

# SCIENCE, TECHNOLOGY AND INNOVATION

## 21.1 INTRODUCTION

Due to their vital role in economic, social and environmental development, science, technology and innovation have enjoyed considerable interest. Such interest focused on strengthening and expanding the capacities of scientific research institutions and technology centres, and consolidating coordination of their activities. The objectives of this effort were to: enhance utilization of the contemporary scientific revolution in improving education, health and social services; raise production and productivity in all sectors, including development of natural resources and protecting the environment from risks of pollution; increase public knowledge; and improve quality of life.

Significant scientific and technological progress was achieved under the Eighth Development Plan, especially with the onset of implementation of the first five-year plan for science, technology and innovation. This progress was evident in major expansion of: the various activities of King Abdul-Aziz City for Science and Technology (KACST), in higher education institutions, in R&D centres attached to universities and to a number of governmental and private institutions, and in advances in sponsorship of talent and innovation. Moreover, there were under the plan mounting national efforts in transfer and indigenization of advanced technology, and improvements in scientific publications and patents indicators.

The Ninth Development Plan aims at indigenization and development of advanced strategic technologies in all productive and service sectors, as well as in all components of the science, technology and innovation system, with the aim of raising productivity and enhancing competitiveness. Moreover, the Plan attaches particular importance to developing existing research centres and upgrading their capabilities; establishing new research centres; developing regulations governing

the performance of the science, technology and innovation systems and developing their institutional structures.

This chapter addresses the current status and the key issues and challenges facing scientific, technological and innovation development, and reviews the relevant objectives, policies and targets set by the Ninth Development Plan.

## **21.2 CURRENT CONDITIONS**

### **21.2.1 Research, Development and Innovation**

The national system of research and development (R&D) consists of KACST, 200 scientific research units attached to universities and a number of governmental and private institutions. In 2008, expenditure on R&D was estimated to be about 0.4% of GDP. Scientific research and technological development centres are concentrated in major cities, reflecting concentration of the population: Riyadh city is home to about 50% of these centres, followed by Jeddah, with 19.3%; Dammam with 12.5%; Jubail and Yanbu with about 3.5%; with the remaining 14.7% distributed among other regions. Hence, there is a need for reviewing the distribution of scientific research centres to improve geographical distribution of employment in R&D among the regions.

Official statistics show that conducted research, research grants, and published articles are concentrated in medicine, agriculture, engineering and basic sciences. In addition, developmental research is small compared with applied and basic research, constituting only between 10% and 15% of total research. In the following, the current situation of R&D in KACST, universities, government institutions , and private institutions is reviewed.

#### **□ *King Abdul-Aziz City for Science and Technology (KACST)***

KACST is comprised of seven institutes; four centres; five national programmes of research, development and innovation; and a number of

joint research centres, it constitutes the broadest base for research, development and innovation in the country. Under the Eighth Development Plan, KACST achieved remarkable progress. The new programme of grants for strategic and advanced technologies, which is part of the National Plan for Science, Technology and Innovation, led to a quantum leap in the support of the Kingdom R & D system. In 2009, the last year of the Plan, support for research projects at universities and other research bodies exceeded SR500 million. Moreover, KACST continued implementing the programme of annual grants, with research projects supported from its inception until 2008 numbering 2,388 by a budget of SR796.11 million.

Under the Eighth Development Plan, research projects in the institutes and centres of KACST, particularly the strategic and advanced technologies projects and programmes. These projects produced more than 200 technical products in five main sectors, thereby contributing to economic and social development. Among its numerous achievements, KACST obtained several patents, and succeeded in developing innovative techniques and methods to meet strategic national needs, including advanced technologies to reduce the cost of solar energy production and water desalination that are viable on a large scale. This success has led to a national initiative for water desalination by solar energy, with its first phase designed to meet the full needs of the city of Khafji, estimated at approximately 30 thousand cubic metres of desalinated water per day. In the second and third phases of the initiative, this technology will be applied throughout the country. In addition, KACST succeeded in manufacturing, developing and launching 12 satellites, designing and constructing an Electrostatic Particle Accelerator; developing a radar system to protect aircrews from lasers, an Arabic morphological analyser, an automatic diacritizer of Arabic text, and an automatic Romaniser of Arabic names. Furthermore, using nanotechnology, KACST succeeded in developing catalytic materials for producing clean, cheap fuel. It also developed heat-and-fire-resistant polypropylene plastics and a device for uncovering the Red Palm Weevil; and it succeeded in cloning and producing the dromedary (Arabian camel) insulin hormone. Moreover, KACST accomplished advances in studying the palm genome.

