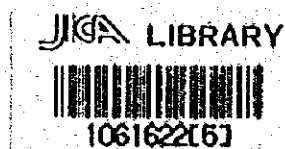


REPORT FOR
LONG-TERM DEVELOPMENT STRATEGY
OF
EGYPT TOWARDS THE 21st CENTURY

SEPTEMBER, 1979

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Specialized Councils of Egypt
Japan International Cooperation Agency
Institute of National Planning of Egypt

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REPORT FOR LONG-TERM DEVELOPMENT STRATEGY OF EGYPT TOWARDS THE 21st CENTURY

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INTRODUCTION

This paper presents a set of analysis, projections and recommendations for the long-term development strategy of Egypt which is the results of the joint study conducted by Japanese and Egyptian experts.

The paper starts with the population projection by sex and by five-year age groups, covering the next fifty years, i.e., the period from 1976 to 2026, because we consider that the long-term population projection can represent the least uncertain future among projections on various variables, and that it gives influences on almost all the sectors of human activities.

On the basis of the population projection, the paper deals with the impacts resulted from the population growth and the change of demographic structure in such sectors as education, employment, housing, and new urban developments, and then, gives some policy implications of them.

Further, the paper discusses on the necessary conditions of the rapid economic growth which is assumed in the preceding part of the paper as well as the desirable choice of industrial activities which matches the projected long-term development path.

Finally, the paper gives the policy implications and recommendations based on the preceding analysis and projections.

Some of these recommendations may look like too ambitious to be implemented in short period, however, we believe that they are essential for the desirable development towards the 21st century, and should be implemented even in step by step approach.

It is obvious that this paper deals with the only limited scope for the long-term development. We expect that the following study conducted through Egyptian and Japanese Cooperation will provide more comprehensive and detailed strategy for the long-term development of Egypt.

Chapter I Long-term Population Growth and It's Age Structure

1.1 Population Growth and It's Characteristics Since 1947

(1) Total Population

1.01 The population of Egypt had doubled in twenty nine years from 1947 to 1976. The compound average annual growth rates of population was 2.4 %, and the growth rates of each inter-census period did not show either considerable change or decreasing tendency (Table 1-1).

Although the birth rates have dropped from 43 to 37 per thousand since 1966, the death rates have also decreased from 18 to 13 per thousand since 1947, and therefore the population growth rates have remained approximately constant.

The above facts show the difficulty of controlling the population growth, although the government has reiterated the need for this control.

Table 1-1 POPULATION GROWTH OF EGYPT SINCE 1947

| Year | Population (thousands) | Average Annual Growth Rate (%) | (Rate per thousand) | |
|------|------------------------|--------------------------------|---------------------|------------|
| | | | Birth Rate | Death Rate |
| 1947 | 19,022 | — | — | — |
| 1960 | 26,085 | 2.38 | 41.7 (2) | 17.5 (2) |
| 1966 | 30,076 | 2.54 | 42.6 | 16.0 |
| 1971 | 33,853 (1) | 2.24 | 37.2 (1) | 15.0 (1) |
| 1976 | 38,228 | 2.38 | 36.9 (1) | 13.4 (1) |

Note: (1) The figures are estimated in the Joint Study.

(2) The figures are the average rates in the 1952-1960 period.

Source: CAPMAS (Central Agency for Public Mobilization and Statistics) and the Joint Study Estimations

(2) Age Structure of Population

1.02 The change of the age structure of population from 1960 to 1976 is due to two main reasons. The first reason is continued high level of birth rates since 1947 with its slight slow down since 1966. The second reason is the consistent improvement in mortality rates since 1947, especially in infant mortality rates.

As a result of this changing pattern, the ratio of the population aged 0-14 to the total population has maintained a very high level in spite of a recent slight decline, and the ratio of population aged 15-24 and that of 65 and over, has shown a gradual increase (Table 1-2).

Table 1-2 AGE STRUCTURE OF POPULATION

| Age groups | Population in thousands | | | Distribution by age groups (%) | | |
|------------|-------------------------|--------|--------|--------------------------------|-------|-------|
| | 1960 | 1966 | 1976 | 1960 | 1966 | 1976 |
| 0 - 14 | 11,109 | 12,743 | 15,186 | 42.8 | 42.4 | 39.7 |
| 15 - 24 | 3,949 | 5,206 | 7,652 | 15.2 | 17.3 | 20.0 |
| 25 - 49 | 7,710 | 8,420 | 10,442 | 29.7 | 28.0 | 27.3 |
| 50 - 64 | 2,311 | 2,650 | 3,437 | 8.9 | 8.8 | 9.0 |
| 65 - | 904 | 1,052 | 1,511 | 3.5 | 3.5 | 4.0 |
| Total | 25,983 | 30,076 | 38,228 | 100.0 | 100.0 | 100.0 |

Note: Population by age groups in 1976 is estimated in the Joint Study

Source: CAPMAS and the Joint Study Estimations

1.03 The most outstanding feature of the age structure of the present Egyptian population is that the young population occupies an extremely large portion of the total population.

In 1976, the population aged 0-14 still occupies 40 % of total population, and when the population aged 15-24 is added to it, they reached 60 % of total population, that was 23 million out of 38 million. If we define young population as that in age of 0-24, the share of young population in 1976 was even larger than that in 1960.

The existence of a large number of young population directly indicates that the supply of new labor force entering in labor market will have rapidly increased in at least this century, and that the increasingly large demand will be forecasted in the fields of education, housing, and other urban services over a long period.

1.2 The Method and Preconditions of Population Projections

(1) The Period of Projection and the Significance of Population Projection by Age Groups

1.04 As the basic information to formulate long-term development strategy, it is desirable that the projection of the future population in developing countries covers a future period until these developing countries are able to reach a certain satisfactory level of development. This period is generally designated for between twenty five and fifty years, depending on the speed of the expected development. In view of this, it is desirable that the population projection of Egypt covers the maximum period of fifty years.

Since our projection starts from 1976, it will cover the period ending in the year 2026.

The population projection, as a basic information for long-term development strategy, should be the instrument to foresee the influence on such sectors as education, employment, household and housing, etc. For this purpose, it is necessary for the projection to be made not only on the total population but also with a classification by sex and age groups.

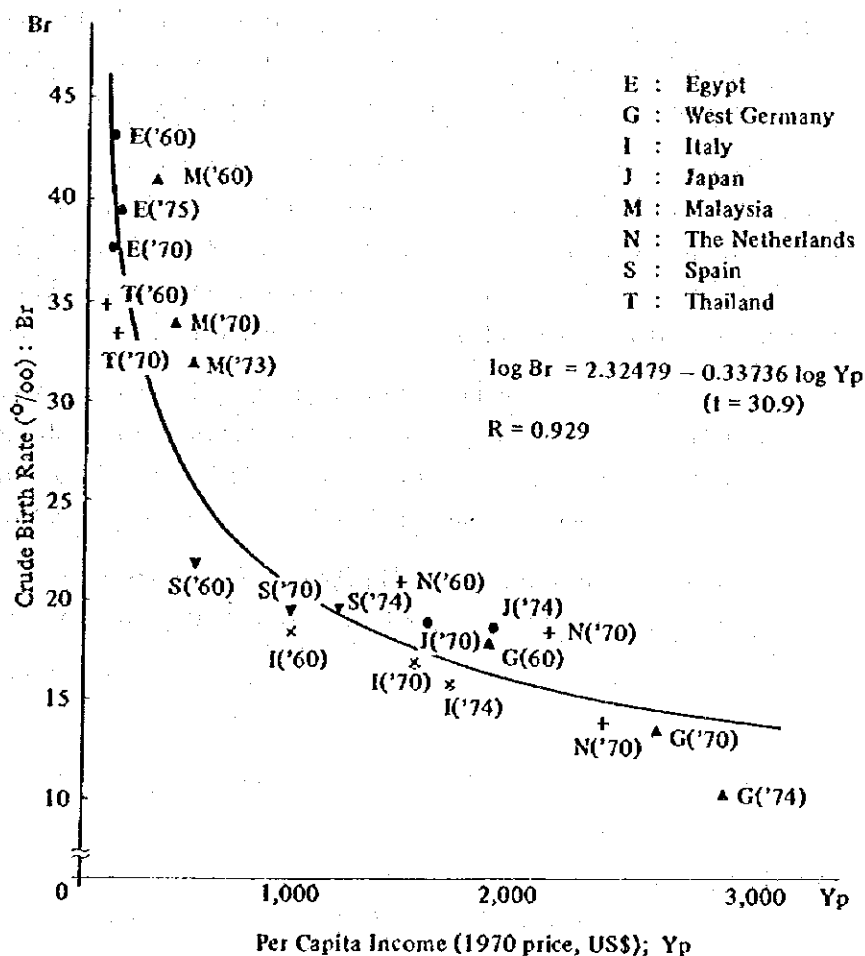
In order to make the projection of the population by sex and age groups, it is necessary to estimate the future age specific fertility rates and the survival ratio by sex and age group over a long period. Since it is difficult to estimate them through time series analysis due to the lack of sufficient data of Egypt, the estimation was made through international comparative analysis.

(2) Two Alternative Projections with Differentiation of Birth Rates

1.05 There is a fairly clear interrelationship between the stage of economic development and the birth rates, which is determined by fertility rates and age structure of the population. It can generally be observed that the birth rates are very high in economically low-developed stage, and that these birth rates start to decline rapidly after the economic development reaches a certain stage, then decreasing gradually along with further economic development.

It may usually be justified to treat the level of per capita income as a main indicator representing the level of economic development, so in our projection the quantitative interrelationship between birth rates and per capita income was examined through international comparative analysis (Fig. 1).

Figure 1. CRUDE BIRTH RATES AND PER CAPITA INCOME



The regression equation of birth rates to per capita income is as follows:

$$\log Br = 2.32479 - 0.33736 \log Yp$$

(t = 30.9)

$$R = 0.929$$

Br: Crude birth rate (per thousands)

Yp: Per capita income (1970 price, US \$)

1.06 Here, we assumed that there would be alternative possibilities for the path of economic growth of Egypt, and on the above relationship between Br and Yp, we made two cases of population projections with difference in long-term economic growth rates and consequently birth rates.

Case 1: For Case 1, the assumption was made as the growth rate of per capita income of 5 % per annum in real term. In this case, it takes about fifty years for the per capita income of Egypt to catch up the present level of developed countries. Consequently, the case assumed the slow decline of birth rate, and it also takes fifty years to reach the level as low as the present developed countries.

Case 2: For Case 2, the assumption was made as the growth rate of per capita income of 10 % per annum in real term by the year 2001, and gradual decline to 5 % by the year 2026. In this case, it takes about twenty five years for both the per capita income and the birth rate of Egypt to reach the present levels of developed countries.

The assumed annual growth rate of per capita income of 5 % in Case 1 corresponds to GDP growth rate of approximately 7 %, and is almost the same as the average annual growth rate of GDP of Egypt in the latest five years from 1973 to 1978. In this sense, Case 1 can be considered as the case of trend economic growth.

On the other hand, the assumed annual growth rate of per capita income of 10 % in Case 2 corresponds to GDP growth rate of approximately 12 %, is very high rate from world experience which only Japan and Korea had been able to maintain for more than one decade. In this sense, Case 2 may be considered as the case of maximum economic growth.

The birth rates and fertility rates of two cases in the next fifty years were calculated by using the above equation, and the results in 1986, 2001 and 2026 are shown in Table 1-3.

Table 1-3 POPULATION PROJECTIONS FOR THE NEXT FIFTY YEARS

| | 1976 | 1986 | | 2001 | | 2026 | |
|---|--------|--------|--------|--------|--------|---------|--------|
| | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| Total Population (thousands) | 38,228 | 49,301 | 48,150 | 68,954 | 61,317 | 102,081 | 78,490 |
| Total Fertility Rate | 5.96 | 5.25 | 4.50 | 3.85 | 2.50 | 2.30 | 2.10 |
| Birth Rate (per thousand) | 36.9 | 34.6 | 30.7 | 26.5 | 19.6 | 18.0 | 14.9 |
| Death Rate (per thousand) | 13.4 | 10.0 | 9.7 | 5.2 | 5.6 | 6.8 | 8.3 |
| Rate of Natural Increase (per thousand) | 23.5 | 24.6 | 21.0 | 21.3 | 14.1 | 11.2 | 6.5 |

Note: Total fertility rate, birth rate, death rate and rate of natural increase in each year are the average rates of five years period immediately preceding these specific years in the Table.

Source: Joint Study Projections

1.07 As to the survival ratio, since its past improvement was remarkable in comparison with the fertility rate, and since medical and hygienic condition of the society can rapidly be improved in the cause of economic development, we assumed that the survival ratio of Egypt would improve to the same level of the present developed countries by the beginning of the 21st century for both cases despite the difference in economic growth rates. The reason why the future death rates of both cases in Table 1-3 differ from each other in spite of having the same survival ratio is due to the difference in the age structure of the future population of the two cases.

1.3 Population Projection for the Next Fifty Years

(1) Future Population Growth

1.08 The population growth and its components like birth rate and death rate for the next fifty years are represented in Table 1-3.

In Case 1, the economic growth following the past trend is assumed as mentioned in the previous section, and the birth rate and the fertility rate will decrease slowly in accordance with the slow economic development.

In Case 1, the population in 1986 will increase by 11 million from 1976 and reach 49 million.

The increasing rate of population in the next ten years from 1976 to 1986 turn to be 2.58 % per annum which is somewhat higher than the past ten years' average of 2.31 % per

annum, and this is due to the fact that the death rate will decrease faster than the birth rate in the next ten years.

In Case 1, the population projected for 2001 will increase to 69 million which is 31 million more than in 1976, and the population of Case 1 in 2026 will triple the present size and reach 102 million which is approximately similar to the present population of Indonesia, Brazil and Japan.

- 1.09 In Case 2, the realization of the maximum economic growth is assumed, and the birth rate and the fertility rate will decrease rapidly in accordance with the rapid economic development.

The pattern of population growth of Egypt projected in Case 2 will become similar to that of the developed countries by the beginning of the 21st century in the sense that few births will be accompanied by few deaths.

Even in this case, however, the projected population in 2001 will increase to 61 million which is 23 million more than in 1976, and the population in 2026 will double the size of the present population and reach 78 million.

- 1.10 If we compare the projected population of Case 1 with Case 2, we can see that the difference in 1986 will only be 1 million. However, the former will surpass the latter by 8 million in 2001 and by 24 million in 2026. This large difference of population in the next century indicates the difference of the burden which Egypt will have to bear. The difference in total population is mainly resulted from the difference in young population as described in the following section.

- 1.11 The reason why the death rate in 2001 is at bottom and rises again until 2026 despite the assumption of consistent decline of the survival ratio is due to the difference in age structure of population. Namely, the age structure of the population in 2026 has much larger weight in the aged population than that in 2001 (See Fig. 2), of which the death rate is higher than of young population, and therefore the crude birth rate in 2026 appears to be higher than in 2001.

(2) Future Age Structure of Population

- 1.12 The main features of transition of the age structure of population are shown in Table 1-4 and 1-5 (For details, refer to Table 1-6 and Fig. 1-2).

The population by age groups of Case 1 will uniformly increase until 1986, and so the distribution of population by age groups in 1986 will not make much change. The only difference between Case 1 and Case 2 is the number of births expected in the next ten years. The population aged 0-14 in Table 1-4 only differs by 1 million between the two cases.

Since the population who will be over 14 years old in 1986 has already been born at present and the future survival ratio is assumed to be the same in both cases, there will be no difference in population by age groups between the two cases in 1986, except for the

population aged 0-14.

