CHAPTER 10

HUMAN RESOURCES DEVELOPMENT
10. HUMAN RESOURCES DEVELOPMENT

The development of human resources is the basic pillar for realizing the objectives and aspirations of the development process. This is attributed to the fact that education and training raises the quality and productivity of the work force, as well as contributing to the cultural and personal development of the individual. This chapter addresses the present conditions, key issues, objectives, policies and programs that will guide the development of human resources throughout the Kingdom in the Sixth Plan period in the following sectors:

- **General Education**, which extends from kindergartens to secondary education, and includes some teacher training colleges for males and females;
- **Higher Education**, which covers education in universities and colleges;
- **Technical Education and Training**, which covers the various stages of technical education and vocational training as well as professional training in both the public and private sectors;
- **Science and Technology**, which covers agencies involved in science and technology and their role in the economic development process.

10.1 GENERAL AND HIGHER EDUCATION

The government provides general education for both boys and girls, through the Ministry of Education (MOE), the General Presidency for Girls Education (GPGE) and some other government agencies. The private sector is also active in the provision of general education. The Ministry of Education and the General Presidency for Girls Education also provide educational opportunities such as (special education) for certain social groups, as well as literacy programs and adult education. The government also provides higher education (post secondary) through the universities, GPGE colleges, military and security colleges, and some other government agencies and GOTEVT colleges.

The government provides free general and higher education, and financial bursaries for male and female students in some areas of general education. University students receive financial bursaries and free housing, along with meals, books and transportation at subsidized prices, while female students are provided with free transportation.

10.1.1 PRESENT CONDITIONS

Based on the fact that investment in human capital is the cornerstone for future economic growth and social prosperity, the government has accorded its utmost care and attention to the development of the education sector. This is reflected in the expenditures on education through the state budgets, as more than SR 153 billion has been allocated for education over the Fifth Plan period, or about 18 percent of approved budgets over this period.
These allocations have enabled the education sector to achieve high growth rates across a range of education variables, as shown for the General Education sector in Table 10.1 during the period 1409/10-1413/14. Student enrollments at the elementary stage increased at an average annual rate of 3.8 percent for males and 4.6 percent for females over this period. Enrollments at intermediate stage rose at an average annual rate of 7.4 percent for males and 10.1 percent for females, while at the secondary stage, enrollments increased by 5.4 percent for males and 11 percent for females over the same period. Enrollments at teacher training colleges increased at an average annual rate of 12.5 percent for males and 20.3 percent for females.

The considerable expansion in the intermediate and secondary stages of general education, in response to social demand, is clearly shown in Table 10.1 and is particularly pronounced in the case of girls' education. This growth in student numbers has been accompanied by rapid growth in the total numbers of male and female teachers.

**Table 10.1**

*Average Annual Growth in General Education (1409/10 - 1413/14)*

<table>
<thead>
<tr>
<th></th>
<th>Elementary</th>
<th>Intermediate</th>
<th>Secondary</th>
<th>Teacher Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys (%)</td>
<td>Girls (%)</td>
<td>Boys (%)</td>
<td>Girls (%)</td>
</tr>
<tr>
<td>Enrollments</td>
<td>3.8</td>
<td>4.6</td>
<td>7.4</td>
<td>10.1</td>
</tr>
<tr>
<td>New entrants</td>
<td>2.5</td>
<td>8.7</td>
<td>7.1</td>
<td>11.2</td>
</tr>
<tr>
<td>Graduates</td>
<td>6.2</td>
<td>6.9</td>
<td>8.5</td>
<td>10.1</td>
</tr>
<tr>
<td>Classrooms</td>
<td>3.6</td>
<td>7.5</td>
<td>7.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Saudi Teachers</td>
<td>6.4</td>
<td>9.0</td>
<td>10.0</td>
<td>13.6</td>
</tr>
<tr>
<td>Total Teachers</td>
<td>5.5</td>
<td>7.0</td>
<td>8.7</td>
<td>10.8</td>
</tr>
</tbody>
</table>

The infrastructure of the MOE and the GPGE also expanded considerably during the Fifth Plan period. Between 1409/10 and 1413/14, the number of elementary schools increased from 8,370 to more than 10,000, the number of intermediate schools increased from 2,884 to more than 4,000, the number of secondary schools from 1,103 to about 1,700, and the number of teacher training colleges from 40 to 43.

Table 10.2 shows the average annual growth rates achieved for a number of variables at the higher education stage over the period 1409/10 to 1413/14. Over this period, the total number of
students increased at an average annual rate of 7.1 percent, while the number of graduates from the system increased at an average annual rate of 5.3 percent. This growth in the number of students has been accompanied by growth in the numbers of teaching staff, with Saudi staff members growing at an average annual rate of 4 percent. These growth rates have been achieved largely in response to the financial allocations to the education sector, which rose from about SR 23 billion in 1409/10 to SR 30 billion in 1413/1414.

Table 10.2

Average Annual Growth in Higher Education  
(1409/10 - 1413/14)

<table>
<thead>
<tr>
<th></th>
<th>Bachelor Level</th>
<th>Post Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Students</td>
<td>7.1</td>
<td>1.7</td>
</tr>
<tr>
<td>New Entrants</td>
<td>4.6</td>
<td>12.4</td>
</tr>
<tr>
<td>Graduates</td>
<td>5.3</td>
<td>8.1</td>
</tr>
<tr>
<td>Saudi Teaching Staff*</td>
<td>4.0</td>
<td>---</td>
</tr>
<tr>
<td>Non-Saudi Teaching Staff*</td>
<td>5.3</td>
<td>---</td>
</tr>
<tr>
<td>Admin. &amp; Technical Staff*</td>
<td>-0.02</td>
<td>---</td>
</tr>
</tbody>
</table>

* Providing services at both bachelor and post graduate levels

The Kingdom’s education sector also witnessed significant developments at policy implementation and decision-making levels in the Fifth Plan period:

- The establishment of the Higher Education and Universities Council by a Royal Decree on 4/6/1414 to act as the highest administrative authority for regulating, coordinating and supervising post-secondary education at all levels.
- Private sector participation in the construction of government schools according to the measures specified by executive and financing agencies.
- To support the balanced development of post-secondary education, work is currently under way by the Ministry of Planning, in collaboration with the Ministry of Higher Education and the universities, to prepare an overall plan for the development of post-secondary education. This overall plan will address most of the higher education issues through the preparation of an integrated policy framework and the identification of appropriate solutions.
- Expansion in the kindergarten programs by both the public and private sectors.
- Upgrading the intermediate colleges affiliated to the Ministry of Education and the General Presidency for Girls Education into colleges that offer Bachelor Degrees.
• Annexation of the GPGE's developed colleges to the Girls colleges.

• Transferring the responsibility of special girls' education to the General Presidency for Girls’ Education.

• The introduction of librarian studies into girls' schools.

• Replacement of the advanced secondary education system for boys by the departmental system.

• Replacement of the credit hour system in universities by the academic term.

• Expanding computer and information technology programs at the secondary level.

10.1.2 KEY ISSUES

The significant growth and achievements of the education sector in the Fifth Plan period have been accompanied by a number of key issues for which remedial measures are needed, so that the education sector can fully realize its development objectives. The most significant of these issues are described below.