KACST and the Ministry of Economy and Planning, in cooperation with other relevant agencies and at a cost of SR 7.9 billion, have completed development of the first implementation plan of the National Science, Technology and Innovation Policy, which covered 190 national projects grouped under eight strategic priority themes, which constitute together the first five-year plan for science, technology and innovation. Work is under way to implement these projects by KACST and other agencies.

KACST also developed detailed plans for strategic, advanced technologies in water, oil and gas, petrochemicals, nanotechnology, biotechnology and genetic engineering, information technology, electronics and communications, photonics, aerospace and aviation, energy, and advanced materials, and the environment. In addition, KACST developed a plan for mathematics and physics to support the target technologies, as well as for building and construction technologies, agricultural technologies and medical and health research.

**Page**

**370**

KACST completed studies of establishing Technology Innovation Centers in Saudi universities to promote closer linkages among the City, the universities and the industrial sector, and also in order to aid transfer of scientific research results into commercially marketed products and services. Furthermore, KACST established two incubators one in information and telecommunications technology and the other in biotechnology, and embarked upon studies for establishing eight other technology incubators, five of which in universities.

Under the Eighth Development Plan, published scientific research papers ranged between 700 and 800 annually.

#### **□ *University research and supporting centres***

Consistent with the National Science, Technology and Innovation Policy, universities supported modern scientific research under the Eighth Development Plan by establishing and funding centres of excellence in scientific research, nanotechnology centres , and science

parks, as well as by sponsoring innovative initiatives and projects. Universities support scientific research through various means and mechanisms (Box 21.1).

King Abdullah University of Science and Technology, which was inaugurated by the Custodian of the Two Holy Mosques on the 23<sup>rd</sup> Sept. 2009, is the most important initiative for promoting graduate studies and scientific research. The University aims to produce distinguished science graduates and has been staffed by an elite of distinguished world-leading scientists and experts. The University grants master and doctorate degrees in 11 scientific fields, and has 11 research centres grouped in four clusters: resources, energy and environment; materials; life sciences and bioengineering; and applied mathematics and computer science.

**Box 21.1: Scientific Research Methods and Mechanisms**

- Basic research in colleges of science: carried out in research centres based in the college itself by faculty members.
- Contractual research: applied research carried out under contracts with private-sector institutions and companies at university research institutions such as the Research Institute at King Fahd University of Petroleum and Minerals, King Abdullah Institute for Consulting and Research at King Saud University, and the Institute of Research and Consultancy at King Abdul-Aziz University.
- Centres of scientific and research excellence at universities: under the Eighth Development Plan, the Ministry of Higher Education funded nine centres at the following universities: King Abdul-Aziz, King Saud, King Faisal, and King Fahd University of Petroleum and Minerals.
- Science parks linked to universities: they are an important mechanism for linking outcomes of university research with economic production and service activities. Science parks attract mostly large companies seeking to establish advanced research centres by taking advantage of the infrastructure provided by the parks, and the human, scientific and technical potential of universities.

### ❑ *Governmental research centres*

Several government agencies carry out R&D activities. For example, the Ministry of Agriculture has in various regions, research centres in agriculture, livestock and fisheries. There are also a number of research centres in the health sector, such as the research centres at King Faisal Specialist Hospital, King Khalid Eye Specialist Hospital, and the Joint Centre for Research in Prosthetics Devices, the National Centre for Vaccine Production in the National Guard King Abdul-Aziz Medical City, and Prince Salman Centre for Disability Research. In addition, there are also a number of research centres in each of the Saline Water Conversion Corporation, the Saudi Wildlife Commission, and others. Moreover, most ministries and public bodies have departments for research and studies.

### ❑ *Private sector research centres*

**Page**  
**372**

Several private-sector companies started establishing R&D centres and units; notably, the Saudi Basic Industries Corporation (SABIC), the Saudi Arabian Oil Company (Saudi Aramco), and the Arabian Metals Company, as well as the companies of the Economic Offset Programme, such as: the Aircraft Complementary Equipment Company, the International Systems Engineering Company, the Al-Bilad Catalyst Company, the Obeikan Technical Fabrics Company, and the United Lubricant Oil Company.