Table 1-4 AGE STRUCTURE OF THE POPULATION IN THE NEXT FIFTY YEARS

(population in thousand)

| Age Groups | 1976 | 1986 | | 2001 | | 2026 | |
|------------|--------|--------|--------|--------|--------|---------|--------|
| | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| 0 - 14 | 15,186 | 19,335 | 18,184 | 24,227 | 17,703 | 27,181 | 17,732 |
| 15 - 24 | 7,652 | 9,220 | 9,220 | 13,522 | 12,409 | 18,020 | 11,332 |
| 25 - 49 | 10,442 | 14,190 | 14,190 | 21,630 | 21,630 | 36,669 | 29,215 |
| 50 - 64 | 3,437 | 4,519 | 4,519 | 6,119 | 6,119 | 12,955 | 12,955 |
| 65 - | 1,511 | 2,037 | 2,037 | 3,456 | 3,456 | 7,256 | 7,256 |
| TOTAL | 38,228 | 49,301 | 48,150 | 68,954 | 61,317 | 102,081 | 78,490 |

Source: Joint Study Projections

Table 1-5 AGE STRUCTURE OF POPULATION IN THE NEXT FIFTY YEARS
DISTRIBUTION BY AGE GROUPS

| Age Groups | 1976 | 1986 | | 2001 | | 2026 | |
|------------|-------|--------|--------|--------|--------|--------|--------|
| | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| 0 - 14 | 39.7 | 39.2 | 37.8 | 35.1 | 28.9 | 26.6 | 22.6 |
| 15 - 24 | 20.0 | 18.7 | 19.1 | 19.6 | 20.2 | 17.7 | 14.4 |
| 25 - 49 | 27.3 | 28.8 | 29.5 | 31.4 | 35.3 | 35.9 | 37.2 |
| 50 - 64 | 9.0 | 9.2 | 9.4 | 8.9 | 10.0 | 12.7 | 16.5 |
| 65 - | 4.0 | 4.1 | 4.2 | 5.0 | 5.6 | 7.1 | 9.2 |
| TOTAL | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Joint Study Projections

- 1.13 The most remarkable feature of the age structure in 2001 that is twenty five years later from now, is the marked increase in the population aged 25-49. The reason is that the present population aged 0-24 which covers 60 % of the total population as a result of continued high birth rate since the revolution in 1952 (See 1.03), will all belong to the age of 25-49 in 2001. Consequently, the population of this age group will increase from 10 million in 1976 to 22 million in 2001 and its share of the total population will rise from the present figure of 17 % to 31 % (Case 1) or 35 % (Case 2) in 2001. As the approximate two thirds of the population aged 25 - 49 will participate in labor force, a large increase in the supply of labor force can certainly be forecasted by 2001.

The other feature of the age structure in 2001 is the continued large increase in the population aged 15-24. Since the population who will belong to this age group in 2001 is to

be born in the period between 1976 and 1986 when the fertility rate will remain considerably high for both Case 1 and Case 2, a large increase can be forecasted in the population aged 15–24 by 2001. This age group needs upper secondary education and higher education, therefore, the large increase in the population of this age group will inevitably result in a large demand for the above mentioned stage of education.

As for the population aged 0–14 in 2001, since they are to be born in the year from 1986 to 2001 when the projected fertility rate will fairly differ between Case 1 and Case 2, there will be large difference in the population of this age group between the two cases. Although in Case 2, the population of this age group in 2001 will see a slight decline compared with that in 1986, the population of the same age group in Case 1 will keep large increase in the same period. Consequently, the difference will be as much as 7 million between the two cases for the population aged 0–14 and this will result in a large difference in the demand for primary and lower secondary education toward the beginning of the twenty first century.

- 1.14 The population aged 0–49 in 2026, i.e. fifty years later from now, is to be born after 1976, and therefore, this population of Case 1 and Case 2 will naturally differ each other due to the difference in the future birth rates. Especially, the population aged 0–14 of Case 1 will exceed that of Case 2 by 9 million, and this population of Case 2 will show even a slight decline after 1986 (Table 1–4). According to the detailed calculation, the peak of the population of this age (of Case 2) will be 18.7 million in 1991, and this population in 2001 and 2026 are less than the peak by approximately 1 million.

As to the population aged 15–24 in 2026, Case 1 exceeds Case 2 by 7 million. The population of this age group of Case 1 will further increase in the period between 2001 and 2026 by 4.5 million. On the other hand, this population of Case 2 will decrease by 1 million in the same period, and thus the large difference between the two cases will be forecasted in the impacts on education, employment, and economic growth.

The population aged 25–49 in 2026 occupies the largest share in the total population, i.e. 36 % in Case 1 and 37 % in Case 2. These percentage shares to total population in the two cases are similar, however in number, Case 1 exceeds Case 2 by about 7 million. Since the labor participation rate of this population is very high, the above gap between the two cases will result in a large difference in labor supply in 2026.

As to the population aged 50 years and over in 2026, they had already been born before 1976, and they will increase very rapidly in the first quarter of the 21st century. The percentage share of the population of this age group to the total population will rise from 13 % in 1976 to 20 % (Case 1) and 26 % (Case 2) in 2026 (Table 1–5).

- 1.15 Summarizing the above observations, Egypt can be called as young society by 1986 in the sense that young population (aged 0–24) dominates over the age structure of population. In the last fifteen years of the 20th century, the population aged 25–49 will show the most rapid increase and the share of the population aged 0–14 will start to decline rapidly, especially in Case 2. In the first quarter of the 21st century, the population aged 50 years and over will occupy the larger portion in the total population as

well as the population aged 25–49 will do, and the so called matured society will appear in the sense that the middle age population will dominate over the age structure of the population.

Such general views of demographic transition in the next fifty years are well represented in the population pyramids for Egypt (Fig. 1–2). The rapid expansion of the scale of population, especially in Case 1, and the drastic changes in age structure in the next fifty years are clearly observed in Fig. 1–2. And the large difference between Case 1 and Case 2 in demographic pattern especially from the beginning of the 21st century should also be noted.

By the year 2026, the aged population of Egypt occupies a considerable share to the total population, however, it will take some more time before Egypt will face the problem of enlarged old population which can be seen in the present developed countries. The old population aged 65 years old and over occupies somewhere around 15 % in many of those developed countries, and this stage will come to Egypt by 2050 in Case 2 and by 2075 in Case 1.

Table 1–6–1 ESTIMATED POPULATION BY SPECIFIC AGE GROUPS IN 1976

| Age | Number (thousands) | | | Ratio (%) | | |
|-----------|--------------------|--------|--------|-----------|--------|--------|
| | Male | Female | Total | Male | Female | Total |
| 0 – 14 | 7,836 | 7,350 | 15,186 | 40.66 | 38.78 | 39.72 |
| (0 – 5) | 3,536 | 3,339 | 6,875 | 18.35 | 17.62 | 17.98 |
| (6 – 11) | 2,938 | 2,742 | 5,680 | 15.24 | 14.47 | 14.86 |
| (12 – 14) | 1,362 | 1,269 | 2,631 | 7.07 | 6.69 | 6.88 |
| 15 – 64 | 10,757 | 10,774 | 21,531 | 55.81 | 56.84 | 56.32 |
| (15 – 17) | 1,205 | 1,110 | 2,315 | 6.25 | 5.86 | 6.06 |
| (18 – 21) | 1,602 | 1,470 | 3,072 | 8.31 | 7.76 | 8.04 |
| (22 – 39) | 4,569 | 4,603 | 9,172 | 23.71 | 24.26 | 23.99 |
| (40 – 59) | 2,973 | 3,152 | 6,125 | 15.42 | 16.63 | 16.02 |
| (60 – 64) | 408 | 439 | 847 | 2.12 | 2.33 | 2.21 |
| 65 – | 681 | 830 | 1,511 | 3.53 | 4.38 | 3.96 |
| Total | 19,274 | 18,954 | 38,228 | 100.00 | 100.00 | 100.00 |

Source: Joint Study Projection

Table 1-6-2 ESTIMATED POPULATION BY SPECIFIC AGE GROUPS IN 1986
(CASE 1)

| Age | Number (thousands) | | | Ratio (%) | | |
|-----------|--------------------|--------|--------|-----------|--------|--------|
| | Male | Female | Total | Male | Female | Total |
| 0 - 14 | 9,960 | 9,375 | 19,335 | 40.02 | 38.40 | 39.22 |
| (0 - 5) | 4,466 | 4,218 | 8,684 | 17.95 | 17.28 | 17.61 |
| (6 - 11) | 3,862 | 3,625 | 7,487 | 15.52 | 14.85 | 15.19 |
| (12 - 14) | 1,632 | 1,532 | 3,164 | 6.55 | 6.27 | 6.42 |
| 15 - 64 | 14,019 | 13,910 | 27,929 | 56.34 | 56.97 | 56.65 |
| (15 - 17) | 1,517 | 1,422 | 2,939 | 6.10 | 5.82 | 5.96 |
| (18 - 21) | 1,904 | 1,786 | 3,690 | 8.61 | 8.06 | 8.33 |
| (22 - 39) | 6,730 | 6,257 | 12,987 | 26.09 | 24.89 | 25.49 |
| (40 - 59) | 3,283 | 3,790 | 7,073 | 13.19 | 15.52 | 14.35 |
| (60 - 64) | 585 | 655 | 1,240 | 2.35 | 2.68 | 2.52 |
| 65 - | 906 | 1,131 | 2,037 | 3.64 | 4.63 | 4.13 |
| TOTAL | 24,885 | 24,416 | 49,301 | 100.00 | 100.00 | 100.00 |

Source: Joint Study Projection

Table 1-6-3 ESTIMATED POPULATION BY SPECIFIC AGE GROUPS IN 1986
(CASE 2)

| Age | Number (thousands) | | | Ratio (%) | | |
|-----------|--------------------|--------|--------|-----------|--------|--------|
| | Male | Female | Total | Male | Female | Total |
| 0 - 14 | 9,366 | 8,818 | 18,184 | 38.56 | 36.96 | 37.77 |
| (0 - 5) | 3,944 | 3,726 | 7,670 | 16.24 | 15.62 | 15.93 |
| (6 - 11) | 3,790 | 3,560 | 7,350 | 15.57 | 14.89 | 15.23 |
| (12 - 14) | 1,632 | 1,532 | 3,164 | 6.75 | 6.45 | 6.61 |
| 15 - 64 | 14,019 | 13,910 | 27,929 | 57.71 | 58.30 | 58.00 |
| (15 - 17) | 1,517 | 1,422 | 2,939 | 6.24 | 5.96 | 6.10 |
| (18 - 21) | 1,904 | 1,786 | 3,690 | 7.84 | 7.49 | 7.66 |
| (22 - 39) | 6,730 | 6,257 | 12,987 | 27.71 | 26.22 | 26.97 |
| (40 - 59) | 3,283 | 3,790 | 7,073 | 13.52 | 15.88 | 14.69 |
| (60 - 64) | 585 | 655 | 1,240 | 2.40 | 2.75 | 2.58 |
| 65 - | 906 | 1,131 | 2,037 | 3.73 | 4.74 | 4.23 |
| TOTAL | 24,291 | 23,859 | 48,150 | 100.00 | 100.00 | 100.00 |

Source: Joint Study Projection

Table 1-6-4 ESTIMATED POPULATION BY SPECIFIC AGE GROUPS IN 2001
(CASE 1)

| Age | Number (thousands) | | | Ratio (%) | | |
|--------------|--------------------|---------------|---------------|---------------|---------------|---------------|
| | Male | Female | Total | Male | Female | Total |
| 0 - 14 | 12,451 | 11,776 | 24,227 | 35.71 | 34.54 | 35.14 |
| (0 - 5) | 5,246 | 4,961 | 10,207 | 15.05 | 14.55 | 14.80 |
| (6 - 11) | 4,902 | 4,639 | 9,541 | 14.06 | 13.61 | 13.84 |
| (12 - 14) | 2,303 | 2,176 | 4,479 | 6.60 | 6.38 | 6.50 |
| 15 - 64 | 20,969 | 20,302 | 41,271 | 60.15 | 59.55 | 59.85 |
| (15 - 17) | 2,202 | 2,079 | 4,281 | 6.32 | 6.10 | 6.21 |
| (18 - 21) | 2,797 | 2,642 | 5,439 | 8.02 | 7.75 | 7.89 |
| (22 - 39) | 9,343 | 8,854 | 18,197 | 26.80 | 25.97 | 26.39 |
| (40 - 59) | 5,968 | 5,861 | 11,829 | 17.12 | 17.19 | 17.15 |
| (60 - 64) | 659 | 866 | 1,525 | 1.89 | 2.54 | 2.21 |
| 65 - | 1,443 | 2,013 | 3,456 | 4.14 | 5.91 | 5.01 |
| TOTAL | 34,863 | 34,091 | 68,954 | 100.00 | 100.00 | 100.00 |

Source: Joint Study Projection

Table 1-6-5 ESTIMATED POPULATION BY SPECIFIC AGE GROUPS IN 2001
(CASE 2)

| Age | Number (thousands) | | | Ratio (%) | | |
|--------------|--------------------|---------------|---------------|---------------|---------------|---------------|
| | Male | Female | Total | Male | Female | Total |
| 0 - 14 | 9,099 | 8,604 | 17,703 | 29.41 | 28.32 | 28.87 |
| (0 - 5) | 3,523 | 3,331 | 6,854 | 11.39 | 10.96 | 11.18 |
| (6 - 11) | 3,697 | 3,496 | 7,193 | 11.95 | 11.51 | 11.73 |
| (12 - 14) | 1,879 | 1,777 | 3,656 | 6.07 | 5.85 | 5.96 |
| 15 - 64 | 20,393 | 19,765 | 40,158 | 65.92 | 65.05 | 65.49 |
| (15 - 17) | 1,878 | 1,784 | 3,662 | 6.07 | 5.87 | 5.97 |
| (18 - 21) | 2,584 | 2,435 | 5,019 | 8.35 | 8.01 | 8.19 |
| (22 - 39) | 9,304 | 8,819 | 18,123 | 30.08 | 29.03 | 29.56 |
| (40 - 59) | 5,968 | 5,861 | 11,829 | 19.29 | 19.29 | 19.29 |
| (60 - 64) | 659 | 866 | 1,525 | 2.13 | 2.85 | 2.48 |
| 65 - | 1,443 | 2,013 | 3,456 | 4.67 | 6.63 | 5.64 |
| TOTAL | 30,935 | 30,382 | 61,317 | 100.00 | 100.00 | 100.00 |

Source: Joint Study Projection

Table 1-6-6 ESTIMATED POPULATION BY SPECIFIC AGE GROUPS IN 2026
(CASE 1)

| Age | Number (thousands) | | | Ratio (%) | | |
|-----------|--------------------|--------|---------|-----------|--------|--------|
| | Male | Female | Total | Male | Female | Total |
| 0 - 14 | 13,961 | 13,220 | 27,181 | 27.05 | 26.19 | 26.63 |
| (0 - 5) | 5,460 | 5,163 | 10,623 | 10.58 | 10.23 | 10.41 |
| (6 - 11) | 5,691 | 5,396 | 11,087 | 11.03 | 10.69 | 10.86 |
| (12 - 14) | 2,810 | 2,661 | 5,471 | 5.44 | 5.27 | 5.36 |
| 15 - 64 | 34,409 | 33,235 | 67,644 | 66.68 | 65.85 | 66.27 |
| (15 - 17) | 2,842 | 2,695 | 5,537 | 5.51 | 5.34 | 5.43 |
| (18 - 21) | 3,708 | 3,524 | 7,232 | 7.18 | 6.98 | 7.09 |
| (22 - 39) | 14,791 | 14,162 | 28,953 | 28.66 | 28.06 | 28.36 |
| (40 - 59) | 11,255 | 10,982 | 22,237 | 21.81 | 21.76 | 21.78 |
| (60 - 64) | 1,813 | 1,872 | 3,685 | 3.52 | 3.71 | 3.61 |
| 65 - | 3,240 | 4,016 | 7,256 | 6.27 | 7.96 | 7.10 |
| TOTAL | 51,610 | 50,471 | 102,081 | 100.00 | 100.00 | 100.00 |

Source: Joint Study Projection

Table 1-6-7 ESTIMATED POPULATION BY SPECIFIC AGE GROUPS IN 2026
(CASE 2)

| Age | Number (thousands) | | | Ratio (%) | | |
|-----------|--------------------|--------|--------|-----------|--------|--------|
| | Male | Female | Total | Male | Female | Total |
| 0 - 14 | 9,110 | 8,622 | 17,732 | 23.05 | 22.13 | 22.59 |
| (0 - 5) | 3,517 | 3,325 | 6,842 | 8.90 | 8.54 | 8.72 |
| (6 - 11) | 3,726 | 3,528 | 7,254 | 9.42 | 9.05 | 9.24 |
| (12 - 14) | 1,867 | 1,769 | 3,636 | 4.73 | 4.54 | 4.63 |
| 15 - 64 | 27,173 | 26,329 | 53,502 | 68.75 | 67.57 | 68.16 |
| (15 - 17) | 1,851 | 1,755 | 3,606 | 4.68 | 4.50 | 4.59 |
| (18 - 21) | 2,316 | 2,202 | 4,518 | 5.86 | 5.65 | 5.76 |
| (22 - 39) | 10,486 | 10,040 | 20,526 | 26.53 | 25.77 | 26.15 |
| (40 - 59) | 10,707 | 10,460 | 21,167 | 27.10 | 26.84 | 26.96 |
| (60 - 64) | 1,813 | 1,872 | 3,685 | 4.58 | 4.81 | 4.70 |
| 65 - | 3,240 | 4,016 | 7,256 | 8.20 | 10.30 | 9.25 |
| TOTAL | 39,523 | 38,967 | 78,490 | 100.00 | 100.00 | 100.00 |