GENERAL EDUCATION ISSUES

Internal Efficiency

Although both the Fourth and Fifth Plans stressed the importance of improving the output of the education system, data concerning the 1406/07-1411/12 cohort analyzed during the preparation of the Sixth Plan, indicate the following:

a) Continuous high repetition rates, particularly in the first and fourth grades of the elementary stage, the second grade of the intermediate stage, and the third grade of the secondary stage.

b) Continuous high rates of drop-out, particularly in the first and fourth grades of the elementary stage, and notwithstanding the minor improvements in the internal efficiency of education compared with earlier years; this phenomenon does not conform with the sixth basic strategic principle that calls for mandatory primary education for all boys and girls.

c) A decline in the internal efficiency of the system as a result of high repetition and drop-out rates.

d) An increase in the average number of years invested in graduating students from the elementary stage to the secondary stage.
Pre-Elementary Education

The capacity to learn in school is determined in part by a child’s pre-school learning experience. Many education studies have stressed the importance of pre-school education in providing children with the knowledge and experience to cope with the school setting. Therefore, it is imperative to expand pre-elementary education programs, along with encouraging the private sector’s contribution in this direction.

Preparation and Training of Saudi Teachers to Replace Non-Saudi Teachers

The teacher is considered to be the cornerstone of the educational process. Thus, more attention should be given to the educational preparation of the teacher, so as to provide him with the necessary basic skills in his field of specialization. Mere educational preparation is not sufficient in this regard, however. Teachers should also continue to acquire knowledge of science and culture, and thereby gain sufficient practical experience of education following their formal preparation. It is beyond dispute that the proper education of teachers requires a period of in-service training.

Thus, it is important not only to provide Saudi teachers with adequate educational preparation and training, but also to emphasize that practical experience is needed no less than theoretical preparation, and that proper class management requires experienced, capable and well-trained teachers.

Curriculum Development and Teaching Methods

Notwithstanding the ongoing efforts of agencies involved in the development of academic curricula, greater efforts must be made in reviewing the curricula and teaching methods of theoretical subjects, and in adopting modern methods that concentrate on understanding, assimilation, thinking, derivation and problem solving.

HIGHER EDUCATION ISSUES

The following key issues are facing the higher education sector:

University Education for Saudi Girls

The rapid expansion in the institutions of girls’ education has been a great success, in both quantitative and qualitative terms. However, because the role of post-secondary educational institutions is a comprehensive one, contributing as they do to intellectual and cultural heritage as much as to the preparation of individuals to meet the needs of development, the education programs for Saudi girls need to be thoroughly reviewed, in conformity with social demands, development needs and Islamic Sharia teachings.
Capacity of Post-Secondary Educational Institutions

With the increasing number of male and female students graduating from the secondary stage, the post-secondary educational institutions are facing a growing social demand for education. This is a controversial matter amongst education officials. Some believe that universities should be capable of accommodating all male and female students who wish to continue their education, while others think that universities should accommodate only restricted numbers of those secondary stage graduates who are efficient, capable and willing to continue university study. During the Sixth Plan, universities shall continue to admit students in conformity with the Plan’s objectives and strategies. At the same time, the plan for the development of post-secondary education currently under preparation will establish the policy framework to be followed by the post-secondary education institutions in this regard.

Internal and External Efficiency

The accelerating growth of higher education has been accompanied by lower internal and external efficiency. Evidence for this lies in the high number of years spent by some students prior to graduation, the high average number of educational years invested per graduate and the mis-match between the qualifications and experience of graduates and those required in the labor market.

Coordination between Post-Secondary Educational Institutions

Enhanced coordination between post-secondary educational institutions, in terms of educational programs, subject areas of specialization and admission policies, is considered a vital issue during the Sixth Plan period. This coordination process is undertaken by the Council of Higher Education and Universities established by Royal Decree No. M/8 of 4/6/1414.

Expansion in Post-Graduate Studies

During the Fifth Plan period, some higher education institutions expanded their post-graduate studies in a manner that was inconsistent with their capabilities, while others refrained from expanding even though they had acquired adequate facilities and capabilities. Thus, there is a need for an accreditation system -- both internally within the Kingdom’s higher education system, and externally in conjunction with internationally recognized institutions -- whereby these post-graduate programs can be evaluated and upgraded according to the availability of pertinent resources of sufficient quality, such as teaching staff, laboratories and scientific reference books, text books and periodicals. Furthermore, it is imperative that the standard of research prepared for scientific theses be properly evaluated, and that the scope of such research deal with development issues.

Links between Higher Education Institutions and the Private Sector

This issue concerns the many dimensions of the desired links between the private sector and the higher education institutions, taking into account the potential benefits of such cooperative links and the needs of both sectors for education in the context of national development:
• Given that the private sector (i) benefits from the output of the higher education institutions through the employment of graduates, and (ii) already provides practical training for students of these institutions during the summer holidays, consideration should be given to the inclusion in the curriculum of an on-the-job training period, in order to complement -- and make more relevant to private sector needs -- the existing education and skills acquired on graduation. At the same time, the higher education institutions could also provide applied research and development in the producing and service sectors for the benefit of the private sector.

• It is through this linkage that the performance of the graduate can be continuously evaluated by the private sector and that the programs, curricula and teaching methods for the preparation of these graduates could be re-considered.

Role of Continuing Education

Continuing education has an important role to play in expanding the knowledge of both specialists and non-specialists without the need to develop academic programs granting degrees or diplomas. It is an important way of keeping the work force up-to-date on changing technology and other developments in their fields. With the exception of some colleges with continuing education units, insufficient attention has been paid to this type of education by the higher education institutions.

10.1.3 OPPORTUNITIES FOR THE PRIVATE SECTOR

Although the government will continue to be the main provider of education services to citizens, it will further encourage the private sector to expand its activities in this field. In this regard, the private sector has opened 1,100 private schools for boys and girls, while the students attending these schools account for between 6 and 7 percent of total school enrollments. The government has provided these private schools with various kinds of financial and other assistance, with financial assistance amounting to about SR 432 million during the Fifth Plan period. The government also constructed 400 schools through direct financing by the private sector, at a cost of around SR 6 billion. The government operates these schools on a lease basis for 10 years, after which time their ownership will be transferred to the government. During the Sixth Plan, the government will provide the following opportunities for greater private sector participation in the delivery of education services:

• continuation of the policy of private sector financing of some school and education facilities construction projects; construction projects in the education sector amounting to over SR 23 billion are expected during the Sixth Plan period;

• the opening of more private schools, so that student enrollments in these schools will reach 10 percent of total enrollments Kingdom-wide;
the opening of more kindergarten schools;
the establishment of private university colleges or technical colleges;
participation in the application of a cooperative education system;
expansion in school transportation services;
provision of maintenance services for vehicles of those government agencies undertaking educational services, in addition to preventive maintenance for technical machinery and equipment in use.

10.1.4 DEVELOPMENT STRATEGY

The development strategy for the education sector in the Sixth Plan period will be implemented through the following objectives, policies and programs:

10.1.4.1 OBJECTIVES

General Education:

- To continue providing education opportunities and related services to all citizens;
- To ensure that the general education system is responsive to the Kingdom’s religious, economic and social needs;
- To reduce illiteracy rates;
- To continue to improve the responsiveness of the general education system to the requirements of socio-economic development;
- To provide educational facilities at least possible cost;
- To continue updating the school curricula in response to the rapid developments taking place in various branches of knowledge;
- To ensure that the general education system places sufficient emphasis on quality;
- To continue the replacement of non-Saudi administrators and teachers by qualified Saudis.