For example, under the Eighth Development Plan, SABIC achieved a series of scientific and technological research successes, continuing to register more patents that by the end of 2009 totaled 7,096. Moreover, SABIC strengthened its cooperation with several research centres, in addition to launching in 2007 SABIC Chairs in Saudi universities to fund scientific research and technology.

Aramco's R&D centre founded in 2004 focuses its research on oil, gas, energy; nanotechnology; biotechnology; microbiology; and new materials. The centre collaborates with several national and foreign universities and research institutes and seeks to attract talented

scientists and researchers. The company plans to develop research, development, and innovation activities to cover new activities, such as "planning and programming oil production".

The same is true for national companies other than Aramco or SABIC, including the companies of the Economic Offset Programme, which invests a proportion of the value of government procurement contracts in high-tech projects. It is hoped that the number of R&D centres and their units and sizes would grow, as stipulated in the expanded first five-year plan for the implementation of the Science, Technology and Innovation Policy, and as a result of implementing the National Industrial Strategy approved by the Council of Ministers in 2009, which includes a number of policies for the development of science, technology and innovation in the industrial sector.

### **21.2.2 Sponsoring Giftedness and Creativity**

Sponsorship of talent and creativity and support for innovation developed tangibly under the Eighth Development Plan. King Abdul-Aziz and his Companions Foundation for Giftedness and Creativity "Mawhiba" adopted, a strategy to foster giftedness, creativity and support innovation. The vision of Mawhiba envisages that the Kingdom will "be a creative society with a critical mass of gifted and talented young leaders highly educated and well-trained to support the building of the knowledge based economy and the sustained growth and prosperity of the Kingdom". The Strategy identified a set of goals, including improving and expanding available educational opportunities for the gifted and increasing community awareness of the importance of education and innovation and their impact on achieving sustainable development. The first five-year plan for the implementation of this strategy, which coincides with the Ninth Development Plan, includes five main initiatives: (1) partnership with distinguished schools, (2) capacity enrichment programmes and activities, (3) discovering and supporting young leaders, (4) improving work environment to enhance creativity, and (5) raising awareness of the role of giftedness, creativity and innovation. Each of these initiatives comprises a range of detailed projects, the implementation of which was initiated in the fifth year of

the Eighth Development Plan.

In addition to “Mawhiba”, there are several national agencies that foster talents, such as the Riyadh Philanthropic Society for Science, which established “Prince Salman Science Oasis”; the Gifted Students Department at the Ministry of Education; and the Awareness and Publishing Department of KACST, which organizes annual contests in mathematics, physics and other subjects. In addition, some national private institutions started supporting scientific excellence.

To honour and support science and scientists, several public and private awards have been established, such as: the King Faisal International Prize, the King Abdullah Translation Award, the King Abdullah bin Abdul-Aziz prize for Scientific Research offered by SABIC, the Prince Sultan Bin Abdul-Aziz International Prize for Water, the Al Marai Prize for Scientific Innovation under the auspices of KACST, and the Faqih Centre Prize for Research. This is in addition to awards for scientific excellence for university and higher education at various universities, and the awards of King Abdul-Aziz and his Companions Foundation for Giftedness and Creativity. There are also regional governorates’ awards for scientific creativity, such as the Prince Mohammed bin Fahd Prize for Scientific Excellence in the Eastern Region, and the Medina, Hail, Tabuk, Abha prizes for innovation; in addition to the Prince Abdul Rahman Al-Sudairy Prize for scientific excellence.

**Page**  
**374**

Efforts to foster talent, creativity, and innovation culminated with the Kingdom ranking 32 among 130 nations covered by the 2008 Global Innovation Index produced by the Business School for the World (INSEAD).

### **21.2.3 Scientific Publications and Patents**

The Kingdom occupies a prominent place among Arab countries in scientific publications and patents. Between 1996 and 2006, the number of scientific papers published by researchers in the Kingdom, or with their participation, was 26,854. Thus, the Kingdom ranked



second among Arab nations and 48 worldwide (Table 21.1). Moreover, the Kingdom registered 164 patents at the United States Patent and Trademark Office, to become the first rank among Arab states and 43<sup>rd</sup> worldwide.

