization on the part of the KSA.

- *Medium-tech 1 category (MT1)* shows that the KSA is not competitive in passenger motor vehicles and automotive components.

- *Medium-tech 2 category (MT2),* including petrochemicals, synthetic fibres, cosmetics, fertilizers, plastic materials and high-end iron and steel products, seems to be a niche targeted by regional competitors. Medium-tech exports from KSA are mostly concentrated in this sub-group.

- *Medium-tech 3 category (MT3),* comprising equipment for distributing electricity, engineering equipment, different types of manufacturing machinery, engines and motors, ships and boats, heating and cooling equipment etc., exhibited more modest export levels. However, this sub-group could be a target for Saudi specialization in the future.

In sum, there are three interesting findings to be drawn from this analysis while taking its caveats into consideration.

- The bulk of manufacturing activities in the KSA are in the RB2 group where regional competition is rather tough. Regional comparators, for instance Egypt, are not endowed with such extensive oil and natural gas reserves as the KSA, but their relative energy endowments imply an existing competitive edge in energy-intensive industrialization. In addition, cheap labour in Egypt and Tunisia represents another source of competitive threats to the KSA in this sub-group.

- Regional comparators, especially Egypt, Tunisia and Turkey, are significant in the niche of LT1 products because of sizable activities in the labour-intensive textile and apparel industries. But the LT2 subgroup, comprising further-processed iron and steel products, paper and paperboard, furniture, office supplies etc, appears to be open to competition. Turkey seems to be enjoying some revealed comparative advantage in this subsection. This, together with the MT2 sub-group that seems to be a targeted niche by regional competitors, has the potential of becoming a niche market for further industrial specialization in KSA.

- In order to convert comparative advantages into competitiveness a major endeavour is needed to enhance industrial trade capacity-building. This requires building the required industrial capabilities, removing supply side constraints on increasing industrial exports, and establishing the required infrastructure and facilities to meet global norms for product and process standards. In this regard, the WTO agreements on technical barriers to trade (TBT) and on sanitary and phyto-sanitary measures (SPS) play a critical role in international trade. Trade capacity-building measures need to be taken to allow the KSA to compete successfully in international trade in industrial products.

3.4 Manufacturing employment, wages and labour productivity

Because of the special features of the KSA labour market, and the prevailing industrial structure dominated by capital-intensive industries, the share of the manufacturing sector in total employment is the lowest among the group of comparators, standing at 7.6 per cent in 2002 (Annex 3.10). High average manufacturing wages imply that competing in traditional labour-intensive sectors, such as textiles and electronics, is a remote possibility for the KSA.

The relatively high share of employment in services derives from the expansion of the public sector after the first oil boom, when the public sector continued to be a “safe haven” for nationals seeking employment. In addition, the industries that were developed were capital-intensive, such as petrochemicals, iron and steels, fertilizers and cement among others, rather than labour-intensive.

Productivity trends are an important indicator of trends in competitiveness. A decline in labour productivity raises concerns about the labour force and the capital- and energy-intensive nature of existing industries. Annex 3.11 shows that overall labour productivity declined in the KSA over 1980-2001, representing the largest decline among all the countries in the table. This means that KSA competitiveness has fallen significantly, which

is a serious drawback both for non-oil export performance and for attracting investment. This issue needs to be addressed urgently.

According to statistics from the UN's Economic and Social Commission for Western Asia (ESCWA), labour productivity in manufacturing also declined in absolute terms over the 1990s from US$27.4 in 1990 to US$21.5 per employee in 2000. Although the level in 2000 compares favourably with regional comparators such as Syria, Egypt and Oman, the decline over time is poor by world standards and represents a sign of weakness.

One possible explanation for the decline derives from the fact that the capital-intensive oil sector represents more than 50 per cent of MVA in Saudi industry (Table 3.7). Adequate skill levels in the labour component may not match increasing capital and energy intensity in the oil sector. There are concerns about the labour force and the skills base given the imbalance between the outputs of the education and training systems, and the requirements of manufacturing enterprises.

Table 3.7 The KSA: MVA classification by branch of industry (1993 and 2003)

Sector	Share in Manufacturing Value Added (%)	
	1993	2003
Food, beverage and tobacco	12.5	13.2
Textiles, apparel, and leather products	5.9	6.2
Wood and furniture	3.1	3.3
Paper, publishing, and printing	2.8	2.9
Refined petroleum products	34.8	31.3
Chemicals and chemical products	20.9	22.1
Rubber and plastics products	1.5	1.6
Non-metallic mineral products	11.5	12.1
Basic metals and manufactured metal products	3.5	3.7
Office appliances, electrical machinery, motor vehicles	3.4	3.6
Total	**100.0**	**100.0**

Note: Totals may not add up to 100 due to rounding.
Source: UNIDO Industrial Scoreboard database.

Labour productivity declined over 1980-2001, meaning competitiveness has fallen significantly. This issue needs to be addressed urgently.

3.5 Main constraints on industrial competitiveness and diversification

It is clear that previous efforts to diversify the Saudi economy away from oil have fallen short of meeting their goals. Previous industrialization plans have focused on the development of heavy industries, capitalizing on the abundance of cheap energy resources. While this strategy was understandable given the Kingdom's natural advantages in the energy sector, it has created structural problems, leaving the economy exposed to a potentially

destabilizing oil price risk and failing to address unemployment adequately. The focus on capital-intensive, heavy industries has meant that the industrial sector has been unable to absorb the increasing numbers of Saudi entrants to the labour force, and the strategy needs to change to achieve the Government's objective of reducing unemployment.

The current structure and performance of industry in Saudi Arabia is still hampered by several characteristics that constrain industrial diversification and competitiveness, namely:

- *The relative weakness of the industrial base,* where the share of manufacturing in GDP is limited to 10 per cent, compared with much higher dynamic growth and higher shares in developing and newly industrializing countries.

- *The relatively low capacity of the manufacturing sector to create value added,* which limits its ability to grow. The ratio of value added to production is 30 per cent on average, while in newly industrializing developing economies it typically reaches 45 per cent. This is mainly due to the adoption in the KSA of industries with simple technological content in addition to mineral-based industries.

- *A high technological gap* in the Kingdom, which has prevented industry from moving into higher value added activities and expanding its international market share of the fast-growing industries driven by innovation and technological intensity. Whereas the medium and high-tech content in industrial production reaches 65 per cent, the capacity of the manufacturing sector to pass this technological content on to exports is limited, as illustrated by the low share of medium and high-tech exports in total manufactured exports at around 20 per cent. This is due to the high capacity of the sector to acquire technology mainly for production for the domestic market, in the light of the availability of oil revenues, whereas there is low capacity for innovation and indigenous technological development for the export sector, resulting in a technological gap in the range of 45–55 per cent.

- *The dominance of basic industries* that produce petrochemicals, plastics, basic metals and consumer goods which are characterized by medium technological content, while the capital goods industries needed at this early growth stage are those with high technological content, such as machinery, electrical appliances and communications equipment.

- *The lack of technological capacity* due to weak linkages between scientific research, development and innovation on the one hand and the industrial sector on the other. The future competitiveness of the industrial sector will need to rely mainly on its success in the development of R&D capabilities and indigenous innovation capabilities.

- *The KSA remains at the periphery of deep integration into global value chains and international production networks,* except in the case of some petroleum products. Such integration is essential for competitive production and market access, especially now that the Kingdom is a member of the WTO.

- *The combination of relatively high wages and falling labour productivity* implies that building competitive strength in labour-intensive manufacturing is a remote possibility for Saudi Arabia. Industry accounts for a small share of total employment due to the predominance of capital and energy-intensive industries, which account for more than 50 per cent of MVA.

- *As a high-wage, capital and energy-intensive economy, the country will need to find market niches* in industries where its abundant resource endowments, location, well-developed infrastructure and access to regional and international markets are fully exploited and converted into competitive assets.

In light of these indicators, it appears that the internal and external challenges facing industrial growth in the Kingdom are mounting more rapidly than in the past. On the other hand, opportunities for growth are also multiplying. The industrial experience accumulated by the private sector, both within the Kingdom and through large industrial investments in many developed and newly industrializing countries, in addition to the consider-

able efforts being made to formulate an industrial strategy and accompanying political support, are all critical elements in creating a new, sustained growth path based on raising industrial competitiveness and diversification.

This implies a leap forward towards 2020 in which Saudi society and the industrial economy need to intensify public and private efforts to operate in harmony and to focus on the development of a national industrial development strategy that represents the core of the overall national vision towards sustainable development. This vision emerges from a set of action plans that intersect with other industrial strategies in the Kingdom.

The industrial strategies required for improving the diversification and competitiveness of the Kingdom – Industry 2020 – are presented in Part B, comprising Chapters 4–9. This is followed by the agenda for action in Part C, comprising Chapters 10 and 11.

Endnotes

1. Starting with its 2002/2003 flagship publication, *Industrial Development Report (IDR)*, the United Nations Industrial Development Organization (UNIDO) has developed a methodology to measure industrial performance across countries based on a Competitive Industrial Performance (CIP) index. The CIP index includes the six performance indicators listed. Parts of this Chapter draw upon and present updated analyses of some of the main findings of UNIDO 2005b and 2006e.

2. *Industrialization intensity* is the arithmetic mean of the share of MVA in GDP and the share of medium and high-technology (MHT) activities in MVA. For a definition of the technological classification of products, see Annex 3.1.

3. This figure is calculated as a residual percentage from the total of the four product groups (RB, LT, MT, and HT) included in the table.

4. An RCA index is calculated according to the following formula: RCA = (Xij/Yj) / (Xiw/Yw), where Xij is total exports of product i by country j, Yj is total exports by country j; Xiw and Yw stand for corresponding values of world trade, where ‘w’ stands for world trade. An RCA in excess of 1 indicates that the share of exports in a country’s total exports is higher than the respective share of that product in world trade.

Part B

Industry 2020: Strategies for diversification and competitiveness in the Kingdom of Saudi Arabia

Chapter 4. Industry 2020: Principles and mechanism for industrial strategies

4.1 Principles of the industrial strategy

Towards a distinguished regional and global industrial position for Saudi Arabia

To achieve the strategic objectives outlined in Chapter 1 (Endnote 1), the Kingdom will need to attain an advanced regional and global industrial position as a:

1. Manufacturing and exporting centre for key industries;

2. Distinguished technological centre;

3. Global hub for investment with a central position within global value chains in the Arab world.

A strong partnership between the Government and the private industrial sector must be established.

In order to reach such a position, a strong partnership between the Government and the private industrial sector must be established, involving:

1. A Government committed to the implementation of the national strategy for industrial development;

2. A private sector prepared to pursue the industrial path towards achieving the established goals;

3. Networking with global industrial enterprises by both the public and private sectors in order to achieve significant industrial leaps.

Government support needed for implementing Industry 2020

The Government can help to accelerate industrial growth by ensuring that all appropriate government institutions and specialized industrial support services interact efficiently with the private sector, as follows.

1. *To accelerate industrial growth* by establishing a supportive macroeconomic and business environment conducive to attracting greater domestic and external investment.

2. *To manage natural and human resources* in a way that matches the needs of a diversified and competitive industrial sector. To this end, the foundation of industrial expansion could, in the short and medium term, be based on economic exploitation of domestic resources (mainly "inherited" natural resources) and, in the medium to long term, on "created" comparative advantages based on skill upgrading and technological advance.

3. *To absorb the growing demand for jobs.* To achieve this, the strategy must include a comprehensive vision and strategy for general, technical and higher education and training.

4. *To reach a high technological level* that facilitates the upgrading of the KSA's position in global value added chains and maximizes the use of natural and human resources. To achieve this, a national system for science and technology, as well as a cluster-based industrial programme for industrial competitiveness and diversification, should be established.

5. *To achieve balanced regional industrial development* and act as an effective tool in the distribution of its benefits to all parties, raising the standard of living and achieving social harmony. To this end, there is an urgent need for a well-functioning national infrastructure and services network.

Accomplishing such goals requires:

1. Adopting an industrial strategy as part of a supreme national strategy for economic and social development;

2. Combining efforts in all state institutions through integrated action plans that will enhance the role of industry as a new dynamic source of sustainable growth and development.

Creating an enabling environment for private sector industrial development

The extent to which specialized industrial services and institutions should be provided by the public sector depends on the level of industrial targeting and the stage of industrial development. Important requirements are technology centres for the development of resource-based industries and business resource centres that serve the needs of industry for technology, information and marketing. In the early stages of industrial development, the private sector is usually unable to provide most of the required services with either the necessary scale or pace. Governments aiming at rapid industrial growth through the adoption of modern technologies have often included such services in their portfolio and sought to provide the required technical and financial resources. However, in advanced stages of industrial development, these services are generally no longer considered to be public goods, and private companies assume an increasingly important role in providing them.

While the Government has a valuable role to play in promoting industrial development, the private sector is the principal producer and the key player in accomplishing the desired goals. Hence, the establishment of a strong and effective partnership with the private sector is an essential mechanism with which to accomplish the targeted industrial path.

Establishing partnerships between the public and the private sector

There are various public and private sector partnership models that could be adopted. Here, three levels of partnerships are considered, where each higher level includes (and adds to) the elements of the preceding one. The form of public-private partnership that the country adopts should be addressed in a transparent manner as part of the industrial strategies for Industry 2020.

- **Partnership level I (minimum level):** At this level, the private industrial sector leads the drive to develop an internationally competitive industry, with each industrial establishment managing all the elements that affect its competitiveness in terms of production efficiency, labour skills, management and marketing performance. The Government provides a range of basic public services such as improving the investment climate, enhancing the functioning of government bodies dealing with investors, providing infrastructure services, establishing employment regulations, enforcing contracts and the rule of law.

- At this initial level of partnership, the Government's role primarily involves improving the business environment in order to create a solid competitive edge for industry both regionally and globally. This is the minimum level of cooperation between the Government and the private sector. Its success is vital for supporting the development of the private sector along the desired industrial growth path. However, this level of partnership alone would probably not achieve a diversified and balanced industrial base for the KSA at this stage in its development. Although it would have a positive impact on the rates of industrial growth, it would also make it likely that the industrial structure would remain confined mainly to the efficient utilization of "inherited" comparative advantages – primarily oil and gas.

- **Partnership level II (deep level)**: At this level, the Government makes more active efforts to help the private sector diversify and become more competitive. The aim is that the private sector should go beyond traditional production activities to seek development further along the value added chain, and should undertake new investments to achieve greater technological expertise. To this end, the Government establishes technological centres and other technological, managerial, financial and marketing support for private industrial enterprises – including small, medium and large enterprises. This means that the Government provides the necessary resources (keeping in mind its control of the upstream oil sector), institutional support and incentives to achieve an industrial development path that is balanced in terms of both diversification and geographical spread. The decentralization of development is one of the explicit targets of Vision 2020, in order to ensure that different regions of the Kingdom share in the benefits of growth. Proceeding at this level of partnership requires systematic action plans consistent with the types of industries that will be targeted, in addition to complementary efforts to improve infrastructure and financial networks.

- **Partnership level III (strategic level)**: Here, the responsibility of the private sector extends to deepening local manufacturing, nurturing small and medium enterprises (SMEs) and helping to develop professional and vocational training, thereby integrating society into industrial development. The Government's responsibility is deeper and wider, involving specific international partnerships with other governments, institutions or multinational companies for the development of medium and high-tech industries. The role of partnership at this level could pave the way for industrial leapfrogging through growth and diversification that would far surpass the natural path of industrial growth implied in previous levels of partnerships. Many governments in advanced developed and developing countries tend to adopt this strategic level of partnership for accelerated industrial growth towards medium and high-tech industries based on "created" comparative advantages.

The aim is to stimulate the growth and development of efficient, competitive and successful industries.

No matter which model of partnership is employed, it is important that government support should be limited to helping industries start up and develop in their early stages, rather than sustaining them in the long term. The aim is to stimulate the growth and development of efficient, competitive and successful industries, rather than to create industries that are unable to survive without continued government subsidies, which would remain a burden on fiscal policy and could potentially be at risk if future oil price shifts reduce government revenue. Moreover, as a WTO member, Saudi Arabia would have to ensure that assistance to domestic industries is compatible with WTO requirements. The Government has recognized in Vision 2020 that it should expand the role of the private sector. Given that the public has long been accustomed to the public sector playing the primary role in the economy, especially as the main provider of jobs for Saudi nationals, there may be a need for awareness-raising campaigns to promote understanding of the private sector's key role in the post-WTO-entry environment.

Industrial targeting

Following the identification of the roles of all partners and key stakeholders in industrial development, the next question is which industries to target. There are various possible options.

- *Free market mechanism:* The private sector develops industries within the framework of a free market mechanism. In this case, the natural choice will be industries that already have a comparative advantage. In the Saudi context, this means industries that exploit existing, mainly natural, resources, including the country's mineral wealth, which is so far largely unexploited. Furthermore, industrial production will be increasingly geared towards the large and rapidly growing domestic market, which implies a trend towards light consumer goods. This option facilitates higher industrial growth with the availability of a good environment for industrial investment. However, it does not guarantee the achievement of the objectives of industrial deepening, diversification and competitiveness, let alone the social objectives in terms of absorbing new entrants to the labour market.

- *Intensified partnership between government and private industry*: The second option is that the Government initiates a consultative process with the private sector for the targeting of promising future industries and, in response, provides specialized services to industry in order to support that choice. There are several possible scenarios ranging from:

♦ Targeting industries based on natural resources and the value-added chain;

♦ Targeting a range of industries that have potential in the dynamic global market; and

♦ Targeting industries with a high technological and skill content and building industrial clusters for integration into the international production process. This scenario aims at achieving a distinguished industrial position with a strong knowledge base.

Strategic tools: Moving up the value-added chain

Industrial diversification is characterized as a process aimed at moving up the value-added chain in the industrial sector as a way of generating higher levels of income. Moreover, moving up the value-added chain allows for further industrial progress, unveiling new industrial opportunities to increase the accumulation of value-added benefits, in a virtuous circle (Endnote 2).

In addition, there is potential for these industries to create synergies and support each other, if development is focused on those levels of the value chain that are characterized by high linkages and the ability to establish clusters that serve industrial growth as a whole. Illustratively, the diversity in the petrochemical industry allows it to support other industries, such as plastics, in its value-added chain while, at the same time, it supports and enhances the emergence and development of new industries such as textiles.

Narrowing the current technological gap between the KSA and comparator countries would contribute to the generation of higher income from existing natural and human resources.

The KSA's hitherto unexploited natural resources (such as minerals) could also be used to develop new industrial activities that would have competitive advantages in niche areas. This would entail narrowing the existing technological gap with other comparator developing countries, as achieving rapid growth rates and moving on to higher development paths requires not only increasing the level of new investment in the industrial sector and making use of comparative advantages, but also building a stronger, national,

technological base that facilitates the absorption of imported technologies and the creation of a solid, national, innovation system.

Hence, narrowing the current technological gap between the KSA and comparator countries, as analyzed in Chapter 3, would contribute to the generation of higher income from existing natural and human resources. In this way, national wealth could be preserved through the industrial transformation of finite current resources to sustainable sources of income for future generations.

Role of key stakeholders

A clear division of roles and responsibilities among key stakeholders would help to ensure the active participation and commitment of the industrial community in spreading the new approaches to industrial development. This requires a clear definition of the roles of each institution involved with industrial development and of the related support mechanisms. It is vital to minimize the bureaucracy involved, as red tape tends to deter investment. As the Kingdom continues to develop its e-government programme, providing firms and investors with online access to information about industrial opportunities, support services and potential partnerships would help to facilitate development.

4.2 Mechanism of industrial strategy

Combined national efforts over the past few months have resulted in the National Industrial Strategy, which includes the following components.

1. Vision
2. Message
3. Path
4. Strategic goals
5. Strategic tasks
6. Strategic scenarios
7. Implementation mechanisms
8. Strategic leadership

These components will now be outlined in more detail.

Vision

As mentioned in Chapter 1, the industrial vision statement, reflecting the aspirations of society for a promising future through industrial development, is as follows: *"A globally competitive industry based on innovation and creativity and acting as a basic tool for transforming the Kingdom's natural and human resources into sustainable wealth"*.

Message

A message outlines the guiding principle of the desired vision, defining the goals and the tools needed to achieve them. Therefore, the National Industrial Strategy – Industry 2020 – adopts the following message: "*Investing in all national resources and opportunities available to stimulate industrial growth, to position the Kingdom at a distinguished rank on the global industrial map and to transform the national industrial structure into a globally competitive technological structure through distinguished industrial clusters that spread the benefits of growth widely over the Kingdom and provide job opportunities that suit the national framework through strong effective national, regional and global partnerships."*

Path

Pursuing this vision requires strategic directions to guide the Kingdom on its path towards its desired goals, as well as better monitoring of its achievements and measuring any gaps. There is no doubt that ensuring society's commitment to achieving such a path in the next 15 years is a real challenge. Yet, in light of all the existing opportunities, overcoming this challenge is possible. Directing the Kingdom to its promising future depends mainly on a forward-looking approach, seizing opportunities and fostering a commitment to excellence and leadership. Thus, the national industrial development strategy for 2020 – based on the strategic objectives of the national capability for excellence – needs constantly to bear in mind the new global industrial setting while developing its objectives.

Developed countries have gained tremendous capabilities on the basis of:

1. Cohesive government efforts in implementing the strategy;

2. A private sector that is motivated to achieving the strategic goals;

3. Effective public-private partnership at all levels.

All aspects of the preparation of the strategy indicate that there is a strong national consensus and understanding of industry's important role in reaching a higher industrial development path. This has been illustrated by the active participation of the various government institutions in the national industrial development strategy. Their support for these initiatives is a very positive sign of their commitment to the development of future plans for industrialization.

Strategic goals

The industrial strategy is founded on strategic goals, based on a strong national consensus, as follows:

1. To promote industries based on the Kingdom's comparative advantages;

2. To reorient industrial development towards products with high value-added content;

3. To reorient the industrial structure towards industries with high technological content;

4. To develop human resources through skills upgrading in the education and training systems to meet the needs of industry for competing in a globalized industrial economy;

5. To improve the business environment for industrial competitiveness covering regulations, procedures and policies;

6. To build a strong national innovation system for technological upgrading;

7. To adopt industrial clusters as a new source of industrial growth opportunities, benefiting from economies of agglomeration;

8. To support and promote small and medium-sized industrial enterprises;

9. To develop and provide the necessary physical and ICT infrastructure;

10. To build trade capacity for enhancing the industrial competitiveness of domestic products in terms of international product specifications, standards and total quality management;

11. To build and support balanced, regional, industrial development within the KSA;

12. To strengthen regional and global industrial linkages and networking.

The targets for this strategy are outlined in detail in Chapter 9.

Strategic tasks

A. Establishing a globally competitive business environment: While companies compete for markets and try to improve their levels of efficiency, productivity and innovation, countries also compete to attract investment, as it can no longer be guaranteed that the savings generated in one society will be invested in the same society. In a world where capital moves freely, investors do not so much invest in a nation as in an environment that enables them to maximize efficiency, for example by reducing costs, improving quality or minimizing risk. Therefore, the Government should seek to improve efficiency by supporting technological development in order to reduce costs and boost quality, and by providing training programmes to enhance skills productivity. To this end, developed nations continuously monitor their competitive position on the map of investment and assess its impact on existing and new companies. The need for intensive investment in innovation can be a source of risk, as such investment tends to have a long gestation period and uncertain outcomes. Governments should deal with this reality, for example through financial support and risk-insurance guarantees, otherwise industrial production may be limited to the manufacture of traditional industrial goods for the domestic market.

The Government should seek to improve efficiency by supporting technological development in order to reduce costs and boost quality, and by providing training programmes to enhance skills productivity.

The National Industrial Strategy takes account of this and proposes a range of mechanisms to provide a supportive environment: i) some associated with the business environment; ii) others concerned with the local market for raw materials; and iii) further mechanisms relating to the support of innovation and research and development (R&D) within industrial enterprises.

B. Facilitating the transfer of improvements in the business environment to all types and sizes of companies: Development of the industrial and business sector also requires coordinated institutional mechanisms between economic and regulatory frameworks on the one hand and industrial enterprises on the other hand, especially SMEs. As SMEs represent an important source of industrial progress, the National Industrial Strategy is also concerned with improving and developing these enterprises, and placing them in a framework that facilitates their integration into the business community and ensures proper use of the evolving business environment. A significant part of the industrial growth monitored by the strategy will rely on this sector, either through direct interaction with the market or indirect interaction by intensifying linkages between SMEs and larger enterprises, for example through subcontracting arrangements. Importantly, the National

Industrial Strategy aims to create mechanisms to provide feedback on and to measure the impact of improvements in the business environment on industrial performance.

C. Stimulating the participation of all segments of society in order to share the benefits of industrial growth: The National Industrial Strategy aims to encourage and support the industrial sector, while also achieving broader socio-economic goals for society as a whole. Thus, efforts should be geared towards maximizing the contribution of all stakeholders. This can only come about through the creation of channels that allow the participation of all stakeholders in the industrial sector, either directly through the stimulation of SMEs or through employment in associated industrial and business activities, especially industry-related services. Therefore, human resource development is an important element in sharing the benefits, which highlights the importance of developing education and training systems to improve the pool of skills that serves sophisticated modern industry (discussed in more depth in Chapter 5).

D. Diversification towards medium and high-tech as well as R&D-intensive activities: Furthermore, stimulating industry to shift to high-tech activities and applying the results of R&D are critical steps in ensuring that the system provides both a strategic position for Saudi Arabian industry globally, and is an important element in meeting the growing demands of the domestic market, in order to enhance national economic security. Focusing on medium and high-tech industrial activities is critical as they are the most dynamic forces in the world industrial economy and thus the most important sources of industrial growth and diversification.

E. The importance of different geographical levels:

Role of the national and sub-national levels: Achieving competitiveness and diversification calls for different approaches to policy-making. A top-down approach of formulating strategies by the Government at the national level is important, but not enough. Although national policies have a strong impact on the microeconomic business environment – and the success of microeconomic policies is reflected in the differences in prosperity between countries – the differences in economic performances between regions within countries underline the crucial importance of economic strategies for sub-national regions, cities or communities. Building competitiveness needs to be underpinned from the bottom up, with individual sub-national regions (communities) being at the heart of their economic and industrial development.

Regional innovation systems should be linked to national and other systems of innovation within a multilevel governance system.

In this sense, regional innovation systems should be linked to national and other systems of innovation within a multilevel governance system. Such a governance system should be the result of collective efforts by various stakeholders from the private and the public sectors and intermediary organizations (public, private and mixed), and at different national geographical levels, to plan and execute sustainable economic and industrial strategies.

Role of the supra-national level: Collective efforts are also needed at the supra-national level of neighbouring countries, which can influence national productivity and prosperity through creating positive and negative externalities. Economic cooperation among neighbours can be used as an important tool for expanding trade and investment and for improving the business environment in regional economies. Regional trade agreements among developing countries have proliferated in recent years as a part of a wider strategy to promote equitable growth among countries and to adjust smoothly to the processes of intensified globalization. The GCC concluded the Customs Union (GCC-CU), which came into practice in January 2003. The GCC Heads of State agreed to harmonize their external tariffs at a uniform rate of 5 per cent. They also agreed to achieve a unified currency union within ten years and to permit Yemen to join several GCC institutions as a first step towards full membership. The GCC states are also considering free trade agreements (FTAs) with the European Union, Japan, United States, India and China (Endnote 3).

Several studies have concluded that such trade agreements among developing countries, which provide preferential trade access to members but keep trade policy with the rest of the world unchanged, are not always

beneficial for the bloc as a whole, although some members may benefit because of non-competitive conditions or agglomeration effects. Earlier studies from 2002 on the likely static effects of GCC CU on the GCC member states (if trade creation effects exceed the trade diversion effects) concluded that trade creation effects are stronger than trade diversion effects, having positive welfare gains for the GCC group as a whole.

In the medium to long term, regional and bilateral trade agreements may also help the creation of alternative value chains and networks, offering developing countries possibilities for trade and investment and for industrial upgrading. They can create greater scope for developing country firms to expand their functional responsibilities, from assembly to "full package" supply. (NAFTA – the North American Free Trade Area – for instance has allowed some Mexican firms to engage in full–package production). However, to be successful these initiatives need to be complemented by domestic R&D activities or investment in building capabilities. Regional trade initiatives have to be taken more seriously and in a concerted manner at national and supranational levels.

Recent studies also point out that regional cooperation on the provision of regional public goods offers greater promise than regional trade agreements. The increase in cross-border interaction between neighbouring countries increases demand for the provision of regional public goods in a variety of areas such as market integration, environmental issues, technology transfer, regional transportation and telecommunication networks (including roads, railways, ports, inland waterway transport, major civil aviation lines, broadband connectivity and so on), technical standardization and harmonization of different customs and clearance procedures, and coordination of policies and programmes. Adequate provision of these public goods contributes to improving the region's collective benefits and thus economic well-being and the preservation of peace and security in the region.

The collective benefits may include: efficiency gains because of lower transaction costs following trade liberalization; large cost savings from economies of scale; an increase in regional competition; and positive externalities arising from coordinated investment in the development of regional infrastructure as well as from harmonization of policy and regulatory requirements in the areas of technical standards, trade facilitation and intellectual property rights.

To achieve maximum welfare gains from regional integration, countries should have similar levels of industrial development, competitive industrial sectors and the potential to develop complementarities in industrial structure to capture the benefits of economies of scale. As these preconditions are often not met from the beginning, linking and integrating countries with different levels of economic development, infrastructure and regulatory systems are challenges any region may encounter. Facing them goes beyond reducing tariffs and quotas. Once borders have been crossed, foreign investors or exporters are faced with behind-the-border barriers such as different national infrastructure systems, product and technical standards, customs and clearance procedures, tax systems, and competition policies: these may impede trade and segment regional markets. The more these behind-the-borders factors are harmonized among regional trading partners, the more they become a source of locational advantage for countries to expand their prospects of effective participation in the global market. These functional demands involve a need for governing these processes. They call for the commitment of member countries to invest in the provision of these public goods.

Based on the subsidiarity principle, there are several advantages in supplying regional public goods through regional cooperation agreements. The incentives for a free ride decrease as the number of countries that must supply a public good falls. For these agreements to be successful, there should be a nation with the necessary leadership capacity to support the initiative so that other countries can follow. Clearly, the KSA can assume a leading role in the region. The challenge for the KSA is to mobilize all the different geographic levels discussed above with a view to achieving greater competitiveness and diversification.

Strategic scenarios

The National Industrial Strategy aims to achieve unprecedented growth rates in industrial value added through partnerships between the Government and the private sector. Here, the Government should be responsible for creating an environment for investment, production and global transactions that matches the most competitive environments worldwide, whereas the private sector's responsibility is to make effective use of every opportunity to build a diversified and globally competitive industrial base. This requires courage in investment decision-making, entering new areas, and positive partnership with the outside world.

There are two major industry sector scenarios to be considered. This document strongly argues for a proactive diversification strategy to achieve Vision 2020's strategic goals.

Strategic industrial diagnosis and preliminary sectoral analysis of KSA industry show that:

1. The bulk of manufacturing activities are in the resource-based group, such as refined petroleum products, iron and steel scrap, cement, glass and mineral manufactures;
2. Several low-tech groups seem open to regional competition, such as further-processed iron and steel products, paper and paper board, furniture, office supplies, etc.;
3. Medium-tech groups might constitute a target market in such areas as petrochemicals, synthetic fibres, cosmetics, fertilizers, plastic materials, and high-end iron and steel products;
4. Modest exports in medium-tech non-petrochemical products might support diversification.

Detailed analysis and explanation of these findings is provided in Chapter 3.

In this context, there are two major industry sector scenarios to be considered.

1. Scenario One: Expand oil-related industries:
    - Build on existing resource endowments but move up the value chain;
    - Target selected oil-related industries;
    - Assess risks in terms of growth volatility, fiscal vulnerability and limited generation of employment.
2. Scenario Two: Proactive diversification:
    - Diversification and technological upgrading based on in-depth sectoral assessments of prospects;
    - Maximize benefits of regional integration;
    - Build industrial capabilities;
    - Create an enabling business environment;
    - Establish national and regional innovation systems;
    - Promote development of industrial clusters;
    - Seek integration into global value chains.

The strategy proposed in this document strongly argues for proactive diversification to achieve the strategic goals and targets set for Industry 2020. Existing private-public partnerships have managed to promote several industries, especially petrochemicals, to high levels of competitiveness. Their growth is based on technology and R&D that resulted from the comprehensive support and attention of the Government.

Now that the Kingdom is inaugurating an industrial development strategy that involves stimulating the second generation of industries – meaning those that depend on the exploitation of broader sources of wealth, including natural, financial and human wealth – the Government believes that this new generation needs support to progress.

It also believes that where the private sector has a strong partnership with the Government, private companies will be able to lead the development in the future. Therefore, the responsibility of the new generation of industries goes beyond achieving normal industrial growth and requires a combination of investment, use of natural resource wealth and the development of science and information technology.

Hence, the National Industrial Strategy 2020 will be carried out by an integrated combination of dynamic players with effective response from the private sector, in order to activate a partnership that will lead to a promising industrial future in the face of evolving challenges.

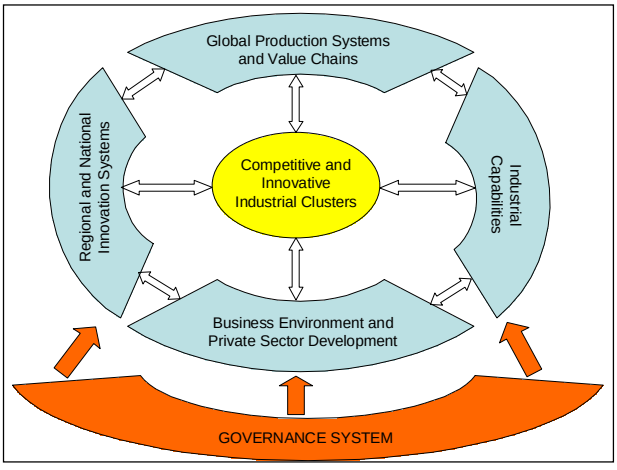
Implementation mechanism and strategic leadership

The implementation of these strategic targets requires an efficient institutional mechanism and strategic leadership through a strengthening of the Ministry of Commerce and Industry. These issues will be further discussed in Chapters 10 and 11 in Part C, which covers the agenda for action for Industry 2020.

Industry 2020: Four main pillars of the industrial strategy

The successful formulation and implementation of industrial strategies for diversification and competitiveness in the context of Industry 2020 will be based on an integrated approach as illustrated in Figure 4.1. The successful integration of Saudi industry into global production systems and value chains will be based on improving industrial capabilities, creating an enabling business environment for private-sector development, establishing a regional and national innovation system, and building competitive and innovative clusters of industries within the framework of an efficient industrial governance system.

Figure 4.1: Industry 2020: Strategic framework for industrial strategies



Source: UNIDO.

Thus, the national industrial strategy for Industry 2020 comprises four main pillars, or axes, of action:

1. Enhancing domestic capability building for accelerated industrialization (Chapter 5);
2. Improving the business environment for enhanced industrial performance, especially SMEs (Chapter 6);
3. Creating a national innovation system for technological upgrading (Chapter 7);
4. Promoting cluster-based industrial development for improved competitiveness (Chapter 8).

Each pillar will be considered and dealt with as a system that includes many activities and which requires interaction between a number of participants from both the Government and the private sector. The four pillars are closely interrelated and to fulfil these aims a joined-up vision is required, as well as mechanisms to coordinate progress on each front. After all, each pillar ultimately serves the same society and overarching aims.

The four main pillars of the industrial strategy 2020 are presented in Chapters 5 to 8. This is followed by analysis of how to position the Kingdom in the global league table of industrial excellence in 2020 in Chapter 9.

Endnotes

1. A major part of this Chapter highlights some of the concepts developed in UNIDO 2006a.

2. A list of various UNIDO background papers on the global value chain in selected key industries may be found at: www.unido.org/publications.

3. The Agreement on CU has facilitated the movement of goods and services between the GCC countries and has helped increase trade exchange between them. Nevertheless, the agreement on the unified Gulf external tariff is full of loopholes that allowed the border customs authorities to hinder the flow of imports and foreign commodities between these countries without the need to impose taxes on them, or what is called “the single entry point policy”. Customs officials in the GCC countries are still demanding certificates issued by certain bodies to ensure that these foreign goods had entered a GCC country after January 2003, so as not to impose customs duties on them.

Chapter 5. Enhancing domestic capability building for accelerated industrialization

5.1 Key role of industrial capabilities in industrial growth, diversification and competitiveness

Industrial performance is determined by the interaction of interrelated structural factors, such as the extent and quality of domestic institutions and infrastructure, the pool of human capital/skills and technological capabilities, as well as the overall stability of the macroeconomic policy framework. These drivers have largely determined the success of developing countries that have achieved competitive industrial performance. In particular, five key drivers are largely instrumental in explaining the observed divergence in industrialization experience among developing regions of the world (Endnote 1). These are (UNIDO 2004):

- Skills (human capital);
- Technological effort (R&D);
- Inward FDI;
- Royalty and technical payments abroad; and
- Modern infrastructure, especially Information and Communication Technologies (ICT).

International industrialization experience suggests that domestic R&D has been a key factor behind the competitive performance of industrialized countries and a handful of highly successful emerging economies. The roles of FDI and skills have also become increasingly important over time with the expansion of global value chains and the need for an adequate human capital base to facilitate the absorption and adaptation of new technologies.

It was these industrial drivers – especially human capital/skills and FDI – that enabled the Asian "Tiger" economies to achieve a rapid pace of export-oriented industrialization. As a result, they have far surpassed other developing countries in achieving rapid economic growth and development, as well as integration into the world economy.

The purpose of this chapter is to examine selected indicators that have largely steered the process of industrial development in the KSA so far, and to assess how industrial capabilities can be enhanced to accelerate industrial growth, diversification and competitiveness. The current status of domestic drivers in the KSA, with the possible exception of the availability of financing for the industrial sector, is not yet conducive to an industrial take-off in the short term. The main areas of concern are the skill base of available human resources and insufficient domestic technological effort. Other issues of concern include the funding of SMEs (which is now improving) and the need to increase the use of ICT in industrial operations (which still has a long way to go).

An overview from an international comparative perspective shows that the KSA is relatively well positioned in terms of imports of capital goods as a source of technology transfer and modern infrastructure, thanks to its heavy investment in infrastructure, but is generally in a weak position in terms of skills, technology transfer and FDI inflows.

5.2 Human resources: higher enrolment in technical, vocational and business-related fields

The overall analysis of industrial capabilities on the UNIDO Scoreboard (UNIDO 2003, UNIDO 2005a, UNIDO 2005b) indicates that neither the current skills base nor the domestic technological effort is conducive to further industrialization and diversification. Despite high literacy rates relative to the Arab world, improvements in secondary and tertiary enrolment ratios have remained low relative to both regional and international comparators. Enrolments in technical and vocational programmes at the secondary level are modest in comparison with comparator countries. Moreover, available indicators indicate a preference for specialization in studies related to education and humanities and a relative neglect of technical and business-related fields. The latter two are of paramount importance in equipping the labour force with the capability to undertake indigenous technological effort and nurture the entrepreneurial spirit of the private sector.

Despite high literacy rates relative to the Arab world, improvements in secondary and tertiary enrolment ratios have remained low relative to both regional and international comparators.

Table 5.1 Tertiary education and technical enrolments (percentage of total population)

	1985		1990		1998		2001	
	Tertiary	Technical	Tertiary	Technical	Tertiary	Technical	Tertiary	Technical
Saudi Arabia	**0.92**	**0.15**	**1.04**	**0.13**	**1.78**	**0.11**	**2.02**	**0.19**
Jordan	2.13	0.38	–	–	2.15	0.49	2.83	0.73
Morocco	0.98	0.26	–	–	0.98	0.24	1.06	0.25
Egypt	1.27	0.16	1.07	0.14	3.97	0.12	2.61	0.44
Tunisia	0.60	0.19	1.08	0.25	1.69	0.23	2.14	0.41
Turkey	0.83	0.23	1.63	0.29	2.16	0.31	2.35	0.40
Brazil	1.09	0.17	–	–	1.33	0.17	1.61	0.27
Chile	1.86	0.54	2.19	0.64	2.74	0.70	2.94	0.82
China	0.20	0.08	0.20	0.08	0.59	0.10	0.95	0.20
Czech Republic	1.65	0.56	1.13	0.39	2.25	0.46	2.54	0.68
India	0.58	0.16	–	–	0.58	0.11	0.95	0.19
Indonesia	0.60	0.08	1.01	0.13	1.15	0.22	1.44	0.28
Malaysia	0.68	0.09	0.67	0.14	2.00	0.12	2.31	0.31
Rep. of Korea	3.70	0.79	–	–	5.70	1.60	6.34	2.11

Note: Data on enrolments in technical subjects at the tertiary level are not available after 1997, thus technical enrolments estimated for 1998 and 2001 are based on the assumption of constant shares in tertiary enrolment.
Source: UNIDO Industrial Development Scoreboard database.

Given the rapid pace of technological progress and revolutions in ICT, the role of domestic drivers has become vital in determining the outcomes of industrial competitiveness. Recent industrialization experience suggests that modern manufacturing activities need to go beyond general labour skills. Industry has become reliant on high-level and specialized skills that allow the absorption and diffusion of modern technology. A strong human-capital base, arising from investment in education and training systems, was a factor behind the impressive growth and development experience of the Asian Tigers.

Literacy rates in the KSA are high relative to the Arab world, reaching 84 per cent for males and 69 per cent for females in 2002**.** However, enrolment in secondary and tertiary education and enrolment in technical and vocational programmes, which ensure the supply of the required skills to the labour market, are important for industrial development. The gross *secondary enrolment* ratio increased from 40.1 per cent in 1985 to 68.0 per cent in 2004, although this ratio is comparatively low when measured against regional comparators, especially Jordan, Egypt, Tunisia and Turkey, as well as international comparators such as Chile, the Czech Republic, Malaysia and the Republic of Korea (Annex 5.1).

The percentage of the population enrolled in *tertiary education* in the KSA more than doubled between 1985 and 2001 but remained relatively low at 2.02 per cent. This figure compares unfavourably with most comparators, where it ranged from a low of 1.06 per cent in Morocco to a high of 6.34 per cent in the Republic of Korea. Even more troubling is the extraordinarily low percentage enrolled in *technical education*, which amounted to 0.19 per cent of the total population compared with 0.73 per cent in Jordan, 0.44 per cent in Egypt, 0.82 per cent in Chile and 0.28 in Indonesia (Table 5.1).

The number of students enrolled in *technical and vocational* programmes at the secondary level amounted to 66,500 in 2004, compared with 2.5 million in Egypt, 1.3 million in Turkey and 2.2 million in Indonesia (Table 5.2). As shares of the respective populations, these figures represent 0.2 per cent in KSA compared with 3.9 per cent in Egypt (almost 20 times more) and 1.8 per cent in Turkey. There is a very serious shortfall here.

Table 5.2 Secondary enrolments in technical and vocational training

	1999	2000	2001	2002	2003	2004
Saudi Arabia	**33,797**	**33,161**	**35,503**	**64,607**	**68,434**	**66,439**
Jordan	41,821	41,534	–	42,481	34,855	35,502
Morocco	103,448	100,112	104,745	99,319	106,097	114,698
Egypt	–	–	2,420,734	2,449,582	2,513,825	2,525,315
Tunisia	–	105,038	78,942	63,648	–	86,597
Turkey	–	1,129,606	1,121,291	1,240,288	1,261,077	1,320,542
Brazil	1,520,554	–	1,314,362	471,227	452,342	–
Chile	370,016	377,958	–	395,557	386,832	384,355
China	12,752,383	12,327,079	–	–	11,298,031	12,851,975
Czech Republic	315,952	347,320	388,548	391,928	390,658	382,065
India	588,981	618,116	513,548	619,303	710,376	726,889
Indonesia	–	2,053,893	–	2,027,464	2,099,753	2,198,443
Malaysia	124,816	131,511	134,302	141,242	138,521	–
Rep. of Korea	936,523	860,150	753,587	656,606	580,274	546,401

Note: These data contain UNESCO estimations.
Source: UNESCO Institute for Statistics (2006).

Imbalance between supply of educational system and demands of the labour market

Another key issue is the quality of education and its relevance to job opportunities, which cannot be judged from aggregate enrolment figures alone. Recent studies suggest that a major problem in the MENA region in general is a sharp disconnection between the outputs of the education and training systems and the demands of the labour market (UNDP 2003). This imbalance between supply and demand is very much the case in the KSA, as evidenced by the relatively high unemployment level of Saudi nationals despite the existence of sizeable labour demand, which is instead supplied by non-nationals.

Recent studies suggest that a major problem in the MENA region in general is a sharp disconnection between the outputs of the education and training systems and the demands of the labour market. This is very much the case in the KSA.

Increasing need for advanced technical skills such as ICT and biotechnology

However, run-of-the-mill industrial skills are only a small part of the human capital required for efficient performance in modern manufacturing. There is an ever-rising need for advanced technical skills, particularly those required in new technologies such as ICT and biotechnology. Educated workers are essential for the introduction of new technologies. Modern business organizations increasingly need multi-skilled workers able to operate in teams and take responsibility for improving quality and raising productivity.

There is an ever-rising need for advanced technical skills, particularly those required in new technologies such as ICT and biotechnology.

Table 5.3 illustrates the preference for education and humanities-related fields in the Saudi student population: in 2001, 65 per cent of all students enrolled in subjects relating to education, humanities and the arts, while only 7 per cent enrolled in science and 8 per cent in engineering, manufacturing and construction. Enrolment in technical subjects, such as science and engineering, is low by regional standards. However, these figures do represent a slight improvement in the proportion of science and engineering students in comparison with the late 1990s.

It is worth noting that low enrolment in business and technical subjects represents a major constraint on the competitiveness of the manufacturing sector in the KSA. Even improvements in training institutions will not pay off if basic skills are lacking. Saudi industry cannot compete in low-tech market segments where labour costs – low wages – are the main source of competitive advantage. Focusing on technology-intensive and innovation-driven industries in the long term requires a significant overhaul of both the education and the training systems, as well as of labour market institutions to inform and build partnerships with educational establishments.

Table 5.3 Structure of tertiary enrolment by subjects for the KSA and other regional comparators (per cent)

	Education	Humanities & arts	Social sciences, business & law	Science	Engineering, manufacturing & construction	Agriculture	Health & welfare	Services	Not known
2002/2003									
Saudi Arabia	**53**	**14**	**11**	**8**	**8**	**1**	**4**	**–**	**1**
Jordan	15	15	26	18	12	1	10	1	2
Morocco	2	26	47	15	4	1	4	1	1
Egypt	–	–	–	–	–	–	–	–	–
Tunisia	1	21	27	22	9	2	7	–	11
Turkey	12	5	17	7	14	3	5	3	34
Brazil	–	–	–	–	–	–	–	–	–
Chile[a]	14	6	35	2	30	5	9	–	–
China	–	–	–	–	–	–	–	–	–
Czech Republic	12	9	27	10	20	4	13	4	0
India	–	–	–	–	–	–	–	–	–
Indonesia	–	–	–	–	–	–	–	–	–
Malaysia	7	13	27	16	24	2	4	0	7
Rep. of Korea[a]	6	18	20	10	31	1	7	7	–
2001									
Saudi Arabia[b]	**50**	**15**	**8**	**7**	**8**	**1**	**3**	**–**	**9**
Jordan	–	–	–	–	–	–	–	–	–
Morocco[c]	5	25	45	15	5	1	3	0	–
Egypt	–	–	–	–	–	–	–	–	–
Tunisia	–	–	–	–	–	–	–	–	–
Turkey	13	6	18	7	13	3	6	2	31
Brazil	–	–	–	–	–	–	–	–	–
Chile	–	–	–	–	–	–	–	–	–
China	–	–	–	–	–	–	–	–	–
Czech Republic	12	8	24	9	21	4	12	4	7
India	1	–	52	15	5	–	1	–	26
Indonesia	–	–	–	–	–	–	–	–	–
Malaysia	–	–	–	–	–	–	–	–	–
Rep. of Korea	5	18	20	10	35	2	7	4	–

Note: Totals may not add up to 100 per cent due to rounding.
a) Data refer to 2003/2004; b) Data refer to 1999/2000; c) Data refer to 2000/2001.
Sources: UNESCO 2004; UNESCO 2005.

5.3 Enhancing domestic technological capabilities

After skills, the second domestic driver that is becoming increasingly important for competitive industrial performance is domestic technological effort. The lack of data on government-financed R&D expenditures and the number of scientists and technicians engaged in R&D activities in the KSA precludes a thorough assessment of domestic technological capabilities and efforts. However, business enterprise expenditure on R&D, both in absolute terms and as a percentage of GDP, compares unfavourably with regional comparators (except for Tunisia). Patent applications (filed nationally) also indicate a comparatively modest performance both regionally and internationally.

Most developing countries are importers of new technologies; as such, their capability to absorb those technologies and adapt them to local needs is instrumental in successfully moving toward the technology frontier in both production and export performance. Technological effort is becoming particularly important for export performance as technology and innovation-intensive products are now the leading dynamic groups in world export markets.

Concerted efforts needed to accelerate trade capacity building for manufactured exports

This requires concerted efforts to accelerate industrial trade capacity building for manufactured exports, especially for products with a high technological and innovation content. WTO rules related to technical barriers to trade (TBT) and on sanitary and phyto-sanitary measures (SPS) are critically important in building successful export-oriented strategies, especially in medium and high-tech products, and require special measures to address supply-side constraints and build the necessary capabilities and infrastructure facilities to meet global norms for product and process standards. Such trade capability building measures are considered preconditions for successful manufacturing export performance.

Need for higher R&D expenditures

The low level of R&D in the industrial sector and low educational specialization in technical subjects indicate that innovation and skill-intensive industrial growth has yet to become visible.

In this context, domestic technological effort takes different forms and it is difficult to gauge it with precision, especially across countries. As highlighted above, data on Government R&D spending and R&D personnel numbers are lacking, reflecting a wider problem of weak data publication in the KSA. However, using another indicator – business enterprise R&D expenditure (Endnote 2) – it appears that R&D undertaken by Saudi enterprises is negligible relative to comparators (Table 5.4), both in absolute levels and as a percentage of GDP**.** The private sector in Turkey, Malaysia and China invests between 0.3 per cent and 1.9 per cent of GDP in R&D activities, with the Republic of Korea investing as much as 1.9 per cent. The low level of R&D in the Saudi industrial sector, coupled with low educational specialization in technical subjects, indicate that innovation and skill-intensive industrial growth has yet to become visible.

Table 5.4 Business enterprise R&D expenditure						
	Business Enterprise R&D Expenditure (US$ billion)			Business Enterprise R&D Expenditure (percentage of GDP)		
	1985	1998	2000	1985	1998	2000
Saudi Arabia	**–**	**0.10**	**–**	**–**	**0.01**	**–**
Jordan	–	–	–	–	–	–
Morocco	–	0.01	–	–	0.03	–
Egypt	–	0.01	–	–	0.02	–
Tunisia	–	0.00	0.01	–	0.00	0.03
Turkey	0.07	0.42	0.50	0.10	0.21	0.27
Brazil	0.96	2.41	2.38	0.07	0.31	0.40
Chile	0.01	0.06	0.09	0.05	0.09	0.12
China	–	2.93	6.22	–	0.31	0.58
Czech Republic	–	0.43	0.36	–	0.75	0.69
India	0.30	0.68	0.68	0.13	0.16	0.15
Indonesia	0.01	0.15	0.11	0.01	0.08	0.07
Malaysia	0.01	0.14	0.18	0.03	0.19	0.20
Rep. of Korea	0.44	5.59	8.95	0.47	1.76	1.94

Source: UNIDO Industrial Development Scoreboard database.