Higher Education:

- To provide university places to citizens who can demonstrate their efficiency, their scientific and mental capabilities, and their willingness to continue their studies;
- To raise the quality and efficiency of the higher education institutions in order to improve the standard and content of the educational process;
• To ensure that the activities of the higher education institutions are responsive to social and economic development needs;
• To expand the absorptive capacity of higher education institutions to meet the needs of social and economic development;
• To expand the base of higher education and to diversify its programs to serve development issues;
• To improve the coordination and cooperation amongst post-secondary education institutions so that they can realize their own particular objectives and those for development in general;
• To provide, maintain and operate university facilities at lowest possible cost, while maintaining quality and improving performance;
• To promote research in science, technology and the arts, and to find adequate solutions to the economic, social and technological challenges that lie ahead;
• To promote literary works that extend the boundaries of knowledge and the understanding of Islamic thought, thereby enabling the Kingdom to fulfill its leading role in the enrichment of human culture, with due regard to the task of translating literary works of scholarship and science for the benefit of the maximum number of citizens;
• To continue the development of Saudi manpower in terms of both quality and quantity, and the replacement of non-Saudis by Saudi nationals.

10.1.4.2 POLICIES

The Sixth Plan includes a range of policies aimed at achieving the objectives of the general and higher education systems, all of which are in accordance with the main strategic themes of the plan and the needs of long term development:

• to raise economic efficiency;
• to enhance the private sector's role in the national economy; and
• to develop Saudi manpower and expand their employment opportunities.

The following policies have been formulated in light of the general objectives and strategic bases of the sixth Development plan mainly to address the key issues identified above.

(A) GENERAL EDUCATION POLICIES

Improving Internal Efficiency

The internal efficiency of general education could be improved by:
• studying the application of an automatic promotion system between grades, particularly at the first grades of the elementary stage, without affecting academic quality and standards;

• using more flexible individual criteria for evaluating students’ progress;

• emphasizing the guidance and counseling of students who are low achievers, and identifying weaknesses early in order to address the phenomena of repetition and drop-out;

• promoting better links between parents and schools in following up the educational standards of students, so that students can be provided with the knowledge and skills needed to solve their scientific, psychological and other personal problems;

• continuing to concentrate on and expand extra-curricular activity as a key instrument in the educational process, along with providing the necessary financial and human resources.

**Improving the Quality of Education**

The following measures will be undertaken to improve the quality of education:

• The academic curricula and teaching methods will be reviewed, improved and made more consistent with student needs, so as to encourage creativity and promote problem solving skills.

• Integration between curricula development and teacher training will be improved.

• Improved teacher performance and professional commitment will be emphasized through scholarships and ongoing training.

• The criteria and methods for evaluating schools will be reviewed.

• The introduction of computer science at secondary stage will be continued, and will be widely taught at both intermediate and elementary stages.

• School textbooks will be renewed and updated on an ongoing basis, and generally made more attractive through the use of pictures, graphs and colored text.

• The general principles of military education will be taught in coordination with the security and military agencies.

• Basic subjects relating to general principles of maintenance will be introduced into the curriculum at the intermediate and secondary school levels.

• Efforts to reduce the disparity in the regional distribution of educational facilities and to ensure that all educational facilities meet minimum standards will be increased.
• The scope for decentralized management in the delivery of education services will be studied.

Expansion of Pre-Elementary Education

Pre-elementary education programs could be expanded through:

• Increased private sector provision of high quality programs for preparing children for their entry into elementary education;

• Adding kindergarten classes to existing schools and encouraging working women to continue with their jobs, thereby utilizing their experience through teaching.

Optimal Use of Education Resources

The following policies will aim to ensure the optimal use of education resources:

• Optimal use will be made of available human and financial resources through efficiency and productivity improvements in the education system and improved teacher performance.

• Education services will be provided at minimum cost through improved internal efficiency and reducing the average number of educational years spent per student.

• Intensive information programs will be prepared at national and regional levels on the role of the individual and society in general in educating the nation’s children.

• Private educational institutions will be encouraged to maximize their potential to expand their provision of educational services, in conformity with the regulations of the general education system, and to continue to finance the construction of schools and other educational facilities.

• Efforts will be made to make the general education system self-sufficient in terms of Saudi teachers, supervisors and management staff.

(B) HIGHER EDUCATION POLICIES

Improving Internal and External Efficiency

Closer links between the output of the higher education system and the requirements of social, economic and technological development will be promoted by improving the internal and external efficiency of higher education institutions and their quality through the following steps:

• Ensuring that students complete their education within the specified time;

• Linking student stipends and bursaries to their performance and providing incentives to industrious students who complete their studies within the specified period;
Continually reviewing admissions policies, taking into account the results of the secondary stage exams and other criteria relevant to the changing needs of the development process;

- Encouraging students to enroll in technical and scientific colleges;
- Enhancing the links between higher education institutions and the private sector in order to upgrade the external efficiency of the sector.

**Enhancing Links with Public and Private Sector Agencies**

Higher education institutions will enhance their links with public and private sector agencies through:

- Identifying the manpower requirements of both sectors and exerting the utmost effort to meet these requirements;
- Providing fee-based technical, research and other consulting services to the government and private sectors;
- Establishing an information base on students trained at private sector establishments, so that they can improve their educational programs and curricula to cope with technological developments in the private sector;
- Discussing the relative contributions of both public and private institutions in financing scientific research centers, academic grants and various types of construction projects.

10.1.4.3 **PROGRAMS**

The Sixth Plan programs for the education sector are as follows:

**Educational Process and Development**

This program covers the major tasks of the educational institutions with respect to the educational process and its development, scientific research and its development, and the qualitative development of these tasks.

**Manpower Development**

This program aims at the maximum utilization of manpower, staff development and the Saudiization of management and technical positions through scholarship programs, training, symposia and conferences.

**Student Services and Activities**

This program provides services to students and includes all extra-curricular and cultural activities.
Community Services

This program covers all the activities of the higher education institutions in the field of community services.

Operation and Maintenance

This program covers the expenditures on staff and materials necessary for the maintenance, cleaning and operation of all buildings and equipment in the higher education sector.

Management and Administration

This program includes management and administration services and the use of advanced technology in providing a cost-effective administrative system.

Construction

This program aims at constructing, equipping and expanding buildings, laboratories, research centers, experiment stations and school classrooms, as well as the provision of other pertinent facilities.

10.1.5 GROWTH TARGETS IN THE SIXTH PLAN

Tables 10.3 and 10.4 show the Sixth Plan targets for male and female students (new entrants and graduates) in the general education sector by academic stages over the period 1414/15 to 1419/20.

Table 10.5 shows the Sixth Plan targets for male and female students (new entrants and graduates) in higher education by university over the plan period (1414/15-1419/20).
### Table 10.3

Sixth Plan Targets for Male and Female New Entrants in General Education ('000)

#### New Entrants (Males)

<table>
<thead>
<tr>
<th>Stage</th>
<th>1414/15</th>
<th>1415/16</th>
<th>1416/17</th>
<th>1417/18</th>
<th>1418/19</th>
<th>1419/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>174</td>
<td>181</td>
<td>188</td>
<td>195</td>
<td>201</td>
<td>209</td>
</tr>
<tr>
<td>Intermediate</td>
<td>124</td>
<td>129</td>
<td>132</td>
<td>137</td>
<td>143</td>
<td>153</td>
</tr>
<tr>
<td>Secondary</td>
<td>74</td>
<td>77</td>
<td>80</td>
<td>84</td>
<td>87</td>
<td>90</td>
</tr>
<tr>
<td>Teacher Colleges *</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

* Four academic years after secondary stage; graduates are granted bachelor degrees.