Source: Joint Study Projection

Figure 2-1 POPULATION PYRAMIDS FOR EGYPT (Population in millions)

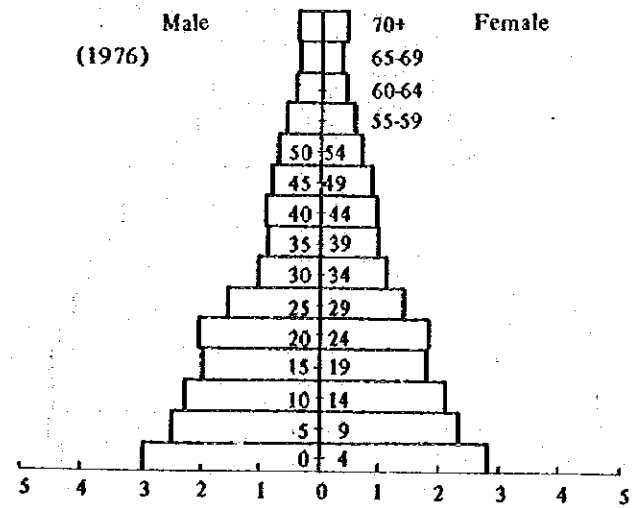
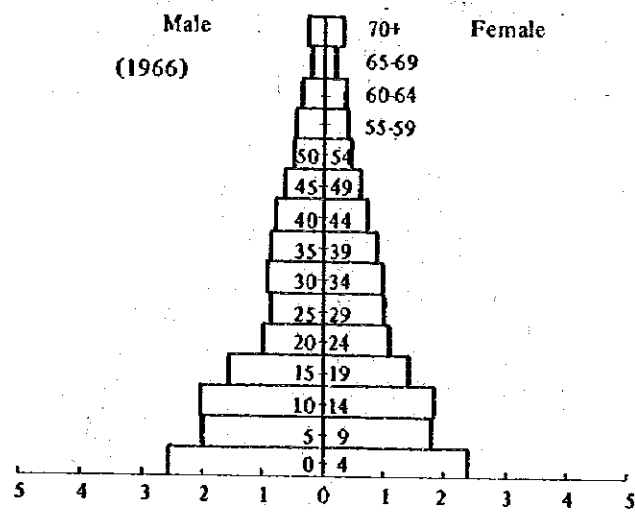
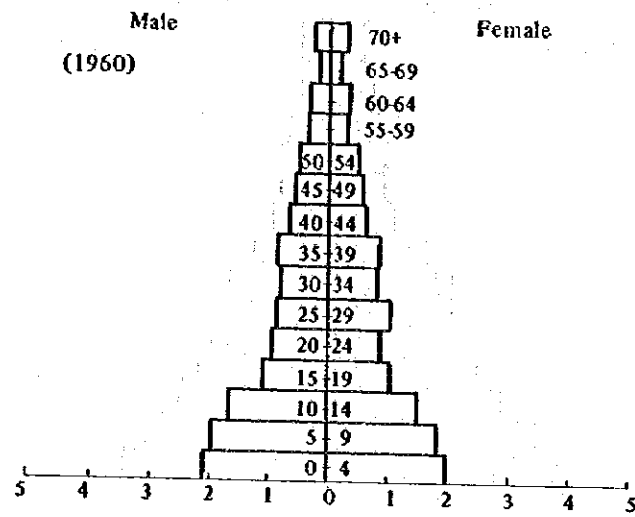


Figure 2-2 POPULATION PYRAMIDS (CASE 1) (Population in millions)

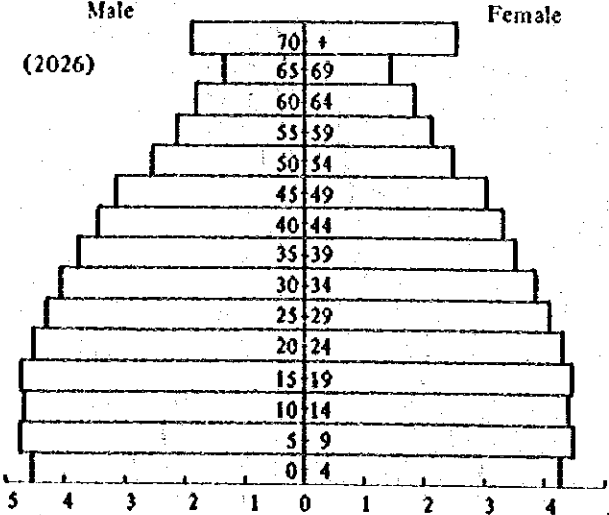
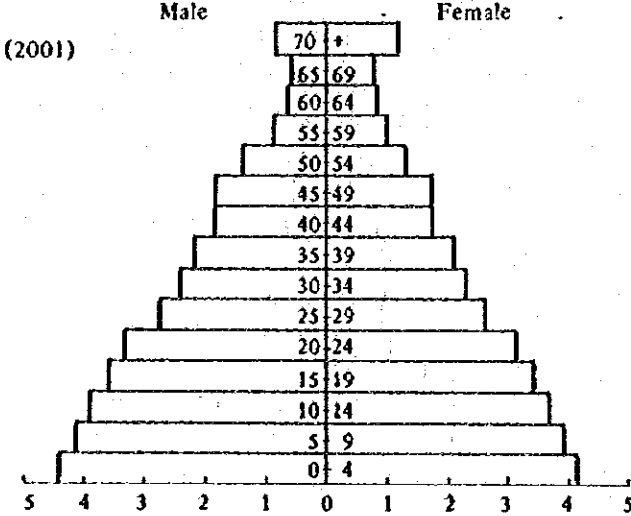
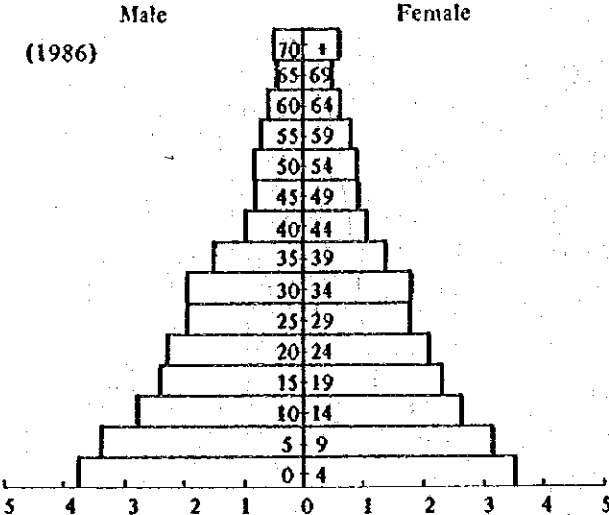
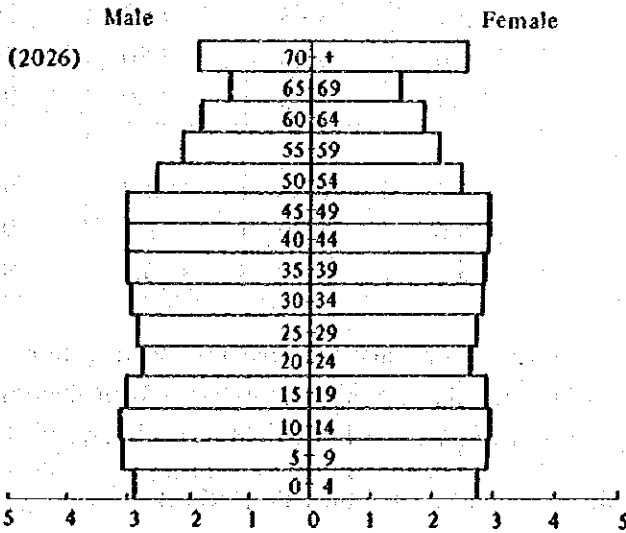
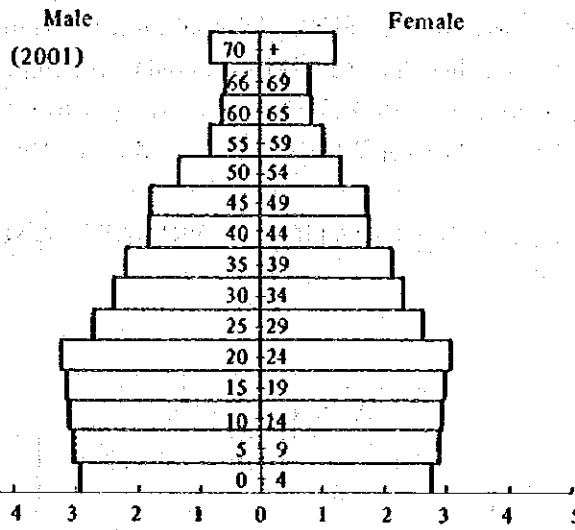
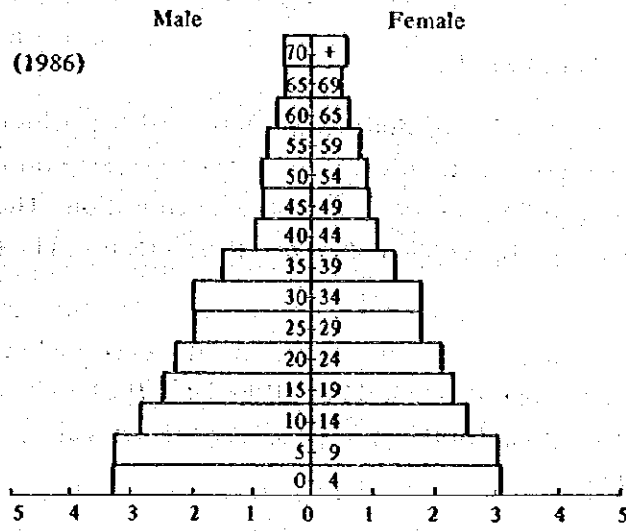


Figure 2-3 POPULATION PYRAMIDS (CASE 2) (Population in millions)



Chapter 2 The Impacts of Population Growth on the Socio-Economic Problems

2.1 Education

(1) Projection of Number of Students

2.01 The projection of the number of students which is consistent with the population projection is the central problem in this section, and as a first step for this, it is necessary to forecast the future enrollment ratio in each stage of education. The future enrollment ratio mostly depends on the public policy, and therefore, it can be treated as policy variables.

The enrollment ratio in primary education has slightly decreased in the past ten years (1966 – 1976), and remains 73 % in 1976. Especially, the enrollment ratio of female has dropped by 10 % points in the same period, and remains at the low level of 54 % in 1976 (Table 2-1).

The reasons for the decline in enrollment ratio are that the construction of new schools and the extension of the educational service could not catch up the large increase of the population of primary school age (6 – 11 years old) which has increased from 4.4 million in 1966 to 5.7 million in 1976, and that the custom to treat the children of these ages as the agricultural labor force has still remained especially in rural areas, etc.

Table 2-1 GROSS ENROLLMENT RATIOS IN PRIMARY AND PREPARATORY EDUCATION

(%)

| | Actual | | Projected | | |
|------------------------------|--------|------|-----------|------|------|
| | 1966 | 1976 | 1986 | 2001 | 2026 |
| Primary Education | | | | | |
| Male | 89.4 | 86.3 | 99.0 | 99.8 | 99.9 |
| Female | 64.0 | 53.8 | 99.0 | 99.8 | 99.9 |
| Average | 77.4 | 72.5 | 99.0 | 99.8 | 99.9 |
| Preparatory Education | | | | | |
| Male | 34.3 | 63.8 | 93.3 | 99.8 | 99.9 |
| Female | 15.6 | 37.0 | 58.4 | 99.8 | 99.9 |
| Average | 25.3 | 50.9 | 76.4 | 99.8 | 99.9 |

Note: Gross enrollment ratios in primary and preparatory education are the ratios of the number of pupils in primary and preparatory schools to the population belonging to the age groups of 6–11 and 12–14 years old respectively.

Source: Ministry of Education and Joint Study Projections

However, from urgent necessity to enforce perfectly the primary education as compulsory for the future development, the realization of full enrollment in primary education by 1986 is aimed as a policy target in this projection.

2.02 The enrollment ratio in lower secondary education, which is called preparatory education in Egypt, has doubled in the past ten years from 25 % in 1966 to 51 % in 1976. This sharp rise reflects certainly the increasing desire of people to participate in preparatory education. It is very important for the consolidation of the basis for the long-term development to make preparatory education as compulsory by some adequate time in the course of development. Therefore, in this projection, the next ten years until 1986 are regarded as the preparatory period to make preparatory education as compulsory, and the policy target is set to implement full enrollment in preparatory education by the possible early time between 1986 and 2001 (Table 2-1).

The enrollment ratio in upper secondary education, which is called secondary education in Egypt, has also rapidly increased in the past ten years from 18 % in 1966 to 33 % in 1976. For the future projection, it is assumed that the enrollment ratio in secondary education follow the path of the economic development which will reach the level of the existing developed countries in the first quarter of the 21st century, and that the ratio will reach by 2026 the highest level among the present developed countries, i.e. 92 % equivalent to the level of Japan in 1975 (Table 2-2).

Table 2-2 GROSS ENROLLMENT RATIOS IN SECONDARY AND HIGHER EDUCATION

(%)

| | Actual | | Projected | | |
|----------------------------|--------|------|-----------|------|------|
| | 1966 | 1976 | 1986 | 2001 | 2026 |
| Secondary Education | | | | | |
| Male | 24.2 | 41.0 | 51.0 | 66.0 | 91.0 |
| Female | 10.2 | 23.2 | 37.2 | 58.1 | 93.0 |
| Average | 17.6 | 32.5 | 44.3 | 62.2 | 92.0 |
| Higher Education | | | | | |
| Male | 12.0* | 22.5 | 26.6 | 32.8 | 43.0 |
| Female | 4.8* | 10.4 | 14.8 | 21.4 | 32.4 |
| Average | 8.6* | 16.7 | 20.9 | 27.2 | 37.8 |

* : Figures in 1971.

Note: Gross enrollment ratios in secondary and higher education are the ratios of the number of students in secondary schools and universities (including higher institute and equivalents) to the population belonging to the age groups of 15-17 and 18-21 years old respectively.

Source: Ministry of Education and Joint Study Projections.

- 2.03 The enrollment ratio in universities and other higher education has doubled in the latest five years from 9 % in 1971 to 17 % in 1976, and has already reached the highest level among developing countries which is also similar to the level of the United Kingdom and the Netherlands.

For the future projection, accompanied with the shift of priority to the improvement of quality in higher education rather than enlargement in quantity, the gradual increase is assumed for the enrollment ratio in higher education, and the policy target is set to reach by 2026 the highest level among the existing developed countries, that is Japan and the United States of America (Table 2-2).

- 2.04 The projection of number of students in each educational stage can be made automatically by using the results of the projection of the future enrollment ratios and the population by age groups (Table 2-3).

The number of students in primary, preparatory, and secondary schools in 1986 will increase 1.7-1.8 times as much as in 1976 because of the sharp rise of the enrollment ratios associated with the large increase in the school age population. With the gradual rise of the enrollment ratio in higher education and the rapid increase in the university age population, the number of students in higher education in 1986 will increase to 1.5 times of 1976.