Limited patents applications

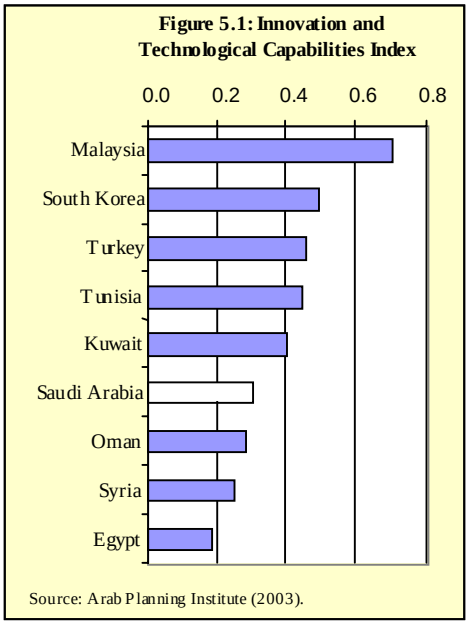
The number of patent applications filed in the KSA in 2002 was 61 for residents and 552 for non-residents. The former compares very unfavourably with comparators: Egyptian residents filed ten times as many patent applications in the same year. However, the number of patent applications by non-residents compares relatively favourably with Egypt and international comparators. ISO certification covering ISO 9000 and ISO 14000 – an indication of increasing conformity to international quality and product-safety standards – showed a significant improvement from 2001 to 2005 and compares quite favourably with regional comparators, except for Turkey and Egypt (Table 5.5).

Table 5.5 Patent applications and ISO certification in the KSA and comparators						
	Patent Applications (2002)		ISO 9000 Certificates		ISO 14000 Certificates	
	Residents	Non-residents	2001	2005	2001	2005
Saudi Arabia	**61**	**552**	**6**	**642**	**6**	**28**
Jordan	–	–	–	293	10	38
Morocco[a]	104	–	14	403	6	26
Egypt	627	788	18	1,326	100	354
Tunisia	–	–	10	380	7	30
Turkey	388	91	72	10,929	91	918
Brazil	3,098	2,484	182	8,533	350	2,061
Chile[a]	241	2,879	15	1,124	17	277
China	39,806	40,426	7,413	143,823	1,085	12,683
Czech Republic	526	551	320	12,743	174	2,122
India	4,417	–	544	24,660	400	1,698
Indonesia	228	633	161	4,068	199	430
Malaysia	–	–	257	5,695	367	694
Rep. of Korea	76,570	29,566	1,156	14,033	880	4,955

a) Data on patent applications for Morocco and Chile are for 2000.
Sources: World Bank, WDI Online (accessed 11 October 2006), and ISO Survey of Certifications 2005 (2006).

More investment needed in innovation capability

The position of the KSA in the Innovation and Technological Capabilities Index (Endnote 3) indicates that, despite its advantageous position vis-à-vis comparators such as Egypt, Syria and Oman, it scored lower than Kuwait, Tunisia and Turkey (Figure 5.1). This suggests that more investment is needed in domestic capabilities supporting technology and innovation if the KSA is to be at least on a par with its regional comparators.



5.4 Domestic financing for small and medium enterprises

In general, provision of finance is relatively strong in the KSA, but both domestic credit and foreign direct investment (FDI) tend to be concentrated in energy-intensive industries. The Saudi

Industrial Development Fund (SIDF) provides finance to meet the needs of the private manufacturing sector and extends subsidized credit facilities that can reach up to 50 per cent of total project costs. Moreover, the growth and liberalization of the banking sector should facilitate greater lending from private banks to private-sector manufacturing firms, including SMEs, in the coming years.

Large industrial establishments do not face a serious funding constraint in the KSA. For instance, 1,330 licences were granted during 2002 for the establishment of new industrial facilities with total financing of US$8.3 billion (Endnote 4), which exceeds the total credit extended by the banking system during the same period to both public and private sectors. This means that those new industrial establishments enjoyed credit financing from non-banking financial institutions and/or foreign institutions. External financing for KSA businesses is facilitated by the fact that exchange-rate risk is limited because of the riyal's long-established peg to the US dollar**,** which the Saudi Arabian Monetary Agency (SAMA) has maintained at the same level since 1987.

Increasing investment for the private sector

During the period 1992–2003, credit extended to the private sector was nearly 72.5 per cent of total credit extended by the banking system, which indicates that Government seasonal borrowing does not excessively crowd out the private sector. However, a worrying sign in recent years is the relative erosion of the share of the private sector in total credit from 80.7 per cent in 1992 to 65.6 per cent in 2003. Should this trend continue, it could indicate a potential constraint on the expansion of industrial activities led by the private sector.

A worrying sign in recent years is the relative erosion of the share of the private sector in total credit.

Between 1995 and 2003, the share of energy-intensive industries (chemicals, plastic products, building materials, ceramics and glass) rose significantly from 44 per cent to 64 per cent of total bank financing extended during this period (Annex 5.2). At the same time, the share of other industrial sectors in total financing declined. This may suggest that credit policies were generally aligned with the overall drive to expand the base of energy-intensive manufacturing.

According to SAMA 2004, there are some 500 establishments with foreign capital; their share of total bank financing is 51.8 per cent and they provide more than 20 per cent of the total employment in the formal manufacturing sector. The establishments with foreign capital were mostly concentrated in chemicals and plastic products (85.2 per cent) (Endnote 5), manufactured metals and machinery (5.2 per cent), building material, ceramics and glass (4.7 per cent), food and beverages (2.7 per cent) and paper, publishing and printing (1.2 per cent).

5.5 Enhancing FDI flows to the non-oil sector for technology transfer

Need to channel FDI into non-oil sector

Although the KSA has the highest stock of FDI in the MENA region, FDI inflows seem to have been primarily directed to the energy sector. Very little FDI is attracted by export-oriented projects in the non-oil sector. Effective integration into global manufacturing value chains has yet to be realized, depriving the country of one of the most important drivers of successful industrial performance in the developing world. Moreover, FDI's contribution to GDP and to gross fixed capital formation is modest by comparison with regional comparators.

Very little FDI is attracted by export-oriented projects in the non-oil sector.

FDI is not just a major source of finance for developing countries, which, after all, is not a primary priority for the KSA given its traditional status as a capital exporter. More importantly, FDI helps to improve links with international markets and greatly facilitates technology transfer, by providing access to modern technologies that are the result of intense R&D operations in the developed world. FDI performance and its mode of operation are also important indicators of an economy's engagement in international production networks and value chains.

FDI as an entry point for global value chains

FDI is the prime channel for entry into global value chains. This comes about directly through foreign companies investing in majority or wholly-owned subsidiaries, or via business alliances that rely on subcontracting and licensing agreements. The preferences of Trans-National Corporations (TNCs) among different forms of FDI depend on three factors: value chain type: the nature of activities in the value chain: and the trade regimes of the target markets for value chains (UNIDO 2004). As indicated earlier, FDI can help increase competitiveness at a time when domestic capabilities are still under construction; indeed, it has been a key factor in the Asian Tigers' successful industrialization experience (UNIDO 2003).

Limited FDI channelled into non-oil industrial exports

The KSA is the leading host of FDI in the MENA region, with a stock of FDI net inflows amounting to US$25.6 billion in 2003. It is followed by Egypt with an inward FDI stock of about US$21 billion (UNCTAD 2004). However, FDI seems to be largely concentrated in the oil and gas sector, and export-oriented projects in the non-oil sectors attract very little. FDI inflows in 1985, 1990 and 2000 were quite modest, amounting to between US$0.5 billion and US$0.2 billion, lower than some regional comparators (such as Turkey, Morocco and Tunisia) and less than the other international comparators. However, FDI flows increased significantly in 2004 to US$1.9 billion, which compares favourably with all regional comparators except Turkey. This led to a significant increase in FDI per capita levels in 2004, which were high in comparison with regional comparators, except Jordan. In turn, this narrowed the gap in FDI per capita levels between the KSA and most international comparators, except Chile, the Czech Republic, Malaysia and the Republic of Korea. (Table 5.6). It should, however, be mentioned that FDI flows to the KSA, as in other countries, are subject to large annual variations and it remains to be seen whether the high level achieved in 2004 will be sustained in the future.

Modest FDI inflows in relation to GDP and fixed capital formation

FDI as a percentage of GDP represents a modest contribution in comparison with regional comparators. The ratio of 0.4 per cent achieved in 2003 is low by regional and international standards in comparison with 4.0 per cent in China, 6.1 per cent in Chile and 9.1 per cent in the Czech Republic (Annex 5.3). The same applies to FDI flows in relation to gross capital flows.

FDI as a percentage of GDP represents a modest contribution in comparison with regional comparators.

It is worth noting that FDI inflows to the KSA are subject to two main constraints. Firstly, being mainly confined to the oil and gas sector, FDI has been conditioned by the fortunes of the oil sector and its dependence on

global oil prices. Secondly, investment in non-oil activities has been hampered by limited complementary inputs, mainly the scarcity of well-qualified labour, and small internal markets.

Table 5.6 FDI net inflows in the KSA and selected comparators, 1985, 1990, 2000 and 2004

	FDI net inflows (US$ billion)				FDI per capita (US$)			
	1985	1990	2000	2004	1985	1990	2000	2004
Saudi Arabia	**0.5**	**0.3**	**0.2**	**1.9**	**38.2**	**19.0**	**8.5**	**78.0**
Jordan	0.0	0.0	0.8	0.6	9.2	11.6	161.1	111.6
Morocco	0.0	0.2	0.4	0.9	0.9	6.7	14.6	27.5
Egypt	1.2	0.7	1.2	1.3	23.7	13.2	18.4	17.3
Tunisia	0.1	0.1	0.8	0.6	19.4	10.7	81.4	63.9
Turkey	0.1	0.7	1.0	2.7	1.9	11.9	14.4	37.8
Brazil	1.4	1.0	32.8	18.2	10.4	6.6	188.5	98.8
Chile	0.2	0.7	4.9	7.6	13.7	50.2	315.3	471.5
China	2.0	3.5	40.7	60.6	1.9	3.1	32.5	47.2
Czech Republic	–	–	5.0	4.5	–	–	485.7	436.3
India	0.1	0.2	2.3	5.3	0.1	0.3	2.3	4.9
Indonesia	0.3	1.1	-4.6	1.0	1.9	6.0	-21.8	4.6
Malaysia	0.7	2.6	3.8	4.6	44.3	146.3	164.7	185.8
Rep. of Korea	0.2	0.8	8.6	7.7	5.3	17.7	183.6	161.3

Source: UNCTAD, FDI Online (accessed 25 October 2006).

As stated in ESCWA (2001a and 2001b), the huge amount of savings that were accumulated in the Saudi economy after the first oil boom in the early 1970s could not be channelled into productive investments in non-oil economic sectors, because the amount of savings exceeded the physical and economic possibilities for investment. As a result, the primary focus has been on improving the physical infrastructure and financing the over-expansion of the public sector to absorb Saudi national labour.

Potential technology transfer and diffusion of new technology via FDI

External technology transfer and the diffusion of new technology through FDI can come about via a number of routes. Firstly, such new technology may not be commercially available and innovating firms may refuse to sell technology via licensing agreements; in this case, alliances with innovating firms may be the best means of learning new technology. This could involve a strategy encouraging Saudi investment in foreign innovation-strong companies via acquisitions through outward FDI. Secondly, FDI may also provide the competition necessary to stimulate technology diffusion, particularly if local firms are protected from import competition. Thirdly, technology transfer may occur through worker training and the diffusion of managerial skills. Fourthly, diffusion of new technology and organizational practices can come about through labour turnover as

domestic employees move from foreign to domestic firms. Finally, innovating firms will be more likely to license their technology to Saudi firms if copyright protection is improved; inadequate intellectual property protection is often cited by businesses as one of the Kingdom's disadvantages (Endnote 6).

Shift in imports towards capital goods and licensing to deepen domestic technological capabilities

The lack of data on royalty payments in the KSA prevents an evaluation of the extent of technology transfer. However, imports of capital goods can help proxy the extent to which domestic firms are investing in improving their production technology by acquiring state-of-the-art imported technology embodied in capital goods. It can also gauge the extent of "reverse engineering" activities (meaning the discovery of the technological principles underlying an existing product through the observation and analysis of that product) in economies where this has been an important source of technology diffusion, which was largely the case in the Asian Tigers.

In 2002, the KSA's imports of capital goods stood at 14.6 per cent of total imports, which compares with the MENA average of 15.4 per cent. However, comparison with regional competitors such as Egypt (18.9 per cent) and Turkey (21.1 per cent), as well as international comparators such as Indonesia (22.4 per cent), suggests that a further shift in the Saudi import structure may be necessary to deepen domestic technological capabilities**.** It should also be noted that on account of insufficient data breakdown, it is not known how much of the imported capital goods go into the oil sector; here, spillover effects are likely to be restricted as the extent of "reverse engineering" in oil-sector capital goods is limited.

A shift in the Saudi import structure may be necessary to deepen domestic technological capabilities.

Finally, it is important to note that recent studies stress the crucial role of domestic human capabilities for the diffusion of imported technology, to modify it for domestic needs and to improve it continuously. The existence of a skilled, technologically aware labour force in the Asian Tiger economies has been a key factor underlying technology transfer via FDI, more so than in other regions such as Latin America. Differences in education levels, the quality of education and the nurturing of technical and scientific disciplines can crucially shape the way an economy benefits from FDI in economic development.

5.6 Supportive drivers such as digital infrastructure and ICT indicators

With regard to the supportive drivers, the early use of windfall oil revenues mentioned above has decisively contributed to modernizing the physical infrastructure; however, a high level of variability is evident in the status of infrastructure within industrial cities, with the majority in need of further improvement in overall infrastructure investment.

Favourable physical and digital infrastructure

The physical infrastructure base in the KSA compares favourably with regional comparators and provides a strong base for future industrialization initiatives. The digital infrastructure is also relatively strong overall, but levels of internet access and ICT spending as a proportion of GDP remain low, which means the Kingdom is missing out on potential productivity gains. In modern economies, infrastructure plays an increasingly important role in support of business operations in industrial and non-industrial sectors. Whereas traditional elements of infrastructure such as transportation and utilities continue to play an important role, the blistering pace of

ongoing innovation in information and communication technologies points to an increasingly important role for the new *digital* infrastructure of an economy, as distinct from the traditional *physical* infrastructure.

The digital infrastructure is relatively strong, but levels of internet access and ICT spending as a proportion of GDP remain low.

The extent and quality of the digital infrastructure is becoming crucially important in shaping overall country competitiveness, especially in export-oriented economies relying on innovation and technology-intensive sectors. Digital infrastructure also provides better, easier access to information and statistical data, which are currently key inputs in the decision-making processes of modern business organizations.

Table 5.7 ICT infrastructure and energy consumption in the KSA and comparators

	Telephone mainlines (per 1,000 people)	Mobile phone subscribers (per 1,000 people)	Personal computers (per 1,000 people)	ICT expenditure (% of GDP)	Electric power consumption (per capita kWh/year)
	2004	2004	2004	2005	2003
Saudi Arabia	**154.3**	**383.1**	**353.9**	**2.3**	**6,259**
Jordan	117.0	302.3	56.9	8.3	1,502
Morocco	43.9	313.1	20.8	6.3	577
Egypt	130.3	105.2	31.7	1.5	1,127
Tunisia	121.2	358.7	47.5	5.8	1,118
Turkey	266.6	483.9	51.6	7.8	1,656
Brazil	230.4	356.7	105.2	7.8	1,883
Chile	205.8	593.3	132.6	6.1	2,880
China	241.1	258.3	40.9	5.3	1,379
Czech Republic	337.7	1,054.3	239.8	7.2	6,070
India	40.7	43.8	12.1	5.9	435
Indonesia	45.9	137.9	13.9	3.4	440
Malaysia	178.6	587.0	196.8	7.0	3,061
Rep. of Korea	541.9	760.9	544.9	6.9	7,018

Source: World Bank, WDI Online (accessed 11 October 2006).

Unquestionably, one of the virtues of economic planning and management in the KSA has been the early recognition of the windfall nature of oil revenues during oil price booms. Thus there has been a strong tendency to use this windfall income to modernize the *physical and social infrastructure.* After the first oil price boom, most government expenditure went into the development of the transport network, housing facilities, water, electricity, schools and hospitals. A smaller proportion went to projects in the main productive sectors and to the heavy industries that were launched at that time. By regional and international standards, the network of physical infrastructure in the KSA today is advanced and constitutes a key source of strength. Investment-promoting authorities such as the Saudi Arabian General Investment Authority (SAGIA) capitalize on this feature in their industrialization plans and the promotion of FDI into the industrial sector. However, infrastructure

still needs to be improved in some of the industrial cities, which is an issue that needs to be addressed in order to boost industrial growth.

In terms of the *digital infrastructure*, the figures in Table 5.7 indicate that the KSA has a competitive edge vis-à-vis regional competitors in terms of the number of telephone mainlines, mobile telephones and the availability of personal computers. In relation to international comparators, the KSA also compares relatively well as far as these indicators are concerned.

Limited use of ICT despite favourable ICT infrastructure

However, in terms of ICT expenditure in relation to GDP, the KSA has the lowest level compared with both its regional comparators, except Egypt, and all international comparators**.** This is also reflected in data on internet users, broadband subscribers and international internet bandwidth, where the KSA has the lowest rank, except for Egypt in the former case and Egypt and Morocco in the latter two cases (Table 5.8). This is a serious constraint given the increasingly important role of the internet as a source of information, which benefits manufacturing businesses in several ways: by spreading knowledge; by helping to increase efficiency and keep costs down by facilitating price comparisons; and as a forum for commerce. Roughly 20 per cent of the world's population now use the internet, whereas Saudi Arabia is lagging behind with fewer than 7 per cent. In contrast, the KSA compares favourably with regard to secure internet servers both regionally and internationally.

Table 5.8 Internet use in the KSA and comparators

	Internet users (per 1,000 people)	Broadband subscribers (per 1,000 people)	Secure internet servers (per 1 million people)	International internet bandwidth (bits per person)
	2004	2003	2005	2004
Saudi Arabia	**66.2**	**0.3**	**3.1**	**31.3**
Jordan	113.8	1.0	3.7	58.8
Morocco	117.4	0.1	0.7	26.0
Egypt	53.7	0.1	0.5	19.4
Tunisia	84.1	0.3	1.4	44.0
Turkey	142.5	0.8	16.9	123.5
Brazil	119.6	6.6	14.1	149.3
Chile	266.7	22.4	21.0	787.9
China	72.5	10.5	0.3	57.4
Czech Republic	469.8	3.4	41.7	–
India	32.4	0.1	0.6	11.4
Indonesia	66.7	0.2	0.5	10.3
Malaysia	396.8	4.5	14.9	128.3
Rep. of Korea	656.8	233.6	20.0	1,484.5

Source: World Bank, WDI Online (accessed 11 October 2006).

Roughly 20 per cent of the world's population now use the internet, whereas Saudi Arabia is lagging behind with fewer than 7 per cent.

The current boost in government revenue, deriving from the recent surge in international oil prices, could be effectively used to fund further enhancements in the effective use of the digital infrastructure**,** just as previous oil price windfalls were used to create an excellent physical infrastructure that will stand the Kingdom in good stead for many years.

High electricity consumption partly for energy-intensive industries

Electricity consumption per capita is, unsurprisingly, very high in the KSA, ranking second only to Kuwait in the region. Per capita consumption of electric power in the KSA recorded 6,259 kWh in 2003 compared with 10,251 in Kuwait in 2001. This reflects high demand from two main sources. Firstly, given the climate, air-conditioning use is very high and represents the main source of domestic electricity consumption. Secondly, and more important from the point of view of an industrial strategy, the Saudi industrial sector is mostly comprised of energy-intensive industries such as petrochemicals, iron and steel, fertilizers and others. The country's low electricity tariffs add to demand from both these sources.

5.7 Industrial strategies for enhancing industrial capabilities

This chapter has highlighted strategies for enhancing domestic capability building for accelerated industrial growth, diversification and competitiveness in the following areas.

1. Enhancing human resource development to meet the needs of industry through strengthening technical, vocational, business and ICT skills.

2. Improving domestic technological and innovation capabilities through greater technological effort, involving increased R&D and building industrial trade capacity.

3. Strengthening financing for small and medium-sized enterprises (SMEs).

4. Enhancing FDI flows to the non-oil sector for increased technology transfer and diffusion, as well as improved export market access.

5. Increasing imports of the capital goods and licensing needed by industry to deepen technological capabilities.

The following section will provide a more detailed elaboration of strategies for improving human resources and skills (point 1 above) to meet the emerging requirements for industrial diversification and competitiveness in the light of the new global industrial setting. Such strategies are generic and overarching in character and affect most other strategies recommended in Industry 2020. Other strategies listed above (points 2–4) have either been elaborated in the relevant sections of this chapter or are discussed in further detail in the next chapter (Chapter 6) on improving the business environment, in Chapter 7 on creating industrial innovation systems and in Chapter 8 on promoting cluster-based industrial development.

Industrial strategies for human resource development to aid industrial development

There is no doubt that human resources are the true wealth of the Kingdom. Human resource development is therefore one of the most important objectives within the overall vision for the industrial sector and a basic task in the National Industrial Strategy.

Significant progress has been made in strengthening the country's education system and shifting the emphasis towards science and technology at the secondary and tertiary levels. The quality of graduates is high in some tertiary institutions; however, it is not adequate across the entire range. Moreover, the quality and relevance of education have not kept pace with the growing number of students. In particular, industry is faced with an imbalance between the output of the education system and the particular skills needed, as discussed above. Therefore, as Industry 2020 recognizes, an urgent reform programme is needed to enhance the quality and content of education, teacher training, vocational facilities and the use of technology. Table 5.9 shows that the demand-supply gap in the KSA is particularly critical in the scientific and technical, sales and services, agriculture and production, construction and transport occupations. Scientific and technical occupations grew by 7,700 during 2001-2003 while the supply of graduates only increased by 3,301 leaving a gap of 4,399 presumably taken up by foreign employees. Out of 67,500 jobs created during the above period only 38 per cent were filled by the supply of KSA graduates, leaving a gap of 32,000.

Table 5.9 KSA demand-supply gaps by occupation: 2001-2003 average

Sector	Jobs Created	Supply of Graduates	Gaps
Scientific & technical	7,700	3,301	-4,399
Admin & business	1,900	5,438	3,538
Clerical jobs	4,900	8,102	3,202
Sales & services	16,000	8,100	-7,900
Agriculture	5,000	578	-4,422
Production, construction and transport	32,000	nil	-32,000
Total	67,500	25,519	-41,981

Sources: SAMA, Ministry of Higher Education reports.

Industry 2020 recognizes that an urgent reform programme is needed to enhance the quality and content of education, teacher training, vocational facilities and the use of technology.

The skills strategy for industrial development rests on four axes.

1. Developing skills consistent with the overall vision for the industrial sector in order to maximize the use of such skills in industry. Such skills should be prioritized in all stages of public education, university and technical education, and vocational training programmes, as well as research and development.

2. Developing training opportunities and programmes to meet the requirements of industry in the short term.

3. Skills development should also be characterized by long-term continuity, requiring the building up of an institutional structure to enhance the skills of employees in a flexible way, in order to meet the emerging and evolving needs of existing and future industrial activities.

4. A two-way process of public-private sector dialogue and partnership in order to dovetail industry's need for human resources with the output of the education and training system through an assessment of skills needed by the private industrial sector.

All four axes have the same key goals:

- Emphasizing the development of the skills of graduates and upgrading their experience and expertise to achieve the overall vision for the industrial sector of the Kingdom;

- Strengthening the outputs of the educational and training systems to become compatible with the needs of the industrial sector over the medium and long term.

The National Industrial Strategy acknowledges that establishing such a close relationship between education and industry is vital not only for providing industry with the required workforce, which is the centrepiece of any industrial development strategy, but also in sharing the benefits of the industrial growth in the wider society. To this end, it is crucial for industry to provide job opportunities not only for the elite, but also for each and every citizen willing to work in industry.

In order to strengthen the network of relationships between education and industry, the National Industrial Strategy therefore acknowledges:

- The importance of building a pyramid of diverse skills;

- The inevitable intertwining of national and international experiences;

- The need for a proactive national learning system;

- The need for dialogue between the Government, educational institutions and private-sector employers to obtain an accurate and comprehensive assessment of skills needs and to maintain mechanisms for feedback about the progress of the new educational initiatives;

- The dovetailing of the needs of industry with the needs of the community for creating employment opportunities.

To achieve the overarching skills development goals, strategies for enhancing human resources for accelerated industrial development will focus on the following tasks:

- Raising the standards of technical and scientific education in schools and colleges;

- Enhancing the managerial competence and innovative capabilities of existing firms through industrial learning by producing for competitive markets;

- Encouraging the expansion of technology-based skills, in particular those needed by SMEs;

- Developing a National Innovation System to support technological learning, innovation and the exchange of technological knowledge between R&D centres and private firms producing goods and services;

- Providing support for all firms to establish: strategic alliances and ways of networking with international technology leaders and domestic technology centres, especially science and technology schools of KSA universities; licensing arrangements; and the use of domestic and foreign consulting services.

It is essential to develop technical and vocational training and employee training within enterprises further, to upgrade employee skills continuously.

Furthermore, it is essential to develop technical and vocational training and employee training within enterprises further, to upgrade employee skills continuously. Such skill development programmes should be coordinated with the framework of the overall industrial strategy. Training programmes need to be scaled up on a sector-specific basis and made more responsive to the requirements of industry. Illustratively, this could include wider use of skills audits, appropriate management courses, industrial sponsorship programmes, work experience programmes and a graduate placement scheme. Incentives could also be provided for employee training, such as double tax-deductibility of training expenses, as in Malaysia, or treatment of training as an investment. The provision of skills and training must be specifically adapted to the needs of SMEs, which tend to face constraints in skill-intensive activities, and which need assistance in upgrading their employees' existing skills and gaining new ones.

Enhancing ICT skills: a key priority

A special priority area for human resource development is the need to enhance ICT skills for wider application in competitive industrial development in three key areas:

- Enhancing access to knowledge, technology, innovation and learning;
- Introducing new management and organizational systems for improved industrial efficiency and productivity; and
- Improving access to markets, distribution channels and global value chains.

To achieve these goals, the Government should also aim to broaden access to ICT facilities, particularly personal computers and the internet, from the current low levels. There is great potential to increase the use of ICT in schools, both to enhance the immediate learning experience and to create a computer-literate generation capable of using ICT in their future employment.

Available indicators also suggest that further improvements are needed in the business environment to make it more attractive for domestic and foreign investors and to cater more to the needs of small and medium-sized enterprises. Industrial strategies on these issues are elaborated in Chapter 6.

Endnotes

1. This Chapter presents updated analyses of some of the key findings of UNIDO 2005b and 2006e.
2. This indicator tends to provide a better indication of technological effort in manufacturing than an aggregate indicator such as government expenditure on R&D, which would include activities such as agriculture and defence, the outputs of which are likely to be detached from the needs of commercial industrial sectors. This is especially so in countries where the links between public/university R&D centres and the industrial sector are weak.
3. This is a normalized index based on four core indicators (percentage of science and technology graduates, ratio of FDI to domestic investment, share of capital goods in total imports and the share of high-tech exports in total exports). See Arab Planning Institute (2003) for data sources and methodology.

4. Source: Saudi Arabian Monetary Authority, *Annual Report*, 2004.

5. Figures in parentheses in this paragraph refer to the ratio of financing extended to establishments with foreign ownership, which stood at SR132.7 billion as of end 2003.

6. The Kingdom remains on the International Intellectual Property Alliance's (IIPA) monitoring list. Positively, the Government has made commitments to improve copyright protection since joining the WTO and the Ministry of Culture and Information has increased its seizures of pirated material. However, according to the IIPA's 2006 report on Saudi Arabia, deterrents for copyright infringement remain insufficient. More information on the copyright protection issue can be found at http://www.iipa.com/rbc/2006/ 2006SPEC301SAUDIAARABIA.pdf.

Chapter 6. Improving the business environment for enhanced industrial performance, with special reference to SMEs

6.1 Rationale for a competitive business environment (CBE)

Like other medium-to-high income countries in a rapidly globalizing world, Saudi Arabia operates in a competitive economic environment in which capital, and now increasingly, labour move relatively freely between national borders. Hence the rapid establishment of a competitive business environment (CBE) for industry is crucially important, not only to attract FDI, but also to induce Saudi capital to invest in domestic industry. Encouragingly, the World Bank's 2006 "Doing Business" report, a benchmarking exercise for 175 countries, ranks the Kingdom in 38th position for "ease of doing business". The current target, expressed by the Saudi Arabian General Investment Authority (SAGIA) in its "10-by-10" vision statement is to raise the KSA to within the top ten in the global rankings and to the first place in the World Economic Forum's Arab World Competitiveness Report.

A CBE benefits from growth and employment creation in the following ways:

- A CBE *accelerates innovation and the acquisition of technological know-how* in large companies and SMEs. It promotes private sector dynamism and facilitates FDI inflows.
- A CBE *reduces transaction costs* and *boosts productivity*, thereby generating faster economic growth, employment creation and the inflow of new investment to the dynamic areas of the economy.
- A CBE *promotes labour market mobility and job satisfaction* as wages are bid up by companies competing to hire the most productive workers.
- Perhaps the most important function of a CBE is that it *gives rise to an evolving learning system* within the whole economy, as companies learn from the successes of other companies and their own mistakes. Faster feedback generates rapid self-correcting mechanisms within companies and entire industrial sectors.

Perhaps the most important function of a CBE is that it *gives rise to an evolving learning system* within the whole economy, as companies learn from the successes of other companies and their own mistakes.

Essential aspects of a CBE include the maintenance of fairness and transparency in the domestic market and the inhibition of non-competitive practices, fraud and violations of intellectual property rights. Another important component is the free and transparent flow of finance for business activities. The following sections discuss how the business environment can be upgraded in the KSA to enhance diversification and industrial competitiveness. The chapter begins with an assessment of the Saudi business environment in relation to international comparators and takes particular account of the environment for SMEs. This is followed by a discussion of the key findings of interviews that UNIDO conducted with leading Saudi industrialists. The chapter ends with a range of recommendations for policies to improve the business environment in order to boost industrial growth, especially through SMEs.

6.2 Defining the business environment for industry

The competitiveness of a firm does not just depend on the efficiency of the firm's production processes but also on the external environment within which firms operate. Clearly, poor physical infrastructure can add to costs by causing delays in the flow of supplies and finished goods. Inefficient or inadequate business institutions can also hinder industrial processes and raise overall costs. Common examples are delays and costs associated with customs clearance and the issue of licences. The "institutional infrastructure" – the network of institutions within which businesses operate – is just as important as the physical infrastructure in determining overall competitiveness.

Firms' behaviour and transaction costs are highly sensitive to instabilities, perceived risks and threats consequent upon macroeconomic, trade and competition policies. A poor institutional infrastructure will not only lower productivity, but also introduce higher risk, which dampens firms' readiness to invest in risky new technologies. Here, the institutional and physical infrastructures are together referred to as the "business environment" within which firms operate.

While individual firms are largely responsible for controlling in-house production costs, the government can influence the scope for keeping transaction costs and uncertainties associated with the business environment at an acceptably low level. A business-friendly environment is a classic example of an essential "public good" supplied by the government that is a determinant of the competitiveness of private goods production. The business environment can be separated into distinct components as indicated below (Endnote 1).

- ***Macroeconomic policies*** covering monetary, fiscal and exchange-rate regimes determine macrostability, i.e. tax rates, inflation rates, real exchange rates and real interest rates. Conservative macropolicies – such as balanced budgets – are believed to promote business investment and foster high growth by reducing business uncertainty. In addition, macroeconomic policies that ensure low inflation enable the monetary authorities to keep real interest rates relatively low, thus providing a low-cost source of finance for businesses and encouraging investment.

- ***Trade and competition policies*** cover tariffs, quotas, effective rates of protection and export incentives. Low levels of effective protection promote competition and faster productivity growth by inducing better operational efficiency, technological upgrading and easier introduction of new products. Low protection also builds competitive strength in domestic firms, which leads to expansion of exports.

- ***The legal and regulatory system***, as it operates de facto, affects business transaction costs. Transparent and efficient regulatory and legal systems reduce the costs of doing business, thereby promoting increased investment and the rapid resolution of commercial disputes. Protection of intellectual property rights (IPRs) promotes greater investment in domestic R&D and knowledge-intensive business activity by both foreign and domestic firms. Procedures relating to customs, trade taxes and licensing are also included in this category as they also affect the cost of doing business in the country.

- ***The system of incentives and support*** for business investment and innovation by large domestic and foreign companies and SMEs is also necessary to consider provisions and incentives for regional development within the country, as well as competition and cooperation within the Gulf Cooperation Council (GCC) region.

- ***The physical infrastructure***, which constitutes the network of roads, railways, ports, air links and the telecommunication and IT infrastructure.

6.3 Macroeconomic stability

Data on the Saudi economy are presented in Table 6.1, confirming that the macroeconomic environment is generally favourable for business. Over the past two decades, consumer price index (CPI) inflation has been less than 1 per cent per year on average (WTO 2005). The exchange rate has also been stable against the US dollar for the past two decades as a result of the currency peg. As the US dollar depreciated against other major currencies over the period 2001–2004, the Saudi riyal also depreciated in real effective terms, raising the comparative advantage of non-oil exports but adding to import costs. The real effective exchange rate fell by 20 per cent between 2001and 2004 (IMF 2005). Domestic interest rates closely track US interest rates, as part of the currency peg system. Saudi Arabia typically records large trade and current account surpluses, reflecting its valuable oil exports; the current account has not been in deficit since 1998 and the trade balance has been positive since the Saudi Arabian Monetary Agency (SAMA) started publishing its balance of payments figures in 1961.

Table 6.1 Key macroeconomic indicators for the Kingdom of Saudi Arabia

Macroeconomic indicator	2000	2001	2002	2003	2004
Annual inflation rate %	-1.10	-1.10	0.20	0.60	0.30
Ratio of budget surplus (+) or deficit (-) to GDP %	3.3	-4	-2.9	4.5	11.4
Ratio of current account surplus (+) or deficit (-) to GDP %	8.5	5.5	7.0	15.4	26.8
Exchange rate (Saudi Riyals/US$)	3.75	3.75	3.75	3.75	3.75

Source: Extracted from the SAMA website.

Government fiscal management has in the past been uneven (Ramady 2005, Chapter 3). High oil revenues brought the budget into surplus for each of the past three years despite strong growth in public spending. However, the budget was in deficit for seven of the ten years between 1994 and 2004 (according to SAMA data). Previously, the KSA had financed its deficits by drawing down foreign currency reserves, but that trend now appears to have been reversed as the favourable oil price environment of the past few years has allowed SAMA to build up its stock of foreign reserves and other foreign assets while also repaying debt.

Data on the Saudi economy show that the macroeconomic environment is generally favourable for business.

Data on Government debt levels are not readily available from SAMA or other official sources. However, "Saudi Arabia reports minimal or virtually no direct sovereign state borrowings from international capital markets" (Ramady 2005, p69). In fact the KSA is a net creditor in international financial markets, thanks to the large revenues it earns from oil exports. Domestic debt has been high, rising from 45 per cent of GDP in 1993 to 120 per cent in 1999 and coming down to 80–98 per cent in 2003, depending on alternative estimates of the extent of debt (Ramady 2005, pp. 66–71)**.** Debt levels fell further in 2004 and beyond as indicated by the following IMF statement: "*The central government fiscal position strengthened further in 2004 on account of record oil revenues and a relatively limited increase in outlays. The fiscal surplus increased to 9.5 percent of GDP, up from 1.25 percent of GDP in 2003. Over half of the 2004 fiscal surplus was used to reduce the gross central government debt by 16 percentage points to 66 per cent of GDP, while the remaining surplus was placed in a special fund to finance investment in priority areas over a five-year period.*" (IMF 2005, Endnote 2.)

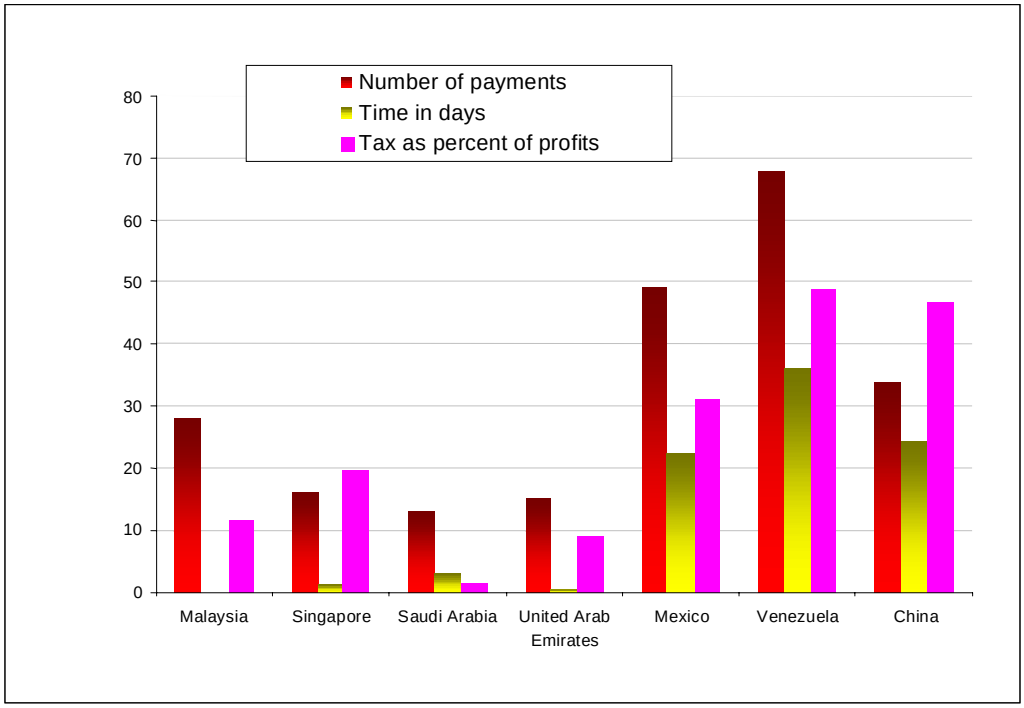
It is clear that the country's heavy dependence on oil revenues introduces a high degree of volatility into the budget and current account balance, but the Government has taken steps to counter this volatility by building up reserves and reducing public debt. In the December 2005 review cited above, the IMF commended the Government for maintaining prudent macroeconomic policies and for deciding to maintain the peg to the US dollar until the proposed GCC currency unification, targeted for 2010. The IMF also endorses the Government's plans to use oil revenues to promote the private sector and diversify the economy, invest strongly in infrastructure and education and maintain the momentum of reform and effective regulation. Overall, macroeconomic management has improved significantly and is helping to moderate the high risk that the KSA still faces from movements in the global oil price.

6.4 Tax policy and tax administration

In 2004, Saudi Arabia implemented a relatively liberal business tax regime that includes internationally accepted tax principles such as transfer pricing laws. Multiple corporate tax rates on non-GCC companies have been replaced by a uniform corporate tax rate of 20 per cent on non-oil and non-gas net profits earned by non-GCC companies (Endnote 3). Progressive tax rates, ranging from 30 to 85 per cent, continue to be levied on activities that are related to petroleum or natural gas. In contrast, GCC companies or the GCC share in jointly owned companies pay no corporate tax; instead they pay a 2.5 per cent religious tax (called "*Zakat*"). Therefore, the "tax base" is the share of annual profits accruing to foreign ownership in the company, minus various deductions (for example, capital depreciation is treated as an allowable expense). Capital gains are treated the same way as taxable profits, while dividends and the business income of non-residents paid out are taxed at the rate of 5 per cent. Companies face no property, regional, local or sales taxes at present.

The financial and administrative burden of the prevailing tax regime is benchmarked in Figure 6.1, based on data reported on the World Bank's "Doing business" website. The data reflect the taxes a medium-size company must pay or withhold in a given year, as well as measures of the administrative burden in paying taxes.

Figure 6.1: Indices of taxes and tax administration



Source: Constructed from World Bank data at http://www.doingbusiness.org/ExploreTopics/PayingTaxes.

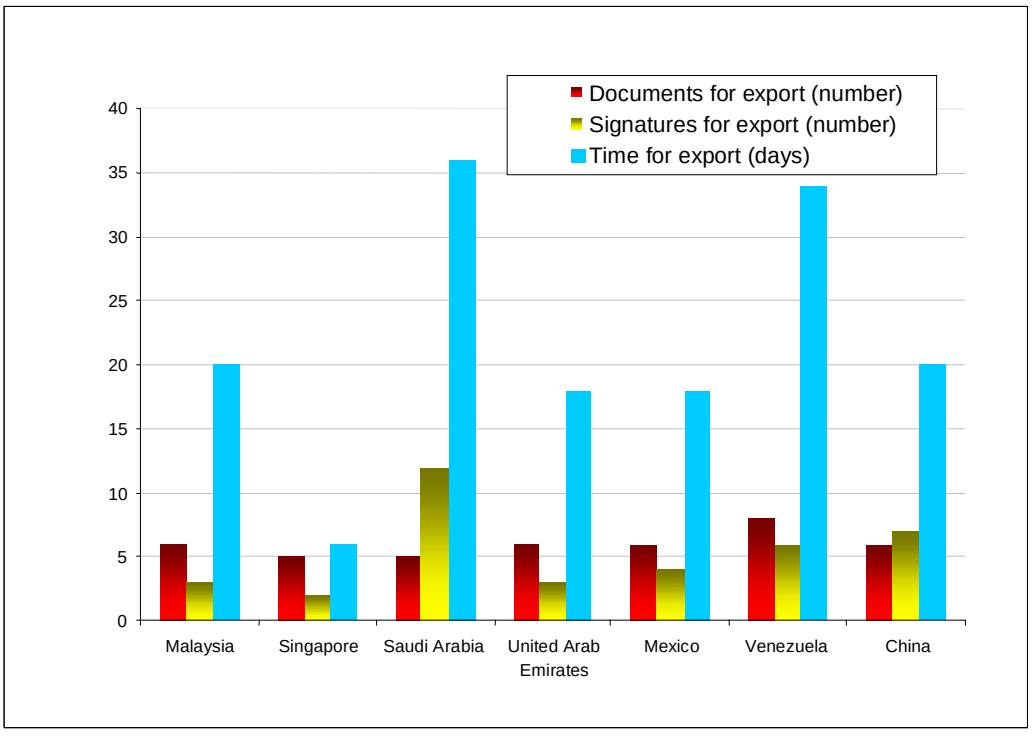
Clearly Saudi Arabia compares extremely well with even Singapore, Malaysia and the United Arab Emirates on all three indicators. The total tax burden – around 1.4 per cent of net profits – is the lowest in the group; this reflects the fact that Saudi businesses pay very low taxes. The time spent dealing with tax matters, however, is considerably longer than in the best comparator countries.

The appropriate questions in the current context are whether tax rates need to be so low and whether it is wise to discriminate so heavily against foreign investment in industrial activity. In particular, the discrimination against foreign firms is likely to introduce distortions that are inimical to the healthy development of technological capability in the long run. Following WTO entry, such policies will need to be phased out to conform to the non-discrimination principle, as is currently being discussed between the Saudi authorities and the WTO (WTO 2005). Moreover, it should be noted that with subsidized prices for energy and water, business organizations actually enjoy negative tax rates in real terms.

6.5 Trade policy and current trading characteristics

In December 2005, Saudi Arabia signed the articles of accession to the WTO as its 149th member after a period of negotiation that began in July 1993. As part of its WTO accession agreement, Saudi Arabia has undertaken to reform the trading regime by streamlining and simplifying business regulations, increasing transparency and revising legislation, particularly as regards intellectual property protection, import licensing, customs valuation, standards and technical regulations. Highlights of the proposed reforms are summarized in Endnote 4.

Figure 6.2: Export characteristics



Source: World Bank data at http://www.doingbusiness.org/ExploreTopics/TradingAcrossBorders.

In 1981, the KSA, jointly with Bahrain, Kuwait, Oman, Qatar and the United Arab Emirates (UAE), established the Gulf Cooperation Council (GCC). Currently the GCC operates as a preferential trade association with common external tariffs, but the long-term objective is to move through a customs union to full economic union. Currency unification is scheduled for 2010 (GOIC 2003). Since January 2003, Saudi Arabia has applied the GCC common external tariff with exclusions for a limited number of sensitive items that are permitted

within the GCC framework. It was agreed that these sensitive items would be brought within the GCC framework after a period of three years from December 2002 (WTO 2005**)**. At that time, more than 85 per cent of tariff lines carried duties of 0 or 5 per cent. Of the remainder, 7 per cent carried duties of 12 per cent, 6 per cent carried duties of 20 per cent and just 20 lines (tobacco and related products) carried duties of 100 per cent. Imports of 70 lines (including pork and alcohol products) were completely banned for religious reasons.

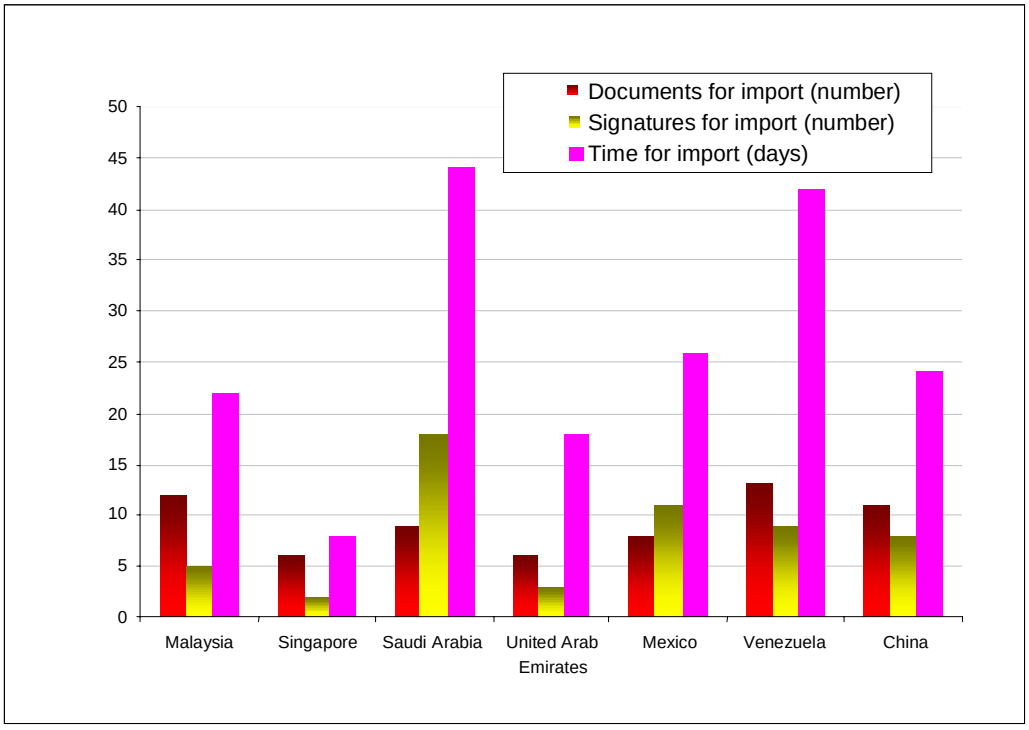
As part of its WTO accession agreement, Saudi Arabia has undertaken to reform the trading regime by streamlining and simplifying business regulations, increasing transparency and revising legislation.

Actual business experience with importing and exporting is reflected in data posted on the World Bank "Doing Business" website, displayed in Figures 6.2 and 6.3. As survey data were compiled sometime before WTO accession in 2006, the trading situation is likely to improve in the future. Saudi Arabia compares unfavourably with Malaysia and Singapore on all three measures for both imports and exports.

6.6 Competition and pricing policy

It is recognized that a strong, clear competition policy is needed to promote industrial competitiveness and diversification. Healthy enterprises can emerge and develop only in an environment of fair domestic competition, where they can build capabilities and are not subject to the stifling market power of large companies, including privatized enterprises. A highly competitive domestic market is also a launching pad for successful exporters, as the experience of the Republic of Korea and Taiwan Province of China shows.

Figure 6.3: Import characteristics



Source: World Bank data at http://www.doingbusiness.org/ExploreTopics/TradingAcrossBorders.

The Saudi government issued a Competition Law in June 2004, which deals with cartels, monopoly-type behaviour, mergers and anti-competitive commercial practices. Further legislation has been drafted to address implementation issues. Prices are also set by market forces except in respect of a limited set of essential goods, including wheat flour, fuel oil, gasoline, diesel, kerosene, LPG cooking gas, natural gas liquids (propane, butane and natural gasoline), asphalt, natural gas (ethane and methane), crude oil used as fuel, and pharmaceuticals. Electricity tariffs are also very low and the Saudi Electricity Company sustains losses. Pharmaceuticals are also subject to profit regulation. These regulations are to be applied without discrimination to private or public, domestic or foreign business organizations (WTO 2005).

An important part of the economic reform programme of the KSA is privatization of a number of state-owned enterprises.

Privatization programme

An important part of the economic reform programme of the KSA is privatization of a number of state-owned enterprises. Currently, 20 state-owned utilities in various essential service areas have been approved for privatization (WTO 2005). The objectives of the above measures relating to competition policy and privatization have been explicitly spelled out in the Working Party Report (WTO 2005), as follows:

- Build efficiency in the national economy to meet regional and global competition;
- Encourage the private sector to move into as many areas of the national economy as is feasible, thereby contributing to higher growth and employment of Saudis;
- Enlarge ownership of productive assets by Saudi citizens and encourage domestic and foreign capital to invest in the economy;
- Provide services to citizens more efficiently and effectively;
- Rationalize and reduce public expenditures.

The general objective is to bring the Saudi economy into line with current practice in OECD countries as regards domestic competition and the role of the public sector, subject to certain limited exceptions.

To sum up, the general objective is to bring the Saudi economy into line with current practice in OECD countries as regards domestic competition and the role of the public sector, subject to certain limited exceptions that relate to cultural and religious practices. The main issue is, of course, the efficiency and speed with which these plans and objectives can be realized. This depends mainly on the ability of the political leadership to carry through a transformation in the attitude and motivation of various public sector organizations involved. In the longer term, the speed of adjustment to the globalizing world economy will also depend on the alacrity with which reforms in the educational system are implemented, among other factors.

6.7 Business environment

Aggregate rankings

Table 6.2 shows Saudi Arabia's rankings on key business environment indicators relative to key international comparators, drawn from the World Bank's "Doing Business" survey. (The KSA is not currently included in the international competitiveness rankings compiled by the World Economic Forum (WEF) or the International Institute for Management Development (IMD) business school, though it is included in the WEF's Arab World Competitiveness Report.) More detailed information on each of the individual activities is available on the same World Bank website.

Table 6.2 Relative rankings of Saudi Arabia as regards business activities in 2006

Activity	Economy						
	Saudi Arabia	United Arab Emirates	Singapore	Malaysia	Mexico	Venezuela	China
Ease of Doing Business	38	77	1	25	43	164	93
Starting a Business	156	155	11	71	61	129	128
Dealing with Licences	44	79	8	137	30	98	153
Employing Workers	21	57	3	38	108	165	78
Registering Property	4	8	12	66	79	75	21
Getting Credit	65	117	7	3	65	143	101
Protecting Investors	99	118	2	4	33	162	83
Paying Taxes	6	3	8	49	126	167	168
Trading Across Borders	33	10	4	46	86	116	38
Enforcing Contracts	97	112	23	81	87	129	63
Closing a Business	87	137	2	51	25	144	75

Source: World Bank data from http://www.doingbusiness.org/EconomyRankings.

On most indicators used in this survey, Saudi Arabia compares favourably with regional averages. However, the Middle East region, which lags behind on many business environment indicators, is not the standard of choice for the KSA, which is seeking to compete on the world stage. Our analysis therefore considers other successful emerging market economies as international comparators.

Overall, Saudi Arabia ranks well below Singapore – the star performer – and Malaysia, the most frequently cited role model, on most of the indicators. The rankings compare quite well with the UAE, Mexico, China and Venezuela. By comparison with both OECD averages and most of the international comparators shown in Table 6.2, Saudi Arabia does reasonably well on the following indicators, which this report will therefore not discuss further:

- Dealing with licences;
- Employing workers;
- Registering property;
- Getting credit;
- Protecting investors;
- Paying taxes.

Activities for which the Kingdom compares less favourably with OECD countries and Singapore and Malaysia, and which will be discussed further below, include:

- Starting a business;
- Trading across borders (which has been discussed above). It is worth adding that the data posted on the World Bank site shows that exports and imports are seriously hampered: the number of signatures required for clearing each shipment and time delays range from 3–6 times the OECD norms. These comparisons bear out the conclusions made in relation to Figures 6.2 and 6.3 that the existing trading structures constitute a significant obstacle to building industrial competitiveness.
- Enforcing contracts;
- Closing a business.