#### New Entrants (Females)

<table>
<thead>
<tr>
<th>Stage</th>
<th>1414/15</th>
<th>1415/16</th>
<th>1416/17</th>
<th>1417/18</th>
<th>1418/19</th>
<th>1419/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>191</td>
<td>202</td>
<td>211</td>
<td>221</td>
<td>233</td>
<td>244</td>
</tr>
<tr>
<td>Intermediate</td>
<td>122</td>
<td>128</td>
<td>136</td>
<td>141</td>
<td>148</td>
<td>155</td>
</tr>
<tr>
<td>Secondary</td>
<td>65</td>
<td>74</td>
<td>80</td>
<td>89</td>
<td>97</td>
<td>107</td>
</tr>
<tr>
<td>Teacher Colleges *</td>
<td>8</td>
<td>9</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
</tbody>
</table>

* Two academic years after secondary stage; graduates are granted diplomas.
Table 10.4

Sixth Plan Targets for Male and Female Graduates in General Education ('000)

Male Graduates

<table>
<thead>
<tr>
<th>Stage</th>
<th>1414/15</th>
<th>1415/16</th>
<th>1416/17</th>
<th>1417/18</th>
<th>1418/19</th>
<th>1419/20</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>141</td>
<td>144</td>
<td>148</td>
<td>150</td>
<td>153</td>
<td>157</td>
<td>752</td>
</tr>
<tr>
<td>Intermediate</td>
<td>89</td>
<td>92</td>
<td>95</td>
<td>97</td>
<td>101</td>
<td>104</td>
<td>489</td>
</tr>
<tr>
<td>Secondary</td>
<td>40</td>
<td>43</td>
<td>47</td>
<td>51</td>
<td>56</td>
<td>61</td>
<td>258</td>
</tr>
<tr>
<td>Teacher Colleges*</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>28</td>
</tr>
</tbody>
</table>

* Four academic years after secondary stage; graduates are granted bachelor degrees.

Female Graduates

<table>
<thead>
<tr>
<th>Stage</th>
<th>1414/15</th>
<th>1415/16</th>
<th>1416/17</th>
<th>1417/18</th>
<th>1418/19</th>
<th>1419/20</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>135</td>
<td>143</td>
<td>152</td>
<td>163</td>
<td>171</td>
<td>181</td>
<td>810</td>
</tr>
<tr>
<td>Intermediate</td>
<td>79</td>
<td>89</td>
<td>95</td>
<td>105</td>
<td>113</td>
<td>125</td>
<td>527</td>
</tr>
<tr>
<td>Secondary</td>
<td>51</td>
<td>55</td>
<td>59</td>
<td>64</td>
<td>70</td>
<td>77</td>
<td>325</td>
</tr>
<tr>
<td>Teacher Colleges*</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>48</td>
</tr>
</tbody>
</table>

* Two academic years after secondary stage; graduates are granted diplomas.
Table 10.5

Sixth Plan Targets: Higher Education New Entrants and Graduates at Bachelor Level by University
(1415/16-1419/20)

<table>
<thead>
<tr>
<th>University</th>
<th>New Entrants</th>
<th>Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>KSU</td>
<td>26,000</td>
<td>14,595</td>
</tr>
<tr>
<td>KAAU</td>
<td>27,176</td>
<td>17,936</td>
</tr>
<tr>
<td>KFU</td>
<td>6,833</td>
<td>4,538</td>
</tr>
<tr>
<td>KFUPM</td>
<td>6,000</td>
<td>---</td>
</tr>
<tr>
<td>Islamic University</td>
<td>5,990</td>
<td>---</td>
</tr>
<tr>
<td>Imam University</td>
<td>33,280</td>
<td>7,285</td>
</tr>
<tr>
<td>Umm AL-Qura University</td>
<td>10,825</td>
<td>9,195</td>
</tr>
<tr>
<td>Girls Colleges</td>
<td>---</td>
<td>75,396</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>116,104</td>
<td>128,945</td>
</tr>
</tbody>
</table>

10.2 TECHNICAL EDUCATION AND VOCATIONAL TRAINING

10.2.1 PRESENT CONDITIONS

The Kingdom has long recognized the development of human capital as a crucial goal in its overall planning strategy. The formation of a skilled labor force raises productivity levels and thereby makes an important contribution to economic development. This recognition is reflected in the tremendous efforts to expand the Kingdom's training system, both quantitatively and qualitatively, to meet the challenges of economic development and technological change. It is the task of this system to produce a flexible labor force that is capable of acquiring new skills in response to the changing needs of the national economy. The acquisition of such skills benefits both the individual -- through higher earnings and enhanced employment mobility -- and society as a whole, through higher productivity and the ability to exploit new opportunities through the use of advanced technology. The wide-scale acquisition of technical skills is particularly important for safeguarding the longer term development of the Saudi economy for the benefit of future generations.
Vocational and technical education and training in the Kingdom is provided by a number of public and private sector agencies and institutions. The General Organization for Technical Education and Vocational Training (GOTEVT) and the Institute of Public Administration (IPA) are the largest training agencies in the Kingdom. The IPA provides mainly pre-service training programs, short term in-service training for civil service employees and some training programs for the private sector, in addition to research and consulting services to improve public administration practices. General occupational preparation is provided by GOTEVT through its technical education and vocational training programs, which range in duration from short-term (up to 18 months) at the vocational training centers to 3 years at the secondary level and 2 years at the post-secondary level. It is noteworthy that the Riyadh Technology College grants bachelor degrees in applied engineering through programs directed towards secondary stage graduates and other programs directed towards technical secondary graduates.

GOTEVT is also responsible for the technical training of manpower to fill some positions through short-term courses and for upgrading skills through short-term pre-service and in-service training programs. In addition, a number of government ministries and agencies operate in-house training institutes or centers to meet their own specialized training needs. The universities provide specialized training courses for professionals upon requests from government agencies or private sector establishments. Some other agencies also have specialized training institutions. For example, the Ministry of Health runs 41 secondary health institutes for boys and girls, enrollments at which exceeded 7,000 during the Fifth Plan period, while four intermediate colleges offering a range of programs, such as management and psychotherapy, have been created. The MOPTT operates three postal institutes, three training centers and two intermediate telecommunications colleges. The postal institutes offer one-year and three-year training programs. The Presidency of Civil Aviation runs two colleges and one training center. SAUDIA has five training centers, while the Saudi Ports Authority has two training centers. The Human Resources Development Institute at Jubail organizes intensive 18-months training programs. Enrollments in these programs reached 1,000 trainees. ARAMCO operates 15 training centers and organizes training courses for 9,000 staff members each year. Jubail Industrial College accommodates 1,200 trainees while Yanbu Industrial College accommodates 1,000 trainees.

The banking sector has its own training centers such as the Banking Training Institute, which is run by SAMA and offers short and long-term training courses with the participation of around 4,000 employees.

With respect to the training available for women, the General Presidency for Girls Education administers technical education and vocational training for females. The tailoring training centers have been upgraded to institutes and new programs have been provided according to the needs of Saudi women and in conjunction with the Sharia. Enrollments in these courses increased from 1,532 in 1409/10 to 1,625 in 1413/14. Furthermore, more than 4,000 female trainees attended IPA training courses in 1413/14.
The Ministry of Health runs 20 female institutes and work is underway to transform these institutes into intermediate health colleges.

Some private sector companies offer specialized training programs for women, particularly in fields related to business and computers. Some large business establishments operate and maintain training centers to train their own employees.