Table 2-3 ACTUAL AND PROJECTED NUMBER OF PUPILS AND STUDENTS

| | 1966 | 1976 | 1986 | | 2001 | | 2026 | |
|--|--------------------|-------|--------|--------|--------|--------|--------|--------|
| | | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| Number of Pupils and Students (thousands) | | | | | | | | |
| Primary | 3,419 | 4,120 | 7,412 | 7,260 | 9,522 | 7,179 | 11,076 | 7,247 |
| Preparatory | 601 | 1,339 | 2,418 | 2,418 | 4,470 | 3,648 | 5,465 | 3,632 |
| Secondary | 339 | 752 | 1,303 | 1,303 | 2,661 | 2,276 | 5,092 | 3,316 |
| Higher | 239 ⁽¹⁾ | 513 | 770 | 770 | 1,482 | 1,369 | 2,736 | 1,709 |
| Index (1976 = 100) | | | | | | | | |
| Primary | 83 | 100 | 180 | 176 | 231 | 174 | 269 | 176 |
| Preparatory | 45 | 100 | 181 | 181 | 334 | 272 | 408 | 271 |
| Secondary | 45 | 100 | 173 | 173 | 354 | 303 | 677 | 441 |
| Higher | 47 ⁽¹⁾ | 100 | 150 | 150 | 289 | 267 | 533 | 333 |

Note: (1) The figure is in 1971

Source: Ministry of Education and Joint Study Projections

- 2.05 The most outstanding feature of the projection in 2001 is the tremendous increase in the number of students of secondary school and universities. Due to the very rapid increase in the secondary school and university age population of 15-24 years old associated with

the continued rise of the enrollment ratio, the secondary school students will be 3.0–3.5 times as much in 1976 and the university students will become 2.7–2.9 times as much as in 1976.

As to the number of students of primary and preparatory school, there will be a considerable difference between Case 1 and Case 2. The increase in the preparatory school students of Case 1 will be remarkable between 1986 and 2001 because of the increase of the school age (12–14) population and the rise of enrollment ratio as well.

In Case 2, the increase in the preparatory school students will be 1.2 million in the period between 1986 and 2001 which is 0.8 million less than in Case 1, because there will be only a slight increase in the preparatory school age population in Case 2 (See Table 1–6).

The increase in the number of primary school students in the period between 1986 and 2001 will be only affected by the increase in the primary school age (6–11 years old) population, because the enrollment ratio in primary education remains constant (nearly 100 %) after the full enforcement of compulsory education by 1986. It is noted that the primary school students in Case 2 will show a slight decline in the above period due to the decline of the school age population.

- 2.06 There will be a remarkable difference between Case 1 and Case 2 in the number of students of all educational stages in 2026. This results from the fact that, in Case 2, the population aged less than 24 will not increase any more in the period between 2001 and 2026, on the other hand, the population of this age group in Case 1 will still increase in the same period (See Table 1–4).

The number of students in secondary schools and universities in Case 1 in 2026 will become nearly twice as much as in 2001, and reach 5.1 million and 2.7 million respectively. On the other hand, in Case 2, the increase in students will only be derived from the rise of enrollment ratios, the increase in this period only covers 40 % of the secondary school students of Case 1 and 25 % of the university students of Case 1.

The increase of the primary and preparatory school students after 2001 will only be affected by the increase of school age population (6–11 and 12–14), because the enrollment ratio remains constant after the full enforcement of compulsory education. The number of students in these stages in Case 1 will still increase due to the gradual growth of the school age population, however those in Case 2 will show no increase after 2001.

(2) Forecast and Problems of Required Inputs for Education

- 2.07 The required inputs for education are forecasted in this section on the basis of the above projection of students. Here, the forecast of the required number of teachers in primary and secondary education (including lower and upper secondary) and the government current expenditure for education, are dealt with as the inputs, and the results require a great amount of resource allocation, both human resources and financial resources, to the field of education. Since the education is the most basic foundation for the long-term socio-economic development, the resources should be preferentially allocated to this field.

- 2.08 The required number of teachers can be forecasted by the future targets on the number of students per teacher (student: teacher ratio) and the number of students itself.

As to the student : teacher ratio, which is a main indicator representing the quality of educational service, the ratios of Egypt in 1973 were 41 for primary education and 28 for secondary education (35 for preparatory, 20 for upper secondary), and it is necessary to fix the future targets of these ratios.

The average student : teacher ratio of nine developed countries⁽¹⁾ in 1972 or 1973 was 26 for primary education and 19 for secondary education, and there was a large gap with the ratio of Egypt. It is not realistic to assume that the ratio of Egypt will reach the average ratio of the above developed countries within a short period of time.

Especially for the student : teacher ratio in 1986, it is realistic and appropriate as well to set the target to maintain the level in 1973, if it is taken into account that the increment of students in the next ten years will be very large and that there will be very limited resources to be allocated to education in this period.

Since the ratio is quite likely to deteriorate in the near future, and since there are some indications that the ratio in the latest year is even lower than in 1973 especially in secondary education, it would be regarded as a rather high target to maintain the level of 1973 by 1986.

It may also be realistic to set the target on the level of Egypt that will reach the average present level of the developed countries by 2026. And the target in 2001 was interpolated between those in 1986 and 2026.

- 2.09 The number of teachers in future is forecasted through the target on the student : teacher ratio and the projected number of students.

The required number of teachers in primary, preparatory, and secondary schools will increase rapidly at a rate of 5-6 % per annum in the next ten years until 1986 despite the assumption that there will be no improvement of the student : teacher ratio because of the huge increment of the number of students in this period.

After 1986 in Case 1, the number of teachers from primary to secondary school in the period between 1986 and 2001 and those of secondary schools in the period between 2001 and 2026 will show a large increase resulted from both the increase in the number of students and the improvement of the target on the student : teacher ratio. On the other hand, in Case 2, the comparatively slow increase will be forecasted especially on the number of primary school teachers after 2001 because there will be no increase in the number of students in these educational stages in the respective periods (Table 2-4).

(1) These countries are Austria, Canada, West Germany, Japan, The Netherlands, New Zealand, Norway, The United Kingdom, and the United States of America.

Table 2-4 ACTUAL AND PROJECTED NUMBER OF TEACHERS

| | 1973 | 1976 | 1986 | | 2001 | | 2026 | |
|--|------|------|--------|--------|--------|--------|--------|--------|
| | | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| Number (thousands) | | | | | | | | |
| Primary | 98 | 102 | 181 | 177 | 272 | 205 | 426 | 279 |
| Preparatory | 29 | 38 | 69 | 69 | 144 | 118 | 228 | 151 |
| Secondary | 31 | 38 | 65 | 65 | 148 | 126 | 364 | 237 |
| Total | 157 | 176 | 315 | 311 | 564 | 449 | 1,018 | 667 |
| Average Annual Increasing Rates (%) | | | | | | | | |
| Primary | — | 1.4 | 5.9 | 5.7 | 2.8 | 1.0 | 1.8 | 1.2 |
| Preparatory | — | 10.0 | 6.1 | 6.1 | 5.0 | 3.6 | 1.9 | 1.0 |
| Secondary | — | 6.8 | 5.5 | 5.5 | 5.6 | 4.5 | 3.7 | 2.6 |
| Total | — | 3.9 | 6.0 | 5.9 | 4.0 | 2.5 | 2.4 | 1.6 |

Source: Ministry of Education and Joint Study Projections

2.10 The required supply of trained teachers, which consists of the increment of the required number of teachers and the number of replacement calculated on the assumption of an annual attrition rate of 5 % will become a great amount (Table 2.5).

In the next ten years until 1986, the supply of trained teachers in all the educational stages will be required to increase a lot for boths Case 1 and Case 2. As to the supply of teachers in primary schools, for instance, whereas the required supply must be 14-15 thousands per annum, the government is now planning to increase the supply fom 6.6 thousands in 1976 to 7.0 thousands in 1981. This planned supply only covers half of the required supply, therefore, unless the government raise the target on training output of teachers twice as high as the present plan, it becomes impossible to maintain the student: teacher ratio of 1973, and it is sure to result in the severe deterioration in the quality of the primary education.

The supply of teachers in Case 1 will be needed to extend rapidly in all educational stages in the whole period of the next fifty years, on the other hand in Case 2, the required increase will be relatively moderate except for the secondary school teachers.

As for the secondary school teachers, the largest increase in supply will be required, and it should be noted that the supply of secondary school teachers must be extended to a level similar to that of primary school teachers in the 21st century. And it is obviously important to strengthen the policy to increase the supply of qualified teachers in secondary education, for Egypt's transition to higher development stage.

Table 2-5 REQUIRED SUPPLY OF TRAINED TEACHERS

| | 1976-1986 | | 1986-2001 | | 2001-2026 | |
|--|-------------|-------------|-------------|-------------|--------------|-------------|
| | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| Number in the Periods (thousands) | | | | | | |
| Primary | 146 | 141 | 257 | 170 | 579 | 372 |
| Preparatory | 56 | 56 | 150 | 116 | 310 | 200 |
| Secondary | 52 | 52 | 157 | 129 | 511 | 328 |
| Total | 254 | 249 | 564 | 415 | 1,400 | 900 |
| Average Annual Number (thousands) | | | | | | |
| Primary | 14.6 | 14.1 | 17.1 | 11.3 | 23.2 | 14.9 |
| Preparatory | 5.6 | 5.6 | 10.0 | 7.7 | 12.4 | 8.0 |
| Secondary | 5.2 | 5.2 | 10.5 | 8.6 | 20.4 | 13.1 |
| Total | 25.4 | 24.9 | 37.6 | 27.7 | 56.0 | 36.0 |

Source: Joint Study Projection

- 2.11 The government current expenditure for all stages of public education is forecasted and presented in Table 2-6. The forecast is based on the estimation of the future unit cost that is educational cost per student.

Since education is a labor intensive sector, the rise in real wage should be taken into account. In this forecast, the increasing rate of real wage is assumed as equivalent to the growth rate of real per capita income, and therefore they are assumed to be 5 % per annum in Case 1 and 10 % per annum in Case 2 (See 1.06).

Consequently, this forecast may be regarded as a minimum estimation of the cost in the sense that no improvement is taken into account on the quality of education such as the improvement of the student : teacher ratio, and the quality of the equipment and classrooms.

The results of the forecast show that the ratio of the government current expenditure for education to GDP is required to increase at least from 4.8 % in 1976 to about 6.5 % in 1986 and 7-8 % in 2001. These ratios in the future years represent the highest level in the present world (Table 2-6).

Table 2-6 GOVERNMENT CURRENT EXPENDITURE FOR EDUCATION

(Million L.E.; 1976 Price)

| | 1976 (Actual) | 1986 | | 2001 | | 2026 | |
|--------------------------------|------------------|---------------|---------------|---------------|----------------|----------------|----------------|
| | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| Primary | 82 | 245 | 378 | 647 | 1,558 | 2,536 | 8,501 |
| Preparatory | 38 | 114 | 182 | 438 | 1,145 | 1,820 | 6,178 |
| Secondary | 52 | 149 | 237 | 631 | 1,725 | 4,089 | 13,615 |
| Higher (1) | 96 | 236 | 376 | 944 | 2,789 | 5,899 | 18,848 |
| Others | 12 | 39 | 62 | 140 | 380 | 755 | 2,481 |
| Total | 280 | 783 | 1,235 | 2,800 | 7,597 | 15,099 | 49,623 |
| GDP | 5,828 | 12,243 | 19,039 | 35,598 | 101,280 | 178,463 | 702,110 |
| Percentage of total to GDP (%) | 4.8 | 6.4 | 6.5 | 7.9 | 7.5 | 8.5 | 7.1 |

Note: (1) Others include such current expenditure as for education of handicapped people, adult literacy projects, administration, etc.

Source: Joint Study Projections

2.12 The increment of the government current expenditure for education should be financed through not to add as a new expenditure but to replace the reduction of the existing expenditure such as military expenditure and living-cost subsidies, since the government expenditure has already occupied a very large portion of the GDP (nearly 60 %) and has been suffering from a large deficit.

Although the forecast does not include capital expenditure for education, if we could add it to current expenditure the financial burden would become still heavier. Since the capital expenditure in Case 1 would be far more than that of Case 2, because of the large difference in the increasing number of students, the gap of total government expenditure for education between the two cases would certainly widened. Judging from the large differences in the human and financial resources required for education, the choice of the development path of high growth rate and rapid decline of birth rate, i.e. case 2, is obviously more favorable than that of low growth rate and gradual decline of birth rate, i.e. case 1.

2.2 Labor Force and Employment

(1) Projection of Labor Force

2.13 The future labor force is projected through the population projection by age groups and labor force participation rates by age groups.*

* For details regarding the method and results of the projection of the labor force, refer to the technical paper.

As for the present labor participation rates by age groups in Egypt, the rates for males between 25 and 64 years old have already reached a very high level similar to the developed countries, and therefore, it will remain unchanged for a long period of time. The rates for males of more than 65 years old (62 % in 1976), are much higher than in the developed countries because of the overwhelming share of the agricultural labor force, and they will gradually decrease over a long time in accordance with the future decline of the share of the agricultural labor force. The labor participation rates of females are extremely low in Egypt, and the labor force covers only 9.1 % of the total female population and 13.5 % of the female population aged 15 and over in 1976 (Table 2-7). It is assumed in this projection that the labor participation rates of females will gradually approach the level of the existing developed countries in the course of the long-term socio-economic development, and reach the rate of 45 % for the female population aged 15 and over by 2026 which is fifty years after the starting year of the projection. The labor participation rates of the population aged 15-24 are closely interrelated to the enrollment ratios in secondary schools and universities. Accordingly, the future labor participation rates of this age group are forecasted so as to maintain the consistency with the latter.

Table 2-7 LABOR FORCE PARTICIPATION RATES

| | 1966 | 1976 | 1986 | | 2001 | | 2026 | |
|--|------|------|--------|--------|--------|--------|--------|--------|
| | | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| Ratio of Labor Force to Total Population (%) | | | | | | | | |
| Male | 52.1 | 52.3 | 49.5 | 50.7 | 52.3 | 58.1 | 59.5 | 63.7 |
| Female | 4.4 | 9.1 | 13.3 | 13.6 | 21.1 | 23.0 | 33.6 | 35.4 |
| Total | 28.5 | 30.9 | 31.6 | 32.3 | 36.9 | 40.7 | 46.7 | 49.6 |
| Ratio of Labor Force to Population of Age 15 and Over (%) | | | | | | | | |
| Male | 85.0 | 81.9 | 81.9 | 81.9 | 81.4 | 82.4 | 81.6 | 82.7 |
| Female | 6.0 | 13.5 | 20.9 | 20.9 | 32.2 | 32.1 | 45.6 | 45.4 |
| Total | 45.0 | 47.4 | 51.3 | 51.3 | 56.9 | 57.3 | 63.4 | 64.1 |

Source: CAPMAS and Joint Study Projection

- 2.14 The future labor force forecasted by the future labor force participation rates and the projected population will increase from 11.8 million in 1976 to 15.6 million in 1986 and to 25 million in 2001 which is more than twice as much as in 1976. There will be no difference of labor force in 1986 and there will be a slight gap in 2001 between Case 1 and Case 2 because the labor force in 1986 only consists of the population who has already been born, and the labor force in 2001 includes the population born between

1976 and 1986 and enter in the labor market, however, the birth rate in this period in both Case 1 and Case 2 will not differ much. And the labor force of Case 1 in 2026 will fairly differ with that of Case 2, because there will be a large difference in the population who will be born in the next thirty five years until 2011 and enter in the labor market.

The annual growth rate of the labor force will consistently be higher than that of the population over the next fifty years. Especially, the growth rate in the next twenty five years, until 2001, will maintain a very high level of approximately 3 % per annum which is the same level as in the last ten years and this directly indicates the necessity for a rapid expansion of employment opportunities (Table 2-8).

Table 2-8 PROJECTION OF THE LABOR FORCE FOR THE NEXT FIFTY YEARS

| | 1966 | 1976 | 1986 | | 2001 | | 2026 | |
|---|-------|--------|--------|--------|--------|--------|--------|--------|
| | | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| Labor Force (thousands) | | | | | | | | |
| Male | 7,903 | 10,088 | 12,323 | 12,323 | 18,243 | 17,986 | 30,712 | 25,163 |
| Female | 658 | 1,722 | 3,252 | 3,252 | 7,186 | 6,987 | 16,976 | 13,782 |
| Total | 8,561 | 11,810 | 15,575 | 15,575 | 25,429 | 24,973 | 47,688 | 38,945 |
| Average Annual Growth Rates of Labor Force (%) | | | | | | | | |
| Male | -- | 2.5 | 2.0 | 2.0 | 2.6 | 2.6 | 2.1 | 1.4 |
| Female | -- | 10.1 | 6.6 | 6.6 | 5.4 | 5.2 | 3.5 | 2.8 |
| Total | -- | 3.3 | 2.8 | 2.8 | 3.3 | 3.2 | 2.5 | 1.8 |
| Average Annual Growth Rates of Population (%) | | | | | | | | |
| | 2.4 | 2.4 | 2.6 | 2.3 | 2.3 | 1.6 | 1.6 | 1.0 |

Note: The labor force includes workers abroad

Source: CAPMAS and Joint Study Projection

2.15 The age structure of the labor force in the next fifty years is shown in Table 2-9. The most outstanding feature is the consistent decline in the share of the young labor force aged 6-19, which results from facts such as the enforcement of full enrollment in primary and preparatory schools as compulsory education, and the consistent rise in the enrollment ratio in secondary and higher education associated with the decline of the share of the population of this age group. The second feature of the age structure is that whereas the share of the labor force aged 20-39 will show a gradual decline from 1986, the share of the labor force aged 40-59 to the total labor force will increase to a level as high as that of the 20-39 labor force in 2026 in Case 2 which is projected under the assumption of the rapid de-

crease of the birth rate. In Case 2, in 2026 Egypt will find itself in a situation where the use of the aged labor force and the treatment of the middle management will become a serious problem as seen in many advanced countries at present.