Starting a business

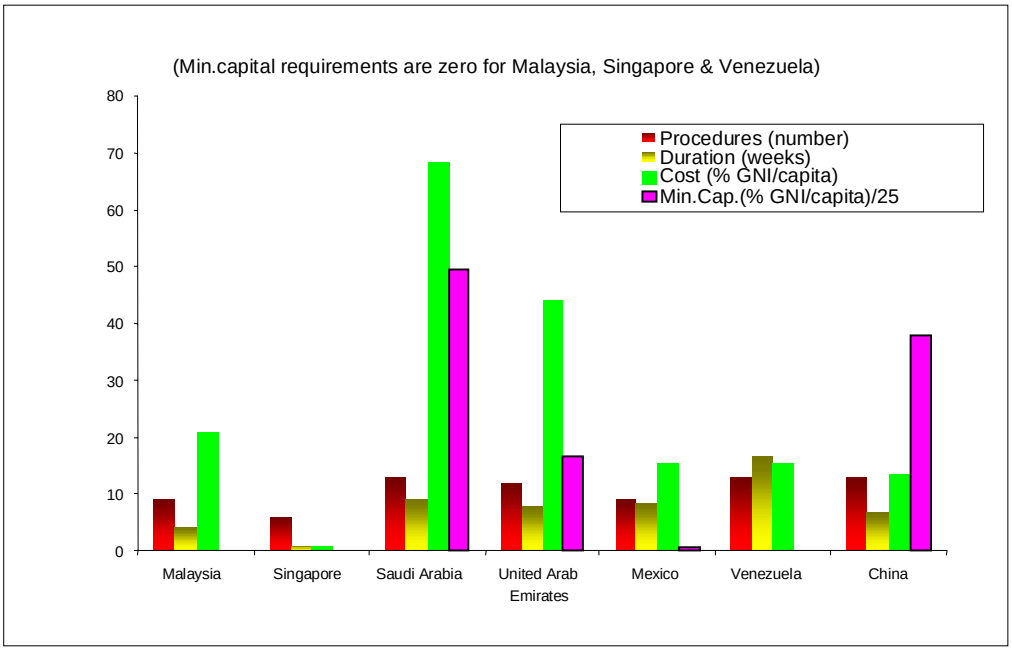
The key indicators on which the "starting a business" score is based are shown in Table 6.3. The challenges are significant: entrepreneurs typically go through 13 steps to launch a business, which takes more than 39 days on average, at a cost equal to 58.6 per cent of gross national income (GNI) per capita. They must deposit the equivalent of at least 1,057.5 per cent of GNI per capita in a bank to obtain a business registration number (World Bank). Figure 6.4 compares the Kingdom with the list of comparator countries; figures for the last category, "minimum capital requirement (per cent of GNI per capita)", have been reduced by a factor of 25 for scaling purposes. Saudi Arabia performs less well than all the comparator countries on all these indicators.

Table 6.3 Starting a business in Saudi Arabia: aggregate characteristics (2006)

Indicator	Saudi Arabia	Region	OECD
Procedures (number)	13	10.3	6.2
Time (days)	39	40.9	16.6
Cost (% of income per capita)	58.6	74.5	5.3
Min. capital (% of income per capita)	1,057.5	744.5	36.1

Source: World Bank data from http://www.doingbusiness.org/ExploreEconomies.

Figure 6.4: Starting a business



Source: World Bank data at http://www.doingbusiness.org/ExploreTopics.

The main conclusions related to starting a business are as follows.

- The requirements for starting a business in the KSA are similar to those in other countries in the region, but much less satisfactory than the OECD average, Singapore, Malaysia and even Mexico and Venezuela.
- Table 6.3 shows that roughly twice as many procedures are involved in starting a business in Saudi Arabia compared with advanced country standards.
- The average cost of starting a business is higher in relation to per capita income than the OECD average or Singapore and is three times higher than the cost of starting a business in Malaysia.
- The time taken to start a business is three times as long as in OECD economies and twice as long as in Malaysia.
- The minimum capital requirements are prohibitively large at 30 times the OECD average in relation to per capita income.

More details on the bureaucratic procedures involved in starting a business, which are particularly burdensome, are highlighted below in Table 6.4 (Endnote 5). Most of the start-up cost is incurred in publishing the articles of association, commercial registration and registration at the Chamber of Commerce.

Table 6.4 Starting a business in Saudi Arabia: component procedures (2006)

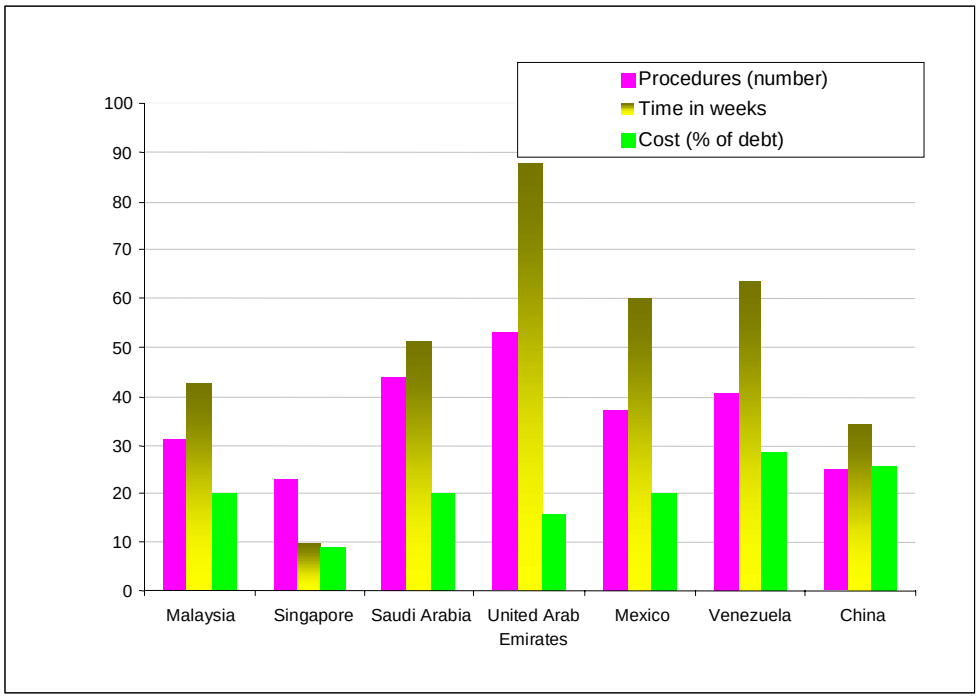
Nature of procedure (2006)	Procedure number	Duration (days)	US$ Cost
Submitting the articles of association to the Ministry of Commerce & Industry for approval	1	3	0
Approval of the company name	2	2	0
Publication of the company name in the Official Gazette	3	1	174.25
Signing the articles of association before a notary public	4	8	0
Publication of a summary of the articles of association in the Official Gazette	5	7	3,733.91
Deposit of the initial capital into a bank account	6	2	0
Commercial registration	7	3	1,493.57
Obtaining approval of office location by Municipality	8	1	0
Registration at the Chamber of Commerce	9	1	1,493.57
Company books stamped by Chamber of Commerce	10	1	0
Registration with the Department of Zakat and Income Tax	11	5	0
Registration for social insurance	12	3	0
Registration with the Labour and Recruitment Offices	13	2	0
Totals:	13	39	6,895.30

Source: World Bank data from http://www.doingbusiness.org/ExploreEconomies.

Operating a business

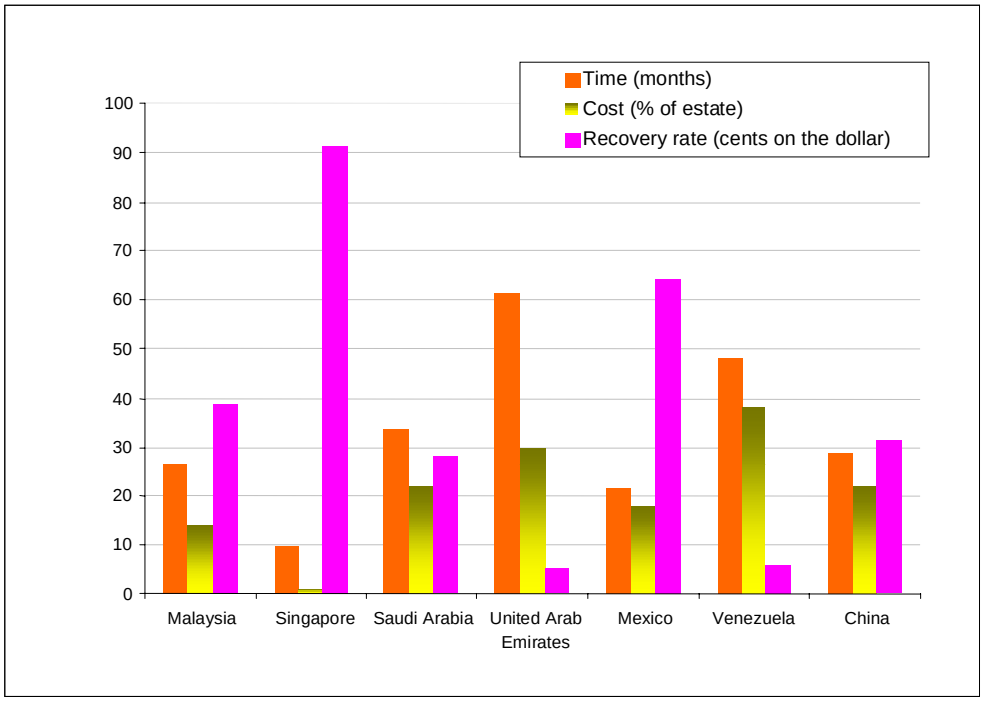
When it comes to operating a business, the key issues are enforcing a contract and the ease of closing the business (exiting the market). Figures 6.5 and 6.6 depict Saudi Arabia's position with respect to the comparator countries on both of these criteria. The KSA is better positioned than the UAE, roughly on a par with Malaysia, Mexico and China on both criteria and substantially below the level of Singapore. Saudi Arabia does significantly less well than the OECD economies in "enforcing contracts": procedures and costs are over 100 per cent greater and time delays are much longer. Similar weaknesses are recorded for "closing a business" except that the differentials with OECD averages are larger. Both of these problem areas indicate that the system of codified business law and the efficiency of enforcement need to be improved significantly.

Figure 6.5: Enforcing contracts



Source: World Bank data at http://www.doingbusiness.org/ExploreTopics.

Figure 6.6: Closing a business



Source: World Bank data at http://www.doingbusiness.org/ExploreTopics.

Overall, the World Bank survey ranks Saudi Arabia in position 38 as regards ease of doing business and at position 156 on starting a business. Currently, SAGIA is involved in an effort to verify these numbers with the help of a team from the "Monitor Group", and under its 10-by-10 plan (mentioned above), which aims at raising the Kingdom's "doing business" ranking into the top ten by 2010.

The system of codified business law and the efficiency of enforcement need to be improved significantly.

6.8 Physical and ICT infrastructure

Physical infrastructure in the KSA today is advanced by both regional and international standards and constitutes a key source of strength. Investment-promoting authorities such as SAGIA emphasize this feature in their industrialization plans and the promotion of FDI in the industrial sector. Some SR2.2 billion has been spent on building infrastructure for the country's 14 industrial cities during the past 30 years. However, there are geographical variations in the amount and quality of infrastructure and there is much scope for improvement. The developed parts of the industrial cities add up to 47 million square metres, out of a total area of 92.5 million square metres. There are 1,542 factories established in these industrial cities with investments totalling more than SR50 billion. There are also 12 allocated locations for new industrial cities in different parts of the KSA that have a total (undeveloped) area of 372 million square metres. Along with already-developed areas, the total area for industrial cities will rise to 541 million square metres. So far, the developed infrastructure comprises less than 9 per cent of this total. The five-year plan (2004–2009) of the Saudi Organization for Industrial Cities and Technology Zones (SOICTZ) included the development of industrial lands with a total area of 30 million square metres at a total cost of SR1.2 billion. However, there have been difficulties in obtaining the required finance and private-sector participation in the development of these lands without support or guarantees from the public sector.

Physical infrastructure in the KSA today is advanced by both regional and international standards and constitutes a key source of strength.

Data on comparative measures of infrastructure quality are not readily available, but an assessment of the adequacy of existing infrastructure by local industrialists is given in the next section. In addition, Chapter 5 assesses the quality of the digital infrastructure, where the KSA performs well in terms of many indicators but lags behind in terms of internet use in comparison with regional and international comparators. The need to enhance industrial capabilities related to the use of ICT is discussed in detail in Chapter 5.

6.9 The business environment and SME development

SME development (Endnote 6) is crucial to rapid job creation and the diversification of industry in general. SMEs are widely credited with generating the highest rates of revenue and employment growth in most economies and are considered to be the engines of private sector growth within both developing and developed countries. They were the main drivers of growth in economies as diverse as those of East Asia and the United States and can play a similar role in the KSA. The rationale for supporting SMEs is therefore based on their potential contribution to economic growth and new employment creation.

SMEs have the potential to support innovation and economic activity in the regions as well. However, practical experience and empirical evidence have shown that the SME sector faces many obstacles, with small companies struggling to secure financing, access information and compete in a difficult local business environment that often favours larger firms. Special policies for SME development are therefore needed to ensure the realization of their full potential. An encouraging sign is that access to finance is already being improved through a programme established by the Saudi Industrial Development Fund (SIDF) in collaboration with local banks (discussed in more detail in Chapter 5). Other strategies to promote SME development could be organized along the following major axes:

- Improving the business environment;
- Business development services;
- Facilitating access to business and technological information;
- Further improving access to finance.

Special policies for SME development are needed to ensure the realization of their full potential.

SMEs typically suffer from weak entrepreneurial skills as well as deficiencies in accounting, production management and business planning. As SMEs grow, they increasingly need to be able to connect with export markets and the world economy. Recent experience suggests that ensuring the availability and adequacy of services needed to improve the capacity of SMEs is the most effective way of targeting government assistance and subsidies to the sector. More specifically, government and private sector strategies for SME development should involve the following.

- Facilitating SMEs' access to markets, partly by providing incentives for large companies to subcontract to SMEs as suppliers. Special SME agencies could also set up marketing links with domestic and international markets and provide marketing information to SMEs.
- Enhancing information flows and developing instruments for risk management for investment capital and operating finance. Banks are already taking steps to improve credit assessment processes as a vital part of compliance with the Basel II revised international capital framework.
- Investing in public goods that improve SME competitiveness including infrastructure (information, communications, power, water and transport), education and technology development.
- Reconsidering regulations that result in higher costs for SMEs and setting up e-governance regulation of SMEs.
- Mobilizing the private sector to provide entrepreneurship and general business training through the Chambers of Commerce and the General Organization for Technical Education and Vocational Training (GOTEVOT).

Recent experience suggests that ensuring the availability and adequacy of services needed to improve the capacity of SMEs is the most effective way of targeting government assistance and subsidies to the sector.

The performance of enterprises of any size is affected by the business environment in which they operate. Certain aspects of the business environment of particular relevance to SME development and competitiveness need to be addressed in the following areas.

- Procedures, such as costly licensing and registration, could be streamlined.
- SMEs need significant flexibility in hiring and firing workers to acquire the specific skills they need. As contributions to the social security fund for new employees could slow SME growth and job creation, a grace period in SME contributions to the fund should be investigated. Such measures are necessary to ensure that SME growth and expansion will create new jobs for Saudi citizens rather than for expatriates.

- Restrictions on access to information, transportation and communications need to be relaxed considerably.
- Procedures for bankruptcy and for the use of property as collateral need to be set up.
- Tax structures and the trade climate need to be improved in areas where they discriminate against SMEs.
- A legal framework for commercial dispute resolution and enforcement would need to be set up.
- Procurement procedures must be improved, where they discourage SMEs from bidding.
- Zoning regulations would need to be modified – if they restrict SME operations.
- Efforts to set up a single agency to promote SME development are still in process; no official measures have been taken yet but the matter is under review. Such an agency should systematically collect and publish data on SMEs to guide, assess and continuously tailor assistance to the needs of SMEs.

6.10 SWOT analysis of the business environment

The following SWOT analysis of the Kingdom's business environment summarizes the analysis made in this chapter, which does not include other determinants of industrial competitiveness.

Strengths

The Kingdom's *strengths* lie primarily in the following areas.

- A positive macroeconomic outlook, with improving macroeconomic management.
- A government that ensures continuity of policy.
- A low tax level.
- WTO entry and ongoing trade liberalization.
- A relatively good physical and, to a lesser extent, ICT infrastructure. In addition to a relatively affluent domestic market, the Kingdom has an excellent geo-strategic location for trade with the rest of the Arab world.

Weaknesses

The Kingdom's *weaknesses* are as follows.

- There are serious shortcomings in the existing business environment relating to the starting of a business, closing a business, obtaining licences, commercial dispute resolution and the enforcement of contracts. SAGIA and the Ministry of Commerce and Industry (MCI) are making special efforts to reduce some of these shortcomings.
- Trade administration is perceived to be in need of improvement.

- There is an unfavourable business environment for SMEs, especially in terms of access to industrial cities, business training and technological information.
- Lack of industrial cities with sufficiently developed infrastructure.
- Lack of strong partnership between the Government and the private sector in the process of formulating policies and monitoring performance.
- Insufficient use of ICT infrastructure to match the stated objectives of the Government.
- A serious shortage of macroeconomic data, with only a limited range of indicators made public, which makes it more difficult for firms to assess the performance of the macroeconomy in order to plan their business strategies.

Opportunities and threats

The country's *opportunities* comprise the following.

- The general climate of business expectations engendered by WTO entry creates a window of opportunity to rationalize and liberalize the trading regime and trade administration.
- Continuing high oil prices would facilitate heavy investments needed in a number of critical areas.
- The Kingdom could benefit from existing regional integration initiatives – especially the GCC agreements – and the eagerness of the private sector for further industrial expansion.
- The attraction of FDI and initiatives to help link domestic enterprises to global value chains could be crucial drivers of knowledge and technology transfer, if the business environment could be made more attractive in a short period of time.
- As a member of the GCC, the Kingdom is negotiating free trade agreements with the EU and Japan and is likely to have the opportunity to sign other such deals, for example with emerging Asian economies.

The most obvious *threat* is that the KSA risks being marginalized in terms of FDI inflows and trade integration due to the slow pace of diversification and weaknesses in the business environment.

6.11 Government initiatives to improve the business environment

This section reviews the main conclusions from individual interviews with key Saudi industrialists and business analysts, conducted in October 2006 in Riyadh (Endnote 7).

Initiatives already taken

Government initiatives in the 1970s led to the establishment of the industrial cities of Jubail and Yanbu and petrochemicals clusters which are still run mainly by the Saudi Basic Industries Corporation (SABIC). In addition, many efforts have been initiated, mainly by the MCI, to promote the business environment. Chief among these are:

- Establishment of SAGIA in 1999;
- Establishment of the Saudi Export Development Center (SEDC);
- Establishment of the Saudi Organization for Industrial Cities and Technology Zones (SOICTZ) in 2001;
- Issuance of the Unified Anti-Dumping System for the GCC's countries in 2003;
- Establishment of the Competition Protection Council in 2004;
- Accession of the KSA to the WTO in 2005;
- SAGIA initiative "10-by-10".

In addition to the above institutional innovations, the most effective initiative was the pricing of crude oil used in domestic industrial projects at US$3.0/barrel. This has been welcomed by the private sector; it is expected to generate a boom in the energy-intensive industries such as power generation, water desalination and smelters. However, there is some concern about the environmental consequences resulting from burning huge quantities of crude oil, as the low price tends to encourage inefficient use.

Ongoing initiatives

SAGIA reports the following measures, which address some of the above needs and shortcomings identified in the previous sections.

- Judicial reforms are in progress: Saudi judges and lawyers are being taught how to interpret and adjudicate on the foreign investment law and how to work with officials to simplify paperwork.
- The KSA is committed to reducing customs duties on a large number of goods, particularly industrial products. Plans are also underway to exempt a range of raw materials and intermediate imports from customs duty.
- Laws relating to commercial policy, state participation in the economy, capital flows, foreign investment and the financial sector are being reviewed.
- Plans are being prepared for the privatization of ports, the upgrading of operational capacity, the use of state-of-the art security procedures, the simplification of port entry-permit procedures and the extension of railroads.
- Many other measures are being implemented for simplifying the regulatory procedures related to inward investment, particularly by means of SAGIA's "one-stop-shop" service and the reduction of bureaucratic procedures.
- Special incentives are being set up to encourage investments in the less-developed regions of the country. Financing provisions for such investments are being relaxed by the SIDF.
- IPR protection is being streamlined, with patent applications being adjudicated in less than two and a half years.

Expected initiatives

The private sector expects the following additional initiatives to improve the business environment in the KSA.

- Industrial cities: Further development of industrial cities in different parts of the country and the provision of all necessary facilities for industrialists, such as electricity, gas, water and sewage systems. This was by far the most keenly requested initiative among all industrialists.

- Rental rates: Industrialists requested that rental rates for such new developments should not exceed rates for existing sites such as Jubail and Yanbu, which are currently priced at SR1 per square metre per year. They also believe that such an initiative would not add to the fiscal burden of the Government because new industries will boost the national economy. They expect an outcome similar to the expansion of petrochemicals that resulted from the establishment of Jubail and Yanbu.

- Infrastructure: Industrialists believe that investment in infrastructure by the Government as an enabling condition for private investment does not contradict WTO regulations; however, to be certain, specific plans would need to be checked against WTO regulations.

- Labour legislation: Industrialists would like the Government to ease Saudization of regulations, especially for industries that are labour-intensive or high-tech-based. While recently relaxed regulations permit issuance of visas directly from Saudi embassies for expatriate experts and engineers, technicians should also be included in this provision as they carry out most maintenance work. Labour laws would need to be reformed to encourage productivity growth within the Saudi workforce, by means of incentives, penalties and workplace discipline.

- Logistics: Industrialists would like the Government to promote a better business environment by completing infrastructure development in the transport sector, gas networks and railroads throughout all industrial areas in the KSA. This will boost mining, downstream activity and many other industries, which will have a positive impact on the contribution of industry to the GDP.

6.12 Vision, strategic targets, policy recommendations

The strategies recommended for improving the business environment for enhanced industrial performance comprise the following.

1. Trade policy and administration

- The trade administration system should be modernized, streamlined and made transparent, to facilitate imports and exports, by cutting down unnecessary delays in customs, etc.

- Tariff reform should continue in line with WTO commitments.

2. Ease of doing business

- The regulations for starting and closing businesses need to be simplified and made transparent, to bring the KSA into line with competitor nations. Other regulations pertaining to the operation of businesses could be modernized along the lines already identified by SAGIA, which has taken the initiative in this respect.

- Business law relating to investment and the resolution of business disputes should also be streamlined and explicitly codified. Judges and other legal personnel would greatly benefit from training in the expeditious resolution of commercial disputes.

An observatory for measuring the attractiveness of the national and regional business environment for industrial investment should be set up.

- The ICT infrastructure would need to be upgraded and more e-governance introduced into the regulation and administration of business to further facilitate and improve the business environment. The Government has recently taken some positive steps by allocating a sum of some SR3bn (US$0.8bn) to introduce e-governance over the next few years.

- An observatory for measuring the attractiveness of the national and regional business environment for industrial investment should be set up. This would measure the ability to attract industrial investment through global benchmarking.

- A project to facilitate the use of mineral resources and mining, in order to enhance the formation of new industrial clusters, should be set up. This would examine the prospects for greater utilization of the Kingdom's raw materials and natural elements, to increase the attractiveness of investment in industries based on these inputs.

- An industrial legislation package to review all laws relating to industry should be designed, along with the activation of new industrial legislation in the areas of intellectual property, antitrust, competition and liberalization of labour market.

- SAGIA has already launched the 10-by-10 project, which is being implemented in cooperation with major public and private stakeholders.

- Infrastructure should be further developed and the network of industrial cities extended into different regions of the country.

3. Access to business information, services and collective learning

- Public provision of business information and services should be improved.

- A strong public-private partnership would greatly help in the identification of problems as they arise and in the expeditious working out of solutions.

- Data collection and publication should be improved in line with international standards.

- Capabilities and networking of providers of business development and sector-specific services should be strengthened.

4. SME development

- To further improve access to finance for SMEs, building on the steps already in place.

- To set up a single authority for SME development along the lines described above and in other studies (Endnote 8).

- To establish a mechanism to foster greater dialogue within and between public agencies and SME institutions and associations.
- To improve business and technical advice to SMEs.
- To promote business partnerships between universities, large companies and SMEs to enhance horizontal and vertical linkages.
- To launch programmes to support SME cluster development in the regions of the Kingdom.
- To promote innovative entrepreneurship training programmes.

The recommendations for the above strategies are translated into concrete plans for follow-up actions in Chapter 11.

Endnotes

1. The concept is defined here in the same way as it is delineated by the World Bank (www.doingbusiness.org).
2. The figures in the IMF statement are slightly different from SAMA data, but the trend is the same.
3. Further details of the tax system can be found at http://www.sagia.gov.sa. It is worth noting that in documents posted on various websites, including the SAGIA site listed above, the "tax base" is mistakenly identified as "'income". This issue is clarified in the WTO accession documents (WTO 2005).
4. Key provisions of the Kingdom's WTO agreement include:

   - *Goods.* The Kingdom will steadily reduce trade barriers and expand market access for goods imports. All tariffs levied on imports have been bound. After a ten-year implementation period, average bound tariff levels will decrease to 12.4 and 10.5 per cent for agricultural and non-agricultural products, respectively. Most tariffs (92.6 per cent) will be set at their final bound rates on the date of accession. The remainder will mostly be implemented in 2008 and 2010, but in no case later than 2015. By 2008, Saudi Arabia will join the ITA (Information Technology Agreement), which stipulates that IT goods (computers, semiconductors, etc) will be imported duty free.
   - *Foreign investment***.** Saudi Arabia has eliminated minimum capital requirements applied previously to foreign investment in agricultural, industrial and service projects. Investment may take the form of joint ventures with no minimum share requirement for the Saudi partner or a 100-per-cent foreign-owned enterprise.
   - *Insurance services***.** Foreign insurance companies will be permitted to operate direct branches in Saudi Arabia. Commercial presence will also be permitted for insurers that establish a locally incorporated cooperative insurance joint-stock company, in which foreign participation is limited to 60 per cent.
   - *Banking services*. Commercial presence of banks will be permitted in the form of a locally incorporated joint-stock company or as a branch of an international bank. Upon accession, the foreign equity cap for joint ventures in banking will be raised to 60 per cent. Financial services can only be provided by commercial banks, but asset management and advisory services may also be provided by non-commercial banking financial institutions.
   - *Telecommunication services*. Within three years from accession, up to 70 per cent foreign equity ownership will be permitted in the telecommunications sector. These commitments apply to both basic telecommunication services and value-added telecom services. Public telecommunications services will have to be provided by a joint stock company.
   - *Distribution of goods*. While Saudi Arabia will maintain some restrictions on the distribution of goods inside the country by foreign entities, these restrictions will be phased out over a three-year transition period.

- *Rules of origin*. While Saudi Arabia and the GCC do not currently have rules of origin for non-preferential trade, future rules will be implemented in accordance with WTO guidelines.

- *Fees* charged for the authentication of trade documents will be reviewed to bring these into conformity with WTO rules within two years of accession.

- *Non-tariff barriers* not consistent with WTO rules will be dropped, but the right to restrict the import and export of a certain number of goods and services in order to protect public morals, the life and health of the population, national security interests, etc., will be maintained. In addition, the list of banned imports will be reviewed at least once a year.

- *Subsidies* on exports of agricultural products will not be maintained.

- *NGL*. Producers and distributors of natural gas liquids (NGLs) will be constrained to operate on the basis of normal commercial considerations, based on the full recovery of costs and a reasonable profit.

- *IPR, TBT, SPS, TRIPS*. In areas such as the protection of intellectual property rights (IPRs), the application of technical regulations and standards and the protection of food safety and human, animal and plant life, Saudi Arabia will implement the relevant WTO Agreements in full from the date of accession. These agreements refer to trade-related aspects of intellectual property rights (TRIPS), technical barriers to trade (TBT) and sanitary and phyto-sanitary measures (SPS).

- *Standards and patents***.** To promote transparency and predictability, standards and technical regulations will be posted on the Saudi Arabian Standards Organization (SASO) website. The extensive backlog of patent applications will be cleared expeditiously and the processing of patent applications will be accelerated.

Sources: WTO website: www.wto.org and the US-Saudi Business Brief, Vol. X, No 4, 2005.

5. Similar details for other listed activities are available, but are not reproduced in this document.

6. The Department of Statistics, responsible for the national statistics of the KSA, defines SMEs as firms with up to 100 employees. Subdivisions in the category vary from source to source; the Department of Statistics uses 1–9, 10–49 and 50–99 employees. These categories are also known as micro, small and medium-size enterprise. Although some authors use different categories, including investment, the present text will use the Department of Statistics categories, unless specifically indicated otherwise.

7. Interviewers showed a keen interest in supporting the efforts of the MCI to develop a national industrial strategy for the KSA. This chapter includes some of their feedback along with other assessments collected from available resources in the MCI, SAGIA and the World Bank's 2007 book on "Doing Business", which relate to each issue under review.

8. Details are given in UNIDO 2005e and Radwan and Al-Kibbi 2001.

Chapter 7. Building up national and regional industrial innovation systems

7.1 Definition of industrial innovation systems

A complex set of relationships

The concept of national systems for technology development and innovation (Endnote 1) emphasizes that innovation and technology development stem from a complex set of relationships among players in the system, where knowledge and skills constitute factors of production, and players include universities, research institutions and enterprises. For policy and decision-makers, understanding the National Innovation System (NIS) can help identify leverage points that will enhance innovative performance by firms and the competitiveness of products. Failure to network in an interactive learning and innovative framework may leave some countries as bystanders at the global technological feast (Endnote 2).

As competitiveness is globalized and comparative advantage localized, a global mindset is required to convert local comparative advantages into international competitiveness. This is necessary to enable local value chains to participate in global value chains, which are increasingly driven by technology, skills and knowledge in an international industrial innovation system.

Failure to network in an interactive learning and innovative framework may leave some countries as bystanders at the global technological feast.

With an enabling policy and an institutional environment supportive of scientific and technological learning and innovation, the sources of dynamic growth can be fostered through a combination of technological, organizational, institutional and human capabilities. An effective science and technology infrastructure should be underpinned by knowledge being generated by universities and institutions, exploited by laboratories and commercialized by firms. Sustained efforts to strengthen science and technology systems can convert industrial operations into horizontally and vertically integrated manufacturing production systems, with increasing complementary service activities. This could enable productive sectors and related services to turn out products that are closer to global production and trade realities, which are increasingly dominated by R&D and innovation-induced products across all segments of manufacturing (Endnote 3).

However, a high level of education does not necessarily mean the automatic creation of technological dynamism and productivity catch-up. In addition to the creation of a pool of technically trained personnel, the state should formulate and implement strategies and policies that encourage innovation at both institutional and enterprise levels. Promoting an educational culture that focuses on creative and critical thinking, in contrast to the traditional systems of learning by rote, would help generate greater innovation and unleash more entrepreneurship.

Facets of an ideal industrial innovation system

An effective framework for science and technology development entails knowledge and skill flows in an interactive framework that is designed to reduce the distance to technological frontiers and thereby help firms with-

stand competitive pressures. R&D expenditure, patents, production and trade in innovation-induced products are only part of innovation systems. The core types of knowledge and skill flows in national systems for technology development encompass the following.

Industry alliances

- Inter-firm research cooperation
- Industry/university interaction
- Cooperative industry/university R&D
- Industry/university co-patents
- Industry/university co-publications
- Industry use of university patents
- Industry/university information sharing

Industry/research institute interactions

- Cooperative industry/institute R&D
- Industry/institute co-patents
- Industry/institute co-publications
- Industry use of research institute patents
- Industry/institute information sharing

Technology diffusion

- Technology use by industry
- Embodied technology diffusion

Personnel mobility

Movement of technical personnel among industry, universities and research institutes.

Within the above framework, information, R&D and innovation-intensive production technologies, with operating models and organizational structures based on flexible specialization and inter-firm networking, can survive in an internationally competitive environment. Companies are increasingly dependent on the complementary resources of other companies and on closer integration with one another in order to strengthen collective responses to competitive pressures. The effectiveness of new production systems depends on how quickly companies and the basic structures and institutions of society adapt.

The effectiveness of new production systems depends on how quickly companies and the basic structures and institutions of society adapt.

The new industrial geography is characterized by integrated international sourcing, technology, manufacturing and services networks, which together comprise the spatial distribution of production. This system is governed both by large international firms and multi-faceted sub-contractual linkages between large and small enterprises, which enable countries to insert their industrial sectors into local and global value chains. The effective implementation of sub-national regional policy and networking requires local governments and institutions to think globally and act locally and thereby effectively respond to local and global challenges.

In particular, successful clusters in dynamic industrial locations seem to work well within well-established institutional contexts, which are formed by local institutions of education, training, research and technology. The capabilities of firms are strongly affected by local externalities. The policy approach should therefore aim to create an environment conducive to local and transnational networking (Endnote 4).

Best practice in subsector-specific innovation systems

Box 7.1 describes the key elements of best practice in sector-specific innovation systems, i.e. those tailored to the needs of specific manufacturing sectors.

Box 7.1 Facets of subsector-specific innovation systems

Aspect	Factor
Technoware (facilities)	1. Intensive application of integrated manufacturing 2. Large investment for continuous upgrading of facilities 3. Continuous scanning of technology 4. Large investment for quality control
Humanware (skills)	1. Skill to convert ideas into innovative products 2. Transfer of engineers from research to production for skill development 3. Intensive, corporate-level, skill development efforts 4. Well-developed operator-engineer communicative skills 5. Highly evolved technology assimilation skills
Infoware (facts)	1. Online information availability 2. Detailed forward-looking assessments 3. Standard for jointly derived products 4. Firms holding large share of patents
Orgaware (framework)	1. Three-year industry plans prepared by consensus 2. Inter-industry collaboration 3. Use of diverse technology acquisition arrangements 4. Long-term technology development projects 5. Government coordinates inter-industry aspects 6. Rigorous standardization 7. Commitment to technology upgrading 8. Incentives for technology development 9. Concern for high quality 10. Intense interaction between design/engineering/production/marketing functions 11. Intense technology development efforts 12. Risky projects are not necessarily rejected 13. Objective, long-term, cooperative, technology development projects among firms 14. Well-developed subcontracting network 15. Presence of large, diversified but vertically integrated firms 16. Detailed planning for technology development in thrust areas
Technology climate (national supporting systems)	1. Will to succeed in the market place 2. Low cost of capital and cost of doing R&D at the enterprise level 3. Emphasis on technology in education 4. Strong import of technology for manufacturing 5. Publication of numerous technical journals and books 6. Operator-engineer relationship is cordial and smooth 7. Technology parks and science cities 8. Plans for developing technology-intensive cities 9. Knowledge-based society as a national objective

Source: Bowonder and Miyake 1988.

7.2 Situation analysis of the KSA's industrial innovation system

Overview

An in-depth situation analysis of an industrial innovation system requires information on key parameters that indicate efficiency. These include: findings of R&D surveys, if any; patents granted to domestic innovators with and without affiliation to foreign firms; technology content of manufactured exports; mapping out institutions and policies that support industrial innovation; human resource development policies and programmes; financial instruments that support industrial innovation; intellectual property regime; industrial standards; physical technological infrastructure; percentage of firms with technological innovations; R&D intensity (percentage of workers in R&D) and R&D-related costs (percentage of sales revenue spent on R&D) at enterprises; percentage of firms with innovative partnerships; percentage of firms with domestic innovative partnerships; enterprise training for acquiring, assimilating and adapting foreign technology, and learning and innovating new technology; and the extent of commercialization of research findings. The analysis contained in this section is based on the available information on the innovation system in the KSA.

There is great potential to enhance the profile and effectiveness of the KSA's industrial innovation system.

Box 7.2 shows the state of the national innovation system in the KSA. Notwithstanding the limitations that it highlights, there is great potential to enhance the profile and effectiveness of the industrial innovation system as shown by the existing institutional framework in selected fields.

- Universities, especially those with engineering, science and business schools.
- Research institutes and laboratories, of which King Abdul Aziz City for Science and Technology (KASCT) and the Saudi Basic Industries Corporation (SABIC) are leading institutions.
- Service institutions, including the Saudi Organization for Industrial Estates and Technology Zones, the Saudi Arabia Standards Organizations (SASO), and the National Patent Office.
- Funding organizations. Today almost 90 per cent of funding is provided by the public sector, either by government or by public enterprises.
- Public and private enterprises and organizations. This includes SABIC and Saudi Aramco, which both carry out in-house R&D, as well as private foundations such as the King Abdulaziz and his Companions Foundation for the Gifted. However, with some exceptions, most industrial firms (whether large or SMEs) are not yet part of the national research and innovation system, as they are not innovators.
- Scientific societies. A relatively large number exist in the KSA in all areas of knowledge. These are particularly important for creating a more favourable environment for the diffusion of concepts and visions of innovation.

As highlighted in Chapter 5, business enterprise expenditure on R&D in the KSA is relatively low. However, some institutions are carrying out significant research and innovation, and may serve as models. Some key case studies are highlighted in the following sections.

Box 7.2 National research and innovation system in the KSA

Function/research/innovation	Status in the KSA
Research (basic, development, engineering) for the creation of "new knowledge"	Done mainly in universities and institutions such as the KACST and SABIC. Could be improved by further investment. Research is basically "supply-sided" and new investments should promote more demand-driven activity.
Performance of research, development and innovation	Research results are published as scientific papers of quality, but few are registered as patents, thus limiting innovation. Some projects lack precise objectives and there is also a lack of long-term projects.
Education and creation of human capital: Human resources development and capacity building Creation of a labour market that the new technology based firms can use	There are universities of quality, but higher education still needs to be improved. New technology-based firms, although small in number, cannot find an appropriate indigenous labour supply.
Resource allocation at the national level. Financing of innovation-related activities	Financial resources for research are available and are expected to increase from 0.25–0.30 per cent of GDP currently to nearer 1 per cent. Financing of innovation does not exist. In general, there are weak incentives for innovation.
Policy formulation and regulatory policy-making: Facilitate regulation for technologies, materials and products to enlarge and enhance market access	Important advances have been made, but policy and regulatory systems still need to be enhanced.
Creation of knowledge flows and linkages (bringing together complementary knowledge)	Linkages and flows within the National Research and Innovation System (NRIS) need to be created and improved.
Provision of technical services and infrastructure. Creation and diffusion of technological support.	Technical services are urgently required. A whole maintenance culture must be built. There are a few efficient service organizations.
Create and diffuse products. Create markets and diffuse market knowledge. End-users: customers of the product or process outputs.	Market research through information and surveys needs to be enhanced. More market and macroeconomic data need to be made available. Awareness of the system's activities needs to be promoted.
Incubate in order to provide facilities, equipment and administrative support	Incubators are still at a very early stage. Incubator programmes should be accelerated.
Enhance networking inside and outside the Kingdom.	Networking is in its infancy. Bureaucracy is heavy, with rigid public institutions at the centre. Limited dialogue with private sector.
Facilitate the creation of positive external economies of scale in the form of an exchange of information, knowledge and visions.	There are limitations in the exchange of information as an instrument for the creation of positive external economies. Lack of coordination among programmes of different organizations limit flows.

Source: UNIDO 2006a.

King Abdul Aziz City of Science and Technology (KACST)

This is a key organization for research and innovation. The KACST promotes science and technology by coordinating and cooperating with various academic institutions, private agencies and government research organizations, and by encouraging Saudi experts to undertake research that will help promote the development and evolution of society. Its areas of emphasis are information technology (IT), system integration (SI), geographic information systems (GIS) and other cutting-edge technologies.

The key functions of the KACST are:

1. To conduct applied research for the socio-economic development of the Kingdom;

2. To develop and guide the country's science and technology policy;

3. To recommend and encourage the pursuit of national policies for the promotion of applied research in sciences and engineering;

4. To establish and operate laboratories for applied scientific research in areas of importance to the Kingdom;

5. To provide assistance to the private sector in developing productive agricultural and industrial research that will help increase GDP;

6. To initiate and support joint research programmes between the Kingdom and international scientific institutions in an effort to keep pace with scientific developments around the world;

7. To foster and support the development and use of computers and other scientific methods and technologies, primarily for research in science and technology;

8. To govern and regulate the internet.

Parameters assessing the extent and effectiveness of innovation

Findings of R&D surveys. Brief surveys and direct interaction with the management of relevant institutions reveal useful information. Cooperative research programmes have successfully completed several solar-energy research projects, including the establishment of a Saudi Centre for Remote Sensing, the establishment of a national observatory, the building of aquaculture research facilities and other projects.

Institutions and policies that support industrial innovation. The KACST has established several national research institutions that focus on the issues and problems faced by both the public and private sectors. These institutes are the Energy Research Institute (ERI), the Natural Resources and Environment Research Institute (NRERI), the Atomic Energy Research Institute (AERI), the Petroleum and Petrochemical Industries Research Institute (PPIRI), the Astronomy and Geophysics Research Institute (AGRI), the Space Research Institute (SRI) and the Electronics and Computers Research Institute (ECRI). The main purpose of this approach is to provide links between research and academia on one hand and industry on the other. According to Prince Turki ibn Saud ibn Mohammed al-Saud, Vice President of the research institutes at the KACST, King Abdul Aziz City is also setting up a communications-technology R&D centre to help entrepreneurs to develop their own businesses.

Physical technological infrastructure

The Solar Village. This important site was built in 1980 under the Solar Village project for remote electrification with a 350 kW photovoltaic power. The project, located 45 kilometres from Riyadh, initially provided electricity to the villages of Al-Oyaynah, Al-Jubaileh, and Al-Hijra. Later, it became the first solar-energy research station at a local or regional level. It is considered one of the greatest achievements in the field of applied research at KACST. It was developed with technical cooperation from the United States in the field of solar-energy utilization in remote regions. Its key achievements are: using solar energy in different fields; raising public awareness of solar energy; providing a scientific laboratory; knowledge transfer; and training.

The Space Research Institute (SRI). Part of the KACST, the SRI implements the Kingdom's National Scientific Technology Policy as regards space and aeronautic technology. The Policy outlines the priorities for scientific research and technology development, taking into account national security needs and plans for sustainable development. The SRI works on the transfer and adaptation of advanced technologies in the space and aeronautics fields. It conducts scientific and applied research, coordinates with universities and scientific centres, and trains manpower to implement the Kingdom's development plans.

As part of an ambitious plan to promote space technology for commercial purposes, the Kingdom was preparing to launch six new satellites in 2006, all of which have been designed and fabricated by a team of Saudi scientists at the SRI. For the future, the KACST is looking at new projects to develop technologies in strategic areas, including water desalination, petroleum, IT, aerospace, bio- and nanotechnology, environment and energy.

Intellectual Property Regime: The KACST is a strict adherent to the Paris Convention for the Protection of Intellectual Property. It is also involved in establishing a Patent Documentation Centre (PDC) to collect local and foreign patents.

Enterprise training for acquiring, assimilating, adapting foreign technology, and learning and innovating new technology. Through cooperation with international scientific organizations, the KACST encourages closer ties with friendly countries. As mentioned earlier, its cooperative research programmes have successfully completed several solar-energy research projects, including the Saudi Centre for Remote Sensing, a national observatory and aquaculture research facilities.

Current challenges. An important development in the KASCT is the recognition of the need to transform it from a “supply-oriented” research organization into a “demand-oriented” one. It is also recognized that some changes in its legal structure are necessary, as at present the KASCT’s charter does not fully define and clarify the City’s role in the area of innovation. Therefore, some supporting complementary norms should be developed in order that this gap is covered. Further, the Ministry of Commerce and Industry (MCI) should have a more active role in innovation and work in a more coordinated way with the KACST. The institution also recognizes the need to create a linkage mechanism between research/innovation and production.

The KACST needs to focus on:

- Restructuring with a high degree of autonomy from government bureaucracy, especially in the financial aspects of implementing programme components;
- Establishing a good relationship with the industrial sector and obtaining clients and projects with clear objectives;
- Establishing an incentive programme to attract national and international research leaders to its research centres (currently remuneration packages are very low for skilled professionals);

- Upgrading the capabilities of its scientists through external research programmes with international research centres in specializations similar to the projects in hand.

The KACST has finalized a promising strategy, the National Strategic Plan for Research and Technology, covering the period until 2020. The plan is expected to contribute significantly to the national innovation system and in particular to the industrial innovation system.

Saudi Basic Industries Corporation (SABIC)

SABIC is a diversified manufacturing company, active in chemicals and intermediates, industrial polymers, fertilizers and metals. It is the largest non-oil public industrial company in Saudi Arabia. The Saudi Government, however, still owns 70 per cent of its shares. Its headquarters are in Riyadh. SABIC is currently the second-largest producer of ethylene glycol in the world and aims to become the largest. SABIC currently ranks tenth worldwide in petrochemicals; it is the third-largest polyethylene manufacturer, the fourth-largest polyolefins manufacturer and the sixth-largest polypropylene manufacturer.

Parameters assessing the extent and effectiveness of innovation

Outcome of an efficient industrial system. The outcome of an efficient innovation system can be gauged from the number of patents registered. SABIC has secured several international patents and has registered over 200 patents in addition to hundreds of confidential papers. SABIC is considered to have the most advanced research and technology (R&T) centres in the region and is able to attract world-class expatriate scientists, with excellent salary packages.

Findings of R&T survey. One example of SABIC's R&T expansion is its focus on developing the most relevant technology in the most relevant country, a strategy called "Cross National Development". At the heart of this programme is the establishment of SABIC R&T operations outside Saudi Arabia, in Houston, USA, India, Germany and the Netherlands. These carry out research related to the technologies with which the parent company is involved, as well as exploring and developing new technologies, as seen most recently in the development of a new grassroots acetic acid technology (see below).

Technology content of manufactured exports. SABIC's R&D achievements include the development of new technologies as well as the improvement of existing processes. Some examples include:

- CO_2 treatment technology, which has environmental benefits;
- Improved processing technology, resulting in enhanced quality of polystyrene products;
- Butene-1 technology (owned jointly by SABIC and IFP);
- Acetic acid technology developed by SABIC;
- Linear alpha olefin process in partnership with Linda AG of Germany.

Physical technological infrastructure. SABIC has developed a new process for producing acetic acid. This is a grassroots technology for the partial oxidation of light hydrocarbon into olefins and carboxylic acids. In its current version, it targets the production of acetic acid from ethane.

Human resource development policy and programmes. In a complex industry such as petrochemicals, nurturing human talent is essential. SABIC's key asset is its more than 16,000 employees worldwide, including 2,300 employees at SABIC Euro Petrochemicals. Eighty-five per cent of SABIC's employees are Saudi nationals, while in its R&T centres abroad, 45 per cent are Saudi nationals.

Not only has the number of Saudi nationals in SABIC and its affiliates increased over the years, the percentage of Saudi technical manpower against the total number of Saudi employees has also risen. Saudi nationals now occupy 99 per cent of management positions in SABIC and its affiliates. Moreover, Saudis form 79 per cent of employees in the administrative field, 77 per cent in technical areas, 63 per cent in engineering, 72 per cent in IT, 78 per cent in finance and 100 per cent in safety and security.

SABIC's human resources strategy places considerable emphasis on training and developing employee skills, often in partnership with academic institutions. Ongoing training programmes include the following.

Scholarships. SABIC and its affiliates provide opportunities for Saudi employees to continue in higher education and specialize in their particular areas of work. They often sponsor training courses that are designed to improve employees' skills and specialization.

Cooperation programme with universities and colleges. Universities and colleges in the KSA are keen to pursue training-related programmes organized in coordination with national companies. These programmes are specially tailored for students who are about to graduate. SABIC's Training Department also oversees on-the-job training for these students, both at headquarters and at affiliates in Saudi Arabia.

Enterprise training for acquiring, assimilating and adapting foreign technology, and learning and innovating new technology. SABIC R&T has several joint programmes with local universities and other business and academic institutions outside the Kingdom.

Firms with innovative partnerships. SABIC has 17 world-class manufacturing affiliates in the KSA. Eight of these are joint ventures with foreign partners, three are wholly owned by SABIC and six are joint venture partnerships with local and regional private sector investors. SABIC is also a partner in three regional ventures in Bahrain. Most of the affiliates in the KSA are based in the Jubail Industrial City and in Dammam; others are located at Yanbu. With the acquisition of SABIC Europe in 2002, SABIC added manufacturing complexes at Geleen in the Netherlands and at Gelsenkirchen in Germany.

Other R&D organizations in Saudi Arabia

Saudi Industrial Development Fund (SIDF). The SIDF is a public sector institution, well qualified in the technical, marketing and financial areas of projects, which also provides technical support to potential clients for the preparation of proposals. The SIDF is not prepared to undertake all the functions required to finance innovation, such as risk resources or equity participation although it is the best candidate to do so, due to its expertise. Innovation-type projects are seldom (if ever) presented to the SIDF, so its staff do not have experience of the innovation process itself, but this is an obstacle that can be overcome.

Traditionally, the SIDF's clients have been large industries that meet its loan conditions. More recently, it has established a Guarantee Programme for SMEs to allow them better access to commercial loans in the banking system. This programme complements the work that the Saudi Credit Bank already carries out in relation to SMEs. The SIDF has little interaction with universities or research centres, but again, this is a problem that can be overcome.

The Saudi Organisation for Industrial States and Technology Zones (SOISTZ). This organization could play a major part in the development process by promoting the creation of technology-based enterprises, through incubation and/or production in designated technology zones, as well as through its involvement with

universities and research centres. At present, the SOISTZ's official role is only to plan the industrial estates and zones; its additional promotional role needs to be clarified.

Saudi Arabia Standards Office (SASO). The SASO has a workforce of 560 employees and 37 technical committees. It has accredited 15 well-equipped laboratories, provided 163 quality seals and developed 2,376 standards. The SASO is part of the Gulf Standards Organization. It is a key element of the research and innovation system and in the development of industry in the KSA, and as such should be further strengthened.

Suggested improvements include: more training (in marketing and developing certified laboratories); fully developing the accreditation area; and linking the SASO with relevant international (e.g. the International Accreditation Forum) and regional organizations. A review of existing regulations for accreditation and further normative developments in this area seems necessary.

King Saud University. The University is well aware of the role it should play in the research and innovation system, particularly in producing research results that can be transferred to production and training human resources at the highest level. It is also well aware of its weaknesses as an agent for innovation.

There are several problems with the latter role. Internally, it lacks experience in the commercialization of research results and has been unable to formulate a policy to overcome this. For example, it does not have a method of dividing the royalties of a patented product or process between the researcher, the laboratory and the University itself; also lacking is a definition of how the University can protect its research results. Patenting is done through the KACST but the process is slow and does not encourage patenting. In general, there is no competitive policy for promoting research and the construction of technology packages among its staff. On the other hand, the University is promoting its research by establishing a business incubator (for which land is already available), nurturing the capabilities of entrepreneurs. This is certainly an appropriate approach, but the University currently lacks information on successful experiences to use as benchmarks.

In February 2004, a conference on linkages was held to analyze different approaches and experiences. The main recommendation was that the Government should be more active in creating some sort of umbrella for these linkages to take place, until the learning process has been completed and the University and other organizations have assimilated the concepts and practices. In general, in the KSA, the Government is considered to have a key role in development, with the responsibility to create the national research and innovation system.

The Saline Water Conversion Corporation (SWCC). The SWCC is a government corporation responsible for desalinating seawater, to augment the supply of potable water to coastal and inland cities. The SWCC is also the second-largest electric power producer in the Kingdom; it runs 30 desalination plants on the Red Sea and Arabian Gulf coasts. The KSA is the world's largest producer of desalinated water, and its water and electricity sectors are growing at the rate of 7 per cent per year.

The SWCC was considering three privatization options and was expected to make a recommendation to the Supreme Economic Council by the end of 2006. Privatization of the SWCC is reportedly expected to raise more than SR60 billion. The three options include: converting the corporation into a joint-stock company and offering part of its shares for public subscription; participation by the private sector in SWCC assets; and setting up five independent companies to operate main diesel plants, according to Fehaid Al-Sharief, the corporation's governor.