The training system has expanded significantly over the last twenty-five years, in terms of both quantity and quality, thanks to government efforts in this area since the First Development Plan (1390/91-1394/95) and its incentives for trainees, such as allowances and free housing. Some of the major achievements made over this period were:

- The number of enrollments at all technical education stages, and short pre-service and in-service training programs, increased from about 6,000 to over 120,000 (i.e. twenty-fold), while the number of graduates reached around 80,000. The number of students enrolled at schools and institutes of technical education supervised by GOTEVT rose from 4,640 in 1400/1401 to more than 28,000 in 1414/15, while the number of graduates reached 8,623 in the same year.

- The number of students enrolled at the vocational training centers rose from 378 trainees in 1390/91 to 11,543 in 1414/15, while the number of graduates reached 7,684 in 1414/15.

- The number of graduates from IPA training programs rose fifteen-fold in the past 25 years, reaching 9,850 in 1413/114.

In the Fifth Plan period, enrollments in the technical colleges run by GOTEVT increased at an average annual rate of 19 percent, while average annual enrollment growth in secondary industrial, commercial and agricultural programs was 4 percent, 10 percent and 18 percent respectively. Enrollments at IPA programs also grew at an average annual rate of 6 percent during this period. This period also saw the expansion of the training sector's infrastructure and the participation of the private sector in training activities under specific programs. The higher commercial education programs have been incorporated in the programs of the technical colleges, and eight new technical secondary institutes have been opened during the Fifth Plan period.

10.2.2 KEY ISSUES

It is to be expected that the rapid growth witnessed by the training and technical education sector over the past two decades should be accompanied by a number of key issues that need to be addressed in the Sixth Plan period, through a range of policies, programs and projects. These issues are as follows:
Vocational Awareness and Work Behavior

Vocational development is closely linked with citizens' vocational awareness and social status. During the first three development plans, the emphasis of technical education and training was on generating the maximum possible number of graduates and providing them with necessary occupational and technical skills. Less emphasis was placed on qualitative aspects, such as work attitudes and behavior. The Sixth Plan will stress the need to upgrade the occupational awareness of citizens, by paying special attention to the educational and vocational awareness and guidance programs for students and trainees.

Private Sector Training Programs

Training in the private sector is a key element in the development of Saudi manpower, through upgrading performance standards and reinforcing the basic skills acquired during technical education and vocational training. In this respect, as the major user of advanced techniques, the private sector has an important role to play through on-the-job training. Thus, the Sixth Plan emphasizes the importance of training within private sector establishment (particularly on-the-job training), so that they will come to rely increasingly on national manpower instead of continuing to depend on a non-Saudi labor force.

Internal Efficiency

Repetition and dropout rates remain high in the technical education and training sector, while student / teacher and trainee/instructor ratios are low and vary between training institutions. This lowers the internal efficiency of the system and raises operating costs. Thus, the Sixth Plan will aim to address these issues.

Coordination among Training Institutions

Coordination among the government's technical education and training institutions is important for identifying the role and responsibilities of individual institutions in accomplishing manpower development objectives. Coordination acquires an added significance in establishing a uniform admissions policy that would regulate student/trainee transfers between institutions. This will lead to a reduction in dropout rates, particularly in the first grades. Thus, it is imperative to develop policies to ensure effective coordination among the various training institutions.

Standards and Accreditation System

There is an urgent need for an occupational standards and accreditation system across training institutions Kingdom-wide. The Sixth Plan will emphasize the establishment and development of an occupational inspection system that will develop standards for each occupation. Attention will also be given to the international accreditation of technical education and training programs.
10.2.3 PRIVATE SECTOR OPPORTUNITIES

Although the government has been both the major provider and user of technical education and vocational training services in the past, a significant shift towards the private sector as both producer and user of these services is expected in the Sixth Plan period. While the government will continue to provide basic training services, the private sector will be encouraged to become more active in the provision and use of training services. At the same time, however, close coordination will be needed between the government's training institutions and private sector employers in order to enhance the skill mix of graduates, to review curriculum contents and to assess the functional skills acquired by trainees. Such coordination will also raise the training institutions' awareness of the needs of private sector employers and their plans to introduce new technology.

The private sector will be encouraged to take on greater responsibility for the training of Saudi manpower in the Sixth Plan. Because most technological innovation enters the Kingdom through private enterprise, the development of new skills to operate this new technology is primarily the responsibility of the private sector. The following activities represent opportunities available for the private sector over the Sixth Plan period:

- the establishment of more technical education and training institutions;
- the provision of on-the-job training for employees;
- participation on the national consulting committees on the training system;
- contributions towards financing some training programs, as well as offering grants and donations;
- study the provision of academic grants by the private sector;
- contributions towards financing and implementing some projects proposed for GOTEVT;
- participation in cooperative education programs through which employers shall shoulder part of the education costs.

10.2.4 DEVELOPMENT STRATEGY

The development strategy for the training sector in the Sixth Plan will be implemented through the following objectives, policies and programs:

10.2.4.1 Objectives

The major objective of technical education and vocational training is to contribute to socioeconomic development by upgrading national manpower skills, thereby enabling the national work force to perform their tasks effectively in an economy that continues to be influenced by the forces of technological change and global competition. More specifically, the following training objectives will be pursued in the Sixth Plan:
• To improve the efficiency and effectiveness of the training system by raising the quantity and quality of its output and by developing its management and technical staff.

• To emphasize quality in technical education and training programs, particularly with respect to modern technology at all levels in response to the needs of the national economy.

• To stress the fact that training is an on-going process of providing national manpower with the flexibility needed to adapt quickly to advances in technology.

• To expand the system of technical education and vocational training both horizontally and vertically, with due emphasis on on-the-job training in both public and private sectors to meet the national need for qualified manpower, through the expansion of the absorptive capacity of training programs in an efficient manner and the provision of a better training environment in the private sector;

• To provide trainees with occupational counseling and guidance programs.

• To promote better cooperation and coordination between technical education and training institutions and agencies.

• To contribute towards the evaluation and financing of cooperative education programs.

• To form technical committees that will contribute to the development and expansion of technical education and training.

10.2.4.2 Policies

The Sixth Plan policies for the technical education and training system aim to achieve these objectives and to address the key issues identified above. These policies also aim at the continuous development of the technical education and training system and to make it more responsive to changes in the labor market and advances in technology, thereby helping to meet the economy's need for highly qualified and well-trained Saudi manpower. Accordingly, the following policies will be implemented:

1. Development of Vocational Awareness

This policy is made up of the following elements:

• Identification of the work attitudes of students since early education stages;

• Acquiring occupational skills;

• Identification of the relationship between the stage of preparation for an occupation and the following stage of training.

• Understanding the varied interests and needs of the trainees and their professional capabilities through which their work attitudes could be identified and modified.
2. **Improving Training Efficiency**

This policy covers the following:

- Re-orientation of the training system to become more responsive to labor market needs through the formation of consulting committees at national level, comprising representatives from employers and training institutions;
- The periodic development of curricula to cope with advances in technology;
- The development of vocational standards in priority fields;
- The follow-up of graduates and evaluation of their employment services along with the enhancement of links with employers;
- Improvements in the quality and quantity of training outputs;
- The expansion of on-the-job training activities as a basic element in the Saudiization strategy;
- The use of training resources in an effective manner;
- The adoption of a selective admissions policy, taking into account student selection, guidance and counseling as significant factors in this regard.

3. **Horizontal and Vertical Expansion of Technical Education and Training Programs**

It is imperative to concentrate on the following regarding this policy:

- Expansion of post-secondary technical education programs to provide a highly trained technical labor force.
- Concentration on short-term training programs (up to six months) for unskilled adults and youths not enrolled in schools, in order to realize their pre-service vocational preparation.
- Emphasizing in-service training in both public and private sectors.
- Making training programs and curricula more flexible and responsive to the requirements of changing technology.