However, the keynote in the age structure of the labor force during this century is the dominance of the young labor force, and accordingly the presence of the potential power for growth. It is obvious from world experience that one of the necessary conditions to support rapid economic growth is the existence of continuous and abundant supply of young labor force. Consequently, whether the rapid economic growth will be achieved or not in Egypt over a long time depends on the success in activation and utilization of the abundant supply of young labor force which will continue within this century.

Table 2-9 PROJECTION OF LABOR FORCE BY AGE GROUPS

| | 1966 | 1976 | 1986 | | 2001 | | 2026 | |
|--|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| Labor Force (thousands) | | | | | | | | |
| 6 - 19 | 1,805 | 2,029 | 1,740 | 1,740 | 2,501 | 2,186 | 2,095 | 1,354 |
| 20 - 39 | 3,628 | 5,579 | 8,548 | 8,548 | 13,199 | 13,058 | 23,735 | 16,589 |
| 40 - 59 | 2,457 | 3,350 | 4,069 | 4,069 | 7,948 | 7,948 | 17,356 | 16,500 |
| 60 - | 671 | 852 | 1,218 | 1,218 | 1,781 | 1,781 | 4,502 | 4,502 |
| TOTAL | 8,561 | 11,810 | 15,575 | 15,575 | 25,429 | 24,973 | 47,688 | 38,945 |
| Distribution of Labor Force by Age Groups (%) | | | | | | | | |
| 6 - 19 | 21.2 | 17.2 | 11.2 | 11.2 | 9.8 | 8.8 | 4.4 | 3.5 |
| 20 - 39 | 42.4 | 47.2 | 54.9 | 54.9 | 51.9 | 52.3 | 49.8 | 42.6 |
| 40 - 59 | 28.7 | 28.4 | 26.1 | 26.1 | 31.3 | 31.8 | 36.4 | 42.4 |
| 60 - | 7.8 | 7.2 | 7.8 | 7.8 | 7.0 | 7.1 | 9.4 | 11.6 |
| TOTAL | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: Labor Force including workers abroad

Source: CAPMAS and Joint Study Projection

(2) Projection of Employment

2.16 The labor force population stands for the supply of labor, and on the other side the demand of labor is represented in the employment. The balance of supply and demand of labor can be recognized in terms of unemployment rates. However, there is no sufficient data on the recent unemployment rates mainly due to the indefiniteness in the number of Egyptian workers abroad. For the projection of the future employment, we estimated the unemployment rates in 1976 as follows (Table 2-10). If we assume that all the pop-

ulation living abroad in 1976 was employed workers, which does not seem realistic, the unemployment rates turn to be 5.2 %. However, it would be more reasonable to assume about two thirds of the population living abroad (1 million) as employed workers, and then the unemployment rates reach the considerably high level of 10 %.

Table 2-10 ESTIMATED UNEMPLOYMENT RATES IN 1976

| | | |
|---|------|--------|
| (1) Labor force (thousands) | | 11,810 |
| (2) Domestic employment (thousands) | | 9,628 |
| (3) (1) - (2) (thousands) | | 2,182 |
| (4) Population living abroad* (thousands) | | 1,572 |
| (5) Number of workers abroad (thousands) | max. | 1,572 |
| | med. | 1,000 |
| (6) Unemployment (3) - (5) (thousands) | min. | 610 |
| | med. | 1,182 |
| (7) Unemployment rates (6) / (1) (%) | min. | 5.2 |
| | med. | 10.0 |

* (4) includes the population in the occupied area of the Sinai.

Source: CAPMAS and Joint Study Projection

2.17 As the next step, we forecasted the number of workers who should be employed in the domestic non-agricultural sector if it is required to maintain the full employment condition under which the unemployment rate of 5 % was assumed (Table 2-11).

The future labor force (a) and the total employment (b) under the full employment condition are shown in Table 2-11. This (b) must be employed among various branches of industries. As to the primary industry, mainly agriculture, no increment of employment can be expected since the agriculture has already absorbed as much employment as possible, and it is assumed to maintain the same level of agricultural employment as in 1976 at maximum, including the necessary workers for newly reclaimed farm land. Accordingly we can forecast the minimum non-agriculture employment (c) which requires to be absorbed in the secondary and tertiary industries. The (d) represents domestic non-agriculture employment under the assumption that the future employment under abroad will be 1.5 million. The (h) stands for the average annual increasing rate of the domestic non-agriculture employment, and this rate will be very high level of 5 % during this century which is much higher than 3.3 % per annum in the past ten years.

2.18 It should be noted that the required employment abroad (f) in Table 2-11 would reach 3 million in 1986 and more than 7 million in 2001 if the full employment is pursued while the domestic non-agriculture employment, will not be able to increase at the rate of more than 3.3 % per annum. It seems unrealistic to expect the tripled employment abroad by 1986, and over seven times more by 2001, and also not desirable for a great part of qualified and skilled labor to emigrate out of Egypt as it would certainly harm the development

Table 2-11 REQUIRED EMPLOYMENT, DOMESTIC AND ABROAD

(thousands)

| | 1976 | 1986 | 2001 | | 2026 | |
|---|----------|----------|-----------|--------|-----------|--------|
| | | | Case 1 | Case 2 | Case 1 | Case 2 |
| (a) Labor Force | 11,810 | 15,575 | 25,429 | 24,973 | 47,688 | 38,945 |
| (b) Total Employment | 10,628 | 14,796 | 24,158 | 23,724 | 45,304 | 36,998 |
| (c) Non-agriculture Employment | 6,404 | 10,572 | 19,934 | 19,500 | 41,080 | 32,774 |
| (d) Domestic Non-agriculture Employment | 5,404 | 9,072 | 18,434 | 18,000 | 39,580 | 31,274 |
| (e) Domestic Non-agriculture Employment (3.3% annual increase is assumed) | 5,404 | 7,513 | 12,316 | 12,316 | 28,068 | 28,068 |
| (f) Required Employment Abroad (c)-(e) | 1,000 | 3,059 | 7,618 | 7,184 | 13,012 | 4,706 |
| | 1966-'76 | 1976-'86 | 1986-2001 | | 2001-2026 | |
| (g) Average Annual Increment of (d) | 152 | 367 | 624 | 595 | 846 | 531 |
| (h) Average Annual Increasing Rate of (d) (%) | 3.3 | 5.3 | 4.8 | 4.7 | 3.1 | 2.2 |

Source: Joint Study Projection

of the domestic industry and economy.

On the other hand, as mentioned above, if the employment abroad is limited to 1.5 million, the average annual increment of domestic non-agriculture employment (g) in the next ten years (1976-1986) and in the period between 1986 and 2001 will be more than twice and even four times as much as in the last ten years respectively. In response to the extremely large increment of the required employment in the domestic industries which will continue until at least the beginning of the next century, the creation of employment opportunities should be treated as the most vital objective of the long-term economic policies. Especially, the employment effect should be considered as the most essential criterion when the long-term investment allocation among various branches of industries is to be planned and the preferential policies to support specific industries are to be formulated.

2.3 Household and Housing

(1) Projection of Household

2.19 The average size of household in Egypt has varied between 5.0 in 1960, 5.3 in 1966, and 5.2 in 1976, and it is not possible to recognize any significant trend from the past data.

The change of the household size over a long time is largely affected by the trend of number of children (or birth rate) and the speed of division of household which results from industrialization and urbanization. There is a certain time lag* between the size of household and birth rate, and the size of household does not start to decrease until a certain period has passed after the decline of the birth rate has begun. The household size of Egypt will also decrease over a long time because of the projected decline of the birth rate and the trend of household division which will be derived from the increase of migrations caused by the progress of industrialization and urbanization. However, until 1986, the decline of household size will not start because the slow down of the birth rate will gradually take place after 1976, but it will need some time for the size of household to be affected by that, and this period will just be the outset of industrialization.

After 1986, reflected by the difference in the trend of decline of the birth rate and the speed of industrialization and economic growth between Case 1 and Case 2, the former assumes a very slow decline of the household size, and the latter forecasts a little more rapid shrinkage of the household size (Table 2-12). However, the speed of the shrinkage in Case 2 is still much slower than in Japan. After all, considering the social and religious factors which may affect the speed of the household division, besides such factors as birth rate and migration, this projection assumes the pattern of the slow decline of the household size. Consequently, the future number of household might be underestimated, and the results could be regarded as minimum estimation.

Table 2-12 FUTURE HOUSEHOLDS, HOUSING STOCK, AND HOUSING CONSTRUCTIONS

(thousands)

| | 1966 | 1976 | 1986 | | 2001 | | 2026 | |
|--|-----------|-------|-----------|--------|-----------|--------|-----------|--------|
| | | | Case 1 | Case 2 | Case 1 | Case 2 | Case 1 | Case 2 |
| Households | 5,706 | 6,986 | 9,096 | 9,049 | 13,391 | 13,182 | 23,829 | 21,854 |
| Average Size of Household | 5.3 | 5.2 | 5.2 | 5.1 | 5.0 | 4.5 | 4.2 | 3.5 |
| Housing Units (Stock) | 5,822 | 6,117 | 9,278 | 9,227 | 13,793 | 13,577 | 24,132 | 22,510 |
| | 1966-1976 | | 1976-1986 | | 1986-2001 | | 2001-2026 | |
| Increment of Housing Units | - | 295 | 3,136 | 3,110 | 4,515 | 4,350 | 10,339 | 8,933 |
| Required Construction of Housing Units | - | 852 | 4,280 | 4,229 | 6,941 | 6,762 | 15,808 | 14,317 |
| Average Annual Construction of Housing Units | - | 85 | 428 | 423 | 463 | 451 | 632 | 573 |

Source: CAPMAS and Joint Study Projection

* In Japan, the birth rate rapidly dropped from around 1949 (from 3.43 % in 1947 to 1.72 % in 1960), however, the decline of the household size started with about ten years time lag and also showed rapid shrinkage (from 4.76 in 1960 to 3.48 in 1975).

2.20 The future number of household can be easily forecasted by the estimated size of household and the projected population. The results show the rapid increase in the number of household from 7 million in 1976 to 9 million, 13 million, and 22–24 million in 1986, 2001, and 2026 respectively (Table 2–12).

(2) Forecast of Future Stock and Required Construction of Housing Units

2.21 It is natural that the number of housing units is closely related to that of the household, and in 1966, there were 5.7 million of household and 5.8 million of housing units. The latter exceeded the former by 2%, and this indicates that there were vacant houses which corresponded to 2% of the total housing units. However, the increment of the housing units is estimated to be only 300 thousands in the last ten years from 1966 to 1976, since the construction of new housing units was restricted to a very small number and it was inevitable to demolish about half a million houses in that period. On the other hand, the number of household increased by 1.3 million in the same period, therefore the number of housing units became less than that of household by 800 thousands in 1976 (Table 2–12). And if the minimum requirement of vacant houses is taken into account, the shortage of housing units is estimated at about 1 million in 1976.

2.22 The number of housing units required in 1986, 2001, and 2026 will be 9.2–9.3 million, 13.6–13.8 million, and 23–24 million respectively, when it is preconditioned that all households will possess their own housing units and the rate of vacant houses to the total housing units will be 2% in 1986 and 3% in 2001 and 2026. The increment of housing units required in the next ten years (1976–1986) will become 3.1 million which is over ten times more than the increment in the last ten years (1966–1976) and the increment in this century will reach 7.5–7.7 million which is even more than the existing stock of housing units.

2.23 The number of housing units required to be built can be calculated by adding the demolition of the existing housing units to the above increment of housing stock.

Under the assumption of the demolition rate of 2% per annum, the required number of housing units to be constructed in the next ten years (1976–1986) will be more than 4 million.

Accordingly, the average annual number to be constructed in this period will be 420–430 thousands and it will even exceed the total number of public housing which is 325 thousand units to be constructed in the next five years (1978–1982) planned in the existing socio-economic development plan. Furthermore, the required number of housing units to be constructed will reach 7 million in the period between 1986 and 2001, and 14–16 million in the first quarter of the 21st century (2001–2026). This tremendous number of required construction of housing units would yet be regarded as minimum requirements as long as it is aimed to achieve the objective of one housing unit per household since the number of future household might be underestimated as mentioned above.

(3) Forecast of Housing Investment

2.24 The housing investments are forecasted as much as LE11 billion in the period from 1976 to 1986, and LE17 billion from 1986 to 2001 in terms of the 1976 constant price, when the average cost per unit is assumed to be LE2500 in 1976 price (Table 2-13).

Calculating the rate of housing investment to the accumulated GDP in the period from 1976 to 1986, it will be extremely high level of 13 % in Case 1 and 10 % in Case 2. Even if the future fixed investment covers the considerable large share of 30 % of GDP, the housing investment occupies 43 % and 34 % of the total fixed investment in Case 1 and Case 2 respectively, and it seems almost impossible to attain such a large amount of housing investment. The rate of housing investment to the accumulated GDP in the period from 1986 to 2001 will decrease to 5.5 % in Case 1 and 2.4 % in Case 2. This results in the share of housing investment to the total fixed investment to be 18 % in Case 1 and 8 % in Case 2, and it will still be necessary to allocate housing investment preferentially in that period in Case 1 when we consider that the share varied between 8 % and 15 % in the past ten years.

Table 2-13 REQUIRED HOUSING INVESTMENT FOR THE NEXT TWENTY FIVE YEARS

| | 1976-1986 | | 1986-2001 | |
|---|-----------|--------|-----------|--------|
| | Case 1 | Case 2 | Case 1 | Case 2 |
| Required Housing Constructions (thousands units) | 4,280 | 4,229 | 6,941 | 6,762 |
| Required Housing Investment (billion L.E., 1976 Price) | 10.7 | 10.6 | 17.4 | 16.9 |
| Percentage of Required Housing Investment to Accumulated GDP. (%) | 12.9 | 10.1 | 5.5 | 2.4 |

Source: Joint Study Projection

2.25 It will be almost impossible to solve the housing shortage in the next ten years, because of the excessive number of housing to be constructed and the excessive share of financial resources to be allocated to the housing sector. Consequently, the housing problem should be treated in longer time horizon, at least in the period of twenty years. It should be noted that even if it is postponed to the end of this century to attain the objective of one housing unit per household, the accumulated housing investment in the next twenty five years would need to cover approximately 7 % of the accumulated GDP in Case 1.

Through the observation of the large difference in the rate of required housing investment to the accumulated GDP between Case 1 and Case 2 despite the similar scale of the required housing construction, it becomes obvious that the maximization of economic growth rate is also very helpful for solving housing problems.

2.4 New Urban Developments

- 2.26 A large amount of land will be required for the construction of the above number of housing. The land required for new residential areas which excludes the land needed for the replacement of demolished housing becomes 780 Km², 1900 Km², and 4500 Km² by 1986, 2001, and 2026 respectively. And it will correspond to 3 %, 7 %, and 17 % of the cultivated area in 1986, 2001, and 2026 respectively (Table 2-14).

Table 2-14 LAND REQUIRED FOR NEW RESIDENTIAL AREAS (CASE 1)

| | 1986 | 2001 | 2026 |
|--|------|-------|-------|
| Land Required For New Residential Areas (Km ²) | 784 | 1,913 | 4,498 |
| Percentage to Cultivated Areas (%) | 2.9 | 7.0 | 16.5 |
| Percentage to Inhabited Areas (%) | 2.2 | 5.4 | 12.6 |

Source: Joint Study Projection

- 2.27 The inhabited land of Egypt is 35,600 square kilometers and occupies only 3.5 % of the total territory. The population density is 1,074 per square kilometer of inhabited area in 1976, and Egypt belongs to the most densely populated country in the world ranked with Japan and Korea.