Saudi Aramco. Saudi Aramco is a fully integrated international petroleum company in charge of the world's largest oil reserves – over one quarter of the global total. Headquartered in Dahran, and fully owned by the Saudi Government, its activities include exploration and producing, refining, distribution, shipping, and marketing.

Highlights of Aramco's achievements

Saudi Aramco is number one in the world in the following:

- Crude oil reserves: 259.8 billion barrels as of 2005 (25 per cent of the world total);
- Crude oil production: 3.3 billion barrels in 2005;
- Sustained crude oil production capacity: over 10.5 million barrels per day in 2005;
- Crude oil exports: 2.6 billion barrels in 2005;
- Natural gas liquids (NGL) exports: 289 million barrels in 2005;
- Discoverer and producer of world's largest oil field, Ghawar, and the largest offshore field, Safaniya;
- No. 4 in world gas reserves: 239.5 trillion cubic feet (tcf) as at year-end 2005;
- No. 8 in worldwide refining capacity: 4 million bpd: of which 1.4 million bpd is at domestic refineries, 705,000 bpd at domestic joint ventures, and 1.9 million bpd at international joint ventures;
- Owns and operates the world's second-largest tanker fleet;
- Number of employees: about 51,843, of which 87 per cent are Saudi nationals;
- Affiliates, joint ventures and subsidiary offices in China, Egypt, Japan, the Netherlands, the Philippines, Republic of Korea, Singapore, United Arab Emirates, the United Kingdom and the United States.

Haradh Gas Plant. On October 23, 2004, Haradh Gas Plant received the Project Management Institute's (PMI) prestigious Project of the Year Award. Among the reasons PMI cited for bestowing the award were proactive management, high levels of innovation, an excellent safety record and a strong, integrated project team. Located 280 kilometres southwest of Dhahran, Haradh Gas Plant draws on the reserves of 87 gas wells to process 1.6 billion standard cubic feet per day (scfd) of non-associated gas into 1.5 billion scfd of sales gas and 170,000 barrels of hydrocarbon condensate. About 90 metric tons of sulfur can be processed each operating day and made available for a sulfur-pelletizing plant in Jubail and then for export. Technological features include the smart multi-speed pump system, oil for heat exchange (as opposed to steam) and a flare system that burns gases completely, making Haradh one of the world's most environmentally friendly plants. The complex consists of a camp capable of housing 1,000 men, plus support facilities and ancillary services. Some 32,000 square metres of shop and office space provide work areas for the Haradh employees and a Boeing 737 can land night or day at an adjacent 8,000-foot, illuminated airstrip.

The project was finished six months ahead of schedule in January 2004 and 25 per cent below budget. At the height of construction, 11,500 men of 36 different nationalities were working on the project. Overall, 49 million man-hours were logged during it without a single workday lost because of a job-related injury.

Haradh Crude Increment III. Technological innovation is the hallmark of Haradh Crude Increment III, the most recent Gas Oil Separation Plant (GOSP) to draw on the reserves of the world's largest oil field, Ghawar. Completed under budget and five months ahead of schedule in March 2006, the Haradh GOSP III finalized the third phase of development laid out in the Haradh master plan. The increment has a maximum production capacity of 300,000 barrels per day (bpd) of Arabian Light crude and 140 million scfd of associated natural gas. It also produces 520,000 bpd of treated seawater for injection to maintain reservoir pressure.

Key technological advantages include the surface and subsurface sensors that relay critical real-time data regarding well conditions to data centres and asset management teams. The unparalleled use of MRC Smart Wells and I-Field (intelligent field) technologies reduced the number of wells required to reach maximum production capacity from 280 (using vertical producers) to 32. By employing the state-of-the-art Supervisory Control and Data Acquisition (SCADA) system, Haradh GOSP III is also the first plant in the Kingdom that can be remotely monitored, opened, closed, choked and controlled down-hole. The implementation of these innovations will not only significantly extend well life, reduce operating costs and increase recovery rates, but will provide valuable lessons for future projects.

Qatif. Dwarfing all others, the Qatif complex is the first of Saudi Aramco's facilities to produce Arabian Light crude oil by blending Arabian Extra Light, Light and Medium grades. The different grades are derived from 151 oil wells drilled on 34 sites that encompass both the onshore and offshore fields. The facility has been designed to produce not only 800,000 bpd of crude oil, but also 370 million scfd of associated gas and 40,000 bpd of high-value condensate. The company's largest co-generation plant produces 140 megawatts of electricity and steam to power the massive complex.

Development of the project required the construction of three new GOSPs, an expansion of the Berri Gas Plant, 34 drilling islands, five new offshore platforms and upgrades to ten others, as well as facilities to inject 650,000 barrels of water per day to maintain reservoir pressure. The project's supervisory team was nearly 100 per cent Saudi and all of the Qatif operating plants are 100 per cent Saudi-run. A combination of the latest technology and well-drilling methods were incorporated into the design and included remote monitoring, extended reach and multilateral wells, viscoelastic diverting acid, permanent down-hole monitoring and smokeless flaring.

OCC Video Wall. The Operations Control Centre (OCC) Big Board is the largest informational video wall in the industry. Measuring 67 metres long by 3 metres high, it is made up of 150 1.7-metre stitched, black-masked screens that use Digital Light Processing (DLP) technology to display real-time images from cameras, satellites and the internet, as well as specialized icons specific to Saudi Aramco operations. The hydrocarbon Supervisory Control and Data Acquisition (SCADA) system delivers some 25,000 points of data to the video wall that are updated between every 2 and 15 seconds. The data give a real-time picture of Saudi Aramco's key operations including oil, gas, natural gas liquids (NGL), terminal planning operations and refined products. The Oil Supply Planning and Scheduling Department, which scrutinizes all aspects of Saudi Aramco's operations, constantly monitors data provided by the wall in order to identify rapidly any situation that might impact on the supply of products to customers and put any necessary contingency plans into action.

The Ministry of Economics and Planning. The Ministry was very active in the formation of the 8th National Development Plan (2005–2009) together with the KACST. The Ministry has also become active in the field of science and technology. It has prepared a list of 22 regulations and some 80 R&D projects that it believes should be implemented. To this end, the Development Plan includes plans for the creation of a National Research Fund to cover the estimated SR3bn costs of the aforementioned projects, of which 50 per cent will come from government sources and 50 per cent will be raised by private contributions, mainly from enterprises. The proposed projects have already been distributed to 56 government agencies for their study and implementation. If the private sector is to participate, the role of science and technology in economic development must be advocated.

The Ministry believes that the creation of a National Council for Science and Technology to govern the KSA's research and innovation system is unnecessary, because the KACST already has the legal and operative capacities to act as a "council". However, for the KACST to assume a more active role as the head of the governance system for science and technology, some changes and adjustments to its regulations may be needed.

Current challenges for industrial innovation

The role of the Ministry of Commerce and Industry (MCI) in matters related to industrial R&D and innovation should be more clearly defined. Stakeholders involved in industrial development (SAGIA, MCI, Ministry of

Petroleum and Mineral Resources, etc.) will need to reach agreement on the sectors that should be promoted. The MCI should take the lead in this and build consensus on a specific vision for these sub-sectors. Importantly, the technical and economic feasibility of large projects should be ensured before they are approved. Any industrial strategy should specify criteria for screening viable projects (such as value added, financing plan, employment prospects, export targets, environmental sustainability, involvement of an experienced foreign partner, etc.). An institutional mechanism for an effective innovation system and related policies needs to be established.

Government agencies can act:

a) As a promoter, providing:

- Tax incentives
- Financial incentives
- Protection of intellectual property rights
- Commercial channels for the transfer of goods – processes and technologies

b) As a producer:

- Carrying out or contracting industrial research
- Guiding public (and private) industrial research institutions

c) As a user:

- By procurement

d) As a facilitator, acting as:

- Antenna for industrial technology, and all related information activities
- Guiding and supporting the financial mechanisms for industry-related research and innovation

It is also important that industrial strategy formulation and implementation is strictly controlled by one body, preferably the MCI, which is currently in charge of industrial licensing. The new Industrial Policy Board at the MCI should also be involved in far more than the process of licensing industrial projects.

It is important to identify the core capabilities and potential of the KSA. A notable source of comparative advantage is its ability to benefit from foreign expertise.

The most important part of formulating an industrial strategy is to agree on a specific vision by building consensus among stakeholders. For this purpose, it is important to identify the core capabilities and potential of the KSA. A notable source of comparative advantage is its ability to benefit from foreign expertise. In addition to energy-intensive industries, the potential for developing products through industrial clusters is also important (see Chapter 8). To formulate the details of the strategy, the relative importance of each industrial sub-sector in terms of its contribution to GDP, employment, value added and exports, and its general strengths and weaknesses must be identified.

New initiatives should include a plan for the restructuring of the MCI within the framework of a long-term vision.

Addressing other key issues

Another key issue is how to take better advantage of the interrelationship between science and technology. Research may be viewed as creating both a new understanding of the nature of science and technical opportunities, some of which may be immediately available while others mature in the longer term. Thus, scientific and technological research contribute to public goods as well as complementing each other.

Technological as well as scientific research should aim at building national capacities and creating new opportunities. When science is the driver for creating new opportunities, research and innovation-induced products will automatically emerge. When it is public or economic needs that drive the research, the political process, informed by research, provides the funding and the overall goals. In both cases, researchers need an environment that favours risk-taking and allows them considerable latitude in setting research strategies.

Because of the present emphasis on research in the KSA, and as it is increasingly difficult to separate science from technology, the NIS can be designated as the National Research and Innovation System (NRIS).

The NRIS should be developed to become an area for the exchange of knowledge and information flows among national, sub-national and sector agents. At the centre of the NRIS will be the entrepreneurial and productive sectors, composed of value chains and clusters which function according to the needs of consumers and maintain leadership in the generation, diffusion and application of knowledge and technology. At the enterprise level, reducing the cost of research is critical. The system should be rooted in human resource development in order to respond to the challenge of building up a “learning economy” as the rapid rate of technical change quickly overtakes established competences and requires the continuous establishment of new ones (see also Chapter 5 on industrial capabilities).

Within the above framework, the required NRIS in the KSA can be defined as the network of organizations and institutions in the private and public sectors involved in the generation, import, modification, diffusion and application of empirical, traditional and new scientific and technological knowledge, transferring the benefits of research according to the requirements of greater competitiveness in the economy and satisfying at the same time social and cultural demands. The network also facilitates learning and educates innovators and entrepreneurs, and is also composed of the organizations responsible for coordinating and supporting these processes. To achieve this, the most important issue is the sequencing of the strategy initiatives.

7.3 Strategies for technological capabilities, efforts and sequencing of initiatives

Technological capabilities

Technological capabilities essentially refer to the physical and human capital needed for technological learning and innovation. Physical capital means facilities and equipment, while human capital refers to trained personnel. Training includes formal education, as well as specialized training programmes and knowledge acquired through on-the-job training and experience (see also Chapter 5 on industrial capabilities).

A comprehensive framework of technological capabilities can be classified into the following key categories (Endnote 6).

- ***Production capabilities**:* Production management, engineering, repair and maintenance capabilities required to operate a plant.

- ***Investment capabilities**:* Knowledge and skills required to establish a new industrial project, from pre-investment activities to project execution and the ability to source external investment capabilities.

- ***Minor change capabilities**:* A company's ability continuously to improve, adapt and incrementally innovate products, processes and organizational arrangements.

- ***Strategic marketing capabilities**:* Ability to collect market intelligence, develop new markets, and establish distribution channels and customer services.

- ***Linkage capabilities**:* Capabilities to organize knowledge and technology-transfer networks within a firm, with other companies and with the local science and technology infrastructure.

- ***Major change capabilities**:* Ability to conduct R&D, and to develop and introduce new products, processes and organizational arrangements, either in-house or in cooperation with customers, suppliers, and public research institutions, for continuous innovation and keeping pace with the changing facets of technological frontiers.

Technological efforts

Successful countries have always adopted a strategy that combines external drivers, such as foreign investment and foreign technology, with local development. Therefore development does not take place simply by opening up (removing tariffs), bringing in foreign investment and buying external technology. Efforts have to be made to develop local, adaptive capabilities, skills, infrastructure, technological efforts and, above all, enhanced R&D and innovation intensity.

There are a number of reasons why Singapore is a star performer in this field, ranking first on the UNIDO scoreboard of industrial performance and capabilities (see UNIDO 2003, UNIDO 2004, and UNIDO 2005a). For a long time, Singapore was known for its *entrepôt* character. In the early 1990s, when several countries started cutting R&D expenditure, Singapore invested heavily in it and created a strong, national, innovation base. Gross expenditure on R&D (GERD) increased from S$2.6 billion in 1999 to S$3.01 billion in 2000, a 15.8 per cent increase. Moreover, 62 per cent of this was from the private sector. Today, Singapore demonstrates how a country can climb the ladder of value added by strengthening the national innovation system towards building production capabilities and related skills.

Sequencing strategy initiatives

The main institutional structure for science and technology policy in the KSA should be revamped. All major policies with respect to industrial innovation will need to be formulated and implemented by a specialized agency, namely an Industrial Innovation Coordination and Development Board.

The chief strategies are summarized below. A detailed follow-up programme of these strategies is provided in Chapter 11.

Increasing the supply of technically trained human resources

Long-term initiatives

The educational system will need to be continually restructured, with an accent on technical and vocational education below tertiary level to provide a growing pool of skilled workers and technicians, as well as a rapid expansion of engineering, business and computer education at tertiary level. More university graduates should be trained in engineering and technical areas. The proportion of students enrolled in engineering, science, management and mathematics at the universities should be targeted to reach at least 60 per cent of university enrolment by 2010 (see also Chapter 5 on industrial capabilities).

An array of attractive incentives may be offered to world-renowned universities and institutions, to encourage them to establish their campuses in the Kingdom, offering courses that contribute significantly to the strengthening of the national and regional industrial innovation systems. Many universities in the United States are concerned about the decline in the number of Arab students studying there as a result of the tightening of visa procedures. As a result, some are interested in setting up campuses in the region, as is seen, for example, in Qatar's Education City.

The Government will need to adopt an incentive system that stimulates entrepreneurial zeal.

Once the country has increased the number of scientists and engineers engaged in R&D and innovation, efforts should be made to disseminate scientific information with commercial potential, and to generate commissioned research projects. Acknowledgement of the necessity of developing appropriate linkages between basic research, applied research, industrial activities and national objectives should be encouraged among scientists and technical personnel, as well as among policy-makers.

The Government will need to adopt an incentive system that stimulates entrepreneurial zeal. Otherwise, a shortage of entrepreneurship and innovation could seriously constrain future growth. Currently, the country is not creating sufficient jobs for Saudis. This is largely owing to the failure of the system to provide the type of skills and knowledge needed for the rapidly changing production systems. The conventional wisdom is that the path to create jobs is through a labour-intensive enclave type of operations. But low wages are increasingly ceasing to be a determinant of competitiveness and are not a realistic option for the Kingdom. Now the path to create jobs lies elsewhere. It may be easier for the KSA to embark on a long-term vision to create a strong skill base capable of supporting the country's industrial innovation system, which in turn is likely to contribute significantly to the process of industrial diversification and technological upgrading.

Short-term initiatives

Graduate reskilling programme. The graduate reskilling programme is intended to offer fast-track programmes for unemployed graduates, enhancing their knowledge and skills to meet the needs of the industrial innovation system. The focus on increasing the nation's skills needs has never been greater and it is important to commit support for specialized training for Saudi graduates. High quality vocational training and learning can boost technical and vocational specialization, while focusing on meeting the skills needs of different sectors (see also Chapter 5 on industrial capabilities).

Acquiring technological capacity and innovation capabilities. In the continuous process of catching up on technology and innovation capabilities, the first task is to reduce the gap between best local and best international practice. In the absence of such indigenous capacity and capabilities, the KSA will have to acquire foreign technological capability and innovation capacities. This entails developing networks, institutions and human capital to support the diffusion of technology. Human capital can be acquired in the short run by

plugging into international networks of researchers and tapping foreign technological capabilities and innovation capacities.

It is important to formulate and implement strategies to acquire the knowledge that enables firms to make effective use of such subsector-specific know-how. A quantum leap in technological capability is commonly associated with the arrival of technical people imbued with skills and up-to-date knowledge of production processes and marketing. They bring expertise that will enrich firms' technological base and enable them to tackle tasks that were previously beyond their competence.

Incentives and support systems for promoting innovative techno-entrepreneurship

It is increasingly evident that R&D at all levels is crucial, not necessarily to generate innovation but to learn, acquire and adapt new technologies. One of the major reasons for the emergence of dynamic industrial locations in particular countries is the presence of high quality academic institutions and a culture that constantly disseminates knowledge for commercial exploitation by intermediate institutions and firms. University R&D institutions and linkages are potential sources of dynamic industrial growth through the creation of talent. The message is clear: a strengthening of the national industrial innovation system comprising universities, institutions and firms is key to fostering industrial progress.

Industrial R&D and innovation cannot be left entirely to either public research institutions or the private sector. The Government will need to put in place a host of essential support systems and instruments. Given this state of affairs, there is no need to commit resources to R&D to re-invent the wheel. The priority should be to conduct adaptive R&D, as technologies tend to be location-specific, which means that technology imported from abroad will have to be adapted to local conditions.

One way of promoting R&D in the enterprise sector is by fine-tuning stimulatory financial instruments, such as research grants and tax incentives. For these to succeed, it is also necessary to use non-fiscal policy instruments, particularly a policy to strengthen the industrial innovation system. However, as evidenced by the experience of Singapore, financial instruments for promoting industrial R&D can succeed only if a country has a high density of technically trained personnel, who can engage in R&D and innovation within a suitable institutional framework.

In developing countries, most firms do not undertake R&D, but engage in a number of non-R&D activities that generate technology, such as the import of capital goods, improving plant layouts, or even "disembodying" technologies from abroad. However, in the longer term, when a country is becoming more industrially developed, the enterprise sector will require investment in R&D, at least of the adaptive type.

7.4 Regional innovation systems (RIS)

In the context of the KSA Eighth Development Plan (see Endnote 1.1, Chapter 1), regional innovation systems alongside clusters can be used as policy frameworks for achieving long-term regional development. These will be of particular relevance in the development centres in the three main regions of the Kingdom (Riyadh, Makka and the Eastern Province), which account for around 64 per cent of the total population.

Recent studies show that the majority of theoretical as well as empirical analyses of innovation systems have a regional focus. Even proponents of the national innovation systems approach accept that increasingly the region (a location or community) is where industrial upgrading takes place, through regional networks of innovative enterprises, their clusters and research institutions.

Differences in economic performance between more and less successful regions can be explained by looking at the mix of regional innovation policies and institutions that foster economic dynamism. Policies pursued by

regional governments can enhance regional cultural and economic identity. The key to the success of regional innovation systems (RIS) is in institutional innovations (governance) that facilitate the creation of dynamic comparative advantage. These institutions promote cooperative practices in the economic and industrial system; they promote the building of collective entrepreneurship and this can result in collective gains in terms of regional economic development. European experience is that RIS continue to play a role as a "strategic driver" in promoting the innovativeness and competitiveness of regions.

The concept of RIS rests upon the notion of public goods provision where market failure to support innovation is evident. RIS involve collective entrepreneurship, exploitation of social capital advantages, building networks, specialist, small-scale enterprise and innovation support services, regional financing and investment vehicles, and labour market adjustment services. Developing innovation is a three-way relationship between innovation, entrepreneurship and talent formation interacting systemically over time. Underpinning all three calls for financial resources to facilitate the processes.

Regional authorities have an important role to play in supporting innovation processes by offering services and other mechanisms that augment the interlinkages between all parties.

One of the assumptions of the RIS approach is that many innovative firms operate in regional networks, cooperating and interacting not only with other firms such as suppliers, clients and competitors, but also with research and technology resource organizations, innovation support agencies, venture capital funds, and local and regional government bodies. Innovation is a process that frequently benefits from the proximity of organizations that can trigger this process. Furthermore, regional authorities have an important role to play in supporting innovation processes by offering services and other mechanisms that augment the interlinkages between all parties.

Although the strategic importance of the regional level for constructing national (or supranational) advantage is emphasized, a multi-level approach to innovation and governance is still necessary. In this sense, regional innovation systems are linked to global, national and other regional systems of innovation within a multilevel governance system.

National versus regional innovation systems

Industrial innovation systems can be defined as the institutional infrastructure that supports the innovation activities of the production system of a country or a region (see Endnote 1). A national industrial system of innovation (NIS) has been defined as a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts that define new technology. A NIS is broader in terms of institutional framework but narrower in terms of its emphasis on "new technology". In contrast, a regional innovation system (RIS) consists of interactive knowledge generation and exploitation of sub-systems linked to global, national and other regional systems for commercializing new knowledge.

RIS involves the interaction of the following three sub-systems.

1. The regional production structure (or knowledge exploitation sub-system) consisting mainly of firms, often displaying clustering tendencies.

2. The regional innovation support infrastructure (or knowledge generation subsystem) consisting of public and private research laboratories, universities and colleges, technology transfer agencies, vocational training organizations, etc. This is responsible for satisfying knowledge, skills, finance and other needs, which markets fail to provide. This business support system can play a crucial role in linkages between local enterprises and global value chains (or global knowledge networks).

3. Governance of the industrial system deals with the coordination of the industrial innovation system. At the national level, various institutions can be entrusted with the overall coordination of national, regional and local levels. They can be public, such as a national innovation agency or private such as industry associations, chambers of commerce and others. They can also be regional development agencies. Regional government has an important role in offering services to augment the interlinkages between the above agents.

Open innovation and new RIS models

Since the early 1990s, an "*open innovation*" RIS model has emerged, following the earlier "*closed innovation*" model, heralding an *entrepreneurial* style of RIS, or bottom-up interactive innovation model (seen, for example, in the United Kingdom and United States), compared with the more *institutional* type (typified by Baden-Wittenberg in Germany and Nordic countries) (see Annex 7.1).

In the past, basic research was done at universities and government-funded research institutions, which made their knowledge available to the centralized R&D headquarters of companies that would commercialize it. The new innovation process is much less sequential and roles are shifting. Specialized private companies are engaged in early-stage research, leading to new ideas at all stages of communication between institutions and to the spreading of knowledge among all players in the RIS and the market.

The difference between the *institutional* and *entrepreneurial* style of RIS models is illustrated in Annex 7.2. Institutional RIS (IRIS) incorporates the R&D functions of universities, public and private research institutions, organizations and enterprises, reflecting a top-down, supply (science push) model of innovation. This has traditionally resulted in a regionalized national innovation system, which is basically a large-firm driven model. Entrepreneurial RIS (ERIS) is smaller-firm focused, relying on private venture capital to fund innovation.

Innovative Policy Platform (IPP)

For the KSA, as for developing countries in general, the importance of a "public goods" role for state intermediation means that a hybrid model of RIS is best. Institutional support is needed for appropriate talent formation in the tertiary education sector "platform" and an Innovative Policy Platform (IPP), moving regions towards a more entrepreneurial, especially "knowledge entrepreneurial", profile is required.

For the KSA, the importance of a "public goods" role for state intermediation means that a hybrid model of RIS is best.

The IPP model encompasses elements of ERIS and IRIS in fostering economic diversification through regional economic growth. In the KSA, the nurturing of technologically, scientifically and entrepreneurially advanced human capital is of particular significance. Research institutes or campuses from leading European and US universities should be established in certain regions to focus on relevant research; expatriate talent should be recruited; and appropriate "related variety" industrial fields should be stimulated. Business schools are essential adjuncts for the training of entrepreneurs. Networking is an important element of contemporary business, research and governance success in relation to building RIS and clusters that might be encouraged to grow within them. This is further elaborated in Chapter 8 on cluster development, in view of the close nexus between innovation systems and cluster-based development.

7.5 Summary of key proposals

To develop a national industrial innovation system, a number of new agencies and strategies are proposed. Follow-up programmes are outlined in Chapter 11. Key proposals are as follows.

Institutions

- Establish an Industrial Innovation Commission within the Industrial Competitiveness and Diversification Board, to be coordinated by the MCI, with the task of coordinating the activities of all agencies involved in industrial innovation.
- Establish an Industrial Research Network and Consulting Centre, operating as a "laboratory without walls", to generate and transfer industrial technology and to network with international institutions and firms in order to enhance innovation capabilities.
- Establish an Industrial Innovation financial mechanism in the Industry 2020 Fund to support enterprise innovation and R&D.
- Establish an Industrial Innovation branch within the Industrial Development Agency, affiliated to the MCI, to disseminate knowledge through seminars and workshops and other means of communicating with the broader community.

Strategic tasks

- Facilitating knowledge dissemination and industry/university/institution linkages.
- Promoting state-societal arrangements that encourage international competitiveness, with public institutional arrangements to facilitate the upgrading of skills in cooperation with the private sector.
- Encouraging multi-stakeholder partnerships.
- Promoting venture capital.
- Developing internal linkages and networking.
- Establishing and managing regional industrial development agencies in the newly created Economic Zones.
- Increasing knowledge spillovers to local companies from foreign companies.
- Establishing Innovative Policy Platforms (IPP).
- Promoting regional innovation systems (RIS).

Endnotes

1. National Innovation Systems (NIS) comprise the whole complex of public and privately owned physical infrastructure, institutions and systems that support and develop productive-sector innovation. *Physical* infrastructure – institutions, laboratories, technology parks, etc. *Technological* infrastructure – technology diffusion schemes, mechanisms to create technology-based firms and technology transfer incentives. *Human development* infrastructure – post-graduate research programmes and training systems. *Financial* infrastructure – loans for technology acquisition, adaptation and application.

2. For an in-depth analysis of the facets of national and regional innovation systems, see UNIDO 2006c.

3. See UNIDO 2003, UNIDO 2004, and UNIDO 2005a.

4. See also UNIDO 2006a.

5. UNIDO 2005b.

6. See Ernst, Mytelka and Ganiatso 1998.

Chapter 8. Promoting cluster-based industrial development for improved competitiveness

8.1 Regional and cluster-based industrial innovation systems: conceptual issues

What is a cluster?

Clusters are "groups of companies and institutions co-located in a specific geographic region and linked by interdependencies in providing a related group of products and/or services" (Endnote 1). They may include linked industries and other entities, such as suppliers of specialized inputs, and specialized infrastructure; distribution channels and customers; manufacturers of complementary products, and related institutions such as research organizations, universities, standard-setting organizations and training entities, venture capital funds, law firms, accounting firms and so on.

Clusters can improve competitiveness and productivity through sharing best practices, labour and management pools, and training. Clusters can drive the direction and pace of innovation and stimulate new firm formation. Clusters can thus become a source of regional competitive advantage, bringing economic benefits to individual firms in the region and to the region as a whole.

Clusters can improve competitiveness and productivity through sharing best practices, labour and management pools, and training.

Cluster-based industrial strategies and policies acknowledge the important role of government in shaping many factors of relevance for company success, while at the same time emphasizing the crucial role of intense and equal competition between companies in a cluster.

Clusters and regional innovation strategies

In regional innovation systems, innovative firms and the clusters that they belong to operate in regional networks, cooperating and interacting with suppliers, clients and competitors, and with research and technology (R&T) resource organizations, innovation support agencies, venture capital funds, and local and regional government bodies. The governance structure of a regional innovation system is more formal than that of a cluster. It usually features a government body that has the responsibility and the resources to facilitate a coherent system by providing services and other mechanisms that promote interlinkages between various regional actors. Regional innovation-based strategies and policies acknowledge the important role of institutions, conditions and coordination mechanisms for knowledge creation and commercialization (see Chapter 7), while clusters are more focused on the transformation of ideas into economic value.

Benefits of proximity

The benefits of a cluster include the following: (Endnote 2):

- Firms benefit from *access to shared resources*, best practices, mobilization and concentration of specialized labour, and the creation of supporting and ancillary industries within a cluster.
- Companies can operate with a *higher level of efficiency*, drawing on more specialized assets and suppliers with shorter reaction times than in isolation.
- Companies and research institutions can achieve *higher levels of innovation* (Endnote 3). Knowledge spillovers and close interaction with customers and other companies provide pressure to innovate, while the cluster environment lowers the cost of experimenting.
- The level of *business formation tends to be higher* in clusters. Start-ups are more reliant on external suppliers and partners, all of which can be found in a cluster.
- Entrepreneurs face *a lower risk in case of failure*, as they can fall back on local employment opportunities in other companies in the same field.
- Cluster advantages increase *opportunities to leverage foreign resources such as skills, technology and knowledge* through participating in cross-national and global value chains (GVCs).
- Clusters *create additional value* that outweighs the often-higher costs of more intense competition for specialized real estate, skills and customers at the location. This reduces transaction costs and enhances access to cutting-edge research and innovation.

How clusters emerge

Clusters can emerge naturally from profit-maximizing decisions. The most prosperous regions tend to have portfolios of clusters that are related and that therefore create reinforcing strengths (Endnote 4). While a region that has specialized in only one cluster faces a trade-off between higher efficiency in that cluster and higher exposure to industry-specific shocks, a region that has specialized in a group of various related clusters can enjoy and increase the benefits of higher efficiency while reducing its exposure to industry-specific shocks (Endnote 5).

Clusters develop over time. Among the most frequent reasons for cluster development in a particular area are specific aspects of the location, its specific business environment conditions, the existence of related clusters, and the long-term impact of specific entrepreneurial decisions by private or public sector leaders. The process can take many years. Another route for cluster development can be the existence of institutions, such as companies or universities, which over time act as an anchor for the cluster by spinning off new businesses and attracting investment from companies outside the region.

Most clusters have developed without dedicated effort to develop or even upgrade them. Government policies or investments, for example in universities or infrastructure, might have been present, but were often not pursued with a deliberate focus on a specific cluster. A strong overall business environment and the establishment of trust between public and private leaders have turned out to be among the strongest predictors of cluster development across regions.

Vertical specialization and open innovation

Increasingly, leading companies have moved away from vertical integration, where a single firm performs each successive stage of its value chain, to vertical specialization, where a firm focuses its activities on core competences while outsourcing other activities to a network of specialized suppliers and service providers. The nature of the innovation process has also changed in the globalizing knowledge economy, moving towards an "open innovation" system.

A strong overall business environment and the establishment of trust between public and private leaders have turned out to be among the strongest predictors of cluster development across regions.

In the past, basic research was done at universities and government-funded research institutions that then made their knowledge available to companies' centralized R&D headquarters, which would commercialize them. The new innovation process is much less sequential and roles are shifting. In this process, specialized private companies are also engaged in early-stage research, while ideas are born at the intersections between institutions, and new knowledge travels back and forth through many players before hitting the market. This new innovation process is also driving cluster development.

Clusters, regional comparative advantage and related variety

Cluster initiatives are often joint initiatives, involving companies, educational and research institutions and relevant government agencies. Some initiatives focus on creating stronger networks among companies that are co-located but know little of each other's existence. Some focus on improving the cluster-specific business environment through joint activities. Others focus on improving the strategies and operational practices of companies in the cluster. The evidence suggests that mobilizing and strengthening the potential of existing clusters that have not yet reached their full potential has the best likelihood of success.

But focusing only on existing clusters is not a viable strategy for diversification. It is crucial to identify industrial areas for new clusters to emerge. These areas could be those that require similar technologies, skills, and other regional assets that existing clusters draw upon (see Annex 8.1).

If the focus of regional development strategy is on the development of new clusters, the goal of regional innovation systems is promoting new economic activity based on industries with a similar analytical knowledge base, requiring close and systemic industry-university cooperation and interaction in the context of science parks, zones or cities, located in proximity to knowledge-creating organizations (e.g. technical universities, research centres, etc.). Stimulating a variety of related industries improves the quality of lateral absorptive capacity, giving a strong edge to regional knowledge capabilities.

The co-existence of many intra-regional clusters with various knowledge bases and different relations to the regional innovation system will require more developed regional governance structures to secure planned and systematic coordination between industry and other institutions that create and diffuse knowledge. Creating regional comparative advantages requires purposive activity through the platform approach, namely:

a) Industry platforms: exploring a related variety of industries;

b) Stakeholders' platform: pursuing planned and systemic cooperation and interaction between university, industry, and government, known as the triple helix approach; and

c) Policy platform: targeting the economy, skills and infrastructure.

Stimulating a variety of related industries improves the quality of mutual absorptive capacity, giving a strong edge to regional knowledge capabilities.

Creating clusters through an improved business environment

Many locations aim to launch completely new clusters. These can involve a related variety of industrial sectors that complement each other, or, alternatively, a group of sectors without obvious linkages, such as sectors that serve the local market (retail, construction, healthcare etc). Governments sometimes try to identify clusters that would seem to be attractive for all regions (life sciences is a favourite example) and then seek to "buy" whatever is necessary to implement them in the region – but such efforts often fail. The multitude of interactions within a cluster is too complex to be created from scratch by government design. A more appropriate regional strategy to stimulate entirely new clusters is to improve the overall business environment, for example by upgrading the skills, finance and infrastructure available, streamlining government rules and regulations, supporting more sophisticated local demand, and opening up to foreign investment and competition.

Clusters as a tool in traditional economic policies

Clusters can also guide the application of many crosscutting economic policy tools that are already used by governments. For instance, if a programme of R&D tax benefits, credit or skill upgrading is directed towards companies within an existing cluster, it can have a wider impact through follow-on spillover effects in that cluster. These effects have to be balanced against the risk of distorting the competition among clusters and industries for input factors such as capital and labour. Quite often, however, at least some level of cluster focus can make sense from an economy-wide perspective. Efforts to attract FDI tend to become more effective by following a cluster approach. Clusters provide a better environment for companies to operate in and, for many of them, clusters provide a market for their products and services.

Other important instruments for the promotion of cluster activities are the creation of various kinds of economic zones, parks and cities. However, accession to the WTO has limited the potential to use various special incentive packages, such as tax holidays. Incentives must be in line with the WTO Agreement on Subsidies and Countervailing Measures (ASCM).

Clusters can guide the application of many crosscutting economic policy tools that are already used by governments.

8.2 Role of government in cluster development

Government clearly has an important role to play in cluster development (see Annexes 8.2 and 8.3). Experience suggests the following:

- A successful cluster policy builds on sound overall economic policies targeting areas such as education, labour market regulation and competition law. Cluster development should be a part of an overall strategy for upgrading competitiveness.

- Government should be open to support all clusters that show willingness for cooperation and have some objective strength to build on. Policy should not pick winners among clusters, and it should generally reinforce established and emerging clusters rather than attempting to create entirely new ones.

- Government should be engaged in cluster initiatives as a facilitator and participant. The most successful cluster initiatives are public-private partnerships.

- Government should not provide subsidies, protection or relaxation of competition laws in order to develop clusters.

8.3 International experience in cluster-based industrial development: Selected case studies

Regions and supra-national cooperation

The currently available data on cluster specialization in the Arab, Asian and North African regions illuminate the challenges facing the KSA in using clusters as a tool for economic diversification and industrial competitiveness (Table 8.1). This raises the important issue of the scope for cooperation between sub-national regions in different countries. Obviously, this issue requires detailed analyses and assessment, keeping in mind both competitive and cooperative elements among regions in neighbouring countries and countries further afield. There are examples of successful cooperation between regions of selected developed countries and sub-national regions of developing countries. The issue is addressed in the follow-up programmes in Chapter 11. Special focus is given to sub-national regional cooperation among different countries of the GCC and MENA regions in terms of exchange of experience and information as well as industrial specialization and complementation.

Table 8.1 Clusters in selected countries

Country	Sectors
Malaysia	Multimedia, palm oil, electronics manufacturing
Qatar	Higher education
Oman	Software, energy, tourism, food
Pakistan	Textiles, defence, sports goods, surgical instruments, software, marble
Dubai	Tourism, finance, trading
Saudi Arabia	Oil and energy industry
Kuwait	Oil and energy industry
Iran	Oil & gas and energy industry
Jordan	Cosmetics, apparel, tourism, pharmaceuticals
Lebanon	Banking, media, tourism
Morocco	Sea products, apparel, textiles
Palestine	Cut flowers, olive oil, tourism
Turkey	Textiles, electronics manufacturing

Source: Osama 2006.

For industrial diversification and new cluster development, a key goal is to promote new economic activity based on industries with a similar analytical knowledge base, requiring close and systemic industry-research cooperation and interaction in the context of science parks, zones or cities, located in proximity to knowledge-creating organizations (e.g. technical universities, research centres, etc.). Stimulating a related variety of industries improves the quality of lateral absorptive capacity, giving a strong edge to regional knowledge capabilities. Stimulating interactive learning and networks consolidates knowledge flow channels and facilitates regional industrial development.

Biologics, the agro-food industry and plastics

In the KSA, it is desirable to seek opportunities where there may already be existing absorptive capacity and related core competences. The example of "biologics", which involves customized manufacturing services to the pharmaceutical and biopharmaceutical industry, is relevant here. Biologics is a medium-to-high-tech industry, which can be viewed as a General Purpose Technology with applications for the healthcare and agro-food industries, both substantial industry platforms, as well as, increasingly, environmental and energy industries. These in turn share certain related variety neighbourhood linkages to the oil industry and may similarly offer opportunities for skills adaptation and knowledge transfer. Software engineering in relation to such industries as mining and other applications could also be developed in KSA research institutes, with regional location and proximity benefits according to existing expertise and industry mix (see Annex 8.4). A related example is the agro-food industry's innovative platform in the Øresund region of Copenhagen-Malmö-Lund, between Denmark and Sweden (see Annex 8.5).

In the KSA, it is desirable to seek opportunities where there may already be existing absorptive capacity and related core competences.

Plastics nowadays have the character of a dynamic general-purpose materials technology present in and applicable as inputs to a great many medium and high-tech industries. End-users are in the automotive industry, electrical engineering, household electrical appliances, aeronautics, telephony, optics, packaging, cosmetics and pharmaceuticals, while the industry itself includes a variety of skills such as design, mould production, machinery manufacture, polymer processing, finishing, decoration, recycling, and industrial and commercial logistics. Local commercial products include toys, eyewear, hair accessories and fashion goods. In the case of one of the KSA's non-oil specializations, production of perfumes, there could be links to hair care products, cosmetics and pharmaceuticals.

Substantial national and regional co-investment funds are required both to facilitate this kind of relatively small-scale development and to assist existing firms to develop related variety business lines as they diversify beyond their current core production capabilities. It would be logical for large firm funding, probably also a public-private fund, to be administered at the KSA governance level, with entrepreneurial co-funding arrangements administered regionally.

The co-existence of many intra-regional clusters with various knowledge bases and different relations to the regional innovation system will require more developed regional governance structures to secure a planned and systematic coordination between industry and knowledge-creating and diffusing organizations, which may imply the use of regional platform policies.

Platform approach

Creating regional comparative advantages assumes purposive activity on the part of society through a platform approach, namely:

a) *Industry platforms:* exploring a related variety of industries (see Annexes 8.4 and 8.5);

b) *Stakeholders' platform:* pursuing planned and systemic cooperation and interaction between university, industry, government, known as the triple helix approach; and

c) *Policy platform*: targeting economy, skills and infrastructure (see Annex 8.6 and Annex 8.7 on Japan's policy platform approach).

The innovation process differs substantially across various industries depending on, among other things, the specific knowledge base required.. For some industries, analytical knowledge is more important than for others (e.g. biotechnology), while for others more symbolic knowledge is required (e.g. marketing capabilities).

For the development of a specific industry and for industrial diversification, it is crucial to enhance a country's capability for knowledge creation, absorption and diffusion. This assumes the existence of certain qualifications for codifying knowledge and for monitoring how the knowledge base of different sectors is changing over time as well as a full understanding of a country's existing competences.

8.4 Regional cluster-based industrial development in the KSA: Current situation

Current situation in the KSA

In terms of business environment conditions affecting cluster development, the KSA suffers from many of the weaknesses that can be generally found in natural-resource rich economies. Probably the most important challenge is the low level of skills among Saudi citizens, as discussed in Chapter 5. Upgrading human capital is a key strategy for building a modern talent base in the KSA. Recent international experience from the Republic of Korea, Taiwan Province, Singapore and Ireland shows that a significant increase in scientists and engineers precedes a fast-growth economic take-off phase of a country (Table 8.2).

Table 8.2 Number of natural scientists and engineers in the economic take-off phase of selected economies

	1975	1995
Republic of Korea	10,266	47,277
Taiwan Province of China	6,700	15,170
Singapore	702	2,965
Ireland	706	5,456

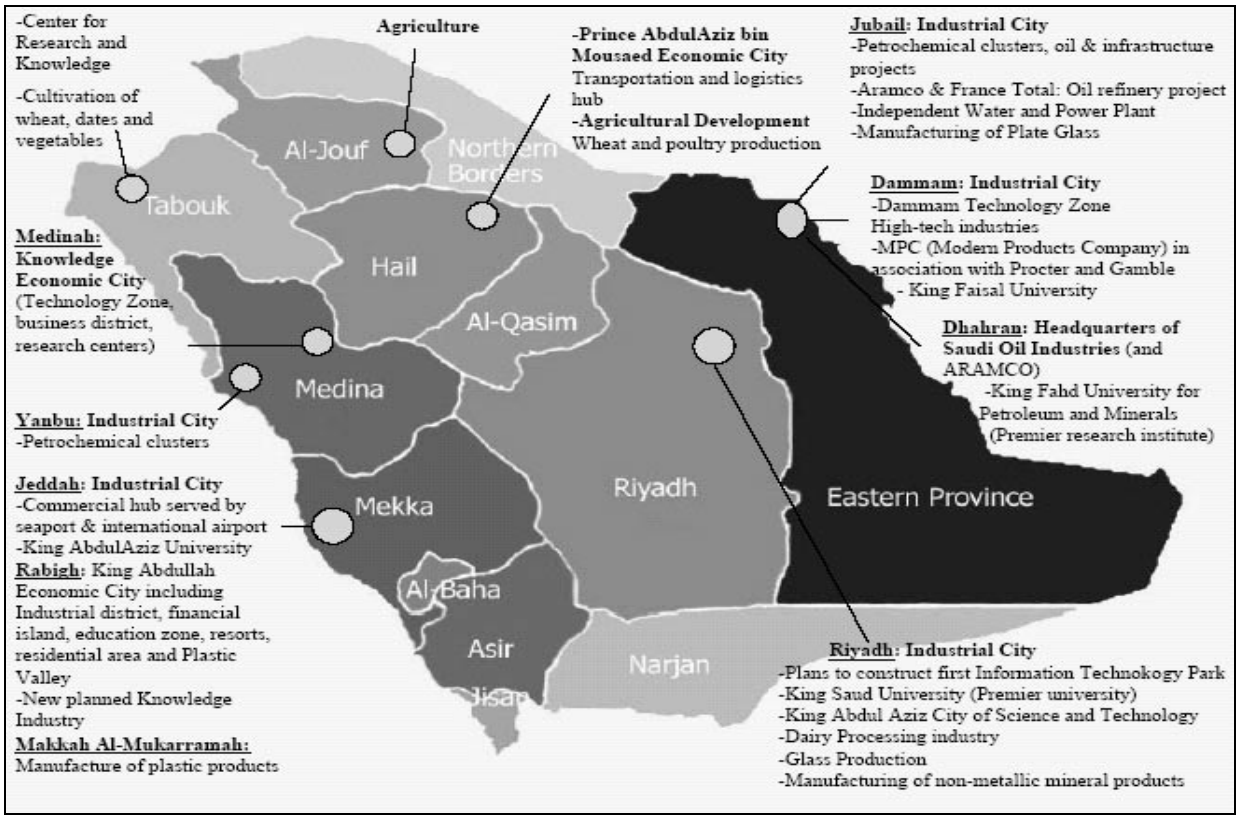
Source: National Science Boards & National Council for Educational Awards.

In the future, the business environment in the KSA needs to provide a supportive context for clusters to be developed.

Another important issue in the KSA is the existence of large business groups. These groups are partly a reflection of the political structure. They are also partly a reaction to shortages of management and entrepreneurial capabilities as well as weaknesses in the financial market structure. At the same time, the infrastructure is generally solid and the country has made some progress on different aspects of business regulations.

However, over the last decade, the business environment in the KSA has not provided a supportive context for clusters to be developed. There is also little available evidence of functioning clusters outside the oil and gas sector. Even in the oil and gas sector, more in-depth data would be useful to assess whether the impressive base of activities in these areas and in related industries actually functions as clusters that result in real, positive spillovers through the geographic proximity of activities. There are some indications of emerging activities in some industries, logistics and transportation as well as in financial services (Figure 8.1 and Table 8.3).

Figure 8.1: Regional economic specialization in the KSA



Source: Based on UNIDO 2005c.

Some geographical agglomeration, suggesting scope for future clusters, is evident in:

- *Basic food products* in Riyadh, Makka, Eastern Province, Medina, Gassim, Asir, Jisan and Najran;
- *Other food products* in Riyadh, Makka, Eastern Province, Medina and Gassim;
- *Paper, printing and publishing* in Riyadh, Makka, Eastern Province, and Gassim;
- *Pesticides and similar products* in Riyadh, Makka, Eastern Province, Medina and Gassim;
- *Plastic products* in Riyadh, Makka, Eastern Province, and Gassim;
- *Non-metallic mineral products* in Riyadh, Makka, Eastern Province, Medina, Gassim, Asir, Jisan and Najran;
- *Structural and fabricated metal products* in Riyadh, Makka, Eastern Province, Medina, Gassim, and Asir;

- *Furniture, transport equipment, glass products, machinery and equipment* in Riyadh, Makka and Eastern Province.

Plans to construct a financial centre in Riyadh by 2010 may also involve cluster-based development.

Table 8.3 Number of establishments in the most important industries in the various regions of Saudi Arabia

Regional/ Industries	Riyadh	Makka	Eastern Province	Medina	Gassim	Asir	Jisan	Nairan	Total	Rankings
Basic foods	55	34	23	14	10	–	–	–	153	8
Other food products	52	92	44	13	10	–	–	–	225	5
Paper, printing, publishing etc.	92	67	50	–	6	–	–	–	225	5
Machinery and equipment	68	39	28	–	–	–	–	–	149	9
Pesticides and similar products	101	77	81	12	10	–	–	–	294	3
Plastics products	128	117	89	–	16	–	–	–	388	2
Glass products	22	30	26	–	–	–	–	–	83	11
Non-metallic mineral products	177	91	114	31	21	39	22	10	530	1
Structural and fabricated metal	201	120	123	–	17	14	–	–	294	3
Furniture	105	46	34	–	–	–	–	–	206	7
Transport equipment	39	27	31	–	–	–	–	–	103	10

Source: Based on UNIDO 2005c.

Which sectors might be suited to cluster-based development in the KSA?

The integration of clusters into global production systems and value chains is particularly critical in the context of enterprises that offer tradable product and service categories**,** i.e. products and services that may be freely imported or exported. Products and services may be relatively non-tradable, due to the unique tastes and preferences of local consumers, due to transport diseconomies or due to demand being for low-volume customized orders.

There may be scope for the emergence of clusters that produce relatively non-tradable goods and services, i.e. those that tend to serve the local market. These could include retail, finance, construction, health and agro-related services, alongside other products targeting domestic or regional demand. Further, oil and gas-related intermediates and downstream chemical and speciality chemicals, as well as agro-business, inorganic chemicals, cosmetics, pharmaceutical and knowledge-based industries may also offer scope for cluster-based development.

There may be scope for the emergence of clusters that produce relatively non-tradable goods and services, i.e. those that tend to serve the local market.

The nexus between competition in the domestic market and export-oriented industrial development is particularly important following accession to WTO membership. International experience shows that competing in the domestic market is a useful platform for successful export performance through the learning experience gained in the process.

Existing strategies for cluster-based development: weaknesses and ways to improve

Cluster-based strategies and policies in the KSA currently suffer from a number of weaknesses that undermine their potential to transform the economy into a more diversified structure. Firstly, many efforts are largely focused on real-estate development and the creation of physical infrastructure. While the physical infrastructure base can facilitate interaction, it cannot substitute for those factors that make interaction attractive and useful for cluster participants, such as the presence of unique skills or knowledge. The industrial cities in the KSA currently seem to go halfway. They combine excellent infrastructure with an ambition to focus on specific clusters – but fail to communicate the need for a clear programme of action on other factors, beyond infrastructure, that would make these cities more attractive locations for the development of strong industrial clusters.

Secondly, where a specific industry focus exists, there is insufficient clarity on the specific value that the regional cluster or the cluster-specific business environment will provide. With more and more locations competing as regional clusters, it is becoming increasingly critical that each location understands and communicates the specific offer it makes in a given cluster area, e.g. a focus on specific activities, a specific geography, or a specific product or market segment.

Thirdly, there are competing cluster efforts by a number of different agencies in the KSA. While this might be natural for the current stage in the discussion on cluster-based economic policies, it is important that greater consistency and an integrated effort is adopted as soon as a new overall cluster programme is rolled out. Otherwise its impact will be reduced by giving confusing signals to foreign and domestic investors and by working against the specialization of individual regional economies according to economic efficiency.

Fourthly, there is a limited appreciation of the roles of the private and public sectors in a cluster. Too often the necessary dialogue is limited to a public-private partnership model for financing infrastructure investments that are necessary to enable further private sector investments. This dichotomy is not only present in the public administration. Many private sector representatives, too, have this view of public-private dialogue and thus need to engage in greater, wider collaboration to upgrade competitiveness.

8.5 Strategies for cluster-based industrial development in the KSA

To overcome the current constraints, industrial strategies and policies for promoting cluster-based industrial development would need to focus on five main avenues.

Creation of a knowledge base

First is the *creation of a sound factual and knowledge base to guide cluster-based policies*. Cluster development is not a generic approach that can just be implemented; it requires many fact-driven decisions on where to

focus and what to focus on. These can be made only with appropriate local data. The following concrete areas are particularly important:

- *Mapping of existing clusters:* It is necessary to know where regional patterns of specialization exist, how deeply they are rooted, the specific profile they exhibit, and the role they play in the regional economy. Such mapping can be done using internationally validated cluster definitions and detailed regional and industry-specific data on employment, productivity, etc.

- *Evaluation of regional business environments,* especially in the context of where emerging clusters exist. It is critical to know the profile of individual regions in the KSA in terms of strengths and weaknesses. This would make it possible to identify clusters that could emerge in a specific region and facilitate targeted business environment upgrading. Survey and hard-data-based methods for such business environment assessments are available and have been used in many parts of the world, including the Arab region.

- *Creation of an "Observatory" to track competitiveness and cluster development over time:* At an early stage, there should be a focus on regular and neutral assessment of how the business environment and the clusters in the KSA are developing. Such information will facilitate sustained efforts, provide an informed base about remaining or new priorities and contribute to upgrading the institutional capacity of the KSA.

- *Financial and technical support for cluster initiative administration (not their activities):* Funding should be made available for the provision of a cluster initiative tool box, for diagnostic and impact assessment tools, for office space and cluster initiative managers and for the training of cluster facilitators. Such investments should be moderate but are critical to achieve a high level of effectiveness in cluster efforts.

Defining an action agenda

The second avenue is *defining a cluster development action agenda*. This agenda should set demanding but realistic objectives to be achieved in different parts of the KSA economy, focusing on the following sectors:

- *Oil & gas cluster:* In this cluster, there is already a strong base of activities and the cluster-specific business environment conditions are generally positive. The objective of cluster development in this area should be to increase economic returns. As an action step, public-private cluster groups (on a national basis, plus regional groups in top locations) should be launched to develop region-specific action priorities to increase productivity and enhance value creation by increasing the degree of processing beyond the sole export of oil and gas. Much is already being done in this area in the KSA.

- *Emerging export-oriented clusters with an existing base (including oil-related sectors such as plastics, as well as transportation & logistics):* In these clusters, there is an existing base of activities as well as some cluster-specific business environment advantages. Initiatives could be taken to strengthen clusters. Specifically, projects should be launched to map specific regional clusters and their business environments in detail, in order to see what is missing in the cluster and which elements in the business environment can be leveraged better. Based on this mapping, projects can be launched to improve cluster-specific business environments, for example by creating cluster-specific research institutions or training programmes, or by providing targeted seed financing for start-ups in these fields.

- *Clusters serving the domestic market (retail, finance, construction, health, agro-related, services etc):* In these clusters, there is also an existing base of activities serving domestic demand. The objective here is to increase productivity, enhance job creation, and promote the formation of new companies.

As a first step, projects should be launched to map key barriers to growth in these areas, including the market power of existing business groups that dominate such markets.