4. **Improving Utilization of Available Training Capacity**

This can be accomplished through:

- Use of short and more intensive training modules, that promote the efficient utilization of training spaces and the reduction of training opportunity costs per trainee.
• Provision of cooperative educational training systems taking into account the full-year academic term system (three terms) in order to increase the absorptive capacity.

• Expansion in the number of daily training periods to make use of available spaces.

5. **Review and evaluate technical education and training programs and curricula at all levels to cope with general trends in the philosophy of on-going training and the development strategy.**

6. **To emphasize the significance of coordination among training institutions in both public and private sectors through:**

   • Regulating admissions procedures in training institutions.

   • Developing regulations for the transfer of technical education and training students from one agency to another.

   • Continuing to encourage students and trainees through an “open door” policy for higher levels, thus paving the way for vocational secondary school graduates to study in higher education.

7. **Pursue the strategic objective of Saudization, through:**

   • Continued expansion of training programs through the implementation of an apprenticeship system that utilizes the capacities of non-Saudi manpower with the aim of Saudizing private sector jobs.

   • Providing pre-service training programs based on demand, through cooperative education and summer training.

   • To develop the incentive system for establishments and individuals with the aim of realizing Saudization effectively through training.

10.2.4.3 **Programs**

The Sixth Plan of GOTEVT includes six main programs that specify all activities required for the operation of the organization. These programs are:

**Education and Training:** This program represents the primary function of GOTEVT and comprises all activities which will be implemented through its education and training units.

**Research and Studies:** This program covers all research, development and planning activities aimed at the collection, processing and dissemination of data related to main functions. The program also includes the establishment of a database, preparation of studies that measure the internal efficiency
of the technical education and training system, as well as the internal efficiency of GOTEVT administrative staff. It also covers follow-up of graduates and translation and publication of specialized books in the field of training.

**Management and operation**: This program aims at developing the administrative organization through creation of new units and improving the efficiency of the existing units. The program also covers administration, finance, public relations and other functions of management and operation.

**Manpower Development**: This program seeks to develop and improve manpower efficiency through training courses, seminars, university education by scholarships, participation in local and international scientific meetings, and the adoption of an effective system for medium and long-term Saudization.

**Operation and Maintenance**: This program covers maintenance and janitorial services of main and branch buildings, in addition to maintenance of equipment and machines.

**Construction**: This program aims at completion of the construction projects currently under implementation, as well as construction of new facilities and renovation of the existing ones.

The Sixth Plan of the IPA comprises five programs that specify the activities required for its operation:

**Administrative Development**: This program represents the primary function of the IPA and aims at management and organization development in government agencies through sub-programs of training, consultation, administrative reform and research.

**Management and Operation**: This program aims at developing the administrative organization through creation of new units and improving the efficiency of the existing units. This program also covers the functions of administration, finance, public relations, and other functions of management and operation.

**Manpower Development**: This program seeks to develop and improve manpower efficiency through training courses, seminars, and university education through scholarships, participation in local and international scientific meetings, and adoption of an effective system for medium and long-term Saudization.

**Operation and Maintenance**: This program covers maintenance and janitorial services of main and branch buildings, in addition to maintenance of equipment and machines.

**Construction**: This program aims at completion of the construction projects currently under implementation, as well as construction of new facilities and renovation of the existing ones.
### 10.2.5 GROWTH TARGETS IN THE SIXTH PLAN

Table 10.6 shows growth targets regarding the number of new entrants and graduates of technical education, while Table 10.7 shows targets of enrollments and graduates of vocational training. Table 10.8 shows growth targets for training new entrants and enrollments at other government agencies and the private sector.

#### Table 10.6

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>1414/1415</th>
<th>1415/1416</th>
<th>1416/1417</th>
<th>1417/1418</th>
<th>1418/1419</th>
<th>1419/1420</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Colleges</td>
<td>3,258</td>
<td>4,354</td>
<td>4,661</td>
<td>5,218</td>
<td>5,965</td>
<td>6,993</td>
<td>27,191</td>
</tr>
<tr>
<td>Industrial Secondary Schools</td>
<td>3,134</td>
<td>3,992</td>
<td>4,374</td>
<td>4,920</td>
<td>5,767</td>
<td>7,191</td>
<td>26,244</td>
</tr>
<tr>
<td>Commercial Secondary Schools</td>
<td>4,664</td>
<td>5,952</td>
<td>6,632</td>
<td>7,564</td>
<td>8,922</td>
<td>10,883</td>
<td>39,953</td>
</tr>
<tr>
<td>Agricultural Secondary Schools</td>
<td>326</td>
<td>548</td>
<td>642</td>
<td>741</td>
<td>845</td>
<td>1,005</td>
<td>3,781</td>
</tr>
<tr>
<td>Technical Supervisors Institute</td>
<td>646</td>
<td>1,101</td>
<td>1,189</td>
<td>1,306</td>
<td>1,480</td>
<td>1,751</td>
<td>6,827</td>
</tr>
<tr>
<td>Electronics Institute</td>
<td>228</td>
<td>360</td>
<td>403</td>
<td>452</td>
<td>507</td>
<td>567</td>
<td>2,289</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12,256</td>
<td>16,307</td>
<td>17,901</td>
<td>20,201</td>
<td>22,486</td>
<td>28,390</td>
<td>106,285</td>
</tr>
</tbody>
</table>

#### Graduates

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>1414/1415</th>
<th>1415/1416</th>
<th>1416/1417</th>
<th>1417/1418</th>
<th>1418/1419</th>
<th>1419/1420</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Colleges</td>
<td>1,945</td>
<td>2,147</td>
<td>2,362</td>
<td>2,653</td>
<td>2,985</td>
<td>3,362</td>
<td>13,509</td>
</tr>
<tr>
<td>Industrial Secondary Schools</td>
<td>2,100</td>
<td>2,740</td>
<td>2,952</td>
<td>3,189</td>
<td>3,457</td>
<td>3,758</td>
<td>16,096</td>
</tr>
<tr>
<td>Commercial Secondary Schools</td>
<td>2,250</td>
<td>2,927</td>
<td>3,220</td>
<td>3,610</td>
<td>4,150</td>
<td>4,943</td>
<td>18,850</td>
</tr>
<tr>
<td>Agricultural Secondary Schools</td>
<td>226</td>
<td>303</td>
<td>373</td>
<td>446</td>
<td>521</td>
<td>598</td>
<td>2,241</td>
</tr>
<tr>
<td>Technical Supervisors Institute</td>
<td>476</td>
<td>506</td>
<td>576</td>
<td>682</td>
<td>843</td>
<td>1,101</td>
<td>3,708</td>
</tr>
<tr>
<td>Electronics Institute</td>
<td>---</td>
<td>---</td>
<td>180</td>
<td>200</td>
<td>230</td>
<td>260</td>
<td>870</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,997</td>
<td>8,623</td>
<td>9,663</td>
<td>10,780</td>
<td>12,186</td>
<td>14,022</td>
<td>55,274</td>
</tr>
</tbody>
</table>
Table 10.7

Sixth Plan Growth Targets for Enrollments
and Graduates of Training

Vocational Training Enrollments

<table>
<thead>
<tr>
<th>Type of Training</th>
<th>1414/1415</th>
<th>1415/1416</th>
<th>1416/1417</th>
<th>1417/1418</th>
<th>1418/1419</th>
<th>1419/1420</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning Training</td>
<td>7,909</td>
<td>8,809</td>
<td>8,989</td>
<td>9,313</td>
<td>9,875</td>
<td>10,857</td>
<td>47,843</td>
</tr>
<tr>
<td>Evening Training</td>
<td>3,614</td>
<td>3,909</td>
<td>4,172</td>
<td>4,515</td>
<td>4,907</td>
<td>5,678</td>
<td>21,381</td>
</tr>
<tr>
<td>Instructor Preparation</td>
<td>100</td>
<td>105</td>
<td>110</td>
<td>116</td>
<td>121</td>
<td>128</td>
<td>580</td>
</tr>
</tbody>
</table>