The urban area required for increasing population will become 5 thousands square kilometers, 7 thousands square kilometers, and 10 thousands square kilometers in 1986, 2001, and 2026 respectively, and will cover 14 %, 19 %, and 29 % of inhabited land in 1986, 2001, and 2026 respectively, if the inhabited land is not expanded (Table 2-15).

Table 2-15 REQUIRED URBAN AREA (CASE 1)

| | 1976 | 1986 | 2001 | 2026 |
|---|-------|-------|-------|--------|
| Required Urban Area (Square kilometers) | 3,823 | 4,930 | 6,895 | 10,208 |
| Percentage to Inhabited Area (%) | 10.7 | 13.9 | 19.4 | 28.7 |

Source: Joint Study Projection

- 2.28 If the land needed for the new residential area and urban area as a whole is acquired in the existing inhabited area, it will be inevitable to sacrifice the other land use, especially agricultural land use. Since the agricultural land in Egypt is very scarce, the transfer of it to other land use should be restricted to the minimum scale. There are two basic countermeasures. The first one is to promote the plan and implementation of the new urban developments with higher density, and the second one is to construct new urban developments outside the existing agricultural land. These countermeasures are further discussed in the last chapter.

Chapter 3 Economic Growth and Industrial Activities

3.1 Requisites for Long-term Economic Growth

3.01 In the previous chapters, we set up two alternative economic growth paths, one of them assumes the growth rates of per capita income in the next fifty years as 5 % per annum in real terms (Case 1), and the other path assumes the growth rates of per capita income of 10 % per annum during this century and of gradual decline to 5 % per annum by the year 2026 (Case 2). We forecasted the population, students, labor force and households according to the age specific fertility rates which were projected in accordance with those alternative long-term economic growth paths.

The assumed growth rates per capita income in Case 1 is equivalent to the GDP growth rate of 7–8 % per annum in real terms in the next fifty years, and that of Case 2 is equivalent to the GDP growth rates of 12 % per annum during this century and of gradual decline to 6 % by the end of the next fifty years period. The assumed GDP growth rate in Case 1 turns out to be fairly high, and that of Case 2 within this century turns out to be very high, if we compare them to the past GDP growth rates of Egypt. (See Table 3–1).

Table 3–1 PAST AND FUTURE RATES OF ECONOMIC GROWTH

| | GDP Growth Rates in Real Term (%) | Population Growth Rates (%) | Per Capita GDP Growth Rates (%) |
|-------------|-----------------------------------|-----------------------------|---------------------------------|
| (Actual) | | | |
| 1955–1960 | 4.7 | 2.4 | 2.3 |
| 1960–1965 | 6.7 | 2.6 | 3.9 |
| 1965–1970 | 2.8 | 2.6 | 0.2 |
| 1970–1973 | 2.9 | 2.2 | 0.7 |
| 1973–1976 | 8.8 | 2.4 | 6.3 |
| (Projected) | | | |
| 1976–1986 | | | |
| Case 1 | 7.7 | 2.6 | 5.0 |
| Case 2 | 12.6 | 2.3 | 10.0 |
| 1986–2001 | | | |
| Case 1 | 7.4 | 2.3 | 5.0 |
| Case 2 | 11.8 | 1.6 | 10.0 |
| 2001–2026 | | | |
| Case 1 | 6.7 | 1.6 | 5.0 |
| Case 2 | 8.1 | 1.0 | 7.0 |

Sources: Ministry of Planning, CAPMAS, World Bank Estimates and Joint Study Projections

- 3.02 The average annual GDP growth rates in real terms was about 5 % in the period between 1955 and 1960 when the Egyptian economy was under mixed structure of the public and private sectors, and it increased to the fairly high level of 7 % in the period between 1960 and 1965 which corresponded to the planning period of the First General Economic and Social Development Plan.

However, in the period between 1965 and 1973 when there were successive wars, especially the Arab-Israel wars in 1967 and 1973, and the periods of war preparation, the GDP growth rates dropped to 3 % per annum, and accordingly the per capita income remained almost constant.

After "the Opening" of 1973, the GDP growth rates in real term rose remarkably to the level of 9 % per annum (the growth rate of per capita income 6 %), which is a little higher than the future growth rate in Case 1, however, still much lower than that in Case 2 (Table 3-1).

- 3.03 The previous chapter has pointed out the desirability to select the long-term economic growth path as close as Case 2, in order to make a large amount of current expenditure and investment feasible so as to meet with the tremendous demands in education, employment, housing, etc., resulted from long-term population growth (See 2.12, 2.18, and 2.25). If the long-term economic growth rates would be lower than that in Case 1, it will be impossible to meet with the above demands, and there will be the low quality of education, a large amount of unemployment, large shortage of housing and the deterioration of the overall quality of life for long time in future.

Since one of the most scarce resources for the long-term economic growth in Egypt is capital, the high saving rates and the efficient use of capital are the indispensable conditions for maintaining the long-term growth rates as high as assumed in this report.

- 3.04 The domestic savings of Egypt occupied 15 % of GDP in 1955/56, however, the share decreased consistently until 1974, when it was only 5 %. After 1974, the domestic saving rates showed a remarkable recovery, and it reached 17 % in 1977 (Table 3-2).

Most part of the gross investment was financed by the domestic savings in the 1950's, however, after the 1960's, the dependence on finance from abroad or foreign savings increased because of the decline of domestic savings. Especially, after "the Opening," both of the gross investment and of the dependence on the finance from abroad have rapidly increased, and the share of gross investment financed from abroad in GDP, which is identical to the share of net imports in GDP in Table 3-2, reached 19 % in 1975 (it was approximately 12 % in 1976 and 11 % in 1977).

Table 3-2. SHARE OF INVESTMENTS AND SAVINGS IN GDP

| | 1955/56 | 1960/61 | 1965/66 | 1970/71 | 1973 | 1974 | 1975 | 1976 | 1977 |
|-------------------|---------|---------|---------|---------|------|------|------|------|------|
| Gross Investments | 16.3 | 15.5 | 18.1 | 13.0 | 13.1 | 17.4 | 27.2 | 25.2 | 27.9 |
| Domestic Savings | 15.1 | 14.1 | 13.6 | 8.2 | 8.0 | 5.4 | 8.0 | 13.5 | 17.1 |
| Exports | 24.5 | 19.2 | 15.3 | 14.0 | 14.0 | 21.2 | 18.3 | 16.5 | 20.0 |
| Imports | 25.7 | 20.5 | 19.8 | 18.7 | 19.1 | 33.2 | 37.5 | 28.2 | 30.8 |
| Net Imports (1) | 1.2 | 1.3 | 4.5 | 4.8 | 5.1 | 12.0 | 19.2 | 11.7 | 10.8 |

Note (1): Net Imports are identical to the difference between imports and exports of goods and non-factor services.

Source: Ministry of Planning

3.05 It is rather difficult to measure the efficiency of capital of Egypt, because there is no available data of capital stock at all, and also there are no consistent sets of data of investments, outputs and value added in real terms and by the branches of industries. However, the marginal capital-output ratios may be considered as a macro economic indicator to give a clue to judge the efficiency of investment as a whole.

The marginal capital-output ratios of Egypt were very high level of 4.9 in the period of 1965-70, and were considerably low level of 2.9 in the period 1973-76. On the other hand, the marginal capital-output ratios of Japan have gradually increased since the 1940's, and the latest ratios of Egypt are almost equivalent to those of Japan in the period of 1955-60 (Table 3-3). One of the influential reasons of rising trend of the Japanese marginal capital-output ratio is that most of the investments were concentrated on the directly productive activities in the reconstruction period after the Second World War (1946-55), and that such investments as housing, infrastructure, anti-pollution investments, etc., which had less productive effects, has rapidly increased after the reconstruction period.

Table 3-3. MARGINAL CAPITAL-OUTPUT RATIOS OF EGYPT AND JAPAN

| Egypt | | Japan | |
|-------------|------|-------------|------|
| 1965 - 1970 | 4.89 | 1946 - 1950 | 2.55 |
| 1970 - 1973 | 3.97 | 1950 - 1955 | 2.32 |
| 1973 - 1976 | 2.90 | 1955 - 1960 | 2.94 |
| | | 1960 - 1965 | 3.56 |
| | | 1965 - 1970 | 3.54 |

Note: The ratios are represented in real term.

Marginal capital-output ratios are here defined as the ratios of the accumulated gross investment to the increment of the output (GDP) in each period, and are calculated at constant 1965 prices in the case of Egypt and at constant 1970 prices in the case of Japan.

Source: World Bank Estimates and Joint Study Estimates

3.06 If the target of the long-term economic growth rates of Egypt in this century are set at 10 % per annum which is equivalent to the approximate average of Case 1 and Case 2, the necessary sets of saving rates and marginal capital-output ratios are, for instance, 30 % and 3.0 or 25 % and 2.5 respectively, assuming that there is no autonomous expenditure. These combinations require very high saving rates associated with considerably low marginal capital-output ratios, i.e. high efficiency of investments.

In case there are needs for autonomous expenditure which is independent from the income, the marginal capital-output ratios of the induced investment should be lower than the above examples if the saving rates will hold same as above.

Provided that the autonomous expenditure follows the progressive growth of which rate of growth is r ($A = A_0 e^{rt}$), the future income which is decided by the multiplier-accelerator inter-action can be expressed as the following equations.

$$Y = \bar{Y}_0 e^{rt} + (Y_0 - \bar{Y}_0)e^{pt}$$

where $Y_0 = A_0/v(p-r)$ (1)

$$p = s/v$$

- here
- Y : Income (or Output)
 - Y₀ : Initial level of income
 - r : Growth rate of autonomous expenditure
 - A₀ : Initial level of autonomous expenditure
 - v : Marginal capital-output ratio of the induced investment
 - s : Saving rates

If we define here the autonomous expenditures as the investments for housing, urban utilities and other services, and the current expenditure for education which are necessary to be increased in accordance with the growth rates of population, number of students and households and are irrelevant to income, and if we assume that those autonomous expenditure should be increased from the initial level of 1976 at a rate of 3 % per annum which are the average growth rates of population, students and households, we can get the value of the following variables.

$$Y_0 = 5,828 \quad (\text{GDP in 1976; million L.E.})$$

$$A_0 = 497 \quad (\text{Investment for housing, urban utilities and other services, and current expenditure for education in 1976; million L.E.})$$

$$r = 0.03$$

Substituting these values in the above equation (1), and further assuming the average saving rates (s) in this century will be 25 % and the marginal capital-output ratio of the induced investment (v) will be 2.5, we can obtain the expected growth rate of GDP of 8.3 % per annum as a result from solving the equation (1). In order to realize the growth rate of GDP of 10 % per annum with the same level of saving rates (25 %), the marginal capital-output ratio of the induced investment is necessary to be decreased to 2.2 which is considered as extremely low level from the past experiences.

The Five-Year Economic Development Plan (1978–1982) projects GDP growth rate of 12 % per annum in real terms with the average saving rates of 29 % (of which domestic saving rates in 1982 is expected to be 23 %) and the marginal capital-output ratio of 2.4. The plan expects very high domestic saving rates and very small marginal capital-output ratio in comparison with the past data (See Table 3–2 and Table 3–3), therefore, the tremendous efforts will be necessary for the increase of the domestic saving rates as well as the efficiency of capital so as to attain the planned economic growth rates.

- 3.07 As already mentioned, it is imperative conditions for the realization of high economic growth rates, to increase the domestic saving rates and improve the efficiency of capital drastically.

As for the raise of the domestic saving rates, firstly, the government saving should be boosted by the raise of revenue through tax reform as well as the reduction of the government current expenditure, especially the military expenditure and living-cost subsidies. Secondly, in order to raise the public enterprise savings, it is essential to reform the management system so as to concentrate the efforts on increasing surplus of enterprises. For this purpose, the comprehensive measures should be formulated such as transfer of decision-making powers from government authorities to enterprise management, financial rewards and promotion for the management who succeeds in boosting surplus, and, on the other side, salary cut or replacement for the management who suffers from continuous losses, the raise of share of surplus which can be used for self-financing, etc. Thirdly, private savings should be stimulated through the raise of interest rates on saving deposits and the promotion of the development of private enterprises.

- 3.08 The measures to improve efficiency of capital are as follows. Firstly, it is essential to preferentially allocate investments to the sectors and projects with high efficiency of capital. For this purpose, scientific and practical methods should be introduced in the field of investment allocation and project evaluation. At the same time, it is necessary to establish the follow-up system of projects, and to freeze the additional investment to the inefficient projects and reexamine the program of them of which return from investment has been very low for a long time.

Secondly, it is indispensable to eliminate the overmanning and improve the skill and quality of workers in the public sector. This requires such fundamental measures as the reform of the guaranteed employment policy which has guaranteed the employment in the public sector to all graduates of universities and higher institutions, rendering the management the right to dismiss workers together with setting up a scheme for unemployment benefits, providing workers the training within industries and adoption of performance related rewards to individual workers.

Thirdly, the management system of public enterprises should be reorganized to the more efficiency oriented system. This requires measures similar to those that are necessary for the reform of the management system in order to boost the public enterprise savings. In

addition to them, the management of inventories and the maintenance system of machinery and equipment must be urgently improved.

Fourthly, the government intervention in the productive sector must be reduced. Especially, the price controls should be steadily abolished according to the medium-term schedule. The pricing of the most of industrial goods should eventually be transferred under the market mechanism.

3.2 Efficiency of Investment in Manufacturing Industry

3.09 The continuation of the long-term economic growth at a rate of approximately 10 % per annum requires not only the above mentioned high saving rates but also plenty of efficient investment opportunities which can absorb the savings.

The development of the manufacturing industry is essential for offering good investment opportunities, since the development of other industries including construction, transportation and communication, trade and finance, and services are only possible through the inter-industrial transactions on the products of the manufacturing industry. In this sense, an adequate investment allocation to the branches of manufacturing industry and the improvement of investment efficiency in those industries are the imperative conditions for the maintenance of rapid economic growth for a long time.

3.10 The gross fixed investment in manufacturing industry in the past fourteen years (1960/61 -- 1974) had occupied 22 -- 26 % of the total gross fixed investment. The investment in the branches of manufacturing industry in this period indicates the following features (Table 3-4). First, the progressive concentration of investment in the basic metals industry. The investments which include those in the iron and steel plant in Helwan, and the aluminium plant in Nag Hammadi, covered 11 % of the total investments in manufacturing sector in the period of 1960/61 -- 64/65, increased its share to 22 % in the period of 1965/66 -- 69/70 and 40 % in the period of 1970/71 -- 74.

Secondly, the maintenance of a considerably large share of investments in the food industry (incl. beverages and tobacco) and the textile industry which have a long history and have had the most important role in this country. The share of investment in each industry fluctuated, however, if add up investments in two industries, they had covered 25 -- 32 % of the total manufacturing investment through the past fourteen years. By these investments, two industries altogether produced a half of gross value added in manufacturing sector in 1974 (they produced about two-thirds of gross value added in the manufacturing sector in 1959/60, see Table 3-7).

Thirdly, chemicals industry which produces fertilizers, detergents, paints, soap, pharmaceuticals, etc. had been allocated a fairly large share of investment (12-16 %) and had produced 11 % of the gross value added in the manufacturing sector through this period.

Fourthly, the share of investment in machinery industries which consist of non-electrical machinery, electrical machinery and transport equipments dropped from 13 % in the period of 1960/61 – 64/65 to 6 % in the period of 1970/71 – 74. Although these industries may have a good potentiality for the future developments, they produce only a small part of the output at the present.