- *Other emerging/potential clusters:* Here, the existing base will be small or non-existent. A realistic objective would be to enable the emergence of a portfolio of regional cluster efforts that will provide experience in private-public collaboration. A competition should be launched for potential cluster initiatives, which should cover at least two of the following three stakeholder groups: companies, universities and regional government agencies. From the point of view of industrial strategies, emerging industrial clusters should be viewed in the context of the following industry categories:
    - Oil & gas industries;
    - Traditional oil-related industries;
    - Strategic industries;
    - Hi-tech industries;
    - Emerging knowledge-based industries;
    - Other non-oil related industries.

Case studies of selected emerging clusters of the above industries, with illustration of possible support programmes, are contained in Annex 8.8.

Applying a cluster focus to current policy programmes

The third avenue involves *benefiting from improving existing economic policy programmes* through a cluster focus. Four areas in particular have significant potential and the KSA can draw on the experience of other countries in these fields.

- *Foreign direct investment attraction:* By marketing specific regional clusters to foreign investors, the likelihood of success is significantly increased. Foreign investment that complements existing clusters is particularly desirable. Existing and new foreign investors can be invited to join partnership programmes to develop clusters of supporting and related industries around them.

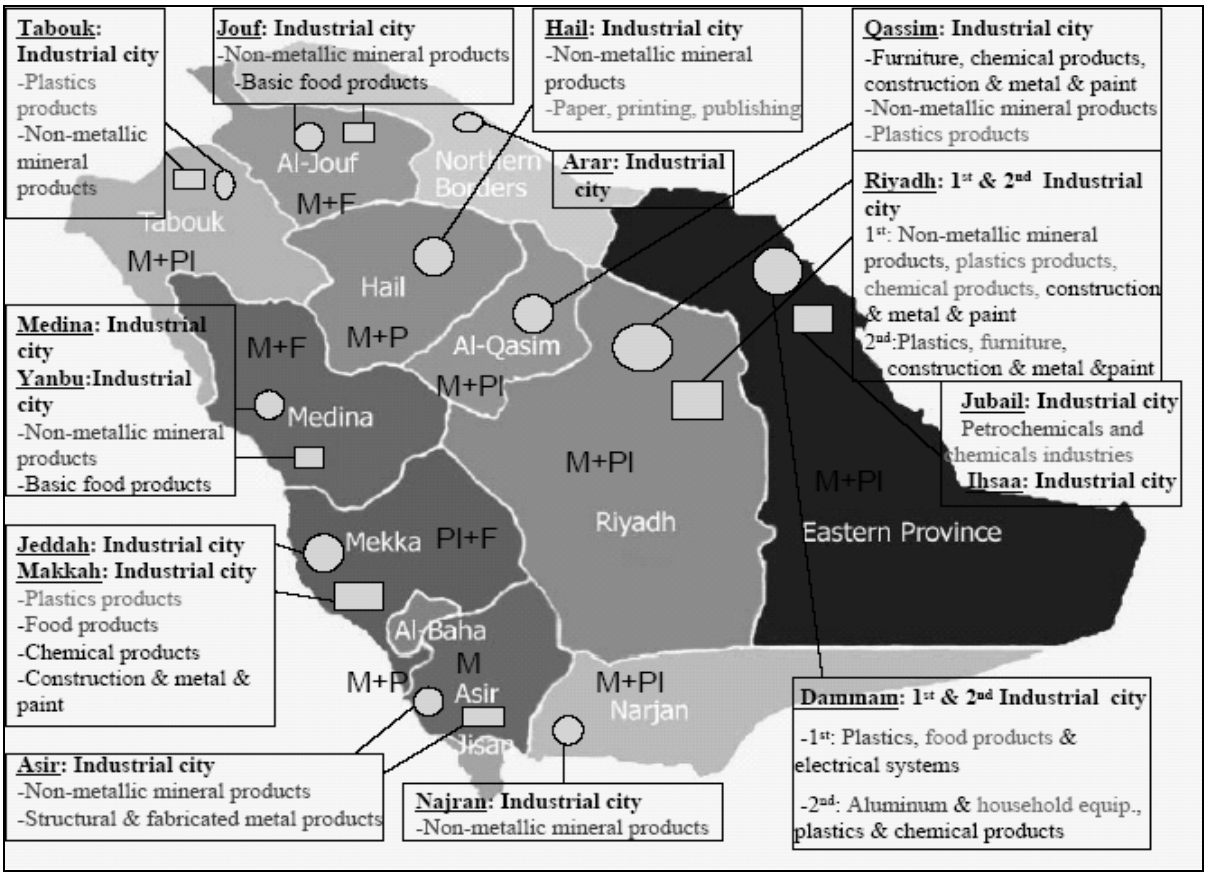
- *Branding of clusters as industrial platforms such as economic/industrial cities/valleys, industrial zones, technology zones:* The designation of locations for specific clusters provides them with a clear profile and defines detailed demands for their business environment qualities. These qualities can then be marketed to the relevant group of companies, leading over time to the cluster itself being the attraction, rather than the specific infrastructure in the economic city or zone. This strategy is already at the conception phase, but more work needs to be done with companies that are active in such clusters to identify their needs beyond a functioning infrastructure in such locations (Table 8.3 and Figure 8.2 on industrial cities) and to identify their potential to develop a variety of related industries and services.

- *Skill upgrading:* The organization of cluster-specific working groups with companies and cluster-relevant educational organizations to launch targeted skill-upgrading programmes has been important in many countries. It should be used in the KSA to supplement the current policies to increase the job opportunities for Saudi citizens.

- *SME support in terms of finance and technical assistance:* Financial and technical support programmes for companies could be focused on those that are part of a regional cluster. In addition, clusters can be

used as a platform to reach groups of companies more efficiently. Existing anchor companies can be enlisted in programmes to actively develop SMEs and create better linkages with them.

Figure 8.2: Industrial cities in Saudi Arabia



Notes: Largest industry in the region ◯ Second largest industry in the region ▭

Legend: F for Food; M for Minerals; P for Paper, printing, publishing etc.; Pl for Plastic.
Source: Based on UNIDO 2005c.

Creating a supporting business environment

Fourth is *the creation of a business environment that is more supportive to cluster development***.** The following policy areas are particularly important. It is critical that such policy reforms are accompanied by improvements in the institutional capabilities required to implement them.

- *Infrastructure and logistics capabilities* to enable linkages between regions within the KSA and with global markets. Globalization of production and trade today requires the availability of adequate modern (digital) and traditional infrastructure, transport and logistic services, and efficient and cheap customs procedures. Besides physical and modern ICT infrastructure and transport and logistics capabilities, business costs are affected by trade policies (e.g. customs procedures, transport and related certifications, and standardization in products, packaging and labelling). In an increasingly globalized economy, efficient trade regulations directly contribute to enhancing the linkages of local supply chains with global value chains.

- *Competition law* to ensure high levels of domestic rivalry, providing healthy pressure for specialization, innovation and new business formation. Clusters tend to be more successful when there is a significant degree of competition within them, helping to drive their development.

- *Business regulations* that reduce administrative costs for the establishment of firms and, in particular, for the operations of SMEs.

- *Financial market* that offers credit and equity finance for SMEs.

- *Trade policy* to reduce protection against foreign imports.

Regional and national strategies

Finally, the fifth key avenue is the formulation of *regional strategies and policy instruments* to support economic diversification and build regional comparative advantages. The main risk associated with cluster development is that excessive focus on this kind of strategy could potentially lead to over-specialization (for example, in oil and gas-related industries and services), whereas the goal in the KSA is diversification of the economic base. A variety of industrial clusters, and a variety of economic activities within each cluster, should ideally be pursued (Endnote 6).

A major step forward towards cluster-based development was the announcement in November 2006 of the establishment of a National Cluster Development Plan as a National Industrial Strategy. A steering committee led by the Ministry of Petroleum and Mineral Resources and comprising other ministries such as the Ministry of Economics and Planning and the MCI has already been formed. The involvement of all stakeholders such as Ministries, Government agencies, private industry and the business sector is essential for the successful promotion of cluster-based development. Initially, the establishment of four industrial clusters such as automotive, construction, appliances and packaging is planned to serve as a base for further industrial diversification and competitiveness.

The current expansion and development of six new "economic cities" are at the forefront of a major investment drive to diversify the KSA economy. The King Abdullah Economic City is the largest investment (US$27 billion) with the expected generation of 500,000 new jobs. Five other economic cities are planned in different regions of the Kingdom to promote private sector industrial development. These include, inter alia, Jazan Economic City, Medina Knowledge City and Prince Abdulaziz Bin Mousaed Economic City, Hail. When these cities are completed in 10-15 years, they are expected to represent a combined GDP of US$150 billion, 1.3 million new jobs and a total population of 4.5 million. The current expansion of Jubail and Yanbu industrial cities will provide a further impetus towards the establishment of industrial clusters and the hosting of new industries with world-class technologies.

A major step forward towards cluster-based development was the announcement in November 2006 of the establishment of a National Cluster Development Plan as a National Industrial Strategy.

Summary of key strategies for cluster-based industrial development

The strategies proposed for cluster-based industrial development in the KSA may be summarized as follows.

1. Creating a sound factual knowledge base to guide cluster-based policies

a) Mapping existing clusters.

b) Evaluating the regional business environment.

c) Creating an Observatory to track competitiveness and cluster development over time.

d) Providing financial and technical support for cluster initiative administration (but not their activities).

2. Defining a cluster development action agenda

a) Oil and gas cluster.

b) Emerging export-oriented clusters with an existing base (including oil-related sectors such as plastics, transportation and logistics).

c) Clusters serving the domestic market (retail, finance, construction, health, agro-related, services etc.).

d) Other emerging/potential clusters comprising: oil and gas industries; traditional oil-related industries; strategic industries; high-tech industries; emerging knowledge-based industries; and other non-oil industries.

3. Improving existing economic policy programmes through a cluster focus

a) Attracting foreign direct investment.

b) Branding of clusters as industrial platforms such as economic/industrial cities/valleys, industrial zones, technology zones.

c) Upgrading skills and human resource development.

d) Supporting SMEs in terms of finance and technical assistance.

4. Creating a business environment that is more supportive to cluster development

a) Infrastructure and logistics capabilities.

b) Competition law.

c) Business regulations.

d) Financial market.

e) Trade policy.

f) National Cluster Development Plan.

The way forward

The industrial strategies proposed for cluster-based industrial development for improved competitiveness in this chapter include three major programme components for follow-up action:

- Technical and financial support for regional cluster initiatives;
- Development of regional industrial clusters (beginning with five pilot regions);
- Replication of the cluster-based approach in other regions of the Kingdom.

These follow-up programmes are presented in more detail in Chapter 11.

Endnotes

1. See Porter 1996.
2. See Porter 1998.
3. Because of the critical importance of innovation for knowledge-based economies, "innovation clusters" have become a particularly popular topic. See OECD 2001 and Porter 2001.
4. See Porter, Stern and Delgado 2006.
5. Experience shows that regions that have developed a related variety of clusters are the most innovative and competitive: see Cantwell and Iammarino 2003.
6. To implement such a strategy successfully, it may be useful to use the balanced scorecard (BSC) method (see Annex 8.9).

Chapter 9. Industry 2020: Positioning the Kingdom of Saudi Arabia in the global league table of industrial excellence

9.1 Transforming comparative advantages based on natural resources to competitive strength based on knowledge and skills

The importance of the four main pillars

The efficient implementation of Industry 2020, as outlined in Chapters 5–8, will greatly accelerate the development of a more diversified and competitive industrial economy, giving the Kingdom new industrial horizons and prosperity. However, efficient industrial governance in order to implement the strategy (as outlined in Chapter 10) will be vital to position Saudi Arabia in the global league table of industrial excellence in the context of Vision 2020, as discussed in Chapter 1.

Positioning the Kingdom at a suitable place in the global league table of industrial excellence will be determined by a combination of the aspirations of Saudi society and enhanced industrial performance working towards accelerated industrial diversification and improved industrial competitiveness. This, in turn, will result from the effective implementation of the Industry 2020 strategy based on the four main pillars:

- Strengthening industrial capabilities;
- Improving the business environment;
- Creating a national innovation system; and
- Promoting efficient cluster-based industrial development.

Efficient industrial governance to implement the strategy will be vital to position Saudi Arabia in the global league table of industrial excellence.

Need to devise performance-monitoring parameters

Such strategic positioning, however, will be determined not only by Saudi moves towards accelerated industrialization, but also by industrial progress in other developing countries that compete with the KSA in the international industrial league table. It will therefore be vital for the KSA to monitor international developments in order to benchmark its performance against that of key comparators – both in the region and further afield – and to learn from relevant experiences in other countries.

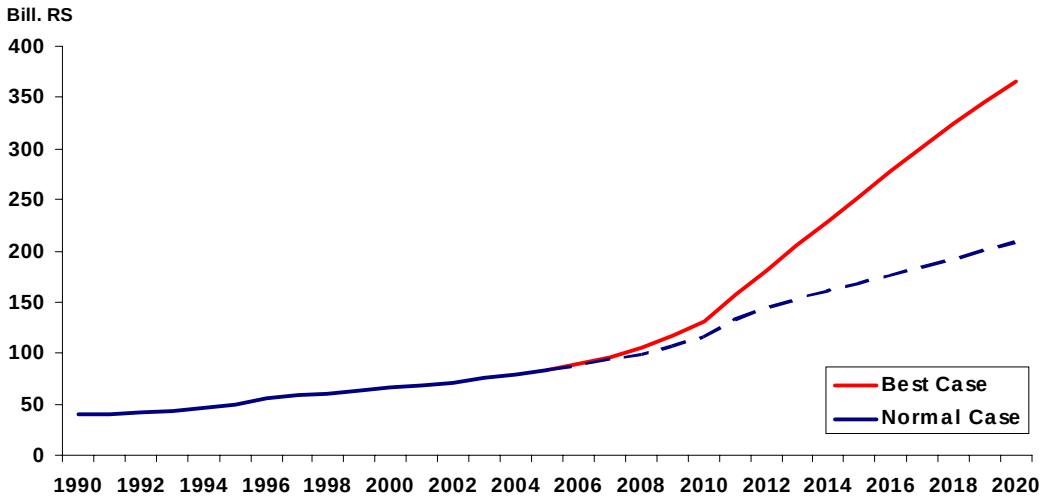
While each industrial experience has its own particular characteristics, success stories from newly industrialized countries have certain common features. First is the fast growth of industrial investment, supported by accelerated growth in establishments with recognized technological capacities. Any industrial strategy seeking rapid, albeit sustainable, success must acknowledge the importance of industry's relationship with society as a whole. Endeavours to support industry are not – and should not be – limited to industrial ministries alone. After all, industrial success benefits the wider society in terms of more income, more employment and a more prominent position in the world industrial economy. Therefore, efforts should be made by all stakeholders in society, both public and private. That is to say, the society's collective effort is the major underpinning of industrial success.

Reaching the top ten in terms of competitive business environment

In this context, Saudi industrial strategy has to meet society's aspirations for high industrial achievement and sustainable growth. To that end, the strategy aims to position the country among the world's leading industrial economies. It is worth noting that inevitably there is some uncertainty over the precise extent of future progress in the rankings, as a country's relative position is also affected by changes in the performance of other countries. But by 2010, the Saudi Arabia General Investment Authority (SAGIA) aims to position the country within the top ten best performers in the World Bank's "Doing Business" league table of competitive business environments (Endnote 1).

This ambitious target requires a commitment to excellence in terms of improving industrial capabilities, creating a sustainable business environment, establishing a dynamic innovation system and promoting cluster-based industrial development. It also requires substantial investment in follow-up programmes as well as institutional efficiency in the plan of action. The Kingdom is fortunate to be in the position, enjoyed by few other countries, of being able to stimulate economic diversification and competitiveness, and to leapfrog in the global competitiveness race, because of the substantial financial resources that are available to help it achieve industrial excellence by 2020.

Figure 9.1: Change in the industrial trajectory as a result of the strategy, 1990-2020



Note: The red (upper) line represents the trajectory of MVA with the strategy implemented; the blue (lower dotted) line without any strategy.
Source: UNIDO 2006a.

Two steps for a working agenda: growth and restructuring of MVA

Transforming challenges into a working agenda requires a two-step procedure. Firstly, the success criteria of international experience have to be adapted to the Saudi context to establish the required targets for the level and growth of manufacturing value added. Secondly, the resultant targets should be converted into sub-targets covering the structure of the sector. Figure 9.1 projects the expected change in the overall industrial trajectory that the strategy hopes to achieve.

The industrial structure should shift towards activities with higher technological content, but related to the KSA's natural and created comparative advantages. This would transform comparative advantages from being based on natural resources to being based on knowledge and skills.

The proposed growth trajectory is expected to involve a preparatory period of about three years, during which a fast-track programme to stimulate industrial take-off is recommended.

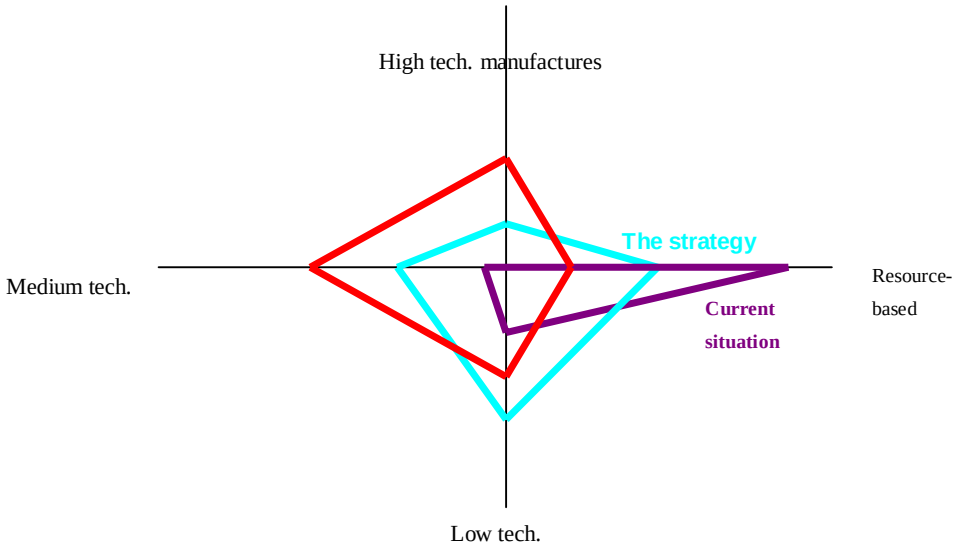
Restructuring the industrial sector

The second task is to review the structure of the industrial sector. To achieve such high growth targets, the sector needs to focus on activities with more value added. In other words, its structure should shift towards activities that have higher technological content, but are still related to the KSA's natural and created comparative advantages. This would have the merit of transforming comparative advantages based on natural resources into comparative advantages based on knowledge and skills. This would help to create a new developmental context with more sustainable generation of income and employment as a result of the boost to competitiveness resulting from increased global integration. For this purpose, the strategy is to restructure the sector towards activities at a higher position in the value chain through adoption of the concept of clustering, founded on both natural and technological bases. The suggested target is to achieve a ratio of manufacturing value added (MVA) to production of at least 45 per cent. To reach this, the share of higher technology activities (involving medium to high technology) is to rise to 60 per cent of MVA (Figure 9.2), and should make up 30 per cent of industrial exports In order to achieve this, the restructuring of production should include both local innovation efforts and industrial trade capacity building. Therefore, establishing a working National System of Innovation is crucial to fulfil all the targets.

The suggested target is to achieve a ratio of manufacturing value added (MVA) to production of at least 45 per cent. To reach this, the share of higher technology activities (involving medium to high technology) is to rise to 60 per cent of MVA and should make up 30 per cent of industrial exports. In order to achieve this, the restructuring of production should include both local innovation efforts and industrial trade capacity building.

The KSA's recent industrial performance is the base from which the economy can join the ranks of successful industrializers by means of a fast-track, albeit demanding, strategy that is tailored to fulfil the national will for excellence. Key "buzz words" that the strategy will promote are*: skills; capabilities; framework conditions; business environment; innovation; cluster; entrepreneurship; and trade capacity building.* Programmes that embody these key concepts are presented in Chapter 11.

Figure 9.2: Expected evolution in the MVA structure under the industrial strategy



Source: UNIDO 2006a.

9.2 Positioning the KSA on the scale of industrial excellence

A better position is well within reach

An attempt is made in this section to position the KSA on the scale of industrial performance in 2020. Between 1980 and 2000, the KSA improved its position on the UNIDO Competitive Industrial Performance Index (CIP) by 18 places. On the scale of technological advancement, Saudi Arabia was number 38 out of 90 countries by 2000. Updating the ranking to 2006 is constrained by the unavailability of valid, reliable and authentic data for inter-country comparison.

A reasonable base for such an exercise could be for the KSA to reach a position among the top 30 countries as a benchmark over the next 14 years.

In the absence of reliable data for inter-country comparison to gauge performance, an attempt is made here to coin a set of both qualitative and quantitative parameters, with a view to presenting reasons why the KSA should attain a much better position in 2020. A reasonable base for such an exercise could be for the KSA to reach a position among the top 30 countries as a benchmark over the next 14 years**.** Table 9.1 depicts the Kingdom's standing in relation to the top 30 countries on the scale of the UNIDO industrial-cum-technological advancement index (ITA) as of 2002 (Endnote 2). Table 9.2 presents a number of key parameters, highlighting Saudi Arabia's position in relation to the average of those 30 countries. Given the speed with which the Kingdom is already creating the required capabilities, a much better position seems well within reach.

Additionally, a new set of guiding parameters could encompass emerging trends in the area of industrial development:

1. Sound macroeconomic preconditions;
2. An enabling business environment;
3. Domestic, regional and global market potential;
4. Global mindset by which entrepreneurs think globally and act locally in order to face the emerging challenges of competitive pressures for efficiency gains and seize new opportunities;
5. Ability of non-oil enterprises to export to desirable markets;
6. Emergence of a vibrant entrepreneurial class and technocrats;
7. Investment plans for industrial cities and economic zones;
8. Plans to reorient the educational system to generate marketable skills;
9. Fast-track graduate reskilling programme to reduce the supply-demand gap;
10. Enhanced role for the Kingdom in the Arab regional industrial development and innovation system;
11. Enhanced role for the Kingdom in South-South industrial cooperation;
12. Determination to use FDI flows for domestic capability building;
13. Creating new sources for enhancing R&D and the commercialization of research findings by productive sectors and related service enterprises;
14. Acquiring knowledge-based and innovative companies;
15. Improving the industrial governance system in the light of new industrial realities and significantly enhanced capabilities of civil servants and the labour force.

Assuming that the above parameters provide a framework for concrete action over the next 14 years, it is argued that it would be well within the Kingdom's reach to improve its industrial performance and reach a position among the top 30 countries.

Innovation is essential for dynamic growth. Strengthening the industrial innovation system at all levels is critical if the KSA is to be among the top 30 countries on the global scale of industrial performance.

The ITA index

It is important to realize that in an internationally competitive environment, even to stay still requires running very fast as the comparators and competitors may run faster. The practical thoughts and actions of decision-makers and industrial stakeholders in recent years bear testimony to the fact that the KSA is on a new course to use non-oil manufacturing and related service activities as dynamic forces for industrial diversification.

The Kingdom is well aware of the need for a unique blend of vision and action at the local, regional and global levels. Industrialization is an ongoing process, necessitating constant restructuring in order to keep pace with the rapidly changing facets of processing, design and marketing that enable countries to capture "niche" markets with research and innovation-induced products. Innovation is essential for dynamic growth. Strengthening the industrial innovation system at all levels is critical if the KSA is to be among the top 30 countries on the global scale of industrial performance.

Table 9.1 Top 30 countries on the industrial-cum-technological advance index, 2002

Ranking	Country	ITA index	Industrial advance indicator	Technological advance indicator
1	Singapore	0.520	0.625	0.832
2	Malaysia	0.457	0.646	0.707
3	Japan	0.456	0.590	0.772
4	Korea, Rep.	0.439	0.652	0.674
5	Taiwan Province of China	0.410	0.632	0.649
6	Germany	0.407	0.589	0.690
8	Hungary	0.396	0.626	0.633
9	Ireland	0.389	0.593	0.657
10	Switzerland	0.389	0.604	0.644
11	United States	0.371	0.529	0.702
12	Sweden	0.370	0.570	0.649
13	Philippines	0.362	0.602	0.601
14	United Kingdom	0.353	0.509	0.694
15	Finland	0.334	0.597	0.560
16	China	0.324	0.631	0.515
17	Mexico	0.320	0.533	0.599
18	France	0.315	0.525	0.600
19	Thailand	0.311	0.605	0.514
20	Austria	0.311	0.550	0.565
21	Netherlands	0.308	0.515	0.599
22	Italy	0.308	0.586	0.527
23	Israel	0.307	0.564	0.545
24	Spain	0.297	0.522	0.568
25	Belgium	0.291	0.522	0.558
26	Canada	0.284	0.484	0.587
27	Brazil	0.252	0.478	0.528
28	Denmark	0.250	0.451	0.555
29	Hong Kong SAR	0.247	0.518	0.477
30	Poland	0.236	0.554	0.426
	Average	*0.345*	*0.566*	*0.608*
66	Saudi Arabia	0.060	0.144	0.420

Source: Based on UNIDO 2005a.

The industrial-cum-technological advancement (ITA) index (Endnote 3) is intended as a proximate assessment of the joint role that industry and technology play in production and trade. The ITA value for a given economy is expected to help gauge the impact that industrial-cum-technological advance is likely to have on its development. However, while assessing the compound weight of industry and technology is of prime interest here, it is also important to disentangle the contributions made separately by industrial advance and technological advance, as well as to appraise the respective parts of production and trade.

Table 9.2 Selected parameters for assessing industrial performance, 2002

Country	Manufacturing value added (MVA per capita) (1995 US$)	Manufactured exports per capita (US$)	Share of manufacturing in total output (GDP) (per cent)	Share of manufacturing in total exports (per cent)	Share of medium or high-techno-logy production in MVA (per cent)	Share of medium or high-technology products in manufactured exports (per cent)
Singapore	6,582.5	33,105.8	28.2	96.8	87.6	78.9
Malaysia	1,516.5	4,120.5	35.9	93.3	65.1	76.2
Japan	9,850.9	3,595.2	25.0	93.0	68.1	86.3
Korea, Rep.	4,858.7	3,591.1	33.9	96.5	64.1	70.6
Taiwan Province of China	4,397.5	6,563.7	28.1	98.3	58.6	71.2
Germany	6,649.1	6,512.1	27.2	90.6	63.2	74.9
Hungary	1,461.2	3,101.9	35.5	89.6	52.9	73.7
Ireland	8,121.0	20,835.0	26.5	92.1	72.2	59.1
Switzerland	12,190.8	10,515.1	29.0	91.8	59.5	69.3
US	5,567.7	1,947.9	17.6	88.1	63.7	76.7
Sweden	8,154.4	8,418.8	24.1	90.0	66.2	63.6
Philippines	269.5	482.4	24.2	96.2	38.3	81.8
UK	3,748.7	3,884.8	16.3	85.5	64.3	74.4
Finland	8,388.7	8,002.3	26.0	93.4	55.9	56.0
China	359.4	234.5	34.5	91.6	57.3	45.6
Mexico	746.0	1,450.4	20.3	86.4	42.8	77.1
France	5,443.7	4,447.7	17.8	87.3	50.8	69.2
Thailand	999.6	869.6	33.6	87.4	42.6	60.3
Austria	6,750.6	7,152.6	20.0	90.1	52.9	60.0
Netherlands	4,841.2	9,164.3	15.4	87.6	60.0	59.7
Italy	4,224.1	4,027.1	22.1	95.0	49.4	55.9
Israel	2,607.7	4,680.6	22.7	90.0	56.1	52.8
Spain	3,152.6	2,533.2	17.5	87.0	50.4	63.1
Belgium	6,024.8	16,907.9	19.3	85.0	55.5	56.0
Canada	4,292.0	7,041.9	18.1	78.6	57.9	59.4
Brazil	865.0	221.9	18.8	76.8	54.1	51.5
Denmark	5,799.3	7864.6	14.6	75.6	54.4	56.5
Hong Kong SAR	1,133.0	3,211.6	8.7	94.9	58.5	36.8
Poland	884.7	782.3	21.0	89.7	38.7	46.4
Average	*4,478.7*	*6,388.5*	*23.5*	*89.6*	*57.3*	*64.2*
Saudi Arabia	846.3	723.2	8.7	20.0	65.3	18.7

Source: UNIDO 2005a.

With a buoyant economy, sound macroeconomic fundamentals, an enabling business environment, availability of finance at low interest rates, a strong infrastructure base, a maturing stock market, a growing population contributing to effective demand, membership of the WTO and the determination to play a key role in regional industrial development, the KSA is well placed to achieve a much better industrial performance ranking by 2020.

A potential product mix that could contribute to this endeavour includes poultry and fishing, electrical appliances, automobiles, biotechnology, construction materials, food processing, packaging, an array of hydrocarbon-based downstream products, pharmaceuticals, energy-intensive heavy industries and equipment for exploiting renewable sources of energy. Additional product areas will need to be identified within the framework of emerging comparative advantages and the Kingdom's lead role in the industrial development of the region and the sphere of South-South cooperation for industrial development.

The tenets and contours of the strategy proposed in Chapters 5–8 will contribute to the achievement of the stated vision. Equally important is the efficiency of governance of strategy implementation and programme follow-up, which is discussed in Chapters 10 and 11.

Endnotes

1. This index is based on different criteria from the UNIDO Competitive Industrial Performance Index, focusing on the business environment in general and not specifically on industrial competitiveness, although a more competitive business environment will also bring benefits for the industrial sector.

2. For a detailed explanation of the ITA index, see footnote to Table 3.2 in Chapter 3. See also UNIDO 2005a.

3. See Endnote 2 for reference to a detailed explanation of the ITA index.

Part C

Industry 2020: Agenda for action

Chapter 10. The governance of implementing strategies, policies and programmes for Industry 2020

10.1 The challenge of implementation

The success of the National Industrial Strategy for Industry 2020 outlined in Part B (Chapters 4–9) and the platform of policies and programmes it involves (referred to hereafter as Industry 2020) will be reflected in the ability to enhance the capabilities of the private sector and the investment community to develop a globally competitive, innovative and diversified Saudi industrial sector that contributes to overall sustainable economic growth and social well-being.

A globally competitive, innovative and diversified Saudi industrial sector that contributes to overall sustainable economic growth and social well-being must be developed.

Two key requirements will be the development and formation of competitive and innovative industrial clusters in the different regions of the Kingdom, and the organization of national and regional innovation systems that will provide these clusters with information, knowledge, skills, technology and global links.

The implementation of the strategy and the platform of policies and programmes will have three main characteristics: it will follow an integrated and regional approach; it will promote and support collaboration and partnership between the Government, the private sector and the institutions of the innovation system; and it will be continuously monitored, evaluated and improved.

An integrated and regional approach

The successful development of competitive and innovative clusters in the regions of the Kingdom, and their integration into global production systems and value chains, will be directly related to the improvement of the business environment and the development of national and regional innovation systems. (See Figure 4.1 in Chapter 4 for an illustration of the interaction between the different components of the industrial system.)

The National Industrial Strategy (NIS) and the platform of policies and programmes will follow an integrated approach towards the overall development of the industrial system, focusing on the joint development of the components and their linkages. This will be especially important for promoting and supporting industrial development in the regions. The strategy will aim at the integrated development of regional industrial clusters and innovation systems, and their links with the national and global innovation system.

Collaboration and partnerships between the Government, the private sector and the innovation institutions

The implementation of Industry 2020 will require the commitment, effort and contribution of the Government, the private sector and the support institutions at both national and regional levels:

- The Government will have overall responsibility for managing the implementation of the strategy and of the platform of policies and programmes;

- The private sector and the investment community will be directly involved in the development and formation of industrial clusters in the regions of the Kingdom;

- The institutions of the national and regional innovation systems will be responsible for providing a range of services to firms and clusters, including training programmes, technology development, financing and global links.

One of the main objectives of the platform of policies and programmes will be to promote and support collaborative initiatives and projects at national and regional levels, in particular for the development and formation of industrial clusters and the organization of national and regional innovation systems.

Continuous monitoring and revision of Industry 2020

Changes in the new global industrial setting, as outlined in Chapter 2, will provide new opportunities and challenges for the industrial development of the Kingdom. It is therefore important to monitor global trends and changes and, if needed, to revise Industry 2020 accordingly.

10.2 Mission and objectives of the governance system

The Ministry of Commerce and Industry (MCI) is the focal organization of the governance system responsible for the implementation of Industry 2020. Its mission will be to promote and support a process of collaboration between the Government, the private sector and the institutions of the national and regional innovation systems, which will contribute to the following objectives.

The Ministry of Commerce and Industry (MCI) is the focal organization of the governance system responsible for the implementation of Industry 2020.

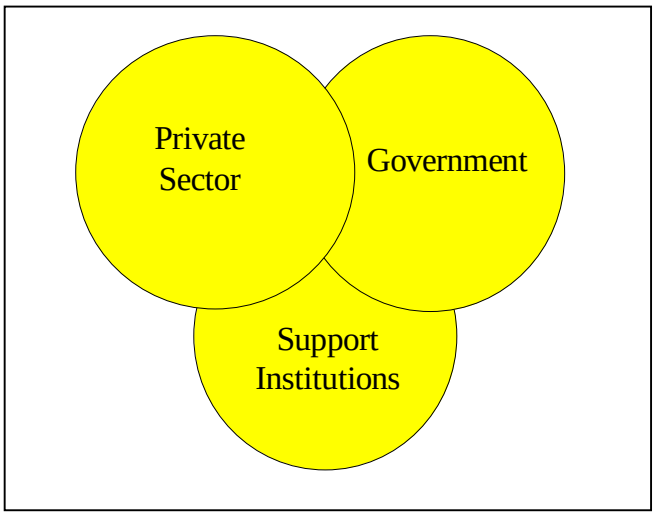
1) To strengthen the national framework for development: building industrial capabilities; improving the business environment; and supporting private sector development, with special emphasis on SMEs.

2) To promote and support the development and formation of innovative and competitive industrial clusters in the different regions of the Kingdom.

3) To develop and strengthen the national and regional systems of institutions which will support the development and formation of the industrial clusters.

This new form of governance is usually referred to as the Triple Helix model, as illustrated in Figure 10.1.

Figure 10.1: The Triple Helix



Source: UNIDO.

10.3 The Industry 2020 Fund

An Industry 2020 Fund will be established to support the financing of programmes and projects. It will contribute to the integrated implementation of Industry 2020 at both national and regional levels.

The fund will, in particular, contribute to and support the implementation of collaborative projects between the Government, the private sector and institutions for the development and formation of industrial clusters and the strengthening of the national and regional innovation systems. It will also contribute to the financing of regional industrial development strategies.

The fund will be managed by an Industry 2020 Programme Review Committee, which will include representatives of the Government, the private sector and support institutions. This committee will review and decide on project proposals submitted for funding. The Government will publish the criteria and procedures for access to the Industry 2020 Fund and the composition of the Industry 2020 Programme Review Committee in a separate document.

10.4 Functions and activities of the governance system

The governance of the implementation of Industry 2020 includes three related functions: steering, executing and monitoring.

1. Steering the process of implementation of Industry 2020 includes the following activities:

- Monitoring and deciding on actions to improve the contribution of industry to the achievement of sustainable overall economic growth and social well-being;
- Promoting and building the public's awareness of the strategic vision and goals of the National Industrial Strategy and the platform of policies and programmes;
- Mobilizing the Government, the private sector and institutions of the national and regional innovation systems to collaborate in the implementation of the National Industrial Strategy;

- Evaluating and deciding on policies and measures for improving the national framework conditions: industrial capabilities, business environment and private sector development, with special emphasis on SMEs;

- Deciding on the platform of policies and programmes that will support the development and formation of industrial clusters and of national and regional innovation systems;

- Deciding on and evaluating the Industry 2020 Fund, which will contribute to the financing of initiatives and projects related to the implementation of the Industry 2020 Strategy.

2. Managing the implementation of the platform of programmes includes the following activities:

- Promoting the platform of programmes and mobilizing the participation of the private sector, support institutions and other Government agencies at national and regional levels;

- Managing the formulation and implementation of projects for the development of the national and regional innovation systems;

- Managing the formulation and implementation of collaborative projects for the formulation and implementation of regional industrial development strategies;

- Managing the formulation and implementation of collaborative projects for the development and formation of competitive and innovative industrial clusters in the different regions of the Kingdom;

- Coordinating and cooperating with other agencies and Ministries responsible for programmes supporting Industry 2020 and, in particular, the development of industrial innovation systems and clusters;

- Managing the implementation of the Industry 2020 Fund.

3. Monitoring and evaluating the implementation of Industry 2020 includes the following activities:

- Monitoring and assessing the new global industrial setting in terms of challenges and identifying of opportunities for the development and formation of industrial clusters in the Kingdom;

- Monitoring, benchmarking and assessing the competitive industrial performances and capabilities at the national and regional level;

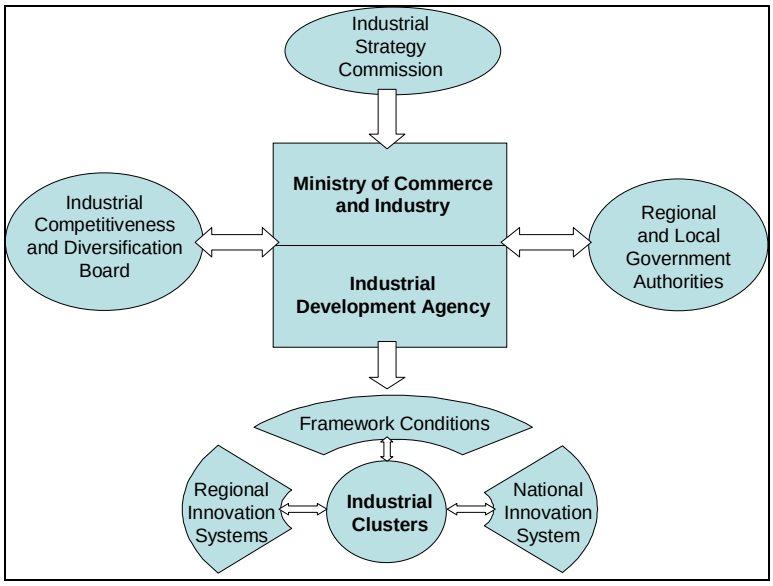
- Monitoring and evaluating the impact and efficiency of the implementation of Industry 2020;

- Evaluating the implementation of the platform of programmes and of the Industry 2020 Fund and recommendations for revisions and new programmes.

10.5 Organization of the governance system

Figure 10.2 shows the institutions of the system of governance that will steer, execute and monitor the implementation of Industry 2020. These institutions will manage the platform of policies and programmes and the Industry 2020 Fund that will contribute to improving the national framework conditions and will support the development and formation of industrial clusters in the different regions of the Kingdom, as well as the organization of the national and regional innovation systems.

Figure 10.2: Organization of the Governance System



Source: UNIDO.

Ministry of Commerce and Industry

The MCI is the focal organization of the governance system. It is responsible for steering the process of implementation of Industry 2020 under the authority of the Industrial Strategy Commission.

The MCI's role will be:

- To promote Industry 2020 and to support collaboration and partnership between the Government, the private sector and the institutions of the national and regional innovation systems for its implementation;
- To formulate and propose measures and policies to improve the framework conditions: industrial capabilities; business environment and private sector development with special emphasis on SMEs;
- To promote and support the development of competitive and innovative industrial clusters and of national and regional innovation systems;
- To monitor and evaluate the overall implementation of the National Industrial Strategy, the platform of policies and programme and programmes and the Industry 2020 Fund.

An Industry 2020 Fund will be established to contribute to the financing of the platform of programmes of the industrial strategies, and in particular of collaborative projects between the Government, the private sector and support institutions.

The Industrial Strategy Commission

The Industrial Strategy Commission is the highest Government authority to decide on the National Industrial Strategy on the platform of policies and programmes and on the Industry 2020 Fund. It is chaired by the Minister of Commerce and Industry. This Commission will include the core economic Ministries of the

Kingdom of Saudi Arabia and other important Government agencies and institutions that have a strong role in the implementation of Industry 2020 as outlined in Box 10.1.

Box 10.1. Members of the Industrial Strategy Commission

Saudi Arabia's Ministries:	Agencies and Core Institutions:
• Ministry of Commerce and Industry	• Saudi Arabia General Investment Authority
• Ministry of Defence and Aviation	• King Abdul-Aziz Center for Science and Technology
• Ministry of Economy and Planning	• Saudi Organization for Industrial Estates and Technical Zones
• Ministry of Education	• General Organization for Technical and Vocational Training
• Ministry of Finance	• Royal Commission for Jubail and Yanbu
• Ministry of Higher Education	• Saudi Industrial Development Fund
• Ministry of Labour	• Saudi Council for Commerce and Industry
• Ministry of Mineral and Petroleum	• Saudi Basic Industry Corporation
• Ministry of Water and Electricity	• Saudi Aramco Corporation

The Commission's role will be:

- To monitor and decide on measures to improve the contribution of industry to the overall economic development of the country in line with the development plans and Industry 2020;
- To decide on the policies and programmes supporting the implementation of Industry 2020;
- To decide on the Industry 2020 Fund;
- To decide on the implementation of the strategy in the regions of the Kingdom;
- To evaluate the implementation of Industry 2020 and to decide on measures to improve the implementation process.

Regional and local government authorities

The regional and local government authorities will be responsible for organizing a process of collaboration with the private sector and support institutions, in order to formulate and implement regional industrial development strategies to enhance industrial competitiveness and diversification in the different regions of the Kingdom.

They will cooperate with the MCI and the Industrial Development Agency in the development and formation of competitive and innovative regional clusters and regional innovation systems.

The Industrial Competitiveness and Diversification Board (ICDB)

The ICDB will advise on the implementation of Industry 2020 and will recommend measures for improvement.

The Board will be established on the basis of the existing Steering Committee. It will be co-chaired by the Minister of Commerce and Industry and a representative of the private sector. Its members will come from the Government, the private sector and the institutions of the national and regional innovation systems. The secretariat will be provided by the Industrial Development Agency.

The Board's role will be:

- To identify and develop a consensus between the private sector and the Government on key issues related to industrial competitiveness and diversification and to the implementation of Industry 2020;
- To recommend measures to enhance industrial competitive performances and capabilities, to speed up the diversification process and to support the development and formation of industrial clusters in the regions of the Kingdom;
- To advise on and recommend revisions of the platform of policies and programmes;
- To organize systems for consultations at the sectoral level and on key components of the innovation system;
- To contribute to the preparation of regular reports on the competitive industrial performances and capabilities of national industry.

The Industrial Development Agency

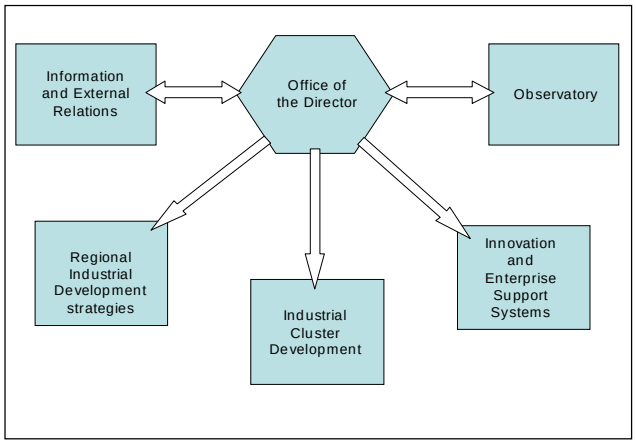
The Industrial Policy Office, which has managed the formulation of Industry 2020, will be strengthened and transformed into an Industrial Development Agency to ensure a flexible and cooperative approach to managing the implementation of the platform of programmes of Industry 2020 and of the Industry 2020 Fund.

The Agency will in particular be responsible for implementing the Regional Industrial Cluster Development Programme and the programmes to support the development of the national and regional innovation systems.

It will also cooperate and coordinate with the other agencies responsible for programmes supporting the development of clusters and the national and regional innovation systems.

The Agency will include four divisions and an Observatory, as shown in Figure 10.3 below.

Figure 10.3: Structure of Industrial Development Agency



Source: UNIDO.

Division on Information and External Relations

This division will have the following main responsibilities:

- To organize campaigns to build awareness and to mobilize the participation of the private sector and institutions of the innovation system in the implementation of Industry 2020;
- To manage a website to disseminate information, documents and publications on the competitive industrial performances and capabilities as well as on Industry 2020;
- To organize conferences and workshops on global trends and on key issues related to Industry 2020.

Division on Regional Industrial Development Strategies

This division will have the following main responsibilities:

- To promote a regional and decentralized approach to industrial development in the regions of the Kingdom;
- To assist regional authorities in the formulation and implementation of regional industrial development strategies in cooperation with the private sector and the national and regional innovation systems and with the support of the Industry 2020 Fund;
- To organize study tours abroad to visit innovative regions with good records of learning, and to develop partnerships.

Division on Industrial Cluster Development

This division will manage the formulation and implementation of collaborative projects between the private sector, the local government and support institutions to support the development and formation of industrial clusters in the different regions of the Kingdom.

Its main responsibilities are:

- To establish and continuously update a map of industrial clusters in the different regions of the Kingdom;
- To promote and support the formulation and implementation of collaborative projects between the private sector, local government and support institutions for the development and formation of competitive and innovative industrial clusters;
- To review and submit cluster development projects to the Industry 2020 Fund;
- To train a group of cluster facilitators that will contribute to the formulation and implementation of cluster development projects and their access to the Industry 2020 fund;
- To coordinate with other cluster development programmes implemented by other Ministries and agencies;
- To facilitate the exchange of experiences between industrial clusters and promote joint learning among them;
- To organize study tours abroad to visit competitive and innovative clusters and to develop partnerships.

Division on Enterprise and Innovation Support Systems

This division will manage the implementation of the programmes to support the development of the national and regional innovation systems and their access to the Industry 2020 Fund.

The Observatory

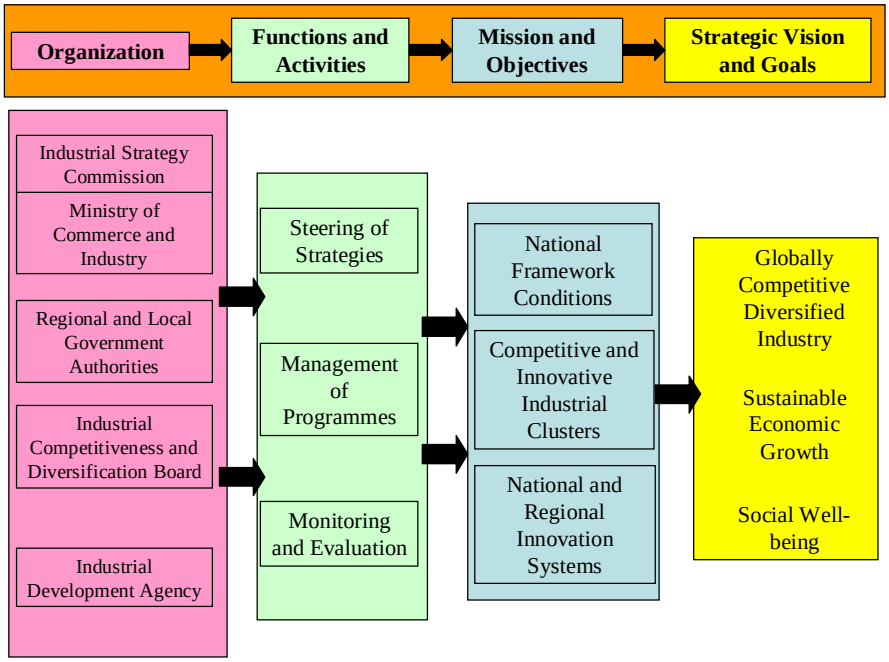
An Observatory will be established as the analytical backbone of the governance system of the strategy implementation.

The Observatory will have three main responsibilities:

- To monitor and evaluate the new global industrial setting and trends and to identify opportunities and challenges for the development and formation of industrial clusters in the Kingdom. It will carry out technology foresight exercises, organize workshops and publish regular reports.
- To assess and benchmark the competitive industrial performances, the industrial capabilities and the innovation systems at national and regional levels. For this it will use the UNIDO Scoreboard, produce reports and organize workshops.
- To evaluate the performance of the governance system: in particular, the progress made in achieving the strategic goals and vision; the outcomes of Industry 2020; and the efficiency of the organization of the governance system. For this, the Observatory will use the methodology of the Balanced Scorecard**.**

Figure 10.4 below presents the system of relationships in the governance system, which will be evaluated by this methodology.

Figure 10.4: The Governance System



Source: UNIDO.

10.6 Process of implementation of Industry 2020

The process of implementing Industry 2020 will follow an experimental and learning approach, which will include the following steps.

1) The MCI will start the implementation process with a national public campaign to promote and explain the strategic vision and goals of Industry 2020. This campaign will particularly aim at mobilizing and building awareness among private sector, support institutions and regional governments and at encouraging their participation in the implementation process.

2) Then, the MCI, in conjunction with the Industrial Development Agency, will start to implement the programmes to develop the national and regional innovation systems and will introduce the Regional Industrial Cluster Development Programme in selected regions. The first group of regions will be selected by the Industrial Strategy Commission on the basis of the presence of competitive regional industrial clusters and a good base of industrial capabilities. The Industrial Development Agency will help each regional government to formulate and implement a collaborative regional industrial development strategy with the private sector and support institutions for the development of a regional innovation system and of competitive and innovative industrial clusters.

3) The results achieved in this first experiment will be assessed and the lessons learned used for improving the implementation of the Regional Industrial Cluster Development Programme in other regions of the Kingdom.

4) After one year, the implementation of Industry 2020 will be evaluated and the lessons learned will be used for its overall improvement and development.

Chapter 11. KSA Industry 2020 Action Programme

This chapter draws on the information and analysis of the preceding chapters to spell out the action programme for Industry 2020.

11.1 The concept

The action programme should include components that contribute to the achievement of the growth and structural change envisaged in Chapter 9. Industrial growth is essentially a function of capabilities. Traditional approaches to resource-based industrialization are inadequate to address the issues of industrial diversification, requiring a new, imaginative and innovative approach, which would also give rise to a set of new challenges. Needless to say, the emerging issues of non-resource-based industrial diversification may call for a new conceptual framework for problem assessment, analysis and policy approach.

Given the paramount importance of industrial diversification and the dynamics of global development, the Strategy proposes a programmatic framework to guide and drive the implementation process. To this end, five clearly defined programmes, each containing a number of project concepts, have been drawn up (see Section 11.2).

There are five clearly defined programmes, each containing a number of project concepts. Industry 2020 is not a utopian aspiration if the right programmes are in place.

Change is the only constant, and the start of the twenty-first century is no exception. Rapid, revolutionary and complete changes were primarily responsible for the UK emerging as a pioneer of the industrial revolution. Similar changes transformed the agrarian society of the United States into an industrial power. Rapid change and a quick response enabled resource-poor Japan to emerge as a mighty industrial giant. As this century develops, it will be the fastest that survive, not the fittest or biggest. By keeping pace with the rapidly changing industrial realities, provided critical preconditions are met, any country can leap into industrial deepening and diversification. With an efficient national industrial innovation system, resource-poor Singapore has developed a dynamic industrial sector and tops the list of countries on the industrial performance and capabilities scales coined by UNIDO. Given the Kingdom's financial resources and determination, Industry 2020 is not a utopian aspiration if the right programmes are in place.

As mentioned in Chapter 3, the Kingdom's strong points relate primarily to its base of natural resource endowments (mainly oil and natural gas), a strategic geographical location with an abundance of coastal regions, a large domestic market and the availability of capital. At the same time, the industrial sector has suffered from a number of weaknesses. These are excessive concentration of industrial activity in energy- and capital-intensive industries, high export concentration in oil and oil-related products, low FDI inflows and R&D activities in the non-oil sector and a mismatch between the outputs of the education system and the skills demanded by the industrial sector.

However, despite these weaknesses, there is an opportunity to achieve the long-standing goal of economic diversification through industrialization by building on the Kingdom's strengths. Benefiting from existing

regional integration initiatives (mainly the GCC and GAFTA agreements) and the eagerness of the private sector to expand industrial activity, the Kingdom could capitalize on its existing industrial base and strategic geographical location to increase non-oil activities. FDI inflows and initiatives to help link domestic enterprises to global value chains could be crucial drivers for such a process. Notwithstanding these opportunities, a number of threats remain. Continued dependence on oil and uncertainty about the future direction of oil prices may continue to be a source of growth volatility and fiscal vulnerability. Slow diversification may risk the KSA being marginalized from the global economy in terms of FDI inflows and trade integration and cause it to miss opportunities for sub-regional industrial complementation.