Vocational Training Graduates

<table>
<thead>
<tr>
<th>Type of Training</th>
<th>1414/1415</th>
<th>1415/1416</th>
<th>1416/1417</th>
<th>1417/1418</th>
<th>1418/1419</th>
<th>1419/1420</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning Training</td>
<td>5,022</td>
<td>5,176</td>
<td>5,326</td>
<td>5,512</td>
<td>5,886</td>
<td>6,542</td>
<td>28,442</td>
</tr>
<tr>
<td>Evening Training</td>
<td>2,662</td>
<td>2,851</td>
<td>3,039</td>
<td>3,281</td>
<td>3,608</td>
<td>4,084</td>
<td>16,863</td>
</tr>
<tr>
<td>Instructor Preparation</td>
<td>72</td>
<td>85</td>
<td>90</td>
<td>95</td>
<td>100</td>
<td>110</td>
<td>480</td>
</tr>
<tr>
<td>Total</td>
<td>7,756</td>
<td>8,112</td>
<td>8,455</td>
<td>8,888</td>
<td>9,594</td>
<td>10,736</td>
<td>45,785</td>
</tr>
</tbody>
</table>

Enrollments on IPA Programs

<table>
<thead>
<tr>
<th>Type of Training</th>
<th>1414/1415</th>
<th>1415/1416</th>
<th>1416/1417</th>
<th>1417/1418</th>
<th>1418/1419</th>
<th>1419/1420</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory Programs</td>
<td>2,150</td>
<td>2,400</td>
<td>2,500</td>
<td>2,600</td>
<td>2,700</td>
<td>2,800</td>
<td>13,000</td>
</tr>
<tr>
<td>In-service training</td>
<td>11,588</td>
<td>12,500</td>
<td>12,800</td>
<td>13,100</td>
<td>13,400</td>
<td>13,700</td>
<td>65,500</td>
</tr>
<tr>
<td>Special Programs</td>
<td>500</td>
<td>500</td>
<td>525</td>
<td>550</td>
<td>575</td>
<td>600</td>
<td>2750</td>
</tr>
</tbody>
</table>
### Table 10.8

**Sixth Plan Growth Targets for Training in Other Government Agencies and the Private Sector**

<table>
<thead>
<tr>
<th></th>
<th>1414/15 New Entrants</th>
<th>1419/20 New Entrants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other government agencies:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ministry of Health:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Health training Institutes (Male)</td>
<td>3,500</td>
<td>3,700</td>
</tr>
<tr>
<td>- Health training Institutes (Female)</td>
<td>3,000</td>
<td>3,500</td>
</tr>
<tr>
<td>MOPTT:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Two Telecom Institutes</td>
<td>500</td>
<td>1,000</td>
</tr>
<tr>
<td>- Postal Secondary Institutes</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Ministry of Defense and Civil Aviation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Presidency of Civil Aviation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Civil Aviation Institutes &amp; Centers</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td><strong>Enrollments</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others *</td>
<td>25,000</td>
<td>40,000</td>
</tr>
<tr>
<td>Training in Private Sector</td>
<td>20,000</td>
<td>35,000</td>
</tr>
</tbody>
</table>

* Includes Agricultural centers, banking institute, SAUDIA, Saudi Government Railroad Organization, Training Center of Saudi Ports Authority.

### 10.3 SCIENCE AND TECHNOLOGY

#### 10.3.1 PRESENT CONDITIONS

Throughout the world, science and technology is fundamentally important to the material advance and socio-economic development of nations. At the same time, there is constant competition between nations in the development of science and technology and a major feature distinguishing the developed from the developing countries is their capability to manage and develop science and technology. This is widely reflected in the close link between a country's scientific and technological capabilities and its economic strength and role in the international economy.
In recognition of its special role in the economic development process, the General Objectives and Strategic Principles of the development plans have always focused on the need to apply the latest available technology that is appropriate to the characteristics of the national economy and its capital-intensive requirements, on the development of production methods using extensive automation, on the use of treated water in agriculture and on support for centers and programs of applied research in the Kingdom.

In pursuing its development objectives, KACST has supported a wide range of scientific and technological research activities. Since 1410, it has supported four annual award/grant schemes covering 83 research activities, thus bringing to 14 the total number of annual grant programs since 1399 covering 337 research schemes. It also supported three national research projects, including phases six and seven of the traffic safety project and the establishment of a comprehensive data base for scientific books written in and translated into Arabic, thus bringing to 14 the total number of supported national projects. By encouraging the spirit of innovation among researchers and inventors, KACST protects patent rights in the Kingdom, with the number of registered patent applications reaching 2,716 by 1414, and has provided 1.73 million British and American patent documents.

In the energy sector, KACST has adopted intensive programs for the development of solar energy research in the Kingdom. A pilot solar energy station for desalination and pumping of ground water has been designed and the design, installation and preliminary operation of a solar energy hydrogen production station have been completed. A dual solar wood-burning oven has also been designed. A survey has been initiated in some areas of the Kingdom to identify possible locations for establishing wind power generation facilities, while in the field of natural resources and environmental research, soil, water and plant research and study laboratories have been established, two fresh water fish stations have been established at Dirab and Qassim, and maps have been prepared showing the locations of wells and other basic information. The national project for water treatment in the Kingdom has been completed. In the oil and petrochemical industries, compounds of benzene derivatives have been developed and improved, which are used in the production of rubber and plastic, while laboratories have been equipped to start developing catalysts for de-sulphurizing oil derivatives. The Saudi remote sensing center (operated by KACST) has processed and analyzed space information received from satellites, and has provided concerned government agencies with such information. This center has also studied the earth crust movement and has monitored locations and directions of oil slicks during the Gulf crisis. In the domain of astronomy and geophysics, three crescent monitoring projects at Makkah, Tabuk and Al Wajh have been equipped and operated, along with the selection of a site for the national astronomical
observatory project at share mountain, east of Khamis Mushait. The Saudi laser observatory at the solar village in Uyaynah has also been established and equipped. Finally, 10 seismic monitoring substations have been established and equipped at Tabuk and Jizan within the national network for seismic monitoring supervised by KACST.

10.3.2 KEY ISSUES

In spite of the rapid progress made over previous development plans, a number of issues need to be addressed in the Sixth Plan in order to improve the Kingdom's status in the field of science and technology.

Technology Gap

The most prominent science and technology issue concerns the gap between the level of technology used in the Kingdom and that which Saudi Arabia can adapt or produce itself. Many sectors of the economy have introduced and applied the most advanced technologies quite successfully. However, the capability to develop such technologies falls far behind either that of the industrial countries or the rapidly advancing countries of South East Asia. Although it will not be possible to close this gap within a short period, further efforts must be made to reduce it as much as possible. Greater emphasis must be put on science and engineering subjects in the education system, and the completion of the comprehensive national plan for the development of science and technology.

Manpower Shortage in Science and Technology

Although the Kingdom has established many universities, technical colleges and technical and vocational training centers aimed at creating a sound manpower base for advancing technological development in the Kingdom, there still exists a shortage of good scientists, engineers and technicians to ensure substantial future development.