**Table 21.1**  
**Areas of Scientific Publication**  
**1996–2006**

Area	Number Published Items	Proportion of Published Items to Total (%)
Medicine	8300	30.91
Engineering	3402	12.67
Chemistry	1746	6.50
Biochemistry, Genetics and Molecular Biology	1648	6.14
Physics and Astronomy	1390	5.18
Mathematics	1193	4.44
Materials Science	1171	4.36
Chemical Engineering	1163	4.33
Pharmacy, Toxicology and Pharmaceutical Sciences	1148	4.27
Agricultural and Biological Sciences	1105	4.11
Energy	1050	3.91
Computer Science	894	3.33
Ecology	872	3.25
Earth and Planetary Sciences	778	2.90
Immunology and Microbiology	571	2.13
Neuroscience	423	1.57
<b>Total</b>	<b>26854</b>	<b>100</b>

*Source: Reports of KACST.*

In 2004, Saudi Arabia established a Patent Registration System, with the aim of safeguarding intellectual property rights and stimulating scientific and technological activity in the service of development goals. The system provides for “the right to own products of intellectual activity in the fields of industry, science, literature, art and other fields.” Over the period 1989–2007, the number of patent applications was 13.3 thousand, 11.4 thousand were examined, and 1,918 were granted. In addition, since 2004, applications for industrial designs certificates numbered 842, of which 515 were granted.

#### **21.2.4 Qualifying Scientific and Technical Cadres**

Universities and colleges contribute to scientific qualification of human resources in science and technology and to dissemination of science, technology and innovation, as do prospective holders of scholarships abroad. Over the first four years of the Eighth Development Plan, eight universities having 52 scientific colleges were established. In addition, three new universities were established in 2009, raising the total number of universities to 24, spread across the Kingdom, apart from King Abdullah University of Science and Technology. Moreover, the number of science faculties rose to 171 altogether, and the number of students enrolled in scientific disciplines rose from about 112 thousand in 2004 to about 181.8 thousand in 2008. In 2008, scholarships for postgraduate studies abroad in scientific disciplines numbered 584, in addition to 130 scholarships granted by King Abdul-Aziz City for Science and Technology. The total number of scholarships for studying abroad granted under the Custodian of the Two Holy Mosques Programme for Scholarships Abroad was about 70 thousand. Furthermore, 3 private universities and 17 private colleges were opened; most focused on scientific and technical disciplines.

**Page**  
**376**

#### **21.2.5 Economic Offset Programme**

Transfer and indigenization of technology take place through various channels, including the Economic Offset Programme. Significant progress was achieved under the Eighth Development Plan. For example, the Advanced Electronics Company established a specialized R&D department, manned by 10% of the employees of the company, which contributed to the development of local products and systems, in addition to its cooperation with universities and with KACST.

The Saudi Polyolefins Company is establishing a centre specializing in plastics manufacture. The company also cooperates with several universities in the Kingdom in research projects, in addition to its relations with institutes of technology within the Kingdom and abroad. DEEF for Pharmaceutical Industries, which produces medical supplies and various types of medicines, is adopting a long-term R&D strategy

aimed at creating new high-tech products, in addition to a short-term strategy aimed at developing and manufacturing alternative drugs to those available in the domestic market. The company is cooperating with local and international research centres, universities and specialist laboratories. To enhance their productive capacities and competitiveness, other companies, such as CAD Middle East Pharmaceutical Industries, Al Salam Aircraft Company, and Manafeth Ambulance and Handicap Vehicles Company are in the process of establishing R&D activities.

### **21.2.6 Institutional and Organizational Development**

Several agencies are involved in the development of science, technology and innovation. By virtue of its mission, and in collaboration with the Ministry of Economy and Planning, KACST plays the role of planning, coordination and controlling alignment of this sector with economic and social development.

To implement the National Science, Technology and Innovation Policy, the City and the Ministry of Economy and Planning prepared, in cooperation with other relevant authorities, the first Five-Year Plan for Science, Technology and Innovation. The City also completed the Extended First Five-Year Plan for Science, Technology and Innovation that covers the implementation of the second phase of the Policy, which will coincide with the Ninth Development Plan. The Plan includes eight major national programmes, comprising national strategic projects in science, technology and innovation; all seeking to achieve the Kingdom's vision of building a knowledge-based economy and a knowledge society.