There is an opportunity to achieve the long-standing goal of economic diversification through industrialization.

To implement Industry 2020 will require strong commitment, effort and contributions from the Government, the private sector and support institutions at all levels. The Ministry of Commerce and Industry is the focal point of the governance system responsible for the implementation of the National Industrial Strategy – Industry 2020, supporting and promoting the process of collaboration between the Government, the private sector and the support institutions in the practical implementation of programmes and projects and monitoring the microeconomic effect of policies and programmes.

An efficient microeconomic response entails unleashing new sources of dynamic industrial growth. It is important to consider options for enhancing global competitiveness supported by programmes and instruments within the framework of public-private partnership. It is also important to disseminate knowledge of the new sources of enhancing and sustaining industrial competitiveness through applied research and dialogue. A minimum knowledge of technological breakthroughs is essential in order to seize the opportunities for industrial diversification. In this context, global-local linkages should be used as an instrument of knowledge creation and skills development.

The process of industrialization today is not driven by resource endowments alone, but also by technology, knowledge, skills, innovation and networking. Given these critical factors, the Kingdom can embark on a massive programme of industrial diversification within the sub-regional perspective in a win-win scenario to enhance its position in the global league of industrial excellence.

11.2 The five programmes

Five clearly defined programmes, each containing a number of projects, have been drawn up with a view to highlighting the expected outcome of the respective project activities and with budgetary guesstimates. The ideas contained in the programme and project proposals are subject to a thorough review by Saudi authorities and industrial stakeholders. The duly approved project concepts will be developed into fully-fledged project documents for implementing a three-year crash programme. Based on the lessons learned from the implementation of the three year programme, substantive industrial sector inputs will be prepared for the Five Year Plan commencing in 2010.

The programmes will be financed by the Fund for Industry 2020 and managed by the Industrial Development Agency under the supervision of the MCI with guidance from the Industrial Strategy Commission and the Industrial Competitiveness and Diversification Board, as illustrated in the attached Programmatic Framework for Industry 2020.

Industry 2020 Agenda for Action is composed of five programmes. These are: Private Sector and SME Development; National and Regional Innovation Systems; Cluster-Based Industrial Development; Domestic Capabilities Building; and Industrial Governance System. The programmes are designed to strengthen the major drivers of the Strategy and organize the process of implementation. The programmes also address the

national and regional dimensions of competitive development and diversification. Each programme is composed of specific project concepts aiming to reach the strategic objectives of Industry 2020.

The objectives of the programmes

The country's industrial objectives: To develop a globally competitive industry based on innovation and acting as a base from which to transform the KSA's natural and human resources into sustainable wealth and employment creation.

Industrial governance system (IGS)

The programme's objectives: To organize the system of governance which will enable the Ministry of Commerce and Industry and the Industrial Development Agency to implement the National Industrial Strategy for Industry 2020 in cooperation with the private sector and other relevant ministries, Government agencies and institutions supporting enterprises, innovation and learning.

Private sector SME development (PSD)

The programme's objectives: To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting.

Industrial Cluster Development Programme (ICDP)

The programme's objectives: To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020.

National and Regional Innovation Systems (NRIS)

The programme's objectives: To build up the KSA National and Regional Industrial Innovation System, so that institutions, financial resources, human resources and political determination combine to promote industrial excellence.

Domestic Capabilities Building (DCB)

The programme's objectives: To enhance industrial capabilities for industrial diversification and competitiveness, particularly in terms of skill development, FDI flows, infrastructure and linkages to the global market through industrial capacity building.

PROGRAMMATIC FRAMEWORK FOR ACTION PROGRAMME: INDUSTRY 2020			
Industry 2020 Vision:			
A globally competitive industry based on innovation and acting as a base for transforming the KSA's natural and human resources into sustainable wealth and employment creation			
Strategic Drivers			
Private Sector	**Innovation**	**Cluster Development**	**Domestic Capabilities**
Programmes			
Private Sector SME Development	**National and Regional Innovation Systems**	**Industrial Cluster-Based Industrial Development**	**Domestic Capacities**
Projects			
PSD 1. A coherent SME policy framework linked to broader economic and social goals	**NRIS 1**. Regional (GCC) Technology Foresight	**ICDP 1**. Building up awareness and knowledge base to guide cluster-based development policies	**DCB 1**. Upgrading of skills for industrial development
PSD 2. Competitive Business Environment	**NRIS 2**. National and sub-national Technology Foresight	**ICDP 2**. National roster of cluster brokers and managers	**DCB 2**. Entrepreneurship development (concentrating on youth and women)
PSD 3. Capacity building of business membership organizations	**NRIS 3**. Innovation policy	**ICDP3**. KSA clusters mapping	**DCB 3**. Enhancing FDI for technology transfer
PSD 4. Reforming of the legal and regulatory framework for SMEs	**NRIS 4**. Institutionalization of the National Industrial Innovation System	**ICDP 4/IGS3**. Financing regional cluster initiatives from Fund for the Industry 2020	**DCB 4**. Enhancing trade capacity building and related services
PSD 5. SME division and Observatory in new Industrial Development Agency *Note: Refer to IGS2*	**NRIS 5**. Creation of a Technology Development Centre and Networks	**ICDP 5**. Coordination between IMPD (Industrial Monitoring Development Programme) and other cluster initiatives under Industry 2020	**DCB 5**. Promotion of Export Consortia arrangements
PSD 6. SME Consultative Council within National Competitiveness Board	**NRIS 6.*** Building up the Riyadh Regional Innovation System for Industrial Development	**ICDP 6**. Cluster-based industrial development in Eastern Province focusing on petrochemicals, traditional and agro-industries	**DCB 6**. Developing modern industrial infrastructure
PSD 7. Network of business incubators	**NRIS 7.*** Building up the Jeddah Regional Innovation System for Industrial Development	**ICDP 7**. Cluster-based industrial development in Gassim region focusing on traditional, agro-industries and SME	
PSD 8. Business Partnership Programmes		**ICDP 8**. SME cluster development in Hail region focusing on traditional, agro-industries	
PSD 9. Responsible Entrepreneurs Achievement Programme (REAP) – The Corporate Social Responsibility (CSR) Programme in the KSA		**ICDP 9**. Joint learning and cooperation platform between regions of the KSA, the GCC and the MENA	

Management of Implementation Industry 2020
Industrial Governance System
Projects
IGS1. Design of the Industrial Governance System and setting up decision-making bodies
IGS2. Establishment of Saudi Arabian Industrial Development Agency (SAIDA)
IGS3. Establishment of Industry 2020 Fund
IGS4. Training of the leaders, managers and national consultants of the institutions of the governance system of the national industrial strategy
Budgetary Guesstimate (including investment in infrastructure of US$3.68 bn and technical assistance of US$0.22 bn)
US$3.9 billion
* The projects in Riyadh and Jeddah region will also address cluster-based principles and approaches to the development of the industrial sector.

Programme Summary Matrix: Industrial Governance System (IGS)

Programme Summary Matrix:
Industrial Governance System (IGS)

THE COUNTRY'S INDUSTRIAL OBJECTIVE (s) *To develop a globally competitive industry based on innovation and acting as a base from which to transform the KSA's natural and human resources into sustainable wealth and employment creation*	*Positioning the KSA in the global league table of industrial excellence*
OBJECTIVE OF THE PROGRAMME *To organize the system of governance which will enable the Ministry of Commerce and Industry and the Industrial Development Agency to implement the National Industrial Strategy for Industry 2020 in cooperation with the private sector and other relevant ministries, Government agencies and institutions supporting enterprises, innovation and learning*	
Cooperating Partners: the MCI, SAGIA, Ministry of Petroleum and Mineral Resources (MinPet), the Chamber of Commerce and Industry and other public and private stakeholders	

Component 1: Organization of the Governance System for the implementation of the National Industrial Strategy			
Projects	***Outcomes***	***Duration***	***Budgetary Guesstimates (US$)***
IGS 1. Design of the Industrial Governance System and setting up decision-making bodies	System of Governance designed including: Industrial Strategy Commission; Industrial Competitiveness and Diversification Board; Regional and Local Government Authorities	2007-2009	**US$1,400,000**
IGS 2. Establishment of Saudi Arabian Industrial Development Agency (SAIDA)	Operational mechanism to promote, support and monitor the implementation of National Industrial Strategy	2007-2009	**US$12,150,000**
IGS 3. Establishment of Industry 2020 Fund (for industrial competitiveness and diversification)	Financial resources allocated and procedures established to support implementation of the support programmes Industry 2020 related to cluster initiatives and innovation projects	2007-2009	**US$400,000**
IGS 4. Training of the leaders, managers and national consultants of the institutions of the governance system of the National Industrial Strategy	Skills upgraded for conceptualizing, formulating, implementing, monitoring and auditing industrial development programmes and policy instruments, with a high degree of transparency and accountability	2007-2009	**US$1,250,000**
		Total	**US$15,200,000**

Indicative work plan			
	Years		
Projects	**2007-2009**	**2010-2014**	**2014-2020**
IGS 1	x		
IGS 2	x		
IGS 3	x		
IGS 4	x		

Programme total budget (US$):	**US$15,200,000**

Project concept (IGS 1):
Design of the Industrial Governance System and setting up decision-making bodies

OBJECTIVE OF THE PROGRAMME:
To organize the system of governance which will enable the Ministry of Commerce and Industry and the Industrial Development Agency to implement the National Industrial Strategy for Industry 2020 in cooperation with the private sector and other relevant ministries, Government agencies and institutions supporting enterprises, innovation and learning

OBJECTIVE OF THE PROJECT:
Organization of the key decision-making processes related to the steering of the National Industrial Strategy, to the preparation, funding and evaluation of the support policies and programmes and to the monitoring and assessment of the strategic vision and goals

Project outputs: Design of the governance system and setting up the following decision-making bodies: Industrial Strategy Commission; Industrial Competitiveness and Diversification Board; Regional and Local Government Authorities

Project Activities	Milestones
• *Design of the system of governance of the strategy and support programmes, using the balanced scorecard approach*	*Approval by the Government*
• *Definition of the responsibilities, activities, structure and relationships of the system of institutions of the governance system*	*Approval by the Government*
• *Preparation of a work plan and budget for the development of the governance system for the first three years*	*Approval by the Government*
• *Preparation of an operational document indicating the procedures and background documentation for decision making*	*Guidelines prepared*
• *Implementation and continuous improvement of each decision-making process*	*Implementation improved*
• *After one year and on the basis of the balanced scorecard, preparation of an evaluation report on the results and performances of the governance system*	*Evaluation report*
• *Submission of the report to the Government and decisions on the measures of improvement*	*Recommendations for improvement*

Budgetary Guesstimate:	
National experts: 48 w/m	US$480,000
International experts: 24 w/m	US$400,000
Short-term technical advisors: 30 w/m	US$420,000
Miscellaneous	US$100,000
Total	**US$1,400,000**

Project concept (IGS 2):
Saudi Arabian Industrial Development Agency (SAIDA)

OBJECTIVE OF THE PROGRAMME:
To organize the system of governance which will enable the Ministry of Commerce and Industry and the Industrial Development Agency to implement the National Industrial Strategy for Industry 2020 in cooperation with the private sector and other relevant ministries, Government agencies and institutions supporting enterprises, innovation and learning

OBJECTIVE OF THE PROJECT:
To establish under the authority of the MCI a new Saudi Arabia Industrial Development Agency (SAIDA) which will be responsible for promoting, supporting and monitoring the development of a competitive, innovative and diversified industrial sector

Project outputs: Organization of SAIDA with the following divisions: Regional Industrial Development, Industrial Cluster Development, Enterprise and Innovation, Information and External Relations and Competitiveness Observatory; Evaluation of the performance of the Industrial Development Agency

Project Activities	Milestones
• *Preparation of a feasibility study presenting the mission, the responsibilities, the objectives, the services, the structure, the budget, the relationships between the Agency and the MCI, the Industrial Strategy Commission, the Industrial Competitiveness Board, the regional and local authorities and the other Government agencies and institutions supporting the industrial sector*	*Approval by the Government*
• *Preparation of the job descriptions, nomination of the director and managers of the Agency, training of the management team*	*Approval by the MCI*
• *Preparation by the management team of a work plan for the first three years of activity and of a balanced scorecard for monitoring the performances and results*	*Approval by the MCI*
• *Implementation of the work plan*	*Implementation organized*
• *After one year of operations an external evaluation team will undertake an evaluation of the performances and results of the Agency, using the balanced scorecard*	*External evaluation*
• *Submission and presentation of the evaluation report to the Minister of Industry and decision on the measures to improve results and performances of the Agency*	*Recommendation approved by the MCI*

Budgetary Guesstimate:		
National staff:	Director of the Agency, 5 directors of divisions,	US$2,000,000
	Professional staff: 15	US$3,000,000
	Technical staff: 10	US$1,000,000
National experts: 50 w/m		US$650,000
International experts: 6x24 w/m		US$3,000,000
Short-term technical advisors: 30 w/m		US$500,000
Equipment		US$2,000,000
Total		**US$12,150,000**

Project concept (IGS 3):
Establishment of Industry 2020 Fund (for industrial competitiveness and diversification)

OBJECTIVE OF THE PROGRAMME: *To organize the system of governance which will enable the Ministry of Commerce and Industry and the Industrial Development Agency to implement the National Industrial Strategy for Industry 2020 in cooperation with the private sector and other relevant ministries, Government agencies and institutions supporting enterprises, innovation and learning*
OBJECTIVE OF THE PROJECT: *To provide financial support for the implementation of Action Programme for Industry 2020 related to cluster initiatives and innovation projects*
Project outputs: Industrial Competitiveness and Diversification Fund set up, procedures and management in place

Project Activities	Milestones
• *Preparation of working documentation presenting the objectives, outcomes, outputs and procedures of the Fund*	*Training materials*
• *Setting up organization of the Fund*	*Financial resources allocated*
• *Submission of proposals related to the regional cluster initiative and innovation projects to the Saudi Arabia Industrial Development Agency (SAIDA)*	*Proposals submitted*
• *Review and endorsement of regional proposals/projects by the Regional Industrial Cluster Development Committee*	*Proposals endorsed*
• *After one year of operations an external evaluation team will undertake an evaluation of the performances and results of the Agency and Fund, using the balanced scorecard*	*Evaluation report*
• *Submission and presentation of the evaluation report to the Minister of Industry and decision on the measures to improve results and performance of the Agency and Fund*	*Evaluation report submitted*

Budgetary Guesstimate:	
National experts: 10w/m	US$100,000
International experts: 10w/m	US$200,000
Miscellaneous	US$100,000
Total	**US$400,000**

Project concept (IGS 4):
Training of the leaders, managers and national consultants of the institutions of the governance system of the national industrial strategy

OBJECTIVE OF THE PROGRAMME: *To organize the system of governance which will enable the Ministry of Commerce and Industry and the Industrial Development Agency to implement the National Industrial Strategy for Industry 2020 in cooperation with the private sector and other relevant ministries, Government agencies and institutions supporting enterprises, innovation and learning*
OBJECTIVE OF THE PROJECT: *To organize and conduct training programmes for stakeholders on management of new industrial strategy*
Project outputs: Skills of stakeholders upgraded for achieving the new industrial realities

Project Activities	Milestones
• *Executive seminar for the leaders and managers of the institutions of the system of governance of the National Industrial Strategy on the new forms of governance in a globalizing economy*	*Awareness created*
• *Study tours to visit and learn from countries with successful systems of governance of industrial development*	*Knowledge improved*
• *Organization of learning workshops on particular themes and subjects of direct relevance to the functioning of the system of governance*	*Knowledge improved*
• *Preparation of the job descriptions, recruitment and training of the staff including study tours for the Agency staff*	*Staff trained*
• *Training programme for national consultants on the new forms of industrial governance and required services to be provided*	*Consultant trained*

Budgetary Guesstimate:	
National experts: 20w/m	US$200,000
International experts: 24w/m	US$500,000
Executive training	US$200,000
Study tours for the staff and stakeholders	US$300,000
Miscellaneous: Printing materials, websites, mass media etc	US$50,000
Total	**US$1,250,000**

Programme Summary Matrix: Private Sector SME Development (PSD)

Programme summary matrix:
Private Sector SME Development (PSD)

THE COUNTRY'S INDUSTRIAL OBJECTIVE (s) *To develop a globally competitive industry based on innovation and acting as a base from which to transform the KSA's natural and human resources into sustainable wealth and employment creation*	*Positioning the KSA in the global league table of industrial excellence*
OBJECTIVE OF THE PROGRAMME *To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting*	
Cooperating Partners: The MCI, SAGIA, MinPet, Chamber of Commerce and Industry and other public and private stakeholders	

Programme component I: Policies and Regulatory Framework

Component objective: *To formulate coherent SME development policies and promote a business-friendly environment*

Projects	*Outcomes*	*Duration*	*Budgetary Guesstimates (US$)*
PSD 1. A coherent SME policy framework linked to broader economic and social goals	Clear and transparent SME policy statement	2007-2009	**US$1,650,000**
PSD 2. Competitive business environment	Cost and time of doing business reduced	2007-2014	**US$1,850,000**
PSD 3. Capacity building of business membership organizations	Strengthening of advocacy capacities and service capabilities. Improved information and services supply	2007-2009	**US$1,200,000**
PSD 4. Reforming of the legal and regulatory framework for SMEs	Facilitated access to financial resources, information and infrastructure	2007-2009	**US$650,000**
		Total	**US$5,350,000**

Programme component II: SME Institutional Infrastructure

Component objective: *To improve and strengthen the capabilities of SME institutional infrastructure*

Projects	*Outcomes*	*Duration*	*Budgetary Guesstimates (US$)*
PSD 5. SME Division and Observatory in new Industrial Development Agency ***Note: Refer to IGS2***	Institutional framework for designing and implementing SME policies and programmes at national and regional levels	2007-2009	***Budgeted to IGS2***
PSD 6. SME Consultative Council within National Competitiveness Board	Government policies reviewed and adjusted to the evolving needs of SMEs	2007-2009	**US$400,000**
		Total	**US$400,000**

Programme component III: Business Linkages			
Component objective: *To promote horizontal and vertical linkages between SMEs and large companies to facilitate integration in regional and global value chains*			
Projects	***Outcomes***	***Duration***	***Budgetary Guesstimates (US$)***
PSD 7. Network of Business Incubators	Enhancement of innovative start-ups	2007-2014	**US$1,550,000**
PSD 8. Business Partnership Programmes	Establishing effective and equal business partnerships between SMEs and large companies taking advantage of the private sector	2007-2014	**US$2,100,000**
PSD 9. Responsible Entrepreneurs Achievement Programme (REAP) – The Corporate Social Responsibility (CSR) Programme in the KSA	Responsible entrepreneurship arrangements introduced in large companies and SMEs, to comply with UN Global Compact	2007-2014	**US$3,870,000**
		Total	**US$7,520,000**

Indicative work plan			
	Years		
Projects	**2007-2009**	**2010-2014**	**2014-2020**
PSD 1	x		
PSD 2	x	x	
PSD 3	x		
PSD 4	x		
PSD 5	x		
PSD 6	x		
PSD 7	x	x	
PSD 8	x	x	
PSD 9	x	x	

Programme total budget (US$):	**US$13,270,000**

Project concept (PSD 1):
A coherent SME policy framework linked to broader economic and social goals

OBJECTIVE OF THE PROGRAMME:
To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting

OBJECTIVE OF THE PROJECT:
To develop transparent and coherent policies for SME development in the Kingdom

Project outputs: Analysis of SME sector needs and mapping SMEs; Review of institutions and services available for SMEs; Review of business environment for SMEs; Draft policy document; National conference on SME development

Project Activities	Milestones
• *Organizing and conducting SME survey*	*Survey report*
• *Analyzing the capabilities of national institutions providing business development and sector specific services*	*Gaps between SME demand and services supply identified*
• *Analyzing the legal and regulatory framework for SMEs and identifying gaps and bottlenecks*	*Recommendations to improve the business environment for SMEs*
• *Setting up a policy drafting team composed of the major stakeholders and supported by national and international experts*	*Stakeholders Task Force established*
• *Study tours by the drafting team to review international experiences*	*Knowledge updated*
• *Drafting the programme and agenda for the national conference*	*Preparatory phase completed*
• *Organizing the national conference on SME policies*	*National consensus on SME development*
• *Finalizing the policy document based on the results of the conference*	*Policy statement issued*
• *Setting up a database on SMEs*	*Information published*
• *To review trade policies and regulations and make recommendations to improve and simplify regulations and procedures*	*Recommendations*
• *To cooperate with SAGIA on the implementation of 10 by 10 initiative with issues related to the trade administration system by cutting down unnecessary delays in customs procedures*	*Facilitate imports and exports*
• *To continue tariff reform to comply with WTO commitments*	*Tariff reforms*
• *To review legislation package related to the industrial sector in the area of intellectual property, antitrust, competition and liberalization of labour market*	*Gaps identified*
• *To prepare recommendations to reform the industrial legislation package to facilitate business performance and diversification*	*Recommendations*
• *To review infrastructure and services provided in the existing industrial cities and make recommendations for improvement in existing and newly created cities*	*Gaps identified*
• *Provide advisory services to the Government to formulate legislation package to be submitted to the Government and parliament*	*Approval by the Government and introduction of new reforms*

Budgetary Guesstimate:	
National experts: 60 w/m	US$600,000
International experts: 30 w/m	US$600,000
Short-term technical advisors: 20 w/m	US$400,000
Miscellaneous	US$50,000
Total	**US$1,650,000**

Project Concept (PSD 2):
Competitive Business Environment

OBJECTIVE OF THE PROGRAMME: *To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting*
OBJECTIVE OF THE PROJECT: *To set up a process of continuous improvement of the business environment for the private sector and to reach a high international standard and rank in the top 10 on business environment by 2010*
Project outputs: Set of legal and regulatory reforms to facilitate business development and innovation

Project Activities	Milestones
• *To review trade policies and regulations and make recommendations to improve and simplify regulations and procedures*	*Recommendations*
• *To cooperate with SAGIA on the implementations of 10 by 10 initiative with issues related to the trade administration system by cutting down unnecessary delays in customs*	*Facilitate imports and exports*
• *To continue tariff reform to comply with WTO commitments*	*Tariff reforms*
• *To review legislation package related to the industrial sector in the area of intellectual property, antitrust, competition and liberalization of labour market*	*Gaps identified*
• *To prepare recommendations to reform the industrial legislation package to facilitate business performance and diversification*	*Recommendations*
• *To review infrastructure and services provided in existing industrial cities and make recommendations for improvement in existing and newly created cities*	*Gaps identified*
• *Provide advisory services to the Government to formulate legislation package to be submitted to the Government and parliament*	*Approval by the Government and introduction of new reforms*

Budgetary Guesstimate:	
National experts: 60 w/m	US$600,000
Short-term consultants: 10 w/m	US$200,000
International experts: 30 w/m	US$600,000
Short-term technical advisors: 20 w/m	US$400,000
Miscellaneous	US$50,000
Total	**US$1,850,000**

Project concept (PSD 3):
Capacity building of business membership organizations

OBJECTIVE OF THE PROGRAMME: *To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting*
OBJECTIVE OF THE PROJECT: *To establish or strengthen capabilities of private sector institutions for effective advocacy role for SME needs in the process of formulation and implementation of industrial policies and strategies*
Project outputs: Capacities of the business membership organizations strengthened; Networking of SME organizations

Project Activities	Milestones
• *Setting up information platform to enhance advocacy capacities and capabilities within business organizations*	*Bases for information dialogue set up*
• *Providing technical and analytical expertise related to SME development strategies*	*Knowledge upgraded*
• *Training and education across organizations*	*Training provided*
• *Improving flow of information between Government and private sector institutions*	*Level of communication and understanding enhanced*
• *Study tours to review best international practices related to advocacy of SME interests*	*Skills upgraded*
• *Promoting national regional and international networks between SME institutions*	*Coordination and cooperation improved*

Budgetary Guesstimate:	
National experts: 30 w/m	US$300,000
International experts: 20 w/m	US$400,000
Short-term technical advisors: 20 w/m	US$400,000
Study tours	US$50,000
Miscellaneous	US$50,000
Total	**US$1,200,000**

Project concept (PSD 4):
Reforming of the legal and regulatory framework for SMEs

OBJECTIVE OF THE PROGRAMME: *To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting*
OBJECTIVE OF THE PROJECT: *To improve the legal and regulatory framework for specific SME needs*
Project outputs: Facilitated access to financial resources, information and infrastructure

Project Activities	Milestones
• *Reviewing major bottlenecks faced by SMEs to access financial resources*	*Gaps identified*
• *Strengthening capabilities of SMEs in preparation of bankable projects through training programmes*	*Skills and knowledge upgraded*
• *Promoting dialogue between administrations of industrial cities and private sector organizations to facilitate access of SMEs to the physical and soft infrastructure*	*Access to the infrastructure facilitated*
• *Strengthening capabilities of private sector institutions to provide business and technical information in line with international standards*	*Access to information improved*
• *Cooperation arrangements with SAGIA to ensure the interests of SMEs are reflected in business environment reports*	*Interests of SMEs reflected in business environment reforms*
• *Preparation of guidelines for monitoring and reforming business environment for SMEs*	*Guidelines available*
• *Establishing mechanisms for e-governance and e-business to facilitate business procedures and regulations*	*Cost and time of doing business reduced*

Budgetary Guesstimate:	
National experts: 10 w/m	US$100,000
International experts: 10 w/m	US$100,000
Short-term technical advisors: 20 w/m	US$400,000
Miscellaneous	US$50,000
Total	**US$650,000**

Project concept (PSD 6):
SME Consultative Council within National Competitiveness Board

OBJECTIVE OF THE PROGRAMME: *To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting*
OBJECTIVE OF THE PROJECT: *Continuous support to informed dialogue between the public and private sectors*
Project outputs: Institutional framework for continuous public-private sector dialogue set up

Project Activities	Milestones
• *To prepare TOR, rules and procedures for the consultative committee*	*Rules and procedures set up*
• *Select members of the consultative committee*	*Members selected*
• *Organize study tour abroad to visit institutions with relevant experience*	*Knowledge acquired*
• *Preparation of the work plan and agenda for the meetings*	*Agenda established*
• *To conduct the meetings and provide recommendations to the National Competitiveness Board on SME policies and support programmes*	*Recommendations provided*

Budgetary Guesstimate:	
National experts: 10w/m	US$100,000
International experts: 10w/m	US$200,000
Study tours	US$50,000
Miscellaneous	US$50,000
Total	**US$400,000**

Project concept (PSD 7):
Network of business incubators

OBJECTIVE OF THE PROGRAMME: *To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting*
OBJECTIVE OF THE PROJECT: *To promote the establishment of business incubators in the regions of the KSA to support start-ups of new business facilitating the development of innovation industry-university linkages, commercializing of research and growth of innovation companies*
Project outputs: To increase the number of start-ups in traditional and innovative businesses

Project Activities	Milestones
• *Market analysis to assess the demand for business incubator services*	*Needs identified*
• *Launching the competitive call for business ideas and proposals to be supported and developed by incubator services*	*Projects selected*
• *Study tour for public and private stakeholders to visit successful business incubators*	*Knowledge acquired*
• *Assistance to entrepreneurs to translate business ideas into viable business plans*	*Business plan developed*
• *Definition of a marketing strategy and marketing plan based on the identified demand for incubator services*	*Strategy defined*
• *Design of the floor plan and preparation of preliminary cost estimates related to the construction of the business incubator, considering different alternatives and options*	*Plan designed*
• *Definition of the organizational and managerial aspects of the business incubator*	*Structure defined*
• *Assessment of the financial viability of the business incubator*	*Assessment*
• *Preparing full proposal for setting up business incubators including required capital investment in infrastructure to be submitted to SAIDA and the ICDF*	*Proposal submitted*

Budgetary Guesstimate:	
National experts: 60w/m	US$600,000
International experts: 40w/m	US$800,000
Study tours	US$100,000
Miscellaneous	US$50,000
Total	**US$1,550,000**

Project concept (PSD 8):
Business Partnership Programmes

OBJECTIVE OF THE PROGRAMME:
To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting

OBJECTIVE OF THE PROJECT:
To enhance the performance of domestic SMEs in industry for the promotion of business linkages so as to facilitate their inclusion in global supply chains

Project outputs: To develop a comprehensive upgrading programme for domestic SMEs so as to implement continuous improvement in management practices and develop world class manufacturing practices; To develop an institutional set up and to train technical engineers/counsellors for the sustainable provision of upgrading services in relevant key industry sectors

Project Activities	Milestones
• *Determination and set-up of the institutional framework*	*Approval by the Government*
• *Develop company upgrading programme, based on UNIDO Business Partnership methodology for continuous improvement management and world class manufacturing practices*	*Upgrading programme developed*
• *Select national engineers/counsellors*	*Engineers selected*
• *Provide training and preparation for national engineers/counsellors*	*Engineers trained and ready for service provision*
• *Study tour for national engineers/counsellors to existing UNIDO Partnership Programmes*	*Study tour completed*
• *Provision of continuous service to SMEs*	*Companies get upgrade continuously*

Budgetary Guesstimate:	
National experts: 48 w/m	US$480,000
International experts: 36 w/m	US$600,000
Short-term technical advisors: 26 w/m	US$520,000
Subcontract	US$350,000
Miscellaneous	US$150,000
Total	**US$2,100,000**

Project concept (PSD 9):
Responsible Entrepreneurs Achievement Programme (REAP) – The Corporate Social Responsibility (CSR) Programme in the KSA

OBJECTIVE OF THE PROGRAMME:
To enhance competitiveness, providing incentives for entrepreneurship, diversification and innovation in the new global setting

OBJECTIVE OF THE PROJECT:
To establish a CSR Programme for SMEs, thereby providing a stable and solid basis for a broad implementation of responsible business practice, responsible supply chain management, and a national and local business-related policy framework, geared towards sustainable industrial development through responsible competitiveness

Project outputs: Creation and up-scaling of training and advisory services based on CSR-related management concepts for responsible competitiveness enhancement of SMEs; Establishment, upgrading and dissemination of institutional and operational capacities for CSR-based activities in relevant partner organizations and public/private institutions; Initiation of local-level multi-stakeholder dialogue for the formulation and implementation of CSR and SME-based policies and sustainable growth strategies

Project Activities	Milestones
• *Strategic business tool and training development, based on UNIDO's REAP methodology, and sectoral adaptation to the specific business needs and the cultural environment in the KSA*	*Approval by the Government*
• *Identification of suitable partners and focal points for training and advisory services*	*Tool and training material developed*
• *Up-scaling of training, advisory and enterprise assessment services in relevant key sectors in the KSA*	*Partners identified*
• *Creation of a capacity-building strategy in all regions covered by the programme*	*Key sectors identified, REAP introduced*
• *Creation of strategic business partnerships for sustainable forward and backward linking supply chain management implementation*	*Regional dissemination strategy determined*
• *Up-scaling campaign for all REAP components with public/private sector partner institutions as focal points*	*Awareness created*
• *Support and strengthening of local partner organizations (focal points) through training on CSR and advisory capacities*	*Partner organizations trained*
• *Regular expert group meetings, technical workshops and seminars on CSR and related issues*	*Meeting held*
• *Creation of multi-stakeholder dialogue platforms in all regions covered by the programme*	*Dialogue institutionalized*
• *Formulation of incentive schemes for CSR-based business practice and responsible supply chain management*	*Incentives schemes determined*
• *Conduct of CSR advocacy activities on regional and national level*	*Awareness raised*
• *Development and initiation of CSR networks and cross-sector partnerships*	*Partnerships created*

Budgetary Guesstimate:	
National staff: Director of the Programme	US$400,000
Professional staff 6	US$1,200,000
Technical staff 5	US$500,000
International experts: 48 w/m	US$750,000
Short-term technical advisors: 26 w/m	US$520,000
Subcontract	US$350,000
Miscellaneous	US$150,000
Total	**US$3,870,000**

Programme Summary Matrix: Industrial Cluster Development Programme (ICDP)

Programme Summary Matrix:
Industrial Cluster Development Programme (ICDP)

THE COUNTRY'S INDUSTRIAL OBJECTIVE (s) *To develop a globally competitive industry based on innovation and acting as a base from which to transform the KSA's natural and human resources into sustainable wealth and employment creation*	*Positioning the KSA in the global league table of industrial excellence*
OBJECTIVE OF THE PROGRAMME *To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020*	
Cooperating Partners: The programme is managed by the Saudi Arabia Industrial Development Agency (SAIDA) under the authority of a Regional Industrial Cluster Development Committee chaired by the Minister of Commerce and Industry with members representing the private sector, government and support institutions The responsibility of the Regional Industrial Cluster Development Committee will be to review the proposals submitted by the regional authorities and the Industrial Development Agency and to approve the allocation of funds to support cluster initiatives	

Component 1: Technical and Financial Support for Regional Cluster Initiatives			
Projects	***Outcomes***	***Duration***	***Budgetary Guesstimates (US$)***
ICDP 1. Building up awareness and knowledge base to guide cluster-based development policies	Awareness and knowledge of the stakeholders on principles and impact of cluster-based development on regional industrial development build up	2007-2009	**US$1,370,000**
ICDP 2. National roster of cluster brokers and managers	The group of national experts with new skills available and fully equipped to promote and organize cluster-based regional development projects	2007-2009	**US$2,650,000**
ICDP3. KSA Clusters Mapping	Analysis of regional patterns of industrial specialization, role of the clusters in regional economy and evaluation of business environment and infrastructure in which they operate	2007-2009	**US$1,250,000**
ICDP 4/IGS3. Financing regional cluster initiatives from the Industry 2020 Fund	Financial resources allocated and procedures established to support regional cluster-based initiatives and projects	2007-2014	**US$1,200,000**
ICDP 5. Coordination between IMPD and other cluster initiatives under Industry 2020	Synergies between national cluster initiatives and Industry 2020	2007-2014	**US$1,200,000**
		Total	**US$7,670,000**

Component 2: Development of Regional Industrial Clusters (Pilot projects)			
Projects	***Outcomes***	***Duration***	***Budgetary Guesstimates (US$)***
ICDP 6. Cluster-based industrial development in Eastern Province focusing on petrochemicals, traditional and agro-industries	Pilot implementation of cluster-based strategies and action programmes in Eastern province	2007-2014	**US$11,800,000**
ICDP 7. Cluster-based industrial development in Gassim region focusing on traditional, agro-industries and SMEs	Pilot implementation of cluster-based strategies and action programmes in Gassim region	2007-2014	**US$11,800,000**
ICDP 8. SME cluster development in Hail region focusing on traditional, agro-industries	Pilot implementation of cluster-based strategies and action programmes in Hail region	2007-2014	**US$11,800,000**
ICDP 9. Joint learning and cooperation platform between regions of the KSA the GCC and the MENA	Exchange of information and experiences between the regions of the KSA and preparation of cluster policy toolbox available on the Internet	2007-2014	**US$1,600,000**
		Total	**US$37,000,000**

Indicative work plan			
	Years		
Projects	**2007-2009**	**2010-2014**	**2014-2020**
ICDP 1	x		
ICDP 2	x		
ICDP 3	x		
ICDP 4	x	x	
ICDP 5	x	x	
ICDP 6	x	x	
ICDP 7	x	x	
ICDP 8	x	x	
ICDP 9	x	x	

Programme total budget (US$):	**US$44,670,000**

Project concept (ICDP 1):
Building up Awareness and Knowledge Base to Guide Cluster Based Development Policies

OBJECTIVE OF THE PROGRAMME: *To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020*
OBJECTIVE OF THE PROJECT: *Promotion of the Regional Cluster Development Programmes*
Project outputs: Building up awareness and knowledge base to guide cluster-based development policies

Project Activities	Milestones
• *Organization of workshops for the regional stakeholders on the benefits of a regional industrial cluster development strategy and implications on competitiveness and diversification of the regional economy*	*Awareness created*
• *Study tours organized for major regional stakeholders and members of Regional Industrial Cluster Development Committee abroad to visit innovative and learning regions in other countries*	*Knowledge acquired*
• *Launching promotional campaign at regional and national levels through mass media, public seminars, websites etc*	*Information disseminated publicly*

Budgetary Guesstimate:	
National experts: 30w/m	US$270,000
International experts: 30w/m	US$600,000
Study tour	US$400,000
Miscellaneous: Printing materials, websites, mass media etc	US$100,000
Total	**US$1,370,000**

Project concept (ICDP 2):
National Roster of Cluster Brokers and Managers

OBJECTIVE OF THE PROGRAMME: *To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020*
OBJECTIVE OF THE PROJECT: *To strengthen national competences and skills required to guide and moderate the formulation and implementation of cluster-based strategies, initiatives and action programmes and projects*
Project outputs: Group of national cluster brokers and managers trained to facilitate the implementation of the pilot regional programmes

Project Activities	Milestones
• *To prepare the methodological, background materials and respective training programmes to be conducted for cluster brokers and managers*	*Training materials*
• *To conduct basic training programmes at national and regional levels*	*Basic skills and knowledge created*
• *To organize training in leading international centres and institutions*	*International experience acquired*
• *To organize on-the-job training abroad in innovative and dynamic regions to allow cluster brokers and managers to apply their knowledge and get practical experience*	*Practical experience acquired*
• *To prepare operational guidelines and policy tool box on cluster development to be available on the Internet*	*Access to information created*
• *To set up a national roster of cluster brokers and managers*	*National expertise available*

Budgetary Guesstimate:	
National experts: 15w/m x (5 regions)=75w/m	US$750,000
International experts: 50w/m	US$1,000,000
On-the-job training	US$800,000
Miscellaneous	US$100,000
Total	**US$2,650,000**

Project summary matrix (ICDP 3):
KSA Clusters Mapping

OBJECTIVE OF THE PROGRAMME: *To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020*
OBJECTIVE OF THE PROJECT: *To analyze regional patterns of current specialization, profiles of clusters (including industrial cities and zones) and regional business environment and infrastructural facilities*
Project outputs: Diagnostic report available for the public and private stakeholders at national and regional levels

Project Activities	Milestones
• *Setting up a team of national and international experts*	*Expert team set up*
• *Preparation of methodology, questionnaire and organization of process and training the teams*	*Working material and process prepared*
• *Review of analysis and conducting to bridge the information gaps*	*Information gaps identified*
• *Benchmarking industrial clusters and business environment*	*Information gaps filled*
• *Preparation of draft report*	*Draft report*
• *Regional workshop of stakeholders to validate findings*	*Findings validated and recommendation formulated*
• *Approval of the final diagnostic report*	*Approved by Regional Authorities and SAIDA*

Budgetary Guesstimate:	
National experts: 50 w/m	US$500,000
International experts: 30 w/m	US$600,000
Workshop	US$100,000
Miscellaneous	US$50,000
Total	**US$1,250,000**

Project concept (ICDP 4):
Financing regional cluster initiatives from the Industry 2020 Fund

OBJECTIVE OF THE PROGRAMME: *To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020*
OBJECTIVE OF THE PROJECT: *To provide support to the regional clusters to undertake initial diagnosis, formulate cluster initiatives and strategies and organize process of implementation*
Project outputs: Financial resources available for the cluster initiatives and projects

Project Activities	Milestones
• *Training of regional stakeholders and cluster managers for the preparation of the business plans to be financed by the ICDF*	*Knowledge and skills created*
• *Preparation of business plans related to the diagnostic analysis and specific projects in accordance with the requirements established by SAIDA and the ICDF*	*Business plans*
• *Submission of proposals by the regions participating in the programme to the Saudi Arabia Industrial Development Agency (SAIDA)*	*Proposals submitted*
• *Review and endorsement of regional proposals/projects by the Regional Industrial Cluster Development Committee*	*Proposals endorsed*
• *Submission of the progress and evaluation reports to SAIDA on the implementation of the cluster projects and initiatives*	*Evaluation report submitted*

Budgetary Guesstimate:	
National experts: 30 w/m	US$300,000
International experts: 30 w/m	US$600,000
Executive training	US$100,000
Methodological materials	US$150,000
Miscellaneous	US$50,000
Total	**US$1,200,000**

Project concept (ICDP 5): Coordination between IMPD (Industrial Modernization Development Programme under the Ministry of Petroleum (MinPet) and other cluster initiatives and Industry 2020

OBJECTIVE OF THE PROGRAMME: *To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020*
OBJECTIVE OF THE PROJECT: *To establish a mechanism of cooperation and coordination on the implementation of the Industrial Manufacturing Development Programme (IMDP) and other cluster initiatives with MinPet and SAGIA*
Project outputs: Synergies between national cluster initiatives and Industry 2020

Project Activities	Milestones
• *To set up arrangements for information exchange on national cluster initiatives*	*Joint information platform*
• *To establish database and website on national cluster projects and initiatives*	*Cluster database and website*
• *To review implementation of cluster projects and initiatives at Industrial Competitiveness and Diversification Board*	*Opportunities for coordination explored*
• *To organize national training programmes and seminars on cluster development*	*Skills and knowledge upgraded*
• *To organize coordination meetings of cluster management teams from MinPet, the MCI and SAGIA*	*Coordination mechanism set up*
• *To monitor the development and implementation of cluster projects, and prepare annual National Report to be submitted to the Industrial Competitiveness and Diversification Board*	*Annual National Cluster Report*

Budgetary Guesstimate:	
National experts: 48 w/m	US$500,000
International experts: 24 w/m	US$400,000
Training programmes	US$200,000
Miscellaneous	US$100,000
Total	**US$1,200,000**

Project concept (ICDP 6):
Cluster-based Industrial Development in Eastern Province focusing on petrochemicals, traditional and agro-industries

OBJECTIVE OF THE PROGRAMME:
To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020

OBJECTIVE OF THE PROJECT:
To enhance regional industrial competitiveness and diversification and contribute to the implementation of Industry 2020 and regional development objectives

Project outputs: Collaborative strategies and action programmes between regional governments, the private sector and support institutions to promote and support innovative industrial development at regional level

Project Activities	Milestones
• *Setting up Regional Cluster Board composed of public and private stakeholders to steer and monitor cluster policies and programmes*	*Regional Cluster Board*
• *Setting up Regional Cluster Resource Centre as a technical arm for the Board to provide services, information and expertise to the regional clusters*	*Regional Cluster Resource Centre*
• *Setting up Regional Observatory to monitor business environment and regional competitive performance*	*Observatory set up and reports published*
• *Establishing network of institutions providing business support and sector specific services to the clusters*	*Network established*
• *Study tours abroad to visit the regions with developed institutional infrastructure*	*Knowledge acquired*
• *Preparation of a strategic diagnosis of the industries to map and benchmark specific regional clusters and cluster-specific business environment and national and regional enterprise support system*	*Regional clusters diagnosed, mapped and benchmarked*
• *Formulation of strategy and policy platform to support the development and formation of competitive and innovative regional industrial clusters*	*Strategy and Policy platform formulated*
• *Organization of cluster development teams and the formulation of a cluster action plan in each promising cluster of the region*	*Cluster teams formed and action plan prepared*
• *Implementation of an action plan for the development of the cluster*	*Implementation stage*

Budgetary Guesstimate: to be financed by the ICDF	
National experts: 60 w/m x 5 years= 300 w/m	US$3,000,000
International experts: 50 w/m x 5 years= 250 w/m	US$5,000,000
Executive training	US$1,000,000
Study tours for the staff and stakeholders	US$1,000,000
Equipment	US$1,500,000
Miscellaneous	US$300,000
Total	**US$11,800,000**

Project concept (ICDP 7):
Cluster-based Industrial Development in Gassim region focusing on traditional, agro-industries and SME

OBJECTIVE OF THE PROGRAMME:
To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020

OBJECTIVE OF THE PROJECT:
To enhance regional industrial competitiveness and diversification and contribute to the implementation of Industry 2020 and regional development objectives

Project outputs: Collaborative strategies and action programmes between regional governments, the private sector and support institutions to promote and support innovative industrial development at regional level

Project Activities	Milestones
• *Setting up a Regional Cluster Board composed of public and private stakeholders to steer and monitor cluster policies and programmes*	*Regional Cluster Board*
• *Setting up a Regional Cluster Resource Centre as a technical arm for the Board to provide services, information and expertise to the regional clusters*	*Regional Cluster Resource Centre*
• *Setting up a Regional Observatory to monitor business environment and regional competitive performance*	*Observatory set up and reports published*
• *Establishing network of institutions providing business support and sector specific services to the clusters*	*Network established*
• *Study tours abroad to visit the regions with developed institutional infrastructure*	*Knowledge acquired*
• *Preparation of a strategic diagnosis of the industries to map and benchmark specific regional clusters and cluster-specific business environment and national and regional enterprise support system*	*Regional clusters diagnosed, mapped and benchmarked*
• *Formulation of strategy and policy platform to support the development and formation of competitive and innovative regional industrial clusters*	*Strategy and Policy platform formulated*
• *Organization of cluster development teams and the formulation of a cluster action plan in each promising cluster of the region*	*Cluster teams formed and action plan prepared*
• *Implementation of an action plan for the development of the cluster*	*Implementation stage*

Budgetary Guesstimate: to be financed by the ICDF	
National experts: 60 w/m x 5 years= 300 w/m	US$3,000,000
International experts: 50 w/m x 5 years= 250 w/m	US$5,000,000
Executive training	US$1,000,000
Study tours for the staff and stakeholders	US$1,000,000
Equipment	US$1,500,000
Miscellaneous	US$300,000
Total	**US$11,800,000**

Project concept (ICDP 8):
SME Cluster Development in Hail region focusing on traditional, agro-industries

OBJECTIVE OF THE PROGRAMME:
To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020

OBJECTIVE OF THE PROJECT:
To enhance regional industrial competitiveness and diversification and contribute to the implementation of Industry 2020 and regional development objectives

Project outputs: Collaborative strategies and action programmes between regional governments, the private sector and support institutions to promote and support innovative industrial development at regional level

Project Activities	Milestones
• *Setting up a Regional Cluster Board composed of public and private stakeholders to steer and monitor cluster policies and programmes*	*Regional Cluster Board*
• *Setting up a Regional Cluster Resource Centre as a technical arm for the Board to provide services, information and expertise to the regional clusters*	*Regional Cluster Resource Centre*
• *Setting up a Regional Observatory to monitor business environment and regional competitive performance*	*Observatory set up and reports published*
• *Establishing network of institutions providing business support and sector specific services to the clusters*	*Network established*
• *Study tours abroad to visit the regions with developed institutional infrastructure*	*Knowledge acquired*
• *Preparation of a strategic diagnosis of the industries to map and benchmark specific regional clusters and cluster-specific business environment and national and regional enterprise support system*	*Regional clusters diagnosed, mapped and benchmarked*
• *Formulation of strategy and policy platform to support the development and formation of competitive and innovative regional industrial clusters*	*Strategy and Policy platform formulated*
• *Organization of a cluster development teams and the formulation of a cluster action plan in each promising cluster of the region*	*Cluster teams formed and action plan prepared*
• *Implementation of an action plan for the development of the cluster*	*Implementation stage*

Budgetary Guesstimate: to be financed by the ICDF	
National experts: 60 w/m x 5 years= 300 w/m	US$3,000,000
International experts: 50 w/m x 5 years= 250 w/m	US$5,000,000
Executive training	US$1,000,000
Study tours for the staff and stakeholders	US$1,000,000
Equipment	US$1,500,000
Miscellaneous	US$300,000
Total	**US$11,800,000**

Project concept (IDCP 9):
Joint learning platform between regions of the KSA, the GCC and the MENA

OBJECTIVE OF THE PROGRAMME: *To promote and support the formulation and implementation of regional cluster development strategies, policy platforms and action plans to enhance competitiveness and diversification in the regions to contribute to the strategic goals of Industry 2020*
OBJECTIVE OF THE PROJECT: *To review, assess and share the experiences and lessons learned from the pilot regional cluster-based development with other regions of the Kingdom*
Project outputs: National workshops on cluster-based experience and lessons learned from pilot cluster projects

Project Activities	Milestones
• *Conducting evaluation exercise of five pilot regional cluster projects after three and five years of implementation*	*Evaluation process organized*
• *Preparation of regional evaluation reports and recommendations to improve the process and tools*	*Regional evaluation reports*
• *Conducting two national workshops on cluster-based development to review experiences of the region and work out recommendations to the government and SAIDA*	*National workshops*
• *Exchange of visits between the regions*	*Country study tours*
• *Preparing cluster policy toolbox customized to KSA conditions and making it available on the Internet for other regions*	*Website with toolbox*
• *Organizing regular workshops on cluster-based development between the regions of the GCC, the MENA and others*	*Workshops*
• *To set up an Internet website to host on-line discussion forum*	*Internet forum*

Budgetary Guesstimate:	
National experts: 0 w/m	US$400,000
International experts: 30 w/m	US$600,000
Workshops	US$300,000
Miscellaneous	US$300,000
Total	**US$11,600,000**

Programme Summary Matrix: National and Regional Innovation Systems

Programme summary matrix:
National and Regional Innovation Systems

THE COUNTRY'S INDUSTRIAL OBJECTIVE(s) *A globally competitive industry based on innovation and acting as a base for transforming the KSA's natural and human resources into sustainable wealth*	*Positioning the KSA in the global league table of industrial excellence*
OBJECTIVE OF THE PROGRAMME *To build up the KSA National and Regional Industrial Innovation System so that institutions, financial resources, human resources and political will combine to promote industrial excellence*	
Cooperating Partners: The MCI, the KASCST, SABIC, ARAMCO, the SIDF, SASO	

Programme component I:	**Policies and Strategies Framework**		
Component objective:	*To formulate innovation policies and strategies for technology promotion*		
Projects	***Outcomes***	***Duration***	***Budgetary Guesstimates (US$)***
NRIS 1. Regional (GCC) Technology Foresight	Regional vision on future technology and innovation for the Gulf region	2007-2009	**US$2,700,000**
NRIS 2. National and sub-national Technology Foresight	National and sub-national visions on future technology and innovation for the KSA	2007-2014	**US$1,500,000**
NRIS 3. Innovation policy	Strategic papers and agreements	2007-2009	**US$1,480,000**
NRIS 4. Institutionalization of the National Industrial Innovation System	Institutional framework for designing and implementing innovation policies and programmes at national and regional levels	2007-2009	**US$1,480,000**
NRIS 5. Creation of a Technology Development Centre and Networks	Capacity to develop and implement innovation and technology dissemination projects	2007-2014	**US$20,100,000**
		Total	**US$27,260,000**

Programme component II: Regional Innovation Systems			
Component objective: *To promote regional industrial innovation in two pilot regions*			
Projects	***Outcomes***	***Duration***	***Budgetary Guesstimates (US$)***
NRIS 6.* Building up the Riyadh Regional Innovation System for Industrial Development	Pilot implementation of collaborative strategies, policy platforms and action programmes in Riyadh region	2007-2014	**US$11,800,000**
NRIS 7.* Building up the Jeddah Regional Innovation System for Industrial Development	Pilot implementation of collaborative strategies, policy platforms and action programmes in Jeddah region	2007-2014	**US$11,800,000**
		Total	**US$23, 600,000**

Indicative work plan			
	Years		
Projects	**2007-2009**	**2010-2014**	**2014-2020**
NRIS 1	x		
NRIS 2	x	x	
NRIS 3	x		
NRIS 4	x		
NRIS 5	x	x	
NRIS 6	x	x	
NRIS 7	x	x	

Programme total budget (US$):	**US$50,860,000**

* The projects in Riyadh and the MENA region will also address cluster-based principles and approaches to the development of the industrial sector.