Inadequate Utilization of Scientific Research Centers

Many research activities in these research centers are not being targeted sufficiently at the problems and constraints of the Kingdom's development process. The successful transfer, assimilation and development of technology requires cooperation and coordination between many different agencies, and in particular, between research institutes at universities and other government agencies and the industrial sector. With the exception of the oil and petrochemicals industries, however, much of the output from these research centers has had little direct relevance to the industrial sector in general. A much more effective mechanism is needed, therefore, to ensure a closer link between the research demands of industry and the activity profile of the research institutes and centers.
10.3.3 SAUDIIZATION

By the end of the Fifth Plan, KACST had achieved the full Saudization of its employees appointed under the civil service regulation and will maintain this position during the Sixth Plan also. By adding those employees appointed under its operations and maintenance budget, the percentage of KACST's total employees accounted for by Saudis will increase from 65 percent in 1414/15 to 71 percent by the end of the Sixth Plan, in order to meet the needs of KACST's research centers. Furthermore, KACST will continue to support its staff through training and scholarship schemes, whereby 81 employees will be sent on scholarships to obtain M.Sc. and PhD. degrees and to upgrade their efficiency.

10.3.4 TECHNOLOGICAL REQUIREMENTS

The introduction of modern technology in all branches of the national economy has raised the demand for the various science and technology services. Thus, the role of the scientific institutions, particularly KACST, will become more significant in fulfilling the responsibility for the planning and development of science and technology in the Kingdom. The rapid expansion of the industrial sector, for example, particularly in petrochemicals and related products, needs many science and technology services, not only for the purpose of import substitution, but also in order to compete on international markets. The expansion of agriculture needs more research on land reclamation and disease control, as well as the development of new species resistant to such diseases. Furthermore, the expansion in preventive and curative health services needs far more studies and analyses on epidemic and endemic diseases.

The control of environmental pollution linked to the Kingdom's development process or arising from external sources is greatly assisted by the results of scientific research and by enforcing regulations pertaining to pollution hazards. The identification, exploration and optimal utilization of the Kingdom's natural resources requires extensive geological studies, surveys, mapping and analyses of satellite images. Furthermore, because of the Kingdom's location near seismically active areas, it is imperative to carry out geophysical research and studies to identify the risks of earthquakes and landslides and to provide continuous information on the risks arising therefrom.

Thus, the development of the Kingdom's own scientific and technological capabilities becomes very important in the Sixth Plan period. It is imperative at this stage to design policies and to prepare long term plans that will include a clear idea on how to direct the advance along the path of scientific and technological development, and to mobilize the necessary resources to achieve such development.

10.3.5 ROLE OF THE PRIVATE SECTOR

Many economic activities in the Kingdom are experiencing substantial progress in advanced technology applications, a matter which necessitates enhancing the Kingdom's own research and development (R&D) capabilities and addressing any constraints in this regard. The private sector has an important role to play in this respect through innovations and the commercialization of R&D results.
By sharing some of the associated risk, and through its support and promotion of domestic capabilities in the field of scientific research and technology development, the government will continue to encourage the private sector to undertake research in science and technology, and to adapt and improve imported technology.

10.3.6 DEVELOPMENT STRATEGY

The development strategy of the science and technology sector will be implemented through the following objectives, policies and programs.

10.3.6.1 Objectives

The following long term objectives will guide the development of science and technology in the Kingdom according to the overall objectives and strategic principles of the Sixth Plan:

- to develop human resources in the field of science and technology;
- to emphasize the use of technological methods appropriate to the needs of the national economy, such as automation and the use of treated water in agriculture;
- to invest in technology research in activities for which the Kingdom enjoys comparative natural and economic advantages, such as petrochemicals research, water conservation, desalination technology and use of treated water in agriculture;
- to support and expand the national scientific research and technology development base;
- to support and enhance the private sector's research and development activities in the industrial and other producing establishments, as well as facilitating the contribution this sector can make in providing opportunities for scientists and researchers to conduct scientific and technological research, and its collaboration with KACST.

10.3.6.2 Policies

To achieve these objectives, the following policies will be adopted during the Sixth Plan:

- The long term national plan for the development of science and technology will be completed;
- Regulations for the transfer of technology will be finalized;
- The development of qualified manpower in science and technology will be promoted;
- R & D activities oriented towards the development needs of the Kingdom will be promoted and supported;
• The research institutes in the universities and other government agencies will continue to be supported and their activities directed towards the optimal utilization of resources and the solution of major problems and constraints facing the development process in the Kingdom; assistance will also be given in converting and translating scientific results into industrial applications;

• Educational programs and curricula relating to science and technology at all education levels will be expanded and upgraded;

• R&D activity in private industry will be encouraged and supported;

• Improvements will be made in the coordination of scientific research and technology development undertaken by KACST;

• Increasing use will be made of international cooperation agreements in scientific and technological fields;

• Increasing use will be made of the private sector's research and study centers.

10.3.6.3 Programs

The following programs have been designed to implement these policies.

Management and Administration: An ongoing program without projects to cover the administrative and technical expenditures of KACST.

Maintenance and Operation: An ongoing program without projects to cover the costs of maintaining and cleaning KACST's buildings, and the operation and maintenance of equipment at KACST's institutes and laboratories.

National Scientific and Technological Manpower Development: This program aims at the creation of a strong base of qualified manpower capable of driving the process of technological development in the Kingdom.

Planning, Directing and Coordinating Science and Technology Activities: This program aims at preparing a national master plan for science and technology, as well as establishing an adequate mechanism for the proper coordination of scientific and technological activities in different agencies to avoid duplication or waste of resources.

Support and Development of a National Technology Base: This program will encourage innovations and technological development in the national industries and will enhance the innovation capabilities of these industries by encouraging them to establish their own research and development units.
and to provide advanced technological training. Saudi industries will be encouraged to undertake technological development studies and to use locally adapted advanced technology. Furthermore, technological consultation will be provided to the national industries. This program will be implemented through cooperation and coordination between KACST, industry and other industrial development agencies.

**Enhancement of Scientific Research:** This program will promote scientific research and technology development in line with the national development objectives and taking into account the natural and environmental conditions as well as the natural resources of the Kingdom. The program includes the provision of annual grants and support for national applied research, and support for applied postgraduate studies in the universities.

**Support Services for Science & Technology:** This program aims at boosting information services at KACST, facilitating their provision to specialists, and at deepening public awareness and understanding of science and technology. This will be accomplished through the development of information bases at KACST, the provision of science and technology information through the various types of media, scientific publications, books and magazines, the production of scientific films, and the establishment of scientific exhibitions and centers. Furthermore, a regulation will be developed for the protection of patent rights, intellectual rights and industrial designs, and a national prize for innovation will be awarded. Finally, the scientific appliances center -- one of the most important support services of science and technology -- will be equipped and made operational.

**International and Regional Cooperation:** This program aims at enhancing technology transfer through international cooperation agreements and expanding links with other countries in similar circumstances, in order to make use of their experience in developing science and technology.

**Applied Development Research Activities:** This program will enhance and upgrade the technological capabilities of KACST's institutes through implementation of applied research activities in the following fields: electronics and computers, geophysics, natural and environmental resources, petroleum and petrochemical industries, atomic power, solar energy, and astronomy.

**Completion of KACST Facilities:** This program will complete the remaining stages of KACST projects and facilities, including phase one of the KACST building, facilities, buildings and equipment of the scientific laboratories, seismic monitoring network, oscillation receiving station, as well as the new vital projects, such as equipping KACST's institutes and laboratories, and establishing a communication and control system.