Table 3-4 GROSS FIXED INVESTMENT IN MANUFACTURING INDUSTRY
AT CURRENT PRICES

| | Accumulated Gross Fixed Investment (million L.E.) | | | Distribution of Accumulated Gross Fixed Investment (%) | | |
|--|---|---------------------|------------------|--|---------------------|------------------|
| | 1960/61 ~1964/65 | 1965/66 ~1969/70 | 1970/71 ~1974 | 1960/61 ~1964/65 | 1965/66 ~1969/70 | 1970/71 ~1974 |
| Food, beverages & tobacco | 46.8 | 65.5 | 65.4 | 13.5 | 17.3 | 11.8 |
| Textiles | 62.7 | 33.8 | 88.2 | 18.1 | 8.9 | 15.9 |
| Wood & Furniture products | 0.6 | 0.2 | 0 | 0.2 | 0.1 | 0 |
| Printing & publishing | 4.2 | 1.4 | 0.2 | 1.2 | 0.4 | 0 |
| Paper & paper products | 15.3 | 11.7 | 4.9 | 4.4 | 3.1 | 0.9 |
| Leather & leather products | 0.4 | 6.3 | 5.0 | 0.1 | 1.7 | 0.9 |
| Rubber | 2.5 | 1.7 | 0.9 | 0.7 | 0.4 | 0.2 |
| Chemicals | 54.2 | 60.9 | 65.3 | 15.6 | 16.1 | 11.7 |
| Coal & petroleum products | 52.2 | 38.4 | 34.2 | 15.1 | 10.2 | 6.2 |
| Non-metallic products | 3.7 | 31.5 | 27.6 | 1.1 | 8.3 | 5.0 |
| Basic metals | 38.8 | 81.7 | 222.3 | 11.2 | 21.6 | 40.0 |
| Metal products | 7.6 | 3.5 | 8.1 | 2.2 | 0.9 | 1.5 |
| Non-electrical machinery | 12.2 | 2.2 | 11.6 | 3.5 | 0.6 | 2.1 |
| Electrical machinery | 13.1 | 9.6 | 10.6 | 3.8 | 2.5 | 1.9 |
| Transport equipments | 21.2 | 23.3 | 10.6 | 6.1 | 6.2 | 1.9 |
| Others | 10.9 | 6.4 | 1.2 | 3.1 | 1.7 | 0.2 |
| Total of manufacturing industry | 346.4 | 378.1 | 556.0 | 100.0 | 100.0 | 100.0 |

Source: Ministry of Planning

3.11 It is not easy to evaluate the performance of the past investment allocation to the branches of the manufacturing industry in comparison with the optimal investment allocation to maximize long-term economic growth. Especially in Egypt, the comprehensive evaluation would be almost impossible because of the lack of not only sophisticated data like capital coefficient matrix, but also such common data as of capital stock, investment and output in real terms and employment by branches of industry.

However, we calculated the marginal capital-output ratio of the branches of manufacturing industry from the data of investment and gross value added at current prices as a simple indicator to measure the efficiency of investment. Although the marginal capital-output ratio has many shortcomings to evaluate the efficiency of investment such as the lack of consideration on the gestation lag of investment in the branches of activities, the absence of consideration on inter-industrial effects of investment, incompetence of time series comparison due to the difference in the deflators of products, etc., it can give a simple and a rough measure to compare the efficiency of investment in the branches of the manufacturing sector.

From the observation of the marginal capital-output ratio of the branches of the manufacturing sector in the last fourteen years (Table 3-5) we may classify the branches of industries into the following four groups.

Table 3-5 MARGINAL CAPITAL-OUTPUT RATIOS IN THE MANUFACTURING INDUSTRY AT CURRENT PRICES

| | 1960-65 | 1965-70 | 1970-74 | 1960-74 |
|-----------------------------------|---------|---------|---------|---------|
| Food, beverages & tobacco | 1.82 | 2.78 | 1.62 | 1.98 |
| Textiles | 2.26 | 0.75 | 1.51 | 1.41 |
| Wood & furniture products | 0.09 | 0.08 | 0 | 0.07 |
| Printing & publishing | 1.14 | 1.27 | 0.07 | 0.74 |
| Paper & paper products | 2.28 | 6.50 | 0.64 | 1.97 |
| Leather & leather products | 0.50 | 4.50 | 0.89 | 1.50 |
| Rubber | 1.32 | 1.42 | 0.56 | 1.09 |
| Chemicals | 2.08 | 3.98 | 3.44 | 2.99 |
| Non-metallic products | 0.47 | 5.08 | 3.49 | 2.87 |
| Basic metals | 4.85 | 9.50 | 12.78 | 10.08 |
| Metal products | 1.27 | 0.95 | 1.65 | 1.32 |
| Non-electrical machinery | 8.13 | 0.71 | 6.82 | 4.13 |
| Electrical machinery | 1.70 | 1.55 | 1.29 | 1.51 |
| Transport equipments | 4.08 | 7.28 | 0.94 | 2.80 |
| Average of Manufacturing Industry | 2.50 | 2.56 | 2.59 | 2.56 |

Note: Marginal capital-output ratios are here defined as the ratios of the accumulated gross fixed investment to the increment of the gross value added in each period.

Source: Ministry of Planning and Joint Study Estimates

| <u>Group</u> | <u>Marginal capital-output ratio</u> | <u>Branches of the manufacturing sector</u> |
|--------------|--|---|
| Group (1) | very small (average of 1960-74, less than 1.5) | Wood & furniture Printing & publishing Rubber Metal products Textiles |
| Group (2) | small (average of 1960-74, 1.5 - 2.0) | Leather & leather products Electrical machinery Paper & paper products Food, beverages & tobacco |
| Group (3) | large (average of 1960-74, 2.5 - 4.5) | Transport equipments Non-metallic products Chemicals Non-electrical machinery |
| Group (4) | very large (average of 1960-74, 10.0) | Basic metals |

The economic growth rates would obviously become higher, if the investment could be concentrated on the branches of industries with the smaller marginal capital-output ratio i.e. groups (1) and (2) as far as the demand of products of these industries clears out the supply in the market.

The actual investment allocation in the period between 1960 and 1974 seems to be too much concentrated on the branches of industries with larger marginal capital-output ratios, namely the industries in groups (3) and (4). Approximately half of the investment in the manufacturing sector was allocated to the industries of groups (3) and (4) in the second half of the 1960's and about 60 % of that in the first half of the 1970's. Above all, the progressive concentration of investment in the basic metals industry (40 % of the total investments in the manufacturing sector in the period from 1970 to 1974) could not be appropriate since the efficiency of investment in this industry seemed to be low* (marginal capital-output ratio was very large) (Table 3-5).

3.12 What is the level of the investment efficiency in the manufacturing industries of Egypt by international standard?

Table 3-6 indicates the comparison of marginal capital-output ratios in the selected manufacturing industries between Egypt and the U.S.A. The further disaggregation of

* See section 3.20

industries would give better comparison because the above selected industries in both countries must have different products-mix, however, this table is sufficient for giving a rough comparison.

There are considerable differences in the marginal capital-output ratios in every industry of both countries. The marginal capital-output ratios in food, textiles, chemicals, and electrical machinery industries of Egypt are twice as large as those of the U.S.A. The basic metals industry of Egypt shows the very large ratio which is five times as much as that of the U.S.A. Although there are some special reasons* for this magnitude of the large ratio, this again indicates the existence of inefficient production system in basic metal industry of Egypt. (*See section 3.20).

- 3.13 The above observations and comparison give the two main conclusions. First, the past investment allocation to the branches of manufacturing sector can not be evaluated as appropriate from the criterion of investment efficiency. Second, the investments in many branches of the manufacturing sector are inefficient by the international standard.

The investment allocation to the manufacturing industry should take more consideration of the efficiency of investment. Since the problem of investment allocation is closely related to the choice of industries in long-term development strategy, this issue is further discussed in the next section.

The improvement of the investment efficiency in the manufacturing industries is the essential task for the long-term economic development of Egypt, and the measures to attain this are similar to those discussed in 3.08.

Table 3-6 MARGINAL CAPITAL-OUTPUT RATIOS
IN THE SELECTED MANUFACTURING INDUSTRIES
OF EGYPT AND THE U.S.A. AT CURRENT PRICES

| | 1960-1965 | 1965-1970 | 1970-1974 | 1960-1974 |
|-----------------------------------|-----------|-----------|-----------|-----------|
| Food, beverages & tobacco (EGYPT) | 1.82 | 2.78 | 1.62 | 1.98 |
| (U.S.A.) | 1.50 | 1.08 | 0.91 | 1.10 |
| Textiles (EGYPT) | 2.26 | 0.75 | 1.51 | 1.41 |
| (U.S.A.) | 0.85 | 0.74 | 0.67 | 0.74 |
| Chemicals (EGYPT) | 2.08 | 3.98 | 3.44 | 2.99 |
| (U.S.A.) | 1.47 | 1.19 | 2.57 | 1.50 |
| Basic metals (EGYPT) | 4.85 | 9.50 | 12.78 | 10.08 |
| (U.S.A.) | 1.63 | 7.45 | 1.04 | 2.02 |
| Electrical machinery (EGYPT) | 1.70 | 1.55 | 1.29 | 1.51 |
| (U.S.A.) | 0.61 | 1.00 | 0.69 | 0.76 |

Note: (1) The definition of marginal capital-output ratios is the same as the footnote in Table 3-5.

(2) The figures for the U.S.A. in the periods 1970-1974 and 1960-1974 are replaced by them in the periods 1970-1973 and 1960-1973.

Source: UN, "Yearbook of Industrial Statistics" and Joint Study Estimates

Table 3-7 GROSS VALUE ADDED IN MANUFACTURING INDUSTRY AT CURRENT FACTOR COST

| | Gross Value Added (L.E. million) | | | | | Distribution of Gross Value Added (%) | | | | |
|---------------------------------|----------------------------------|---------|---------|-------|-------|---------------------------------------|---------|---------|-------|-------|
| | 1959/60 | 1964/65 | 1969/70 | 1974 | 1974 | 1959/60 | 1964/65 | 1969/70 | 1974 | 1974 |
| Food, beverages & tobacco | 74.3 | 100.0 | 123.6 | 163.9 | 163.9 | 33.7 | 27.8 | 25.6 | 24.2 | 24.2 |
| Textiles | 70.9 | 98.6 | 143.8 | 202.1 | 202.1 | 32.1 | 27.5 | 29.8 | 29.9 | 29.9 |
| Wood & furniture products | 6.5 | 13.3 | 15.8 | 18.6 | 18.6 | 2.9 | 3.7 | 3.3 | 2.6 | 2.6 |
| Printing & publishing | 9.7 | 13.4 | 14.5 | 17.5 | 17.5 | 4.4 | 3.7 | 3.0 | 2.6 | 2.6 |
| Paper & paper products | 1.3 | 8.0 | 9.8 | 17.5 | 17.5 | 0.6 | 2.2 | 2.0 | 2.6 | 2.6 |
| Leather & leather products | 2.7 | 3.5 | 4.9 | 10.5 | 10.5 | 1.2 | 1.0 | 1.0 | 1.6 | 1.6 |
| Rubber | 2.3 | 4.2 | 5.4 | 7.0 | 7.0 | 1.0 | 1.2 | 1.1 | 1.0 | 1.0 |
| Chemicals | 13.5 | 39.6 | 54.9 | 75.9 | 75.9 | 6.1 | 11.0 | 11.4 | 10.9 | 10.9 |
| Coal products | 0 | 0.6 | 1.4 | 4.7 | 4.7 | 0 | 0.2 | 0.3 | 0.7 | 0.7 |
| Non-metallic products | 9.5 | 17.3 | 23.5 | 31.4 | 31.4 | 4.3 | 4.8 | 4.9 | 4.6 | 4.6 |
| Basic metals | 7.3 | 15.3 | 23.9 | 41.3 | 41.3 | 3.3 | 4.3 | 4.9 | 6.1 | 6.1 |
| Metal products | 6.9 | 12.9 | 16.6 | 21.5 | 21.5 | 3.1 | 3.6 | 3.4 | 3.2 | 3.2 |
| Non-electrical machinery | 1.8 | 3.3 | 6.4 | 8.1 | 8.1 | 0.8 | 0.9 | 1.3 | 1.2 | 1.2 |
| Electrical machinery | 3.0 | 10.7 | 16.9 | 25.1 | 25.1 | 1.4 | 3.0 | 3.5 | 3.7 | 3.7 |
| Transport equipments | 6.5 | 11.7 | 14.9 | 26.2 | 26.2 | 2.9 | 3.3 | 3.1 | 3.9 | 3.9 |
| Others | 4.5 | 6.6 | 6.8 | 6.9 | 6.9 | 2.0 | 1.8 | 1.4 | 1.0 | 1.0 |
| Total of manufacturing industry | 220.7 | 359.1 | 483.1 | 676.2 | 676.2 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Ministry of Planning

3.3 Choice of Industry

- 3.14 The choice of the key industries to which the resources are allocated with priorities is one of the central problems for the long-term economic development of Egypt. It is recommendable from the analysis and projections already made in this study to assign the following two criteria as the most essential criteria to choose key industries.

Criterion A: Investment efficiency

Criterion B: Employment effects

These two criteria correspond to the most important objectives for the long-term development strategy of Egypt, which are the maximization of the long-term economic growth rates and the maximization of employment in the course of the above economic growth path. Furthermore, it is desirable to take into account the following criteria as the supplementary to the above two criteria.

Criterion C: Contributions to export

Criterion D: Effectiveness to meet construction demand

Criterion E: Efficient use of domestic resources

Criterion C is related to the capacity of the specific industry to gain the foreign currency by the exports of its products. Criterion D is to evaluate the capacity of the specific industry to meet with increasing construction demands for housing, factories, new towns and infrastructures which provide the foundations of all human activities for the socio-economic development. Criterion E is to measure the capacity of the specific industry to obtain high value added through effective use of the domestic raw materials and natural resources which include food, cotton, mineral ore, petroleum, etc.

- 3.15 The most appreciated manufacturing industries from criteria A and B that are those with high investment efficiency as well as large employment effects* are as follows:

- ① Textiles (including clothings and wearing apparel)
- ② Wood and furniture products
- ③ Printing and publishing
- ④ Leather and leather products
- ⑤ Rubber and rubber products
- ⑥ Metal products

All of them satisfy criterion C and industries ② and ⑥ satisfy criterion D, and industries ② and ④ satisfy criterion E at the same time. The above industries can be regarded as those to which resources should be the most preferentially allocated.

* Since there are no satisfactory data on the employment of the branches of manufacturing sector in Egypt, we here refer to results of analysis using the detailed data of the Japanese Industrial Census.

- ⑦ Non-metallic products
- ⑧ Petroleum and petroleum products

are highly desirable industries from either criterion A or B. The industry ⑦ consists of cement and its products, glass and its products, non-metallic building materials, pottery, etc., and most branches of this industry have large employment effects whereas they usually have a relatively large marginal capital-output ratio. This industry also satisfies criteria D and E.

This industry ⑧ is favoured with the very high investment efficiency owing to a large price hike of oil although its employment effects is small. At the same time, this industry satisfies criteria C and E. It is recommendable to allocate resources with high priorities to industry ⑧ and most branches of industry ⑦.

- 3.17
- ⑨ Food, beverages and tobacco
 - ⑩ Paper and paper products
 - ⑪ Electrical machinery

have the considerably small marginal capital-output ratios as well as large employment effects, and so satisfy criteria A and B to a considerable extent. The industry ⑨ could give good effects on the agricultural sector through backward linkage and can satisfy criterion E. Generally speaking, the resources can be positively allocated to those industries, however, further evaluations are necessary by each disaggregated branches of these industries as both the investment efficiency and employment effects vary considerably among them.

- 3.18
- ⑫ Non-electrical machinery

has fairly large employment effects but also has relatively large marginal capital-output ratio in general. However, this combination varies very much by branches of this industry because it consists of various kinds of machineries. Although there might be good possibility for the development of the textile machinery and agricultural machinery which fits arid land agriculture, the further evaluation is necessary since these industries require a large amount of capital.

- 3.19
- ⑬ Chemicals
 - ⑭ Transport equipments

have considerably large marginal capital-output ratio as well as relatively small employment effects in average. Consequently, there are no rational reasons for the preferential allocation of resources to these industries in general. However, fertilizer industry and some branches of petrochemical industries which are a subdivision of industry ⑬ might have good potentialities for development through efficient use of the domestic resources of phosphate at Abu Tartour and limestone, and petroleum in the Gulf of Suez and Sinai respectively, and thus might satisfy criterion E. The rolling stock industry of industry ⑭ has a large employment effects, and so is a favorable industry from criterion B. Like these, there are some branches of industry ⑬ and ⑭ to which the resources could be positively allocated, however, the choice of the specific branches of these indus-

tries as those with priorities requires more detailed evaluations.

3.20 As for

(15) Basic metals

its past marginal capital-output ratio was very large and its employment effects is normally small. This fact directly gives no stimulation for the preferential allocation of resources to this industry although there was heavy concentration of investment in the industry. Long gestation period of investment in this sector in general and a large investment in the aluminium plant in Nag Hammadi which had not started its production in the period of observation are some of the reasons for an extraordinarily large marginal capital-output ratio of this industry. However, there are obviously inefficiency of the present production process and inadequacy of management of inventories and maintenance of machine and equipments in this industry which are another important part of the above reasons. Iron and steel industry might have good potentiality if it could efficiently use the Bahariya iron ore. However, any large additional investment in this sector should start after the overhaul and correction of the inadequate management system as well as the existing inefficient production system*.