In 2008, KACST, in cooperation with the Ministry of Economy and Planning, worked the details of the project "Towards Developing a Comprehensive Framework for the National Innovation System", which aims to coordinate among stakeholders, and stimulate cooperation among them towards interlinking their plans. This framework envisages five specific targets to be achieved through implementing five programmes, comprising 16 scientific projects; all

seeking to achieve the declared vision of “the Kingdom becoming a breeding ground for innovation at the global level, and a sustainable source of innovative solutions.”

In view of the tasks entrusted to KACST by the National Science, Technology and Innovation Policy, the need arose under the Eighth Development Plan for reviewing and reformulating its bylaws, which had been set by the Royal Decree No. M/8 of 1985. The new bylaws take into consideration relevance to global changes in research, development and innovation. For this purpose, the City prepared a three-phase project for developing regulatory frameworks and restructuring. Implementation of the first phase, which is focussed on the development of organizational structure and strategic planning, was initiated in 2008. Phases two and three will be implemented under the Ninth Development Plan; both seek to develop best practices, processes and methods, including obtaining the ISO international standard for quality management.

**Page**  
**378**

## **21.3 ISSUES AND CHALLENGES**

### **21.3.1 Expenditure on Research, Development and Innovation**

Despite growth of expenditure on research, development and innovation projects and activities over the past years, allocations for funding R&D represented only 0.4% of GDP in 2008. Nevertheless, these allocations do constitute a serious step towards achieving the target of 2% of GDP envisaged by the National Science, Technology and Innovation Policy by 2024. Notably, in spite of growing interest by the private sector, its financial contributions are still low, compared with developed countries, where the private sector contributes about 40%–60% of the total R&D funding. Given that funding is a necessary requirement of projects designed to expand research, development and innovation capacity, there is a need for concerted efforts by government agencies, public institutions and private companies to ensure that funding for new R&D reaches the targeted levels.

### **21.3.2 Attracting Researchers and Technologists**

International experiences, and the US is a prime example, underlines the influential role played by expatriate expertise in upgrading the R&D system. Hence, building and expanding scientific and technical capacities and creating conditions for fostering innovation, require careful formation of researchers and experts, recruiting them to work in national, scientific and technological research institutions, and providing them with various incentives; especially in the light of rising global competition for rare scientific competencies. In addition, there is a need for implementing a series of programmes aimed at developing capabilities of graduates of intermediate colleges to enable them to be deployed in scientific and technological projects.

### **21.3.3 R&D at Universities**

Efforts to promote the development of R&D activities notwithstanding, there is a need for highlighting the importance of linking scientific research and technological development programmes and projects at universities, institutes and research centres to requirements of economic, social and environmental development, within the framework of the National Science, Technology and Innovation Policy. Indeed, this calls for linking the funding of scientific and research programmes and projects to the existing and future needs of sectors such as industry, water, agriculture, construction, oil, mining, environment, trade, education, and health.

### **21.3.4 Private Sector Participation**

Despite the growing interest of the national private sector in R&D over the past few years, the rate of its participation in financing R&D activities is still below the desired level. Hence, R&D programmes and projects targeted for implementation over the next five years need to be expanded, with greater involvement of both national and foreign private-sector companies in financing or initiating research, scientific and technological programs. Furthermore, incentives need to be provided to major foreign companies operating in the Kingdom to

establish R&D centres, and encourage closer links between them and national public and private research institutions.

## **21.4 DEMAND FORECASTS**

The Ninth Development Plan envisages increased scientific research, especially in light of efforts to strengthen linkages between scientific and technological research (public and private) and the development process of various public services and natural resources, and the important of environmental health. Under the Ninth Development Plan, R&D projects and innovation initiatives will focus on the following areas:

- Natural resources: water, crude oil, natural gas, minerals, and agricultural land.
- Economic diversification.
- Preventive or curative medical and health research, in addition to research on cleanliness of cities and on reducing environmental pollution.
- Geophysical and seismic research to monitor movements of the earth crust and landslides.
- Development of renewable and alternative energy sources, such as generating electricity from solar sources and nuclear power.
- Biotechnological research aimed at producing high yielding plant varieties resistant to heat and drought.