Project concept (NRIS 1):
Regional (Gulf countries) Technology Foresight Initiative

OBJECTIVE OF THE PROGRAMME:
To build up the KSA National and Regional Industrial Innovation System so that institutions, financial resources, human resources and political will combine to promote industrial excellence

OBJECTIVE OF THE PROJECT:
To elaborate a mid- and long-term development vision of the region as well as bringing a more technology-oriented focus to the relevant national and regional knowledge-based institutions The regional initiative is instrumental in providing assistance to the Gulf economies for more sustainable and innovative development aimed at fostering economic, environmental and social benefits at national and regional levels

Project outputs: (a) to raise awareness of technology foresight for enhancing the competitiveness of industry by exploiting emerging and future trends in science and technology, and thus contributing to improved quality of life; (b) to develop and adapt methodologies and tools for technology foresight in the region; (c) to establish and strengthen national and regional knowledge as well as the capability of using technology foresight for designing policies and strategies that focus on innovation; (d) to initiate regional foresight projects on specific sectors or themes so as to demonstrate their relevance, as well as the practical use of various methods, programme design and execution; and (e) to provide solutions to relevant problems in the region that can be addressed through the appropriate application of technology. Special attention will be given to economic diversification, emerging production chains and connection to global value chains

Project Activities	Milestones
• *Conducting a regional conference to present the regional foresight concepts and approaches and identify areas of work*	*Approval by the Government*
• *Definition of the responsibilities, activities, structure and relationships for the promotion of the regional foresight programme*	*Approval by the Governments involved*
• *Definition of productive chains to be addressed through regional foresight*	*Approval by the Governments involved*
• *Definition of methodologies and capacity building in using these methodologies*	*Foresight exercises conducted*
• *Conducting a series of foresight exercises for the selected productive chains*	*Implementation process established*
• *Establishment of a high-level panel of experts and decision makers to promote the implementation of the conclusions and recommendation of the foresight exercises*	*Evaluation report and recommendations for improvement*
• *Submission of the report to the Government and decisions on the measures of improvement*	

Budgetary Guesstimate:	
National experts: 48 w/m	US$480,000
International experts: 48 w/m	US$480,000
Short-term technical advisors: 80 w/m	US$1,640,000
Miscellaneous	US$100,000
Total	**US$2,700,000**

Project concept (NRIS 2):
National Technology Foresight Project

OBJECTIVE OF THE PROGRAMME*:*
To build up the KSA National and Regional Industrial Innovation System so that institutions, financial resources, human resources and political will combine to promote industrial excellence

OBJECTIVE OF THE PROJECT*:*
To provide assistance on developing capability for strategic decision making on science, technology and innovation (STI) Main target outcome of the national project is to develop policies and R&D programmes that deal with innovation, industrial growth and competitiveness

Project outputs: (a) to raise awareness of technology foresight for enhancing the competitiveness of industry by exploiting emerging and future trends in science and technology, and thus contributing to improved quality of life; (b) to develop and adapt methodologies and tools for technology foresight in the country; (c) to establish and strengthen national knowledge as well as the capability of using technology foresight for designing policies and strategies that focus on innovation; (d) to initiate a national foresight exercise to provide solutions to relevant problems in the country that can be addressed through the appropriate application of technology Special attention will be given to economic diversification, emerging production chains and connection to global value chains

Project Activities	Milestones
• *Conducting a national seminar to present the satisfactory outcomes of technology foresight for strategic decision making*	*National seminar conducted*
• *Definition of the responsibilities, activities, structure and relationships for the promotion of the national foresight project*	*Approval by the Government*
• *Definition of knowledge areas and industrial sectors to be addressed through national foresight*	*Approval by the Government*
• *Definition of methodologies and capacity building in using these methodologies*	*Capacity building achieved*
• *Conducting a national technology foresight exercise for establishing a national strategy for science, technology and innovation*	*Foresight exercise conducted*
• *Establishment of a high level panel of experts and decision makers to promote the implementation of the conclusions and recommendation of the foresight exercise*	*Implementation process established*
• *Submission of the report to the Government and decisions on the measures of improvement*	*Evaluation report and recommendations for improvement*

Budgetary Guesstimate:	
National experts: 48 w/m	US$480,000
International experts: 48 w/m	US$800,000
Short-term technical advisors: 10 w/m	US$120,000
Miscellaneous	US$100,000
Total	**US$1,500,000**

Project concept (NRIS 3): Innovation Policy

OBJECTIVE OF THE PROGRAMME:
To build up the KSA National and Regional Industrial Innovation System so that institutions, financial resources, human resources and political will combine to promote industrial excellence

OBJECTIVE OF THE PROJECT:
To establish an appropriate environment for the successful operation of the NIIS through the interaction of multiple factors to induce attitudes and decisions, which are determinants for the creation of local capacities in organizations dedicated to the generation and use of knowledge

Project outputs: Establishment of a broad consultation process including the key stakeholders of the National Industrial Innovation System; Preparation of policy documents and ancillary mechanisms; Implementation of facilities for monitoring and improving the strategies and measures adopted

Project Activities	Milestones
• *Scoping and composition of the consultation process*	*Approval by the Government*
• *Preparation of policy documents*	*Approval by the Government*
• *Preparation of agreements and implementation framework for the policy and strategies*	*Approval by the Government*
• *Preparation of an operational document indicating the procedures and background documentation for decision making*	*Evaluation guidelines prepared*
• *Preparation of a work plan and budget for the implementation of the policies, strategies and facilities*	*Implementation plan*
• *After one year and on the basis of the balanced scorecard preparation of an evaluation report on the results and performances of the national and sub-national innovation system*	*Evaluation report*
• *Submission of the report to the Government and decisions on the measures of improvement*	*Recommendations for improvement*

Budgetary Guesstimate:	
National experts: 48 w/m	US$480,000
International experts: 24 w/m	US$400,000
Short-term technical advisors: 40 w/m	US$480,000
Miscellaneous	US$120,000
Total	**US$1,480,000**

Project concept (NRIS 4):
Institutionalization of the National Industrial Innovation System

OBJECTIVE OF THE PROGRAMME: *To build up the KSA National and Regional Industrial Innovation System so that institutions, financial resources, human resources and political will combine to promote industrial excellence*
OBJECTIVE OF THE PROJECT: *To enhance the innovation capacities of public and private firms and to improve the technological performance of the KSA It will constitute a platform for the promotion and use of emerging technologies and stimulate national and international partnerships; it will also serve as a linkage mechanism between the different elements of the NIIS*
Project outputs: Setting up an institutional framework for the National Innovation System; Adoption of a "Royal Decree" or equivalent norm for the Institutionalization of the National Industrial Innovation System; Establishment of performance improvement mechanisms and incentives

Project Activities	Milestones
• *Establishment of the Industrial Innovation Commission within the Industrial Competitiveness Diversification Board*	*Policy decision making*
• *Establishment of the Division of Innovation within SAIDA*	*Programmes coordination*
• *Setting up industrial innovation window in the Fund for Industry 2020*	*Financial mechanism set-up*
• *Preparation of the basic draft decree*	*Approval by the Government*
• *Definition of the responsibilities, activities, structure and relationships for the promotion of industrial innovation in the KSA*	*Approval by the Government*
• *Preparation of a operational document indicating the procedures and background documentation for decision making*	*Evaluation guidelines prepared*
• *Preparation of a work plan and budget for the development of the national and sub-national innovation systems*	*Implementation plan*
• *After one year and on the basis of the balances scorecard preparation of an evaluation report on the results and performances of the national and sub-national innovation system*	*Evaluation report*
• *Submission of the report to the Government and decisions on the measures of improvement*	*Recommendations for improvement*

Budgetary Guesstimate:	
National experts: 48 w/m	US$480,000
International experts: 24 w/m	US$400,000
Short-term technical advisors: 40 w/m	US$480,000
Miscellaneous	US$120,000
Total	**US$1,480,000**

Project concept (NRIS 5):
Creation of a National Industrial Technology Development Centre

OBJECTIVEOF THE PROGRAMME:
To build up the KSA National and Regional Industrial Innovation System so that institutions, financial resources, human resources and political will combine to promote industrial excellence

OBJECTIVE OF THE PROJECT:
To enhance the innovation capacities of public and private firms and to improve the technological performance of the KSA It will constitute a platform for the promotion and use of emerging technologies and stimulate national and international partnerships; it will also serve as a linkage mechanism between the different elements of the NIIS

Project outputs: *The centre will provide:* Patent analysis and strategy for patenting research results; Determining the value of a technology; Identification of technology demands; Preparation of strategies for negotiation; Transfer and link with enterprises; Promotion of installed capacities in research laboratories

In its support role to other institutions, the Centre will provide training and advisory services in: Design of technology transfer projects; Management of scientific and technological research in enterprises; Linkage experiences

Project Activities	Milestones
• *Preparation of an opportunity study and implementation business plan*	*Approval by the Government*
• *Definition of the responsibilities, activities, structure and relationships for the promotion of the centre*	*Approval by the Government*
• *Preparation of a operational document indicating the procedures and background documentation for decision making*	*Approval by the Government*
• *Support for a technical evaluation of projects*	*Evaluation guidelines prepared*
• *Feasibility study and start-up implementation and continuous improvement of the centre*	*Feasibility study prepared*
• *Preparation of a work plan and budget for the development of the centre for the first three years*	*Implementation improved*
• *After one year and on the basis of the balanced scorecard preparation of an evaluation report on the results and performances to industrial competitiveness and diversification board*	*Evaluation report*
• *Submission of the report to the Government and decisions on the measures of improvement*	*Recommendations for improvement*
• *Study tours to visit the countries with successful technology development centres*	*Knowledge acquired and network established*

Budgetary Guesstimate:	
National experts: 48 w/m	US$480,000
International experts: 24 w/m	US$400,000
Short-term technical advisors: 40 w/m	US$480,000
Study tour	US$100,000
Equipment and construction	US$18,340,000
Miscellaneous	US$300,000
Total	**US$20,100,000**

Project concept (NRIS 6):
Building up the Riyadh Regional Innovation System for Industrial Development focusing on emerging knowledge based, high-tech and traditional industries

OBJECTIVE OF THE PROGRAMME:
To build up the KSA National and Regional Industrial Innovation System so that institutions, financial resources, human resources and political will combine to promote industrial excellence

OBJECTIVE OF THE PROJECT:
To enhance regional industrial competitiveness and diversification and contribute to the implementation of Industry 2020 and regional development objectives

Project outputs: Collaborative strategies and action programmes between regional governments, the private sector and support institutions to promote and support innovative industrial development at regional level

Project Activities	Milestones
• *Setting up a Stakeholders Platform composed of public and private stakeholders to steer and monitor regional innovation programmes*	*Regional Stakeholders Platform*
• *Setting up a Regional Innovation Management Unit as a technical arm for the Platform to provide services, information and expertise to the regional production system*	*Regional Innovation Management Unit*
• *Setting up a Regional Observatory to monitor business environment and regional competitive performance*	*Observatory set up and reports published*
• *Establishing a network of institutions providing business and innovation support and sector specific services to the regional production system*	*Network established*
• *Study tours abroad to visit the regions with developed institutional and innovation infrastructure*	*Knowledge acquired*
• *Preparation of a strategic analysis of the regional innovation support system and regional production structure (companies) including specific business environment and national and regional enterprise support system*	*Regional innovation system mapped and benchmarked*
• *Formulation of strategy and establishment of policy platform to enhance regional innovation and diversification*	*Strategy formulated and policy platform established*
• *Organization of working groups and formulation of collaborative action plans to implement the regional innovation and diversification strategy*	*Working groups formed and action plans prepared*
• *Implementation of the regional innovation action plan and setting up a monitoring and evaluation mechanism*	*Implementation stage*

Budgetary Guesstimate: to be financed by the ICDF	
National experts: 60 w/m x 5 years = 300 w/m	US$3,000,000
International experts: 50 w/m x 5 years = 250 w/m	US$5,000,000
Executive training	US$1,000,000
Study tours for the staff and stakeholders	US$1,000,000
Equipment	US$1,500,000
Miscellaneous	US$300,000
Total	**US$11,800,000**

Project concept (NRIS 7):
Building up the Jeddah Regional Innovation System for Industrial Development focusing on emerging knowledge based, high-tech, petro-chemicals and strategic industries

OBJECTIVE OF THE PROGRAMME: *To build up the KSA National and Regional Industrial Innovation System so that institutions, financial resources, human resources and political will combine to promote industrial excellence*
OBJECTIVE OF THE PROJECT: *To enhance regional industrial competitiveness and diversification and contribute to the implementation of Industry 2020 and regional development objective*
Project outputs: Collaborative strategies and action programmes between regional governments, the private sector and support institutions to promote and support innovative industrial development at a regional level

Project Activities	Milestones
• *Setting up a Stakeholders Platform composed of public and private stakeholders to steer and monitor regional innovation programmes*	*Regional Stakeholders Platform*
• *Setting up a Regional Innovation Management Unit as a technical arm for the Platform to provide services, information and expertise to the regional production system*	*Regional Innovation Management Unit*
• *Setting up a Regional Observatory to monitor business environment and regional competitive performance*	*Observatory set up and reports published*
• *Establishing a network of institutions providing business and innovation support and sector specific services to the regional production system*	*Network established*
• *Study tours abroad to visit the regions with developed institutional and innovation infrastructure*	*Knowledge acquired*
• *Preparation of a strategic analysis of the regional innovation support system and regional production structure (companies) including specific business environment and national and regional enterprise support system*	*Regional innovation system mapped and benchmarked*
• *Formulation of strategy and establishment of policy platform to enhance regional innovation and diversification*	*Strategy formulated and policy platform established*
• *Organization of working groups and formulation of collaborative action plans to implement the regional innovation and diversification strategy*	*Working groups formed and action plans prepared*
• *Implementation of the regional innovation action plan and setting up a monitoring and evaluation mechanism*	*Implementation stage*

Budgetary Guesstimate: to be financed by the ICDF	
National experts: 60 w/m x 5 years = 300 w/m	US$3,000,000
International experts: 50 w/m x 5 years = 250 w/m	US$5,000,000
Executive training	US$1,000,000
Study tours for the staff and stakeholders	US$1,000,000
Equipment	US$1,500,000
Miscellaneous	US$300,000
Total	**US$11,800,000**

Programme Summary Matrix: Domestic Capabilities Building (DCB)

Programme Summary Matrix:
Domestic Capabilities Building (DCB)

THE COUNTRY'S INDUSTRIAL OBJECTIVE (s) *A globally competitive industry based on innovation and acting as a base for transforming the KSA's natural and human resources into sustainable wealth and employment creation*	*Positioning the KSA in the global league table of industrial excellence*
OBJECTIVE OF THE PROGRAMME *To enhance industrial capabilities for industrial diversification and competitiveness, particularly in terms of skills development, FDI flows, infrastructure and linkages to the global market through industrial capacity building*	
Cooperating Partners: the MCI, SAGIA, MinPet, the KACST, the Chamber of Commerce and Industry and other public and private stakeholders	

Projects	*Outcomes*	*Duration*	*Budgetary Guesstimates (US$)*
DCB 1. Upgrading of skills for industrial development	A high degree of local empowerment ensured	2007-2014	**US$1,800,000**
DCB 2. Entrepreneurship development (concentrating on youth and women)	Business skills are upgraded and labour market diversified	2007-2014	**US$2,200,000**
DCB 3. Enhancing FDI for technology transfer	Facilitate access for local industries to new technologies	2007-2020	**US$2,000,000**
DCB 4. Enhancing trade capacity building and related services	Increased access to export markets and compliance with WTO requirements	2007-2014	**US$70,100,000**
DCB 5. Promotion of export consortia arrangements	Better access to regional and global markets	2007-2014	**US$17,200,000**
DCB 6. Developing modern industrial infrastructure	Traditional and digital infrastructure, facilities and logistics improved in existing and newly established industrial cities, providing infrastructure for business incubators and management of industrial cities upgraded	2007-2020	**US$3,682,200,000**
		Total	**US$3,775,500,000**

Indicative work plan			
	Years		
Projects	**2007-2009**	**2010-2014**	**2014-2020**
DCB 1.	x	x	
DCB 2.	x	x	
DCB 3.	x	x	x
DCB 4.	x	x	
DCB 5.	x	x	
DCB 6.	x	x	x

Programme total budget (US$):	**US$3,775,500,000**

Project concept (DCB 1):
Upgrading of skills for industrial development

OBJECTIVE OF THE PROGRAMME: *To enhance industrial capabilities for industrial diversification and competitiveness, particularly in terms of skills development, FDI flows, infrastructure and linkages to the global market through industrial capacity building*
OBJECTIVE OF THE PROJECT: *To develop and upgrade skills and experiences to sustain industrial vision and supply the correct attributes and capabilities on a continuous basis to meet all the needs in the medium and long term*
Project outputs: A high degree of local empowerment ensured

Project Activities	Milestones
• *Industrial skills auditing to assess the demands of industries and supply from the educational system*	*Skill gaps identified*
• *To review national strategy for skills training with a view to the objectives of Industry 2020*	*Areas of policy coordination defined*
• *To analyze fiscal and financial incentives to be introduced to enhance enterprise training*	*Incentive schemes created*
• *To launch awareness campaigns on the benefits of training and management techniques focusing on high-tech*	*Awareness built*
• *To enhance cooperation between educational institutions and enterprises on the issues related to the participation of business communities in the formulation of curriculum and programmes*	*Curriculum and programmes adjusted to the needs of industry*
• *To prepare recommendations on an incentive regime for students, schools, universities and employers to accept interns and to participate fully in the areas designated as critical and key in fulfilling Vision 2020*	*Internship programmes developed*
• *To scale existing training programmes on the sectoral bases using technology centres*	*Technical skills promoted*
• *To set up procedures to provide grants from the Industry 2020 Fund, to enhance technical education in leading institutions*	*Higher enrolment rate in technical education*
• *To develop on-line distance-learning programmes on innovative technologies and management tools for ICT and biotechnologies and other emerging industries*	*Wider access to learning opportunities*

Budgetary Guesstimate:	
National experts: 48 w/m	US$500,000
International experts: 24 w/m	US$400,000
Training programmes	US$800,000
Miscellaneous	US$100,000
Total	**US$1,800,000**

Project concept (DCB 2):
Entrepreneurship development (concentrating on youth and women)

OBJECTIVE OF THE PROGRAMME: *To enhance industrial capabilities for industrial diversification and competitiveness, particularly in terms of skills development, FDI flows, infrastructure and linkages to the global market through industrial capacity building*
OBJECTIVE OF THE PROJECT: *To create a business environment that encourages the initiatives of youth and women entrepreneurs and to enhance the human and institutional capacities required to foster entrepreneurial dynamism and enhance productivity*
Project outputs: Regional training centres and curriculum developed in cooperation with the corporate sector; High degree of Saudi youth and women involvement encouraged

Project Activities	Milestones
• *To undertake national survey of institutions and curriculum providing entrepreneurship training focusing on women and youth*	*Needs identified*
• *To organize a national seminar in cooperation with the government, business organizations and educational institutions to review the findings of the national survey*	*National seminar*
• *To prepare curricula and training manuals for youth and women's entrepreneurship development (WED), customized to the country's conditions and focusing on SMEs and innovative businesses*	*Training manuals and curriculum*
• *To launch a promotional campaign encouraging youth and women entrepreneurs to develop new entrepreneurial lifestyles and capacities (developing global sensitivity, personalizing global information, flexible orientation, strategic thinking, etc.)*	*Awareness created*
• *Encouraging a collective initiative between the Ministry of Education, universities, local support institutions, women's organizations and NGOs to develop joint regional projects and programmes*	*Mechanism for partnerships established*
• *To support the initiative of Saudi Entrepreneurship Development Institute (SEDI) to extend training programmes to other regions including women's and youth entrepreneurship programmes*	*Training services expanded*
• *To establish an Entrepreneurship Development Center (EDC) for Saudi Arabia with full on-line training programme and a cadre of trainers/consultants (Supreme Commission for Tourism of Saudi Arabia, Chamber of Industry and Trade)*	*Centre established*

Budgetary Guesstimate:	
National experts: 50 w/m	US$500,000
International experts: 50 w/m	US$1,000,000
Study tour	US$100,000
Training	US$200,000
Equipment	US$300,000
Miscellaneous	US$100,000
Total	**US$2,200,000**

Project concept (DCB 3):
Enhancing FDI for technology transfer

OBJECTIVE OF THE PROGRAMME: *To enhance industrial capabilities for industrial diversification and competitiveness, particularly in terms of skills development, FDI flows, infrastructure and linkages to the global market through industrial capacity building*
OBJECTIVE OF THE PROJECT: *To enhance FDI to the non-oil industries to facilitate technological upgrade and linkages to the global values chain*
Project outputs: Facilitate access for local industries to new technologies

Project Activities	Milestones
• *To review investment strategies of Industrial Competitiveness and Diversification Board to ensure coordination with Industry 2020*	*Industrial and investment strategies coordinated*
• *To set up cooperation arrangement between the MCI and SAGIA on promoting FDI in specific industrial sectors and SMEs*	*FDI promotion strategy to specific industrial sectors and SMEs*
• *To build up capabilities of the industrial institutions and consulting companies in preparation for bankable investment projects*	*Capacities built*
• *To develop a portal and match-making services to link buyers and suppliers*	*Links improved and diversified*
• *To organize study tours in cooperation with SAGIA to visit countries with successful investment promotion experiences*	*Knowledge acquired*
• *To provide grants from Fund for Industry 2020 to participate in technological exhibitions and fairs*	*Business contacts promoted*
• *To prepare proposals for sub-contracting arrangements in key sectors and prepare business plan to be submitted to the Ministry*	*Business plan prepared*

Budgetary Guesstimate:	
National experts: 50 w/m	US$500,000
International experts: 30 w/m	US$600,000
Training programmes	US$400,000
Study tour	US$400,000
Miscellaneous	US$100,000
Total	**US$2,000,000**

Project concept (DCB 4)
Enhancing trade capacity building and related services

OBJECTIVE OF THE PROGRAMME: *To enhance industrial capabilities for industrial diversification and competitiveness, particularly in terms of skills development, FDI flows, infrastructure and linkages to the global market through industrial capacity building*
OBJECTIVE OF THE PROJECT: *To increase access to export markets of Saudi products in compliance with market requirements related to quality and safety and consumer and environmental protections*
Project outputs: Improving effectiveness of Conformity Assessment; Strengthening enterprise export capacity and access to markets

Project Activities	Milestones
• *Strengthening accreditation system (laboratories, inspection and certification bodies) and international recognition (incl. regional dimension)*	*Accreditation system internationally recognized (IALC/IAF) and labs/bodies accredited*
• *Strengthening new Conformity Assessment System (CA) and participation in international standardization*	*CA effective and in line with international requirements*
• *Strengthening effectiveness of TBT and SPS enquiry points and consumer protection systems*	*Enquiry points and consumer protection system effective*
• *Implementation of TBT and SPS legal framework to comply with commitments made during accession to the WTO transparency, national treatment*	*Legislation adopted*
• *In-depth analysis of impact on trade agreements and new standards and regulations on exports from Saudi Arabia*	*Policy and implementation to adhere and take advantage of trade agreements*
• *Setting up and making operational a financial facility to provide grants (cost-sharing) to support exporters' access to technology and management systems to overcome barriers to trade (TBT/SPS)*	*Exporters' access to technology to overcome barriers to trade*
• *Upgrading quality/productivity programme for Saudi Arabian exporters including compliance with market requirements and implementation of management systems (ISO 9000, 14000, 22000, SA8000, OHS, BRC, EurepGAP)*	*Recommendations for improvement implemented*
• *Large scale marketing/promotion of Saudi exports*	*Saudi products known and accepted in export markets*
• *Establish a national food traceability system and data base including a pesticides database to ensure compliance with residual of pesticides*	*Food traceability system*
• *Strengthening Saudi Arabia's quarantine system*	*Effective quarantine system*

Budgetary Guesstimate:	
National experts: 240 w/m	US$2,400,000
International experts: 240 w/m	US$3,840,000
Short-term technical advisors: 240 w/m	US$3,360,000
Funds for overcoming barriers to trade for Saudi exporters	US$50,000,000
Equipment	US$10,000,000
Miscellaneous	US$500,000
Total	**US$70,100,000**

Project concept (DCB 5):
Promotion of Export Consortia arrangements

OBJECTIVE OF THE PROGRAMME:
To enhance industrial capabilities for industrial diversification and competitiveness, particularly in terms of skills development, FDI flows, infrastructure and linkages to the global market through industrial capacity building

OBJECTIVE OF THE PROJECT:
Increased capacity of Saudi SMEs to penetrate export markets

Project outputs: Report on the feasibility of promoting export consortia of KSA SMEs in selected sectors; Four to six export consortia promoted; KSA promoters of export consortia trained; Proposals to introduce financial and regulatory incentives to the promotion of export consortia formulated

Project Activities	Milestones
• *Organize a national seminar to present the concept of export consortia to the business associations/federations*	*National workshop organized*
• *Conduct a survey to identify, within the priority sectors, the enterprises with export potential and willing to be part of an export consortium*	*Enterprises identified*
• *Review the regulatory framework relevant to export promotion and to the creation of export consortia*	*Report prepared*
• *Assist the different groups of enterprises identified under the previous output to prepare common business plans for export promotion*	*Business plans prepared*
• *Formalize the consortia into legal entities*	*Consortia formally established*
• *Assist the consortia in the implementation of pilot activities of the business plan including participation in foreign fairs*	*Pilot activities implemented*
• *Organize study tours for the consortia directors to meet with counterparts (directors of well established foreign consortia)*	*Study tours organized*
• *Organize two training courses from both public and private sector associations as well as private consultants*	*2 training sessions organized*
• *Advise the KSA authorities on regulatory and financial measures/incentives to be adopted to facilitate the creation and success of export consortia*	*Policy advice provided*
• *Organize a national workshop to present the project's experience and lessons learned*	*National workshop organized*
• *Set up promotional fund for 5-6 consortia*	*Funds available*

Budgetary Guesstimate:	
National experts: 50 w/m	US$500,000
International experts: 40 w/m	US$800,000
Short-term technical advisors: 20 w/m	US$400,000
Subcontracts	US$200,000
Study tours	US$100,000
Training	US$100,000
Promotional fund	US$15,000,000
Miscellaneous	US$100,000
Total	**US$17,200,000**

Project concept (DCB 6):
Developing modern industrial infrastructure

OBJECTIVE OF THE PROGRAMME:
To enhance industrial capabilities for industrial diversification and competitiveness, particularly in terms of skills development, FDI flows, infrastructure and linkages to the global market through industrial capacity building

OBJECTIVE OF THE PROJECT:
To facilitate the competitive performance and diversification of national industries in line with objectives of Industry 2020

Project outputs: Traditional and digital infrastructure, facilities and logistics improved in existing and newly established industrial cities; Infrastructure for business incubators provided; Management of industrial cities upgraded

Project Activities	Milestones
• *To undertake a survey of the existing physical infrastructure and services in industrial cities, estates, parks, zones etc, and assessment of the needs demand from the business community*	*Gaps identified*
• *To review projects for the new industrial cities with a view to design required infrastructure, facilities and services in line with modern requirements*	*Areas of improvements identified*
• *To undertake study tours abroad to visit countries with successful experience in infrastructure and logistics supporting competitiveness of national industries*	*Knowledge acquired*
• *To prepare specific proposals to equip the new industrial cities with required infrastructure, facilities, logistics and services*	*Proposals prepared*
• *To review projects developed under PSD8 and allocate required financial resources to implement projects on business incubators including industrial cities*	*Projects approved and funds from ICDF allocated*
• *To review revised projects for new industrial cities and allocate financial resourses to build up modern infrastructure, facilities and logistics*	*Projects approved and funds from ICDF allocated*
• *To review projects suggesting improvement of the infrastructure and services in the existing industrial cities and allocate financial resources to implement the projects*	*Projects approved and funds from ICDF allocated*
• *To launch a competitive call for local companies to implement infrastructural projects*	*Best proposals identified*
• *To organize training courses for the management of industrial cities, estates, parks and zones*	*Management improved*

Budgetary Guesstimate:	
National experts: 48 w/m	US$480,000
International experts: 50 w/m	US$1,000,000
Short-term technical advisors: 30 w/m	US$420,000
Study tours	US$100,000
Training	US$100,000
Equipment (digital equipment)	US$1,500,000,000
Capital investment in infrastructure	US$2,180,000,000
Miscellaneous	US$100,000
Total	**US$3,682,200,000**

Annexes

A. Annexes to Chapter 1

Annex 1.1: Eighth Development Plan, 2005–2009: Diversifying the economies of the sub-national regions in KSA

One of the goals of the KSA Eighth Development Plan is the achievement of balanced development among all regions. This requires the creation of a production base that is based on the development potentialities of each region and is guided by the national strategy for targeting investments and activities in those regions.

The main dimensions of the long-term future vision for the regions include:

- Enhancing the developmental role of the Provincial Councils through gradual adoption of decentralization;
- Encouraging private-sector investment in the least-developed regions, transforming the comparative advantages of each region into competitive advantages, as well as strengthening policies and measures for environmental protection;
- Improving the living conditions of citizens in all regions of the Kingdom;
- Achieving sustainable development with its economic, social and environmental dimensions (encouraging the private sector to invest in the least-developed regions, transforming the comparative advantages of each region into competitive advantages, as well as strengthening policies and measures for environmental protection);
- Monitoring and measuring the regional disparities in activities and services (if any) through use of Regional Development Indicators.

Recommendations for policies cover the following areas:

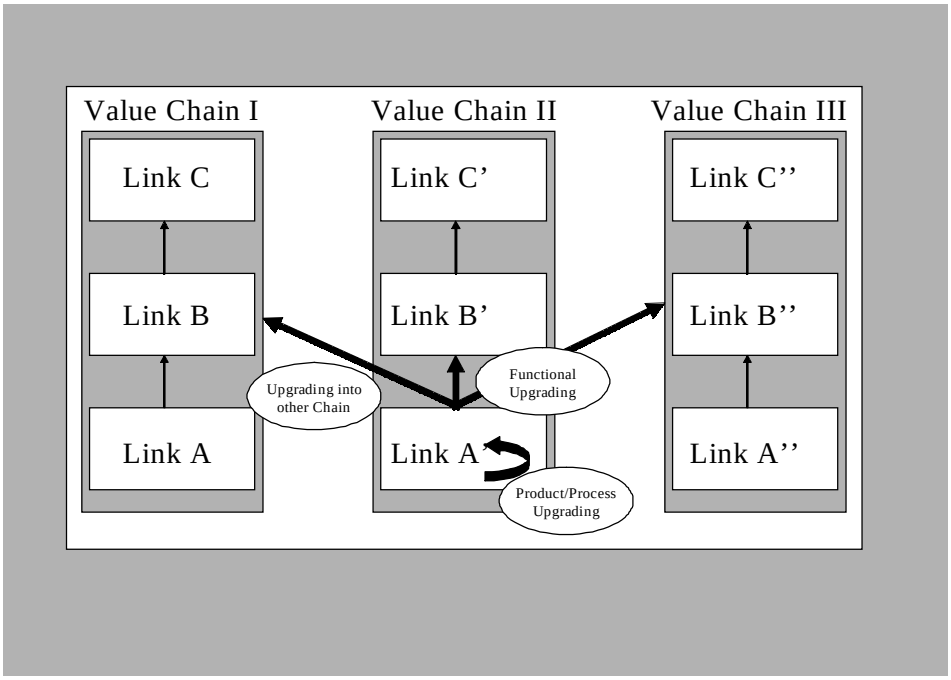
- Diversifying the economies of the regions and enhancing integration among them;
- Identifying the (natural and human) resources available in each region and ensuring their optimal utilization;
- Encouraging the private sector to invest in productive sectors in the least-developed regions;
- Developing municipal and other public services as per the hierarchical structure of the development centres shown in the National Spatial Strategy;
- Ensuring compatibility of a region's share of public services with its share of total population of the Kingdom;
- Upgrading the technical and administrative capabilities of the local authorities and increasing their contribution to the development process.

Source: Ministry of Economy and Planning, the Kingdom of Saudi Arabia, (2006).

Annex 1.2: Value chain analysis

Value chains comprise a sequence of interrelated, value added activities that are necessary to bring products or services to a particular market. In a value chain, production of goods (manufacturing) and services are interrelated with other activities (supply of materials, design, packaging, marketing, logistics, sales, recycling, etc.) in local, regional and global value chains. Different "rents" can be captured along the various segments of a value chain (upstream and downstream), depending on the type and complexity of industry. The interlinkages along a value chain influence job creation, consumption of resources (energy), productivity and competitiveness of an industry and, hence, the prospects for developing country industrial upgrading, catching up and sustainable economic growth.

Possible routes for industrial diversification can also be explored. Stakeholders can start analyzing incumbent industries (e.g. petrochemicals, aluminium, glass and chemicals) and can explore possibilities for intra-chain innovations such as product and process innovations and functional innovation; and can also identify possible inter-chain innovations (moving to another value chain, for instance from plastic bags to bio-plastics to be used for packaging agro-food products). These new industries can be further filtered through the lenses of job creation potential, skills requirements, energy and strategic-material intensity, demand needs, etc.



Source: UNIDO 2004.

Stakeholders can develop a strategic vision through undertaking foresight exercises, or other methods such as business development scorecards, to identify which new value chains to enter, which new markets to enter, which new technologies to acquire and which new skills to develop.

Value chain analysis can be used to examine the relationships within the cluster innovation system and between clusters and regional innovation systems. In value chain analysis, activities may be performed by separate enterprises or can be undertaken under the vertically integrated firm. Different rents can be captured along the various segments of a value chain (upstream and downstream), depending on the type and complexity of an industry. Firms in a particular cluster can occupy several positions along the value chain. A value chain can serve as a useful tool to understand how a cluster operates and what its comparative advantages are. Value chain analysis can assist policy makers to make proper decisions on what institutions and organizations are needed to underpin the process of industrial upgrading of firms at the national, regional and industry levels and to formulate better policies and programmes.

B: Annexes to Chapter 3

Annex 3.1: Defining the technological classification of products

Primary exports are those shipped as raw material or with little or no value-added processing operations. These include crude petroleum and natural gas, agricultural products (vegetables and fruits), farm products (live cattle, fresh meat, milk, …etc.), minerals and the like.

Resource-Based (RB) products include food, agro-based products (e.g. wood manufactures), refined petroleum and rubber products, ore and metal concentrates, cement, cut gems, glass and the like.

- **RB1** includes processed agricultural and farm products (frozen and prepared vegetable and fruits, meat and dairy products, confectionary), tobacco, wood manufactures, and rubber products.
- **RB2** includes refined petroleum products, iron and steel scrap, basic metal ores, cement, glass, mineral manufactures, …etc.

Low-Tech (LT) products include the textile, apparel and footwear (fashion) sub-group, pottery, simple metal parts and structures, furniture, jewellery, toys, plastic products and the like.

- **LT1** includes the textile, apparel and footwear sub-group.
- **LT2** includes further processed iron and steel products, paper products, tools and wires, furniture, office supplies, jewellery, and musical instruments.

Medium-Tech (MT) goods comprise the bulk of skill- and scale-intensive technologies in the production of capital goods and intermediate products. They include automotive products, process industry products (such as synthetic fibres, chemicals and paints, fertilizers, and plastics), and engineering products such as engines and industrial machinery.

- **MT1** includes passenger motor vehicles, lorries, and automotive components.
- **MT2** includes synthetic fibres, chemicals, cosmetics, fertilizers, plastic materials, and high-end iron and steel products.
- **MT3** includes engines and motors, engineering equipment, different types of manufacturing machinery, ships and boats, radio and sound equipment, etc.

High-Tech (HT) products come from industrial sectors that are intensely innovation-driven and where R&D activities are key inputs in the process. These include office and telecommunications equipment, optical instruments, precision instruments, pharmaceuticals and the like.

- **HT1** includes office and telecom equipment, power-generation machinery, and electric machinery.
- **HT2** includes pharmaceuticals, optical instruments, aircraft, and precision instruments.

Sources: UNIDO 2003, UNIDO 2004 and UNIDO 2005a.

Annex 3.2: Breakdown of value added to GDP by sector (per cent) for the years 1970, 1980, 1990, 2000 and 2004

	Saudi Arabia	Jordan	Morocco	Egypt	Tunisia	Turkey	Brazil	Chile	China	Czech Republic	India	Indonesia	Malaysia	Rep. of Korea
1970														
Agriculture	**4.5**	11.6	19.9	29.4	17.0	39.5	12.3	6.9	35.2	–	46.1	44.9	29.4	29.2
Industry	**62.6**	19.0	27.0	28.2	20.6	20.1	38.3	42.0	40.5	–	20.7	18.7	27.4	26.0
Manufacturing	***8.8***	*11.3*	*16.2*	–	*8.4*	*12.5*	*29.3*	*25.9*	*33.7*	–	*13.8*	*10.3*	*12.4*	*17.8*
Services	**32.9**	69.4	53.1	42.4	62.4	40.3	49.4	51.1	24.3	–	33.7	36.4	43.2	44.7
1980														
Agriculture	**1.0**	7.9	18.4	18.3	14.1	26.4	11.0	7.3	30.1	–	38.9	24.0	22.6	16.2
Industry	**71.6**	28.0	30.9	36.8	31.1	22.2	43.8	37.4	48.5	–	24.5	41.7	41.0	36.6
Manufacturing	***4.1***	*12.7*	*16.8*	*12.2*	*11.8*	*14.3*	*33.5*	*21.5*	*40.5*	–	*16.3*	*13.0*	*21.6*	*24.4*
Services	**27.4**	64.1	50.6	45.0	54.8	51.4	45.2	55.3	21.4	–	36.6	34.3	36.3	47.3
1990														
Agriculture	**5.7**	8.1	17.7	19.4	15.7	18.3	8.1	8.7	27.0	6.2	31.3	19.4	15.2	8.9
Industry	**48.8**	28.1	32.4	28.7	29.8	29.8	38.7	41.5	41.6	48.8	27.6	39.1	42.2	41.6
Manufacturing	***8.6***	*14.9*	*18.4*	*17.8*	*16.9*	*19.5*	–	*19.6*	*32.9*	–	*17.1*	*20.7*	*24.2*	*27.3*
Services	**45.5**	63.8	49.8	52.0	54.5	51.9	53.2	49.8	31.3	45.0	41.1	41.5	42.6	49.5
2000														
Agriculture	**4.9**	2.3	13.8	16.7	12.4	15.4	7.3	6.1	14.8	4.0	23.7	15.6	8.8	4.9
Industry	**53.9**	25.5	31.9	33.1	28.6	25.3	28.0	38.4	45.9	39.2	26.3	45.9	50.7	40.7
Manufacturing	***9.7***	*15.7*	*17.6*	*19.4*	*18.2*	*15.7*	*17.1*	*19.5*	–	*26.7*	*15.6*	*27.7*	*32.6*	*29.4*
Services	**41.1**	72.1	54.2	50.1	59.1	59.4	64.7	55.5	39.3	56.8	50.0	38.5	40.5	54.4
2004														
Agriculture	**4.0**	2.8	15.9	15.1	12.6	12.9	10.4	5.8	13.1	3.4	19.6	15.6	9.5	3.7
Industry	**58.9**	28.9	30.4	36.9	27.8	22.4	40.0	44.6	46.2	38.6	27.3	44.3	50.4	40.8
Manufacturing	***10.1***	*18.8*	*16.5*	*18.3*	*17.8*	*13.9*	–	*18.6*	–	*26.4*	*16.0*	*28.7*	*31.4*	*28.7*
Services	**37.1**	68.4	53.8	48.0	59.6	64.7	49.6	49.6	40.7	58.0	53.2	41.4	40.1	55.5

Notes: 1) Manufacturing value added is part of Industry value added.
2) The totals for Agriculture, Industry and Services value added may not add up to 100 due to rounding.
Source: Based on World Bank, WDI Online (accessed 16 October 2006).

The data source for the figures is the World Bank, World Development Indicators database, which might be slightly different to those in the UNIDO Industrial Scoreboard database. However, it is useful to indicate the distribution of value added across other sectors, as well as the magnitude of non-manufacturing industrial value added.

Annex 3.3: Growth in manufactured exports by technological breakdown, 1985-1995 and 1995-2005

	A.A.G.R. 1985-1995					A.A.G.R. 1995-2005				
	RB	LT	MT	HT	Total	RB	LT	MT	HT	Total
Saudi Arabia	**7.7**	**17.4**	**15.3**	**5.7**	**9.8**	**11.1**	**10.0**	**12.4**	**29.3**	**11.6**
Jordan	17.1	2.9	13.2	7.5	11.0	4.3	26.6	5.1	8.0	10.6
Morocco[a]	8.0	12.8	12.3	11.7	10.3	5.8	13.9	9.1	45.3	10.9
Egypt[a]	9.5	20.9	38.5	23.0	16.0	19.8	-0.3	15.3	6.1	11.6
Tunisia[a]	14.8	23.3	13.5	25.9	19.2	6.0	4.9	10.8	10.8	6.5
Turkey[a]	10.9	12.9	11.8	18.6	12.4	8.5	10.6	19.1	26.9	13.4
Brazil	6.6	5.9	8.9	6.5	7.2	8.0	5.6	10.3	19.2	9.2
Chile[a]	18.4	32.4	22.6	29.4	19.3	8.9	3.2	10.3	11.0	8.7
China	21.5	39.0	44.0	50.9	36.4	14.4	13.3	19.6	29.3	18.5
Czech Republic[a]	–	–	–	–	–	8.1	9.5	16.0	23.7	13.8
India[a]	12.8	15.3	18.5	18.2	14.9	14.1	8.8	15.3	13.0	12.0
Indonesia	15.4	32.6	35.1	31.6	22.4	5.9	3.6	8.5	15.0	6.5
Malaysia	10.8	26.7	30.7	29.3	22.4	3.9	5.0	6.1	7.4	6.2
Rep. of Korea	14.4	8.1	15.4	26.3	15.2	13.1	1.9	9.6	10.1	8.8
World	**9.9**	**13.5**	**11.7**	**15.8**	**12.5**	**6.8**	**5.0**	**6.6**	**8.3**	**6.8**

Notes: A.A.G.R. signifies MVA average annual real growth rate (in %). RB stands for 'resource-based', LT for 'low-tech', MT for 'medium-tech', and HT for 'high-tech'. Total includes all these categories, excluding primary products.
a) Data refer to 2004 instead of 2005.
Source: UNIDO 2005b, based on calculations from the UN Comtrade Database, accessed via World Integrated Trade Services (WITS), World Bank, October 2006.

Annex 3.4: Export concentration in the KSA and comparators, 1980, 1990 and 2003

	Export Concentration Index		
	1980	1990	2003
Saudi Arabia	**0.942**	**0.735**	**0.737**
Jordan	0.186	0.317	0.146
Morocco	0.319	0.162	0.164
Egypt	0.188	0.244	0.323
Tunisia	0.481	0.202	0.170
Turkey	0.142	0.117	0.090
Brazil	0.152	0.101	0.088
Chile	0.459	0.396	0.268
China	0.037	0.080	0.100
Czech Republic	–	–	0.088
India	0.112	0.141	0.120
Indonesia	0.530	0.267	0.125
Malaysia	0.303	0.184	0.215
Rep. of Korea	0.093	0.104	0.154

Note: Based on Herfindahl-Hirschmann Index; Values closer to 1 indicate higher export concentration.
Source: UNCTAD 2005.

Annex 3.5: Evolution of manufactured export concentration in the KSA, 1992-2002

SITC No.	Group Name	Technological Classification	Average Export Value 1992-2002 (US$ Mn)	Average Share in Total Exports 1992-2002 (%)	Share of Top 5 Products in Total Manufactured Exports (%)		Share of Top 10 Products in Total Manufactured Exports (%)	
					1992	2002	1992	2002
334	Petroleum products, refined	RB2	7,304.2	13.3%	76.4%	81.1%	87.4%	86.9%
583	Polymers and copolymers	MT2	1,094.0	2.0%				
512	Alcohols, phenols etc	MT2	910.8	1.7%				
511	Hydrocarbons, derivatives	RB2	564.8	1.0%				
516	Other organic chemicals	RB2	448.4	0.8%				
522	Inorg. chemical elements, oxides	RB2	299.7	0.5%	–	–		
562	Fertilizers, manufactured	MT2	278.1	0.5%				
642	Paper and paperboard	LT2	117.3	0.2%				
673	Iron, steel shapes etc	LT2	115.2	0.2%				
661	Lime, cement, building material	RB2	99.3	0.2%				
333	***Crude petroleum***	***PR***	***41,528.5***	***75.5%***				

Note 1) The share of the top 5 and top 10 products in total manufactured exports excludes crude petroleum.
2) SITC group 341 (Gas, natural and manufactured) is excluded due to data discontinuity. It is worth mentioning that it was positioned as the fifth group in 1992 with total export value of US$ 2.1 billion, which is equivalent to 20.6% of the value of total manufactured exports in 1992. However, starting 1994, exports from this group declined drastically (possibly due to an increase in domestic consumption) and thus its exclusion does not affect the analysis.

Source: UNIDO 2005b, based on calculations from the UN Comtrade Database, accessed via World Integrated Trade Services (WITS), World Bank, March 2005.

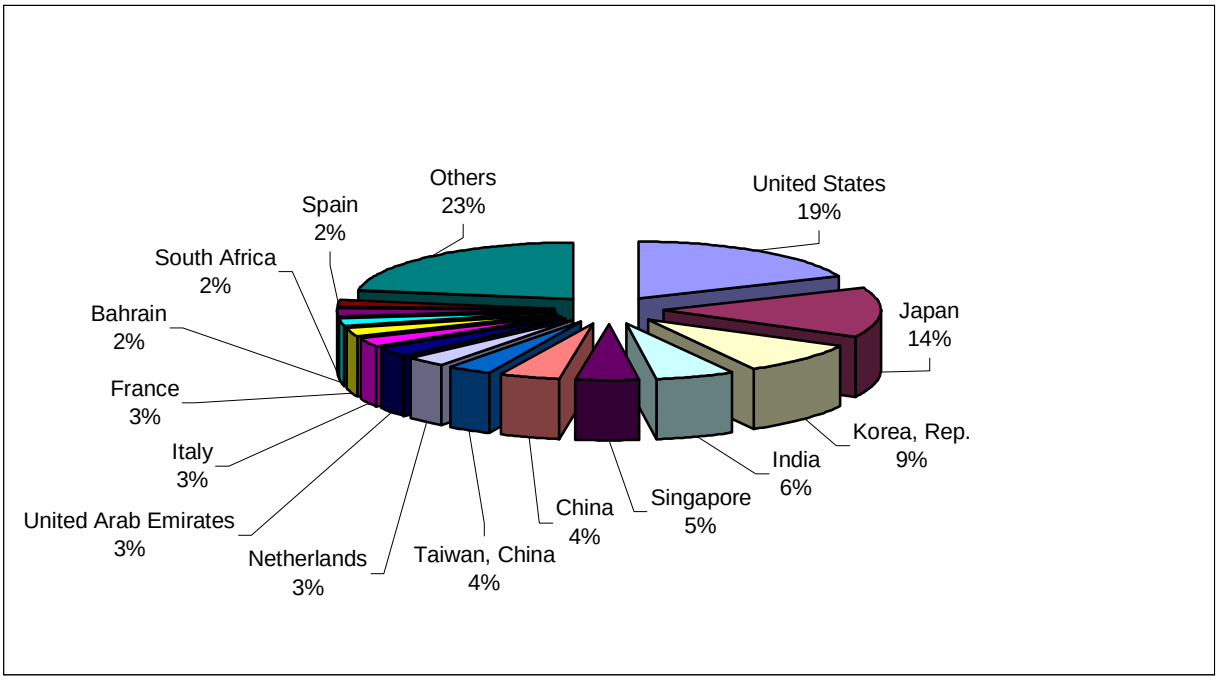
Annex 3.6: The KSA Performance in the World's 40 Most Dynamic Exports, 1992-2002

Rank	SITC Code	SITC Group Name	Flow Name	World		Saudi Arabia	
				A.A.G.R. 1992-2002	Share in World Exports in 2002 (%)	A.A.G.R. 1992-2002	Share in World Exports in 2002 (%)
1	871	Optical instruments	Export	13.6	0.31	41.3	0.00
2	541	Medicinal and pharmaceutical products	Export	12.9	2.87	33.3	0.02
3	776	Transistors, valves etc	Export	11.6	3.89	8.3	0.00
4	341	Gas, natural and manufactured	Export	10.8	1.3	-	0.00
5	764	Telecommunications equipment and parts	Export	10.5	3.23	15.4	0.00
6	515	Organo-inorganic compounds	Export	9.8	0.62	-8.1	0.00
7	872	Medical instruments and appliances	Export	8.1	0.49	76.4	0.01
8	333	Crude petroleum	Export	8.1	4.65	3.4	20.74
9	759	Office machines, parts and accessories	Export	8.1	2.24	-	0.00
10	533	Perfumery, cosmetics, etc	Export	7.9	0.47	26.4	0.22
11	752	Automatic data processing machines	Export	7.8	2.91	-12.4	0.00
12	714	Engines and motors, non-electric	Export	7.4	0.89	34.9	0.00
13	771	Electric power machinery and parts	Export	7.3	0.46	2.1	0.02
14	514	Nitrogen-function compounds	Export	7.0	0.67	-19.1	0.01
15	772	Switch-gear etc, parts, n.e.s.	Export	6.9	1.41	8.0	0.00
16	773	Equipment for distributing electricity	Export	6.9	0.62	-1.7	0.24
17	778	Electrical machinery and apparatus, n.e.s.	Export	6.8	1.52	19.6	0.01
18	821	Furniture and parts thereof	Export	6.7	1.14	3.4	0.03
19	658	Textile articles, n.e.s.	Export	6.5	0.32	28.7	0.05
20	582	Products of condensation ect.	Export	6.5	0.58	18.1	0.14
21	334	Petroleum products, refined	Export	6.5	2.32	6.5	6.60
22	893	Articles of plastics, n.e.s.	Export	6.4	1.15	14.6	0.20
23	899C	Other manufactured goods	Export	6.4	0.42	5.1	0.00
24	664	Glass	Export	6.3	0.34	14.5	0.37
25	846	Under garments, knitted or crocheted	Export	6.3	0.52	45.4	0.00
26	598	Miscellaneous chemical products, n.e.s.	Export	6.2	0.78	-2.5	0.08
27	533	Pigments, paints etc	Export	6.2	0.43	7.2	0.27
28	699	Manufacturers of base metal, n.e.s.	Export	6.1	0.88	-3.1	0.11
29	761	Television receivers	Export	6.1	0.53	-	0.00
30	667	Pearls, precious & semi-precious stones	Export	6.0	0.81	68.8	0.00
31	743	Pumps and compressors, fans, etc.	Export	6.0	0.72	0.1	0.01
32	716	Rotating electric plant and parts	Export	5.9	0.52	41.6	0.01
33	781	Passenger motor cars, for transport	Export	5.9	5.86	-	0.00
34	684	Aluminum	Export	5.9	0.81	5.6	0.09
35	874	Measuring, checking, anslysing instruments	Export	5.8	1.24	26.0	0.00
36	713	Internal combustion piston engines	Export	5.8	1.23	40.8	0.00
37	048	Cereal etc. preparations	Export	5.8	0.37	8.7	0.20
38	784	Motor vehicle parts and accessories	Export	5.5	2.73	11.0	0.01
39	672	Iron, steel primary forms	Export	5.4	0.49	8.5	0.02
40	098	Edible products and preparations, n.e.s.	Export	5.4	0.30	15.3	0.05

Notes: 1. The table includes only export groups whose share in world exports in 2002 was 0.3% or more.
2. Shaded rows highlight product groups where Saudi world market share in 2002 was 0.1% or more, and also its average annual growth rate exceeded that of total world exports of the respective groups.

Source: UNIDO 2005b, based on calculations from the UN Comtrade Database, accessed via World Integrated Trade Services (WITS), World Bank, March 2005.

Annex 3.7: Main export markets of the KSA in 2003



Note: Totals may not add up to 100% due to rounding.
Source: UNIDO 2005b, based on calculations from the UN Comtrade Database, accessed via World Integrated Trade Services (WITS), World Bank, October 2006.

Annex 3.8: KSA Main Export Markets, 1995 and 2003

	1995		2003	
	Value (US$ Billion)	Share in Total Exports (%)	Value (US$ Billion)	Share in Total Exports (%)
United States	8.0	16.3	17.4	18.7
Japan	6.0	12.3	13.2	14.1
Rep. of Korea	0.2	0.5	8.5	9.1
India	0.4	0.7	5.5	5.9
Singapore	0.3	0.6	4.3	4.6
China	0.1	0.3	4.1	4.4
Taiwan Province of China	0.3	0.6	3.3	3.5
Netherlands	1.8	3.7	2.8	3.0
United Arab Emirates	0.7	1.4	2.6	2.8
Italy	1.4	2.8	2.4	2.5
France	2.4	4.9	2.3	2.5
Bahrain	0.2	0.4	2.2	2.3
South Africa	0.0	0.0	2.0	2.1
Spain	1.1	2.2	1.7	1.9
Other	26.1	53.3	21.1	22.6
Total Exports	**49.0**	**100.0**	**93.2**	**100.0**

Source: UNIDO 2005b, based on calculations from the UN Comtrade Database, accessed via World Integrated Trade Services (WITS), World Bank, October 2006.

Annex 3.9: Revealed Comparative Advantage (RCA) and technological upgrading (Average 2000-2002)

	PR	RB1	RB2	RB	LT1	LT2	LT	MT1	MT2	MT3	MT	HT1	HT2	HT
Saudi Arabia	**5.58**	**0.05**	**1.86**	**1.04**	**0.03**	**0.11**	**0.08**	**0.00**	**0.59**	**0.02**	**0.14**	**0.00**	**0.01**	**0.00**
Oman	5.84	0.57	0.22	0.38	0.14	0.13	0.13	0.62	0.21	0.10	0.28	0.04	0.09	0.05
Egypt	1.89	0.53	4.55	2.73	2.12	0.68	1.30	0.01	0.89	0.26	0.33	0.02	0.21	0.07
Tunisia	0.93	0.80	1.00	0.91	7.15	0.44	3.34	0.14	0.89	0.65	0.55	0.23	0.07	0.19
Turkey	0.71	0.98	0.65	0.80	5.20	1.36	3.02	0.73	1.11	0.63	0.77	0.29	0.35	0.30
China	0.49	0.55	0.59	0.57	3.74	1.77	2.62	0.16	0.72	0.86	0.62	1.33	0.37	1.06
Chile	3.58	3.05	2.22	2.59	0.15	0.26	0.21	0.11	0.56	0.09	0.20	0.02	0.07	0.03
Czech Republic	0.30	1.24	0.71	0.95	0.97	2.15	1.64	1.61	0.90	1.22	1.27	0.80	0.34	0.67
Poland	0.74	1.64	0.70	1.12	1.38	2.28	1.89	0.93	0.89	1.30	1.09	0.42	0.23	0.36
Malaysia	0.73	1.32	0.41	0.82	0.50	0.62	0.57	0.04	0.62	0.75	0.51	2.97	0.32	2.24
Indonesia	2.25	2.25	1.00	1.56	2.18	0.78	1.38	0.09	0.80	0.39	0.39	0.61	0.08	0.47

Notes: PR stands for 'primary exports', RB for 'resource-based', LT for 'low-tech', MT for 'medium-tech', and HT for 'high-tech'. RCA indices calculated according to the Balassa Formula..

Source: UNIDO 2005b, based on calculations from the UN Comtrade Database, accessed via World Integrated Trade Services (WITS), World Bank, March 2005.

Annex 3.10: Employment Disaggregated by Sector, 1990, 2000 and 2003

	Saudi Arabia[a]	Oman	Egypt[a]	Turkey	Chile	Czech Republic[a]	Polanmd	Chile[a]	Indonesia[a]	Malaysia
1990										
Agriculture	–	–	39.0	46.9	19.3	–	25.2	53.5	55.9	26.0
Industry	–	–	20.7	20.7	25.2	–	37.0	19.0	13.7	27.5
Manufacturing	–	–	*13.0*	*14.8*	*16.1*	–	*25.0*	*13.5*	*10.1*	*19.9*
Services	–	–	40.1	32.4	55.5	–	35.8	9.9	30.2	46.5
2000										
Agriculture	6.1	6.4	29.6	36.0	14.4	5.1	18.8	46.3	45.3	18.4
Industry	19.9	11.2	21.3	24.0	23.4	39.5	30.8	17.3	10.9	32.2
Manufacturing	*7.7*	*4.9*	*11.9*	*16.9*	*14.0*	*27.1*	*20.0*	*11.2*	*13.0*	*22.8*
Services	73.9	82.1	49.1	40.0	62.2	55.3	50.4	12.7	37.3	49.5
2003										
Agriculture	4.721.0	–	27.5	33.9	13.6	4.8	18.4	44.1	44.3	14.3
Industry	7.6	–	20.6	22.8	23.4	39.6	28.6	17.7	18.8	32.0
Manufacturing	*74.2*	–	*11.6*	*17.3*	*14.0*	*27.7*	*19.0*	*11.3*	*13.2*	*21.6*
Services	–	–	51.9	43.4	63.0	55.5	53.0	16.1	36.9	53.7

Note: Totals for agriculture, industry and services may not addu up to 100.
a) Data for 2002.
Source: ILO Online Statistical Database (accessed 25 February 2005).

Annex 3.11: Labour productivity growth in selected ESCWA Member countries (1980-2001)

	Labour Productivity Growth
Jordan	-1.5
Saudi Arabia	-2.9
Syrian Arab Republic	-0.2
United Arab Emirates	-2.4
Yemen	0.2
Source: ILO 2005.	

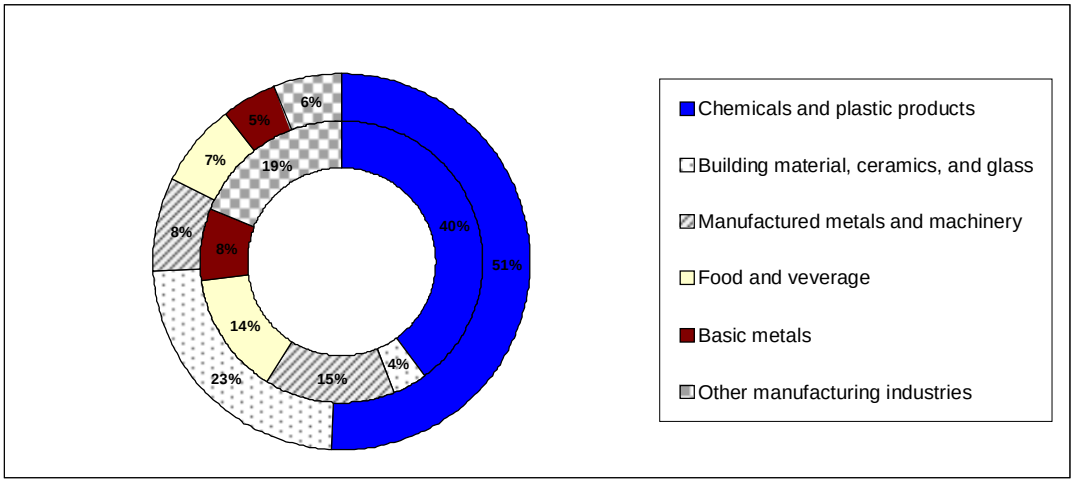
C: Annexes to Chapter 5

Annex 5.1: Gross secondary enrolment ratio (per cent)

	1990	2000	2004
Saudi Arabia	**46.6**	**67.8**	**67.8**
Jordan	63.3	87.7[a]	87.4
Morocco	35.5	39.3[a]	47.6
Egypt	76.3	85.7	87.1
Tunisia	44.9	78.3	81.3
Turkey	47.3	57.7[a]	79.2
Brazil	38.3	108.5	102.0[b]
Chile	73.5	85.5	89.1
China	48.7	68.2	72.5
Czech Republic	91.2	94.6	95.7
India	44.2	48.7	53.5
Indonesia	45.5	57.0	64.1
Malaysia	56.3	70.3	75.8[b]
Rep. of Korea	89.8	94.1	92.9[c]

Notes: Gross enrolment ratio reflects total enrolment in a specific level of education, regardless of age, expressed as a percentage of the population in the official age group corresponding to this level of education (UNESCO, 2006).
These data contain UNESCO estimations. Moreover, percentages may exceed 100 per cent due to the inclusion of over and under-aged students because of early or late entrants and grade repetition. In these cases, interpretation of the ratio needs to be made with caution.
Indicators for 1990 and 2000 may not be comparable in the cases of Chile and Jordan, due to changes in the school-age group between 1990 and 2000, with implications for the duration of secondary education. This may also be relevant in making comparisons between 1990 and 2004. The year 2004 denotes the school year that ended in 2004.
a) Data refer to 1999/2000.
b) Data refer to school year ending in 2003.
c) Data refer to school year ending in 2005.
Sources: UNESCO 2003; UNESCO 2006.

Annex 5.2: Breakdown of Total Bank Financing by Industrial Sector



Source: SAMA Annual Report (2004).

Annex 5.3: FDI contribution to GDP and gross fixed-capital formation: 1985, 1990, 2000 and 2003

	FDI net inflows (% of GDP)				FDI net inflows (% of gross fixed-capital formation)			
	1985	1990	2000	2003	1985	1990	2000	2003
Saudi Arabia	**0.6**	**0.3**	**0.1**	**0.4**	**2.3**	**1.6**	**0.6**	**1.6[a]**
Jordan	0.5	0.9	9.4	4.3	2.6	3.6	48.3	3.4[a]
Morocco	0.2	0.6	1.3	5.2	0.7	2.7	5.3	22.5
Egypt	2.0	1.0	1.2	0.3	6.4	4.6	7.2	4.3[a]
Tunisia	1.7	0.7	4.0	2.3	6.0	2.9	15.4	9.2
Turkey	0.1	0.5	0.5	0.7	0.7	2.0	2.2	3.5[a]
Brazil	0.7	0.2	5.4	2.1	4.0	1.0	28.2	19.6[a]
Chile	0.9	2.0	6.5	6.1	5.1	8.0	31.3	18.2[a]
China	0.7	0.9	3.8	3.8	2.2	3.5	10.3	10.4[a]
Czech Republic	–	–	9.0	2.3	–	–	32.7	9.1
India	0.0	0.1	0.5	0.7	0.2	0.3	2.3	2.9[a]
Indonesia	0.4	1.0	-3.0	-0.3	1.5	3.4	-14.3	0.4[a]
Malaysia	2.2	5.9	4.2	2.4	7.5	17.9	16.4	10.8
Republic of Korea	0.2	0.3	1.9	0.7	0.8	0.8	6.6	2.3[a]

Note: Data for 2004 were not available for FDI net inflows (% of GDP) and FDI net inflows (% of gross fixed-capital formation).
a) Data refer to 2002.
Source: UNCTAD, FDI Online (accessed 25 October 2006). http://stats.unctad.org/fdi/ReportFolders/ReportFolders.aspx.

D: Annexes to Chapter 7

Annex 7.1: Old (closed) and new (open) R&D models

Closed innovation model:

- Firms select desired technologies
- Firms perform R&D in-house
- Firms put technologies in products
- Product revenues fund additional R&D
- Globalization (1) adjusts products to markets

Open innovation model:

- Strategic R&D – integral to business strategy
- Technology acquisition (licensing, corporate venturing, alliances)
- Externalization of R&D (outsourcing, firms research institutes, university centres of excellence)
- Globalization (2) taps global talent pools

Annex 7.2: Knowledge economy & RIS: From coordinated markets to liberal markets

Institutional RIS (IRIS)	Entrepreneurial RIS (ERIS)
Research & Development Driven	Venture Capital Driven
User-Producer Relations	Serial Start-ups
Technology-Focused	Market-Focused
Incremental Innovation	Incremental & Disruptive
Bank Borrowing	Initial Public Offerings
External Supply-Chain Networks	Internal Eco Notes
Science Park	Incubators
Source: Chesbrough 2003.	

E: Annexes to Chapter 8

Annex 8.1: Case study on regional development in Finland

The region of Lahti in Finland was found to be weak in modern talent, knowledge and educational performance. Locked in to a declining mass-market furniture manufacturing profile, the region's leaders sought to envision a new future by:

- Analyzing its potential related to regional expertise;
- Grading regionally, by expert panels, the region's entrepreneurship, growth potential, firm-size balance, global perspective, innovativeness, knowledge intensity, leadership capability, educational quality, research and technology-transfer expertise;
- Comparing industry grades identifying "related variety" of industries was stimulated by innovation system building around potential industry "platforms";
- Integrating industry platforms into global trends to selected "related variety", for example, healthcare industry integrating materials, mechatronics and nanotechnology.

In the first documented case of this approach in Finland, the key actors diversified away from a declining furniture industry by identifying future advantage in the healthcare industry. The new stakeholder platform included industry stakeholders (from firms in plastics, construction, furniture and metal), research and education stakeholders (public healthcare organizations, higher education and research organizations) and the "governance" leader – the regional development agency, incubators and talent development centres.

This approach changed the assumptions of key actors and raised awareness of the crucial importance of regional innovation institutions. Old industrial policy mentalities and measures were transcended, while the power of multi-actor networks was discovered and entrenched in the region.

Most importantly, under the old system, the problems of limited access to knowledge and of integration asymmetries had been overwhelming. Secondly, creative thinking about the future had been vague and had not translated into specific strategies. This was solved by formulation of a special model of knowledge creation similar to balanced scorecard methodology.

The new model enables better cooperation between knowledge exploration (research) organizations and knowledge exploitation (commercial enterprises) sub-systems in the region and between regions where knowledge is imported.

Source: Harmaakorpi 2006.

Annex 8.2: The petrochemical cluster development in Singapore: Role of the Government

While petrochemicals markets in many developed countries have reached maturity, the petrochemical industry in Singapore started growing very rapidly in the 1990s, and expanded by 11 per cent in 2005. Strong demand for petrochemical products in the Asian region (mainly China) has offset declining margins and has led to greater competition in the industry.

In the early 1980s, Singapore chose to develop the chemical industry cluster. In 1984, the Government commissioned the Petrochemical Corporation of Singapore to build the Pulau Ayer Merbau petrochemical complex. Singapore now offers a full range of chemical industry services such as refining, bunkering, petrochemical production, fine and specialty chemicals, oil trading and oilrig manufacturing to companies in the region and worldwide.

The development of an integrated petrochemical complex on Jurong Island based on the cluster approach has played a central role in this development strategy. What makes this cluster so successful?

Factor conditions
Singapore's leading position as an oil refinery centre in East Asia has led numerous downstream players to co-locate here for cost competitiveness reasons. The main attractions of Singapore are its excellent infrastructure, political stability, efficient administration, pro-market environment, skilled workforce, good labour relations and a high commitment to excellence. In addition, the Government's cluster initiatives have created factor inputs that attract downstream players, building in turn favourable demand conditions for the petrochemicals industry.

A fully integrated petrochemical complex with shared facilities, Jurong Island, was created to enable petrochemical and chemical plants to co-locate with their sources of feedstock (the oil refineries) and reduce logistics costs. According to the Economic Development Board, the concept of sharing common facilities and utilities by locating businesses close to one another has helped companies to save up to 20 per cent of their capital cost.

Companies on the island share marine facilities (piers and berthing), waste treatment, chemical warehousing, fire fighting, medical and emergency response services, roads and drainage infrastructure and service pipelines. Service pipelines are a form of common service corridor that runs around Jurong Island so that companies located at any part of the island can have easy access to them. By "plugging in" to the service pipelines, companies can transfer raw materials, finished products and obtain utilities services effortlessly. Besides eliminating the needs of individual companies to deal with complex infrastructure development and high costs, this feature also means that new operations can be set up more rapidly. "Plug and pay" capability is a key element of Jurong Island's strategic advantage.

Government as stakeholder
The Government has provided incentives to encourage start-ups. Through its pilot agency, the Economic Development Board, the Government is prepared to jumpstart projects by taking minority stakes in ventures.

Related and supporting industries/services
The key industries that provide support to petrochemical firms are logistics, utilities, engineering and the finance industry. They play a vital role in supporting the petrochemical firms in their operations. The engineering industry includes design, construction and maintenance of plants and pipelines. The utilities industry helps to power and supply services for operating the petrochemical plants. These include supply of gas, steam, cooling water, demineralised water and process water, as well as providing waste-water treatment.

Free Trade Agreements (FTAs)
The Government has embarked on a series of bilateral FTAs with individual countries since 2002, which helps to attract foreign companies to invest in Singapore because of potential tariff savings.

Human resource development

In 1992, the Government established the Chemical Industry Manpower Advisory Committee to advise on matters such as industry best practices, training and education, and manpower development. The committee put forward three important strategies in developing human resources in the industry:

- Universities to increase intake by 20 per cent;
- Develop training classes in core manufacturing techniques for plant personnel;
- Attract overseas talent.

To close the gap between academic training and practical know-how, the Government has built the Chemical Process Technology Centre on Jurong Island. This facility has the capacity to train 800 students and 8,000 workers annually for both the chemical and pharmaceutical industries. The training gives participants the opportunity to operate in a real-size plant classroom environment. This facility not only helps to shorten the time required for on–the-job training but also provides a platform for workers in the industry to continuously upgrade their skills.

A school outreach programme has also been launched, which promotes better understanding of the industry and fosters awareness of career opportunities.

Institutions and associations

The needs and problems of the chemical manufacturers in Singapore are being addressed by the Singapore Chemical Industry Council, which was set up in 1979. This association plays an important role in forging links between companies, addressing both the individual company and industry needs to the government.

In sum, the experience of Singapore's petrochemical sector suggests that the Government as a facilitator, not a master strategist, creates opportunities for cluster participants to organize, identify and solve common problems, from which private sector leadership will emerge to drive the process.

Source: Pillai 2005.

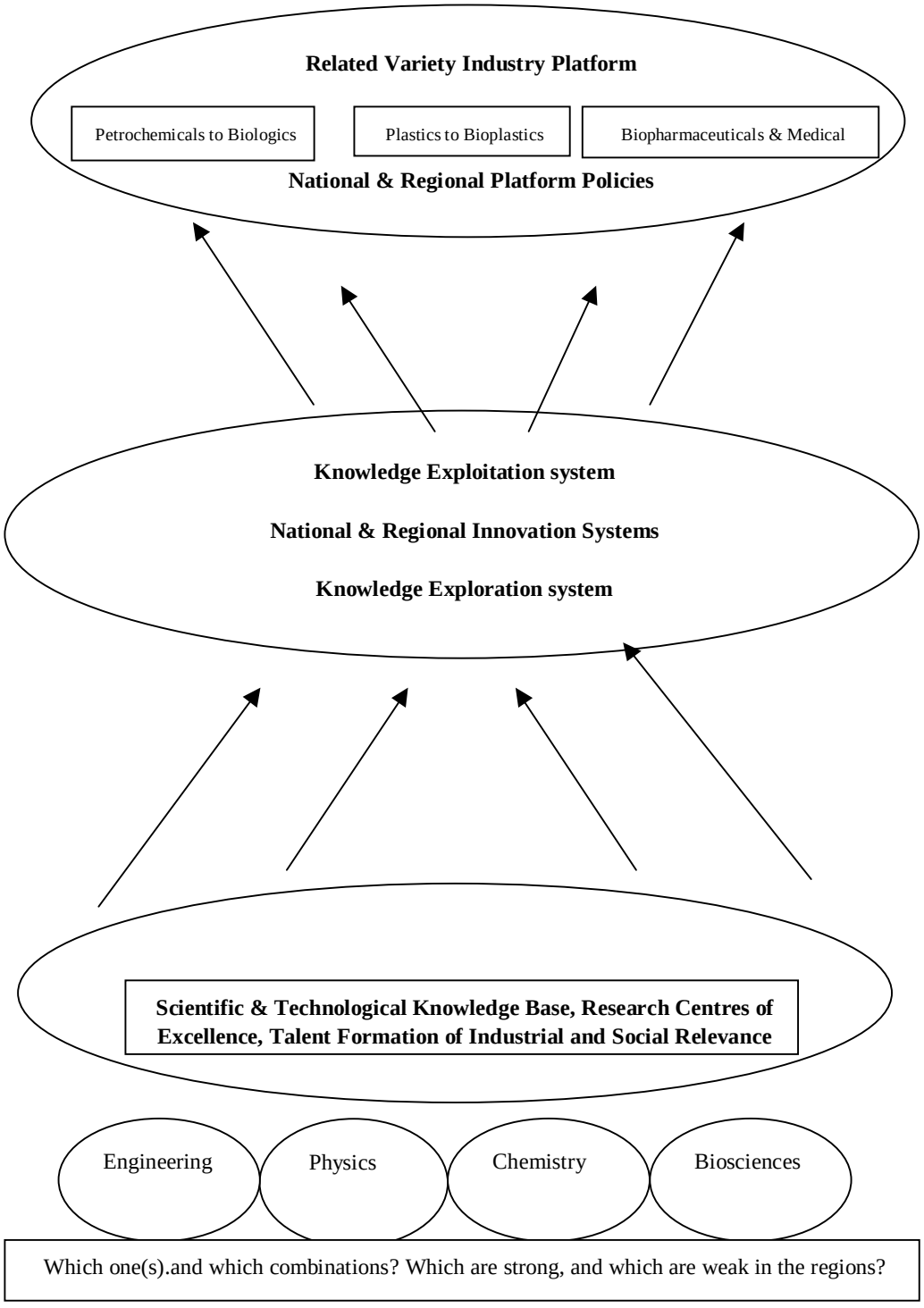
Annex 8.3: Case study of Singapore's *Biopolis* cluster: A strategy of created advantage

Singapore's Government biotechnology initiatives started in 1987 with the establishment of the Institute of Molecular & Cellular Biology at the National University of Singapore, which became industrially important in the 2000–2004 period. The aim was to build a biotechnology cluster by attracting FDI, a policy that worked well in previous developmental stages to support development of petrochemicals, electronics and ICT. Four new institutes in bioinformatics, genomics, bioprocessing and nanobiotechnology have been established at a cost of US$150 million to 2006. Public venture capital of US$200 million has been committed to three bioscience investment funds to fund start-ups and attract FDI. A further US$100 million is earmarked for attracting up to five globally leading corporate research centres. The *Biopolis* is Singapore's intended world-class R&D hub for the geo-region. The *Biopolis* is dedicated to biomedical R&D activities and designed to foster a collaborative culture among the institutions present and with the nearby National University of Singapore, the National University Hospital and Singapore's Science Parks. Internationally celebrated scientists have also been attracted.,

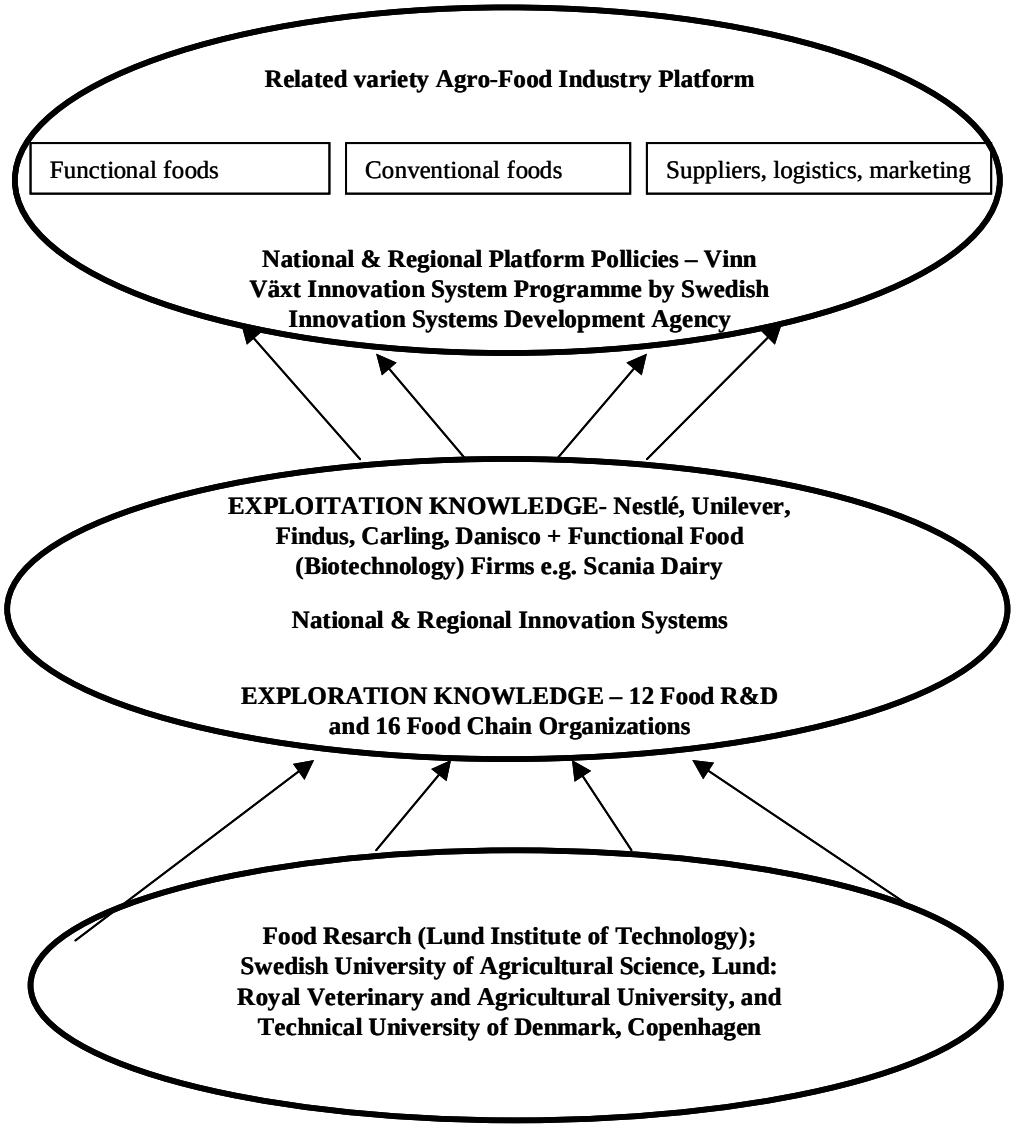
These are "magnet" appointments meant to attract talent and create cluster conventions and practices among research centres. The sector now numbers 38 firms, of which 15 are indigenous start-ups and 23 involve FDI in R&D, manufacturing, clinical research organizations (CRO) and other services. Johns Hopkins, MIT, Duke University, Columbia University and the Indian Institute of Technology have established facilities in Singapore. Singapore's Bioethics Advisory Committee advised acceptance of embryonic stem cell but not human cloning research, which is also a globally attractive locational factor. Pharmaceuticals firms from overseas manufacturing in Singapore include Glaxo since 1989, Schering-Plough (1997), Genset (now Serono, subsequently in 2006 acquired by Merck of Germany) (1997), Aventis (2000; acquired by Sanofi in 2004), Merck (2001), Wyeth (2002), and Pfizer (2004).

In sum, the *Biopolis* is host to a large number of mainly United States and European R&D laboratories of "big pharma" businesses. It has strength in public research activity and small signs of growth in stem cell exploration and exploitation activity. The benign regulatory environment allowing embryonic stem cell research is undoubtedly an attraction that, in the context of Singapore's celebrated "developmentalist state" capabilities, will stimulate cluster growth as an "offshore" research and production platform targeting the burgeoning Asian market.

Annex 8.4: Conceptual model linking the knowledge base, the innovation system and a bio-industrial platform with platform policies (e.g. combination of training, innovation, environmental, marketing, etc.)



Annex 8.5: Agro-food innovation platform in Øresund region, Copenhagen-Lund-Malmö, Denmark – Sweden



Annex 8.6: Innovative platform policies

Source: UNIDO 2006b.

Annex 8.7: Japan's economic and industrial policy 2005: key features

Japan's mid to long-term development goal is to create new products and services through innovations in technologies and new business models, and to promote the values and lifestyles embodied by them to the international community. To meet such goals, the following policy initiatives will be undertaken, based on the New Industry Promotion:

- Investment in human resources and technology, and protection of intellectual property;
- Revitalization of SMEs and recovery of regional economies;
- Development of strategic trade policies, including the establishment of an East Asian Economic Group;
- Focusing on industry groups that utilize Japan's strengths;
- Creating competitive industries through innovation.

Based on the New Industry Promotion Strategy 2005, priority is given to:

- Maintenance and strengthening of the virtuous cycle involving highly specialized component/material industries, SMEs possessing core technologies, and the state-of-the-art industries they support;
- Utilization of intellectual property including human resources, technologies and customer networks;
- Re- establishment of safety and security through the recovery of trust in corporations and products.

Industry platforms
Strengthening of highly-specialized component/material industries.

Policy platform
Establishment of a policy platform package for highly specialized component/material industries and basic industries.

1. Prioritized support for companies that possess core technologies

2. Strengthening of cooperation between upstream and downstream companies, and technology development support
   - Effective sharing of information between upstream and downstream companies will be promoted.
   - Research and development as well as investment in supporting technology will be advanced.
   - R&D support for SMEs that work on technological innovation and other programmes will be radically strengthened.
   - The necessary legal measures for implementation of the above will be considered.

3. Promotion of R&D that will boost "power to integrate"
   - With the aim of promoting innovation from within highly specialized component/material industries, R&D that involves collaboration with users will be supported.
   - Establishment of an optimally regulated communication system for chemical substance information with appropriate management of such substances, in order to facilitate vertical collaboration between upstream and downstream industries.
   - Promotion of human resources development, which will help improve industrial competitiveness, will be developed through the following measures:
     (i) upgrade specialized human resources by promoting the establishment of graduate schools specialized in manufacturing, services and other areas;
     (ii) provision of education that meets industry needs.

Annex 8.8: Emerging industrial clusters in the KSA

The following are examples of areas where the cluster approach would be appropriate and the type of support that could be given.

i) Traditional oil and gas-related industries (e.g. plastics and related products, including packaging clusters)

Plastic products are a segment where SMEs could evolve in large numbers due to low volume, customised, order-related demand patterns. The segment also has synergies with other sub-sectors, such as pharmaceuticals and food processing in terms of manufacture of PET (polyethylene terephthalate) bottles etc. Support can be envisaged in terms of:

- Evolving SPVs (Special Purpose Vehicles) or consortia among enterprises to establish regional testing centres to facilitate tensile testing, material identification etc. There would also need to be mould maintenance facilities.

- Evolving SPVs among enterprises to establish regional training institutes for the skill development of the labour force is critical. This is also true for the packaging segment. Training may be in terms of mould design, processing and fabrication. It also needs to be advanced in terms of offering inputs for software (CAD/CAM) for new product development etc.

- Establishing die and mould making and compounding facilities in the form of CFCs (chlorofluorocarbons), particularly for SMEs.

- Appropriate PPP (Public Private Partnerships) policy schemes to be evolved in terms of assistance with the capital expenditure for the infrastructure-related initiatives specified above.

- Import of related inputs (e.g. metals/wood) through a group purchase scheme to facilitate optimal sourcing of inputs, particularly by SMEs, to enable them to manufacture a variety of products competitively. Many end-products with applications in the automobile, consumer durables and non-durables segment have a polymer/plastic constitution of between 30–80 per cent.

- Appropriate financing instruments need be developed to facilitate the initiative of optimally sourcing inputs.

Pharmaceuticals related sub-sectors/clusters. Interventions in this context may be envisaged in terms of:

- Facilitate evolution of consortia/SPVs to establish incubation centres on a PPP basis. This is to encourage greater transition to segments such as biologics – custom manufacturing services to the pharmaceutical industry to encourage new enterprise creation – particularly by SMEs.

- Generic promotion of cluster brands. Evolving SPVs of industry associations should pursue common market-development initiatives, e.g. encourage the establishment of common warehouses abroad by industry consortia for direct market access, specifically in new markets.

- Evolve appropriate PPP infrastructure schemes to give fiscal support to SPVs' capital expenditure.

- Establish raw material banks (group purchase schemes) to import inputs/products such as starch in optimal volumes with optimal container costs, sourcing etc.

- Evolve appropriate financing instruments in this context.

ii) Strategic industries: Competitive domestic-demand, employment-generating food security/energy and related clusters

Fishery/sea food sub-sectors/clusters: Interventions may be in terms of:

- Evolving consortia/SPVs among existing and potential entrepreneurs to establish common physical infrastructure: development of landing centres for catch, peeling and pre-processing sheds as per EU/USFDA norms, packaging centres, cold stores etc.
- Evolving appropriate PPP policy to provide fiscal support for capital expenditure on relevant PPP projects.
- Evolving group purchase consortia to help the KSA become a global reprocessing centre. Group purchase/import during "off-season" availability of regional catch may be critical.
- Evolving appropriate financing instruments to facilitate extended stocking of inputs.
- Establish energy networks: dedicated power sub-stations/plants (possibly including renewable energy sources in the long term), as the segment is energy-intensive.
- Appropriate policy to be evolved in the context of sustainable renewable energy exploitation by industry.
- Facilitating common brand promotion: establishing warehouses in target markets, evolution of market consortia (sharing vessels, operational expenditures on warehouses abroad) to target specific markets etc.
- Establish HACCP (Hazard Analysis Critical Control Point) and other food laws certification facilities for industry.

Food-processing clusters (fruit & vegetables, wheat, poultry etc.). Support may be envisaged in terms of:

- Establishing joint incubation centres and pilot plants on a PPP basis by industry associations and universities/R&D institutions. This will encourage existing and potential entrepreneurs to explore new products for domestic and export markets. It will also help existing industry move up the value chain.
- Evolving consortia/SPVs among existing and potential entrepreneurs to establish common physical infrastructure: warehouses, cold stores, testing centres, grading centres, rail/transport facilities, etc.
- Evolving appropriate PPP schemes to provide part assistance for capital expenditure to help implement the above.
- Develop group purchase consortia for stocking/importing/sourcing key raw materials off-season; import banks for consumables.
- Evolve appropriate financing instruments for stocking/bulk sourcing inputs.
- Assist industry chambers to establish an information bank, including on food laws worldwide. This will also facilitate greater export orientation.
- Establishing common rail infrastructure on a PPP model to facilitate sustainable and cheap transportation of commodities (inputs and output) region-wide.

- Explore scope for protecting cluster brands in terms of registration under a Geographical Indications Act. Generic brand protection and promotion may be facilitated.

Developing clusters of enterprises providing R&D and equipment/services related to renewable energy. Interventions may be envisaged in terms of:

- Resource mapping of the KSA/region to identify an optimal and sustainable resource base.

- Develop/induce new clusters, such as enterprises to manufacture core equipment/spares related to renewable energy. This may be facilitated by means of evolving common physical infrastructure and Common Facility Centres (CFCs) in terms of product design and calibration centres on a PPP model, i.e. through SPVs/consortia of enterprises.

- Custom and local manufacturing may be particularly critical in the light of related equipment such as the blades and bases for large wind-energy generators, relatively non-tradable products due to transport cost/bottlenecks of the lumpy equipment.

- Evolve appropriate group purchase schemes to facilitate import of inputs.

iii) Hi-tech industries

Intermediates, downstream chemicals and speciality chemicals clusters. Such sub-sector product categories may include those chemicals that have applications in perfumes, cosmetics and paints-related clusters. Some support is envisaged in terms of:

- Inducing clusters in terms of facilitating establishment of cluster parks on a PPP model. These should have common facilities such as: Effluent Treatment Facilities (ETFs), fabrication facilities for chemical vessels and tool and workshop facilities.

- Enterprises in related product categories may be encouraged to evolve consortia/SPVs for implementation.

iv) Emerging knowledge-based industries

Biotechnology. Support may be considered in terms of:

- Establishing incubation centre/pilot plants on a PPP basis (industry/R&D institution/university).

- The segment has close linkages with the food and agro sub-sector/cluster. Hence, its thrust will be towards encouraging enterprises/industry in such sub-sectors to establish the incubation centre on PPP basis.

- Evolution of appropriate policy/schemes to facilitate establishment of the facility on a PPP mode.

- A Cluster Business Information Centre to work closely with existing and potential industry to lend technology linkages.

- Available risk capital in terms of an innovation fund as well as capital from FIs without collateral through a proposed Credit Guarantee Fund specifically for SMEs.

v) Other non-oil related industries

Furniture. Support may be considered in terms of:

- Study tour to dynamic wood-working clusters in Italy/Malaysia/India. Encourage existing and potential entrepreneurs to enter the custom furniture manufacturing (commercial, household) markets in the KSA and the region. This could be facilitated by:
- Establishing a skill development institute on a PPP model by an evolved industry association.
- Evolving SPVs/consortia among industry and encouraging establishment of common facilities in terms of advanced finishing, blended furniture manufacturing (glass/other metals), and CAD/CAM facilities.
- Evolve appropriate PPP policy to partly support capital expenditures for relevant infrastructure on private-led PPP schemata.
- Formulate import banks/group purchase schemes/consortia for import of wood (especially eco-friendly/renewable wood e.g. rubber wood from Malaysia, etc.).
- Evolve appropriate financing instruments for facilitating the above.
- Facilitate evolution of marketing consortia to establish common retailing outlets, common transport and logistics facilities in the KSA and Arab region.
- Use services of proposed Cluster Business Information Centre to access market, design/trend and input sourcing and technology information.

Source: UNIDO.

Annex 8.9: Balanced Scorecard

The 'balanced scorecard' (BSC) method is a management system that spells out and clarifies the strategy's specific goals and defines the measurements of success. This helps regional stakeholders, companies and policy-makers to plan and assess their strategy's progress and achievements from a range of perspectives – not just the one-dimensional measurement of economic growth. Such a scoreboard could be divided into four perspectives, as follows:

- Learning and Growth: The focus here is on improving human capital, learning and skill-upgrading. Key performance indicators relate to levels of skills, entrepreneurship, innovation, and other criteria relating to knowledge and talent.

- Governance: The focus here is to plan achievable action lines and to find committed and credible leaders who are capable of implementing them.

- Stakeholder: The focus here is on how the strategy fulfils the needs and aspirations of key stakeholders in the economic development process.

- Financial: Key performance indicators will be improvements (compared with targets) in growth, revenue, profitability and so on.

Each of the four perspectives is integrated to and driven by *Vision & Strategy*. Answers to each question might involve the following mission statements:

- Learning & Growth: We improve by adopting an Economic Diversification vision and strategy that builds platforms from a core industry towards "related variety" industries.

- Governance: We must excel at identifying achievable actions that fit the vision strategy and identifying committed leaders to implement achievable action lines.

- Stakeholder: We must project the image of competent, innovative change managers who are designing a diversified economic future for the region.

- Financial: Key Performance Indicators will be Growth Rate improvements (to targets) in Employment, Talent, Entrepreneurship, Productivity, Economic Variety and Competitiveness in the region.

Each perspective is measured in terms of objectives, measures, targets, and initiatives. These are linked back to the Governance Process by "learning" or feedback loops to see if:

- Strategy needs adjusting to achieve vision.

- Vision needs adjusting to facilitate strategy.

BSC theory suggests that many organizations place an excessive emphasis on the financial perspective, while neglecting other valuable indicators of success. Specific objectives, measures, targets and initiatives should be devised for each perspective. These should be used to help improve the overall management and implementation of the strategy, acting as feedback loops to identify whether the strategy needs adjusting to achieve the vision, or indeed whether the vision itself needs adjusting to facilitate the strategy.

Such feedback loops are necessary because every governance process involves "negative" variety that is not initially foreseen by strategic planners. Unanticipated consequences, excluded interests, and "wicked" problems are cases in point. The causes of such "negative" variety need to be identified and fixed as they arise. To

establish such a process requires a system of governance that uses feedback loops. The feedback data should be examined to determine the causes of variety, and in particular the processes that give rise to problems. It should then be used to focus attention on fixing that subset of processes. (This approach has been developed into a theory now known as "total quality management".) For instance, civil society institutions, such as industrial associations, could help to provide such feedback, benefiting the overall governance of the strategy.

Key "associative" governance characteristics normally emphasized under this "envisioning" regime are, as noted:

- Stimulate civil society;
- Encourage associations;
- Governance to be inclusive;
- Governance to be accessible;
- Governance to be transparent;
- Create consensus on Vision;
- Allow non-governmental leadership of specific actions within "platforms";
- Monitor and learn from implementation processes.

These are the characteristics that suit a BSC envisioning decision process most effectively.

F: Annex to Chapter 10

Annex 10.1: Regional Industrial Cluster Development Programme

I. Development Objective

The main objective of this programme is to promote and support the development and formation of industrial clusters that will contribute to the sustainable economic growth and social well-being in the regions of the Kingdom.

The programme will:

- Promote regional industrial cluster development as a strategy to enhance regional competitiveness and innovation;
- Assist regions in the formulation of collaborative strategies between regional governments, the private sector and institutions of the innovation system;
- Assist in the formulation and implementation of a cooperative cluster action plan in each promising cluster of the region;
- Support joint learning between regions.

II. Programme Management

The programme will be managed by the Industrial Development Agency under the authority of a Regional Industrial Cluster Development Committee chaired by the Minister of Commerce and Industry with members representing the private sector, government and support institutions.

The responsibility of the Regional Industrial Cluster Development Committee will be to review the project proposals submitted by the Industrial Development Agency and to approve the allocation of funds for the implementation of the projects.

III. Promotion of regional industrial cluster development

A workshop will be organized to explain to representatives of the regions of the Kingdom the benefits of a regional industrial cluster development strategy to enhance industrial competitiveness and diversification. The participants will come from regional and local governments, the private sector and institutions of the national and regional innovation systems.

IV. Regional Industrial Development Strategy

In each participating region, the Industrial Development Agency will help the regional/local government to organize a Regional Industrial Cluster Development Board.

Assistance will then be provided to the Regional Board to prepare a strategic diagnosis of the industrial clusters of the region and of the support provided by the national and regional innovation system.

On the basis of this diagnosis, a strategy will be formulated and approved by the Regional Board to support the development and formation of competitive and innovative regional industrial clusters and to the strengthening of the regional innovation system.

V. Cluster Action Plans

The Industrial Development Agency together with a cluster facilitator will assist each promising cluster of the region in organizing a cluster development team and in formulating a cluster action plan.

The cluster facilitator will then help the cluster team to implement the action plan in cooperation with the Industrial Development Agency and the institutions of the national and regional innovation systems.

VI. Joint learning

The Industrial Development Agency will organize joint learning workshops between regions as well as study tours to visit innovative regions with a good record of learning in other countries.

Selected References

Arab Planning Institute, (2003), *Arab Competitiveness Report*, Kuwait.

Bowonder B, and T. Miyake, (1988), "Measuring innovativeness of an industry: an analysis of the electronics industry in India, Japan and Korea", *Science and Public Policy*, October.

Cantwell J., and S. Iammarino, (2003), *Multinational Corporations and European Regional Systems of Innovation*, London: Routledge.

Chenery H., S. Robinson, and M. Syrquin, (1986), *Industrialization and Growth: A Comparative Study*, New York: Oxford University Press.

Cooke, P., (2006),"Regional Asymmetries, Knowledge Categories and Innovation Intermediation", in P. Cooke, and A. Piccaluga (eds.), *Regional Development in the Knowledge Economy*, London, Routledge.

Economic and Social Commission for Western Asia (ESCWA), (2001a), *Economic Diversification in the Oil-Producing Countries: The Case of the Gulf Cooperation Council Economies*, New York: United Nations.

ESCWA, (2001b), *Impact of the World Oil Market on the Economies of Gulf Cooperation Council States: Quantitative Assessment and Forecast*, New York, United Nations.

Ernst D., L. Mytelka, and T. Ganiatso, (1998), *Technological capabilities in the context of export-led growth: A conceptual framework*, London, Routledge.

Gulf Organization for Industrial Consulting (GOIC), (2003), *The Economies of the Gulf Cooperation Council Member States*.

Harmaakorpi, V., (2006), "Regional development platform method as a tool for regional innovation policy", *European Planning Studies*, 14, 8 (September) 1093-1112.

International Labour Organization (ILO), (2005), *Key Indicators of the Labour Market*, Geneva

International Monetary Fund (IMF), (2005), "IMF Executive Board Concludes 2005 Article IV Consultation with Saudi Arabia", Public Information Notice (PIN) No. 05/161 (December 5,) Website, http://www.imf.org/.

International Organization for Standardization (ISO), (2006) *The ISO Survey of Certifications 2005*, Geneva.

Ketels, C. H. M., (2003), "The development of the cluster concept – present experiences and further developments", prepared for NRW conference on clusters, Duisburg, Germany, December 5, Boston: Institute for Strategy and Competitiveness, Harvard Business School.

Ministry of Economy and Planning, the Kingdom of Saudi Arabia, (2002), "Proceedings of the Conference on the Future Vision of the Saudi Economy (Vision 2020)", Ministry of Economy and Planning, Website, *http://webserver.planning.gov.sa/i-mop/home/*.

Ministry of Economy and Planning, the Kingdom of Saudi Arabia, (2006), *The Eighth Development Plan* (AH 1429/30-1425/26; AD 2009-2005), Riyadh.

National Science Board, (1998), *Science and Engineering Indicators*, Washington DC: US Government Printing Office.

Organisation for Economic Co-operation and Development (OECD), (2001), *Innovative Clusters: Drivers of National Innovation Systems*, Paris.

Osama, A., (2006),"Creating Economic Clusters in the Muslim World", *Dinar Standard*, July 20, Website, http://www.dinarstandard.com/innovation/Clusters71606.htm.

Pekkarinen, Satu and Vesa Harmaakorpi, (2006), "Building regional innovation networks: The definition of an age business core process in a regional innovation system," *Regional Studies*, vol. 40(4), June.

Pillai, J. S., (2005), "Cluster development: A case of Singapore's petrochemical industry", Discussion Papers: Policy and Governance, Asia Pacific School of Economics and Government, The Australian National University, Website, http://apseg.anu.edu.au.

Porter, M. E., (1996), "Competitive Advantage, Agglomeration Economies, and Regional Policy", *International Regional Science Review*, 19, no. 1-2.

Porter, M. E., (1998), "Clusters and Competition: New Agendas for Companies, Governments, and Institutions", in *On Competition*, Boston, Harvard Business School Press.

Porter M. E., S. Stern, and M. Delgado, (2006), "When do Clusters matter for Regional Economic Performance?", address to International Conference, Saint-Etienne, France.

Radwan I., and J. Al-Kibbi, (2001), "Small and Medium Enterprise Development: A Vision for Action in Saudi Arabia", Economic Vision Conference, Riyadh, Saudi Arabia, October.

Ramady, M. A., (2005), *Saudi Arabian Economy: Policies, Achievements and Challenges*, New York, Springer.

Roepstorff T. and K. Yumkella, (2004), "How Can Nigerian Industry Compete?" part of the Industrial Competitiveness Occasional Paper Series for the UNIDO Regional Industrial Development Centre, Abuja, Nigeria.

Saudi Arabian General Investment Authority (SAGIA), Website, http://www.sagia.gov.sa/.

Saudi Arabian Monetary Agency (SAMA), (2004), *Annual Report 2004*, Riyadh, SAMA.

Saudi Arabian Monetary Agency (SAMA), Website, http://www.sama.gov.sa/.

UNESCO Institute for Statistics, Statistics Database, (2006), Website, http://stats.uis.unesco.org/.

United Nations Conference for Trade and Development (UNCTAD), (2004), *World Investment Report 2004: The Shift Towards Services*, New York, UNCTAD.

United Nations Conference on Trade and Development (UNCTAD), (2005), UNCTAD Handbook of Statistics On-line, Website, http://stats.unctad.org/handbook/.

United Nations Conference on Trade and Development (UNCTAD), (2006), UNCTAD Foreign Direct Investment Online (FDI Online), Website, http://stats.unctad.org/fdi/.

United Nations Development Programme (UNDP), (2003), *Arab Human Development Report 2003: Building a Knowledge Society*, New York, UNDP.

United Nations Educational, Scientific and Cultural Organization (UNESCO), (2003), *EFA Global Monitoring Report 2003/200*, Paris, UNESCO.

UNESCO, (2004), *EFA Global Monitoring Report 2005*, Paris, UNESCO.

UNESCO, (2005), *EFA Global Monitoring Report 2006*, Paris, UNESCO.

UNESCO, (2006), *EFA Global Monitoring Report 2007*, Paris, UNESCO.

UNIDO (2003), *Industrial Development Report 2002/2003: Competing Through Innovation and Learning*, Vienna.

UNIDO, (2004), *Industrial Development Report 2004: Industrialization, Environment and the Millennium Development Goals in Sub-Saharan Africa*, Vienna.

UNIDO, (2005a), *Industrial Development Report 2005: Capability building for catching-up: Historical, empirical and policy dimensions*, (Vienna: UNIDO, 2005).

UNIDO, (2005b), "Diagnosis of Industrial Systems and Sectoral Competitiveness", Working Paper for the UNIDO Integrated Programme, 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia', Working Paper based on the work of a team of international experts: D. Noureldin, S. Radwan, S. Lall, C. Rodrigo and J. Moll de Alba, Vienna.

UNIDO, (2005c), Industrial Survey 2002: "Statistical Report", Working Paper for the UNIDO Integrated Programme, 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia', Vienna.

UNIDO, (2005d), *UNIDO Industrial Development Scoreboard, Version 1.0.*, Vienna.

UNIDO, (2005e), "The Small and Medium Enterprise Sector in the Kingdom of Saudi Arabia, A Survey of its Character and Problems", prepared by Paul Hesp for the Ministry of Commerce and Industry and UNIDO Integrated Programme 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia', Vienna.

UNIDO, (2005f), "Terms of Reference of the Industrial Policy Office", prepared by Yuri Akhvlediani and Chris Rodrigo for the Ministry of Commerce and Industry and the UNIDO Integrated Programme 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia', Vienna.

UNIDO, (2005g), "New Forms of Industrial Governance", Background Note prepared by Frederic Richard for the Ministry of Commerce and Industry and the UNIDO Integrated Programme 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia' for High-Level Expert Group Consultation Meeting, June 2005 Riyahd.

UNIDO, (2005h), "Industry Sector Profiles", Working Papers prepared by Chris Rodrigo for the Ministry of Commerce and Industry and the UNIDO Integrated Programme 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia', Vienna:

- Glass and glass products industry in Saudi Arabia;
- Plastics products industry in Saudi Arabia;
- Prospects for biotechnology in Saudi Arabia;
- Electrical machinery and equipment sector in Saudi Arabia;
- Sector/clusters for promotion.

UNIDO, (2005i), "Pre-selection of key products groups/clusers based on Industrial Survey 2002", Working Paper prepared by S. Upadhyaya, Y. Akhvlediani, J. Moll de Alba and F. Ghanem for the Ministry of Commerce and Industry and the UNIDO Integrated Programme 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia', Vienna.

UNIDO, (2006a), "Partners in Building a Promising Industrial Future", Background Paper prepared by Lobna Abdul-Latif for the Ministry and Commerce and Industry and the UNIDO Integrated Programme 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia', Vienna.

UNIDO, (2006b),"Regional Innovation Systems and Economic Diversification: Constructing Advantage via Related Variety Platforms ", Background Paper prepared by Phil Cooke for the Ministry and Commerce and Industry and the UNIDO Integrated Programme 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia', Vienna.

UNIDO, (2006c), "Building Up the National Industrial Innovation System in the Kingdom of Saudi Arabia", Working Paper prepared by Carlos Aguirre and Ricardo Seidl da Fonseca for the UNIDO Integrated Programme, 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia', Vienna.

UNIDO, (2006d), "Regional Innovation Systems as Public Goods", UNIDO Working Paper, prepared by P. Cooke for the Ministry of Commerce and Industry and the UNIDO Integrated Programme 'Strategies to Enhance Industrial Competitiveness and Diversification in the Kingdom of Saudi Arabia', Vienna.

UNIDO, (2006e), "Summary Paper: The Economic Framework Conditions, Industrial Performance and Capabilities of the Kingdom of Saudi Arabia", Working Paper prepared by Olga Memedovic and Robert L. van Lavieren, Vienna.

UNIDO, (2006f), "Cluster-based Economic Development: Issues for Saudi Arabia", Briefing Note by C.H.M. Ketels to the Ministry of Commerce and Industry at the Fourth Coordination Meeting, UNIDO, September 18-20, 2006, Vienna.

UNIDO, (2006e) *Statistics Database*, Vienna.

United Nations Statistics Division, United Nations Commodity Trade Statistics Database, (2006), (UN Comtrade), Website, http://unstats.un.org/unsd/comtrade/.

US-Saudi Arabian Business Council, (2005), "Saudi Arabia Joins the World Trade Organization", *US-Saudi Business Brief, Volume X, No. 4*, Website, http://www.us-saudi-business.org.

World Bank, (2005), 'Doing Business', Website, http://www.doingbusiness.org/.

World Bank, World Development Indicators Online, (2006), (WDI 2006), Website, http://devdata. worldbank.org/dataonline/.

World Trade Organization (WTO), (2005), "Report of the working party on the accession of the Kingdom of Saudi Arabia to the World Trade Organization", 1 November Website, http://www.wto.org/.

Yumkella, K., (2005), *Towards Pro-Poor Sustainable Industrial Development: A Shared Vision for UNIDO*, Vienna, UNIDO.