**Page**  
**380**

## **21.5 DEVELOPMENT STRATEGY**

### **21.5.1 Future Vision**

The Kingdom aspires to achieving scientific, technological and innovative development that contributes to the consolidation of sustainable development and economic diversification, in addition to strengthening competitiveness of the national economy, raising living standards and improving quality of life, and maintaining national security.

## 21.5.2 Objectives

- Indigenizing and developing strategic and advanced technology.
- Developing R&D and innovation, through developing and upgrading the capacities of existing research centres and establishing new ones.
- Developing scientific and technological capabilities, in addition to developing creativity, giftedness, and entrepreneurship.
- Developing the capacity of national manpower in science and technology.
- Increasing sources of financial support for science, technology and innovation and strengthening the role played by the private sector.
- Developing regulations and legislation related to science, technology and innovation, while safeguarding intellectual property rights.
- Developing institutional structures of the agencies involved in scientific and technological research and innovation.

## 21.5.3 Policies

- Preparing a detailed roadmap for indigenization and methodological gradual development of advanced technologies.
- Attracting and indigenizing scientists and technologists with modern know-how.
- Stimulating private sector establishment of joint research centres and labs for various industries, and encouraging them to create an appropriate environment for investing in the transfer of technology, both internally and externally.
- Adopting effective mechanisms for strengthening the relationship between scientific research and technological development institutions on the one hand and production and service sectors on the other.
- Enhancing joint technological innovation centres between the public and the private sectors.

- Enhancing research facilities in universities.
- Providing technical, scientific and technological assistance to SMEs to help them innovate.
- Establishing and expanding technology parks and incubators, through partnerships between the public and the private sectors.
- Adopting environment-friendly product and product development technology and raising engineering development and quality, particularly in the production sectors.
- Studying the feasibility of allocating a percentage of the value of contracts concluded with companies in both the public and the private sectors to support R&D efforts and activities.
- Fostering the gifted and the creative and encouraging the private sector and investors to foster their talents.
- Supporting scientific societies and professional associations, galvanizing their role in development, and stimulating investors to participate in their activities.
- Launching national print and audio-visual media campaigns to raise awareness of science and technology and their importance in development.
- Expanding the capacity of educational institutions in science and technology and attracting outstanding students to them.
- Expanding technical and vocational training programmes quantitatively and qualitatively.
- Developing educational curricula at all levels to expand and intensify scientific and technological content.
- Paying attention to postgraduate studies of strategic sciences and advanced technologies, making efforts to Arabize science and technology education, and establishing centres of excellence in applied science and technology, at both university and post-university levels.
- Increasing financial allocations for R&D and training in government agencies.



- Reviewing and assessing regulations related to science and technology in each sector, with the aim of providing an appropriate environment for raising performance of science, technology and innovation.
- Strengthening the responsibilities of science and technology units in various state sectors.

#### 21.5.4 Targets

- Pursuing implementation of the programmes and projects of the first expanded five-year plan for science, technology and innovation and contributing to the advance towards a knowledge-based economy.
- Providing grants for strategic research projects at universities and national research centres to the tune of SR900 million annually.
- Implementing applied and strategic R&D in the KACST in support of economic and social development programmes nationally, at an annual average of 400 national research projects at a cost of SR980 million .
- Supporting operational research and studies in government agencies at an annual rate of SR300 million, and R&D in private-sector companies at an annual rate of SR200 million.
- Establishing and equipping 10 research centres of excellence.
- Establishing the national company for the manufacture of technological products.
- Establishing at least 8 technology incubators in KACST and universities.
- Establishing 15 national centres for technological innovations in universities affiliated to KACST.
- Establishing 3 major national technology parks in three main regions in the Kingdom.
- Establishing two industrial areas for advanced industries in Riyadh and Al-'Aieinah.

- Publishing 12 scientific journals on strategic and advanced technology.
- Providing scholarships for postgraduate studies in Saudi universities for about 300 students annually.
- Giving about 200 scholarships a year for KACST researchers to pursue postgraduate studies in strategic areas.
- Conducting advanced training programmes for researchers and entrepreneurs in strategic areas for 1,000 trainees annually.
- Establishing a national centre for translations and Arabization of scientific and technological literature.

## **21.6 FINANCIAL REQUIREMENTS**

The financial requirements allocated for the sector of science, technology and innovation (development programmes for KACST) amount under the Ninth Development Plan to SR6.53 billion.

**Page**

**384**