- 3.21 Besides the manufacturing and petroleum sector, the construction industry must be selected as the promising sector to absorb preferential resource allocation. This sector is very much labor intensive and has very small capital-output ratio as well as is indispensable to meet the construction demands by good use of the domestic raw materials and products. Therefore, it satisfies criteria A, B, D, and E. It is recommendable to allocate resources with the highest priority to the vocational training for the construction trades.

The effective utilization of the human resources may be the most advantageous strategy for the long-term development of Egypt. In this sense, it is necessary to allocate resources most preferentially to the education and vocational training sector**. It is a possible and very meaningful image for Egypt to become the center for education and vocational training in the Middle East region.

- 3.22 The evaluations and recommendations in the preceding paragraphs are confined in the qualitative way. However, for the practical purpose, the more quantitative and detailed evaluations on the choice of key industries, or in other words, on the pattern of resource allocation, are necessary. Whether Egypt succeeds in the appropriate choice of key industries and the efficient allocation of resources, even if it would not be optimal, or not, is one of the most vital conditions for the long-term development of this country. Since the advanced and effective methodologies on the efficient resource allocation and adequate choice of industries have been well developed in some advanced countries, it is highly recommendable to apply these methodologies for the long-term planning and its implementations.

* For details, refer to Japan International Cooperation Agency (JICA) "Report on Rehabilitation of Egyptian Iron and Steel Company in Helwan, Arab Republic of Egypt.", October 1977.

** In these 2-3 years, several vocational training centers for construction trades and industrial skilled workers were planned. However, the construction has been far behind the schedule because of shortage of manpower and materials and after all, inadequate resource allocations.

Chapter 4 Policy Implications and Recommendations

In this chapter, we summarize the policy implications of the results of the forecasts and analyses made in the previous chapters and add some recommendations for the long-term socio-economic development of Egypt. The paper includes those on such individual sectors as education, employment, housing, etc., as well as on some comprehensive themes.

4.1 Education

- (1) The study fixes the long-term targets on education. The first target is to enforce the full enrollment in primary education by 1986. The second one is to make preparatory education compulsory and to enforce the full enrollment in it in the period between 1986 and 2001. The third one is to raise the enrollment ratios in secondary and higher education to the highest present level of the developed countries by the year 2026, that is fifty years from now.

Although these targets seem not so ambitious, it is proved to be necessary to allocate a tremendous amount of human and financial resources to the education sector in order to attain them. Nevertheless, it is very important to allocate resources most preferentially to this sector, since education forms the most essential foundation for the long-term socio-economic development.

- (2) It is urgently necessary to increase the annual supply of trained primary school teachers to the level of 14–15 thousands which corresponds to twice as much as the present annual supply of teachers, as soon as possible.
- (3) It is necessary to increase the annual supply of preparatory and secondary school teachers to 11 thousands in the period between 1976 and 1986, and to 16–21 thousands in the period between 1986 and 2001. It is a prerequisite for Egypt's progress to the higher stage of development to improve the quality of the preparatory and secondary education, as well as to promote higher enrollment in them.
- (4) The percentage ratios of the government current expenditure for education to GDP must be raised from 4.8 % in 1976 to 6.5 % in 1986 and to 8 % in 2001 so as to only maintain the present quality of education. The expenditure for education would become much larger amount if we added the current expenditure to improve the quality of education and the capital expenditure to it, however, the expenditure for education should be allocated with top priority even if it meant cutting down the expenditure for other purposes.

4.2 Employment

- (1) It is essential for the maximization of economic growth to provide a set of comprehensive policy measures to activate and utilize the abundant supply of young labor force which will increase very rapidly at least within this century.
- (2) It is necessary for the realization of full employment to create employment opportunities in non-agricultural sectors, so that the rate of increase is approximately 5 % per annum

during this century and so that the average annual increments in the next ten years (1976–1986) and in the last fifteen years of the century (1986–2001) are more than twice and four times as much as in the last ten years (1966–1976) respectively (See Table 2–11).

- (3) The long-term educational and training program should be formulated on such sectors where the large demand for skilled workers and specialists will be expected such as the manufacturing, construction, and transportation and communication industries, education, and medical care. This program should take into account the long-term demand from the neighbouring arab countries as well as from domestic needs.
- (4) The employment effects of industries should be considered as the most important criteria in case of making the long-term industrial development plan and studying the industrial projects evaluation.
- (5) The government should formulate the comprehensive manpower plan which covers the period at least by the end of this century and the wide scope of issues indicated by this report.

4.3 Housing

- (1) In order to attain the target to provide one housing unit for each household by 1986, it is forecasted to be necessary to construct 4 million housing units in the next ten years until 1986 which is more than 5 times as much as the housing units built in the last ten years, and to make tremendous housing investments of which share to the accumulated GDP is required to be 10–13 % in this period (See Tables 2–12 and 2–13).
- (2) Judging from the above results of the forecast, it turns out to be almost impossible to solve the housing shortage in the next ten years. It is highly recommendable to elaborate the long-term housing program which covers the period until the end of this century and deals with the housing investment of approximately L.E. 28 billion (not including the investment for infrastructure of residential districts).
- (3) Since the required resources for the long-term housing program is enormous, the provision of a system to enable the efficient use of resources is essential. From this view point, it is important to assign the desirable and efficient relationship in the program between public and private sector.

4.4 New Urban Developments

- (1) The land required for the new urban area is forecasted to occupy approximately 20 % in 2001 and 30 % in 2026 of the total inhabited area, and therefore it is important to discover the new way of developing the urban area in such a way as not to reduce the precious agricultural land in Egypt.
- (2) One of these new ways is to restrict or prohibit low-density urban developments and to promote high-density urban developments. For this purpose, it is necessary to execute the comprehensive research and development on the size and location of buildings, the

land use pattern, transportation systems and utility facilities so that they will fit well to the high-density urban development. Furthermore, it is desirable to establish new regulations for urban plan after the research and development, and some practical applications.

- (3) The other direction is to develop new urban areas outside the existing inhabited area. This involves the necessity for new urban developments outside the Nile delta and Nile valley. In the medium term, it may be appropriate to extend the new developments to the neighbouring desert area of the Nile delta and Nile Valley which include such new towns as Tenth of Ramadan, Sadat City, New Ameria, etc., as well as the Suez Canal Zone.

However, in the long run, the new urban centers should be planned and implemented in the remote area from the Nile delta and Valley for instance in the Red Sea Coast, the Sinai, and the Mediterranean Sea Coast. Unless the new urban centers in these remote areas can be developed successfully and absorb a considerable portion of population, all arable land along the Nile delta and Valley will be filled up by urban agglomerations in the next century.

4.5 Maximization of Long-term Economic Growth

- (1) In this report, we made a comparative analysis on two alternative long-term development paths which are named Case 1 and Case 2. Case 1 assumes the growth rates of per capita income in the next fifty years as 5 % per annum in real terms (i.e., GDP growth rates of 7–8 % per annum in real terms), and Case 2 assumes the growth rates of per capita income of 10 % (equivalent to GDP growth rates of 12 %) during this century and the gradual decline to 5 % (GDP growth rates of 6 %) per annum in real terms by the year 2026.

The comparison between Case 1 and Case 2 shows that the demands in Case 1 are larger than those in Case 2 in every sector of education, employment, housing, and urban developments. The financial burden to the economy to meet these demands in Case 1 is far heavier than in Case 2.

- (2) Evaluating the results of the comparative study, Case 2 is proved to be much more favourable than Case 1 as the path of long-term development. Accordingly, it is important to allocate the resources efficiently so as to maximize the economic growth rate and to strengthen the integrated policy measures to slow down the birth rate, and thus to approach to the long-term development path of Case 2.
- (3) It is indispensable condition for maximizing the long-term economic growth and approaching the development path of Case 2 as close as possible, first to raise the saving rates, especially domestic saving rates, and second, to increase the efficiency of capital as much as possible from the viewpoint of macro economic policies.

In order to maintain the GDP growth rates of 10 % per annum in real terms, for instance, the marginal capital-output ratio of induced investment must be reduced to 2.2 (it fluctuated between three and five in the latest decade) even if we could expect the long-term saving rates of 25 %.

- (4) The raise of the domestic saving rates requires, first, to boost the government savings by the increase of revenue through tax reform as well as by the reduction of the government current expenditure, especially the military expenditure and living-cost subsidies. Second, for the purpose of increasing the public enterprises savings, the management system must be reorganized so as to concentrate the efforts on increasing the surplus of enterprises. Third, private savings should be stimulated through the raise of interest rates on saving deposits and the promotion of development of private enterprises (See 3.07).
- (5) The recommendable measures to improve the efficiency of capital are as follows. First, the investments have to be allocated preferentially to the efficient sectors and projects. It is necessary to freeze the additional investment in inefficient projects and to reevaluate the investment program for them. Second, the government must reform the employment policy and eliminate the overmanning as well as improve the quality of workers in the public sector. Third, the management system of public enterprises should be reorganized to the more efficiency-oriented system. This requires such measures as urgent improvement of the management of inventories and the maintenance of equipments, the transfer of decision-making power from the government authorities to enterprise management, etc. Fourth, the government intervention in the production sector must be reduced. Especially, the price controls should be steadily abolished according to medium-term schedule (See 3.08).

4.6 Choice of Industry and Its Location*

- (1) The choice of the key industries to which the resources are allocated with priorities is one of the central problems for the long-term economic development.

It is recommendable from analysis and projections made in this study to assign the following two criteria as the most essential criteria to choose key industries.

Criterion A: Investment efficiency

Criterion B: Employment effects

Furthermore, it is desirable to take into account of Criterion C (Contribution to export), Criterion D (Effectiveness to meet construction demand) and Criterion E (Efficient use of domestic resources) as the supplementary to the above two criteria.

- (2) Evaluating through these criteria, it is recommendable to choose such industries as textiles (including clothing and wearing apparel), wood and furniture products, printing and publishing, leather and leather products, rubber and rubber products, metal products, cement and cement products, non-metallic building materials, and petroleum and petroleum products as the key industries to which resources should be the most preferentially allocated in at least medium-term period (See 3.15 and 3.16).
- (3) The food, beverages and tobacco, paper and paper products, and electrical machinery in-

* For details, refer to section 3.3

dustries have considerably good results of evaluation through those criteria in average. Therefore, generally speaking, the resources can be positively allocated to those industries, however, further evaluations are necessary by each subdivision of these industries since the investment efficiency as well as employment effects vary among them to a large extent (See 3.17).

- (4) Non-electrical machinery, chemicals, and transport equipment industries are not well evaluated through the above criteria in general. Among the subdivision of these industries, such industries as textile machinery, agricultural machinery (mainly for arid land agriculture), fertilizers, some branches of petrochemicals, rolling stocks, and buses and trucks industries might have good potentiality for the future development in the long run. However, the choice of the specific branches of these industries as those with priorities requires more detailed evaluations (See 3.18 and 3.19). As to the basic metal industry, important recommendations are in section 3.20.
- (5) Besides the manufacturing and petroleum sector, it is recommendable to allocate resources with the highest priorities to the construction industry and education and vocational training sector.
- (6) The new industrial locations should be guided to the area outside the Nile delta and Nile valley as much as possible, because not only the agricultural land but also environment (soil, water and air) in these areas should be preserved. It is recommended in the long run to plan and develop two or three new industrial complexes associated with urban residential districts and educational and cultural functions in some adequate location in the Red Sea Coast or Sinai or Mediterranean Sea Coast. The comprehensive cost-benefit analysis is necessary for choosing the optimal location and size of these industrial complexes.

4.7 Towards Optimal Allocation of Resources

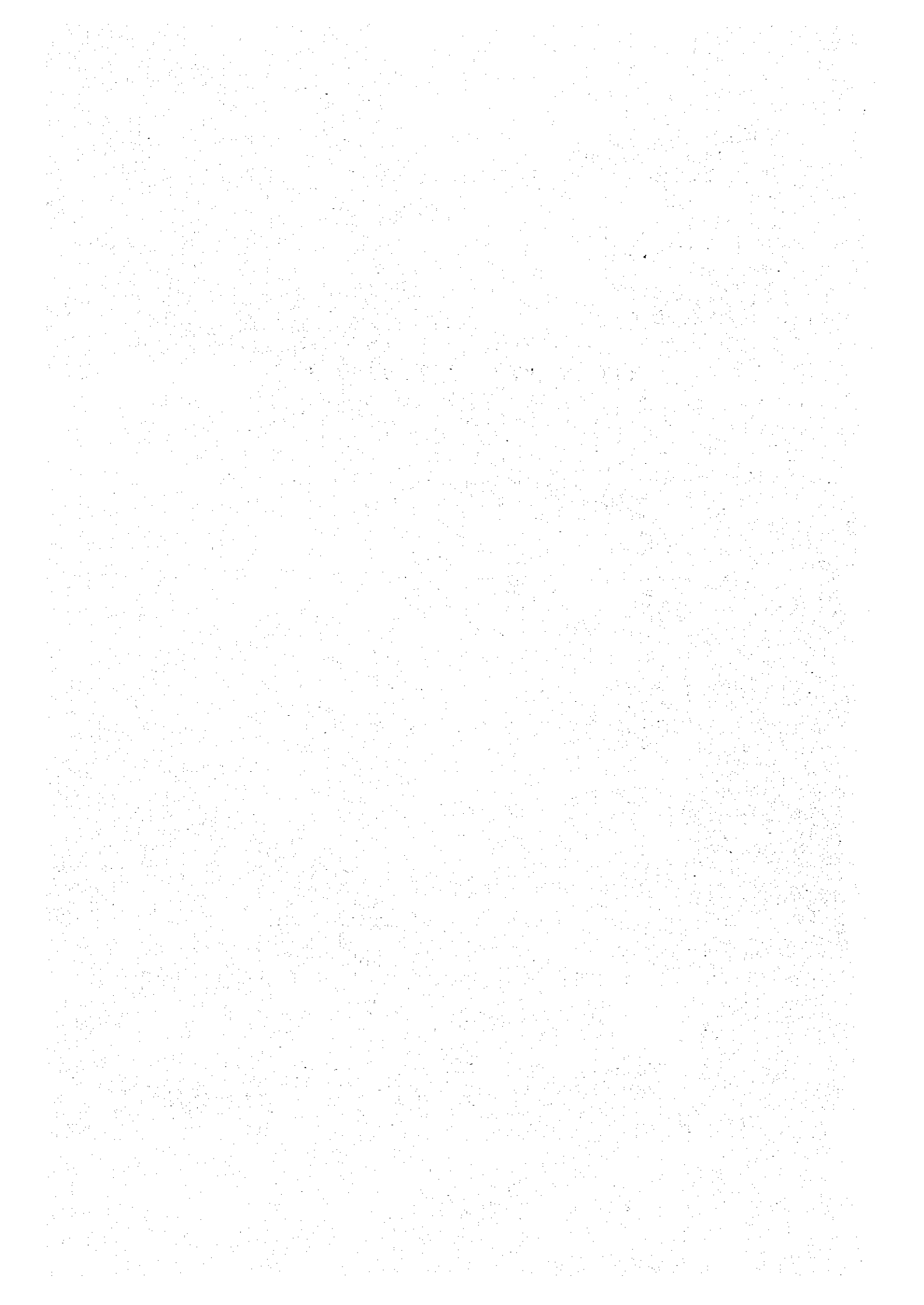
- (1) It is necessary for the long-term development of Egypt to increase the large amount of investments for the infrastructure and industries in addition to the tremendous increment in the expenditure for education and housing. It is impossible for the government expenditure to cover all these increments because the government account has already suffered from the deficit as much as 20 % of GDP. One of the solutions to the problem is to make adequate use of the increasing foreign assistance. However, as a more basic solution, it is recommendable to reduce gradually the military expenditure and living-cost subsidies which have occupied somewhere around 30 % of GDP in these past several years, and transfer them to the above expenditure which are far more beneficial for the future development.
- (2) Furthermore, in general, it is necessary to allocate all important resources which include not only capital, manpower and technology but also such scarce natural resources as water and inhabitable land efficiently to various industries and sectors. The resource allocation should be consistent among various resources as well as comprehensive that is covering all important resources. Moreover, the resource allocation is desirable to be

optimal in the sense that it results in the best contribution to the goals of long-term development. Since this type of planning technology has been rapidly developing, the government should introduce and apply it to formulate the comprehensive resource allocation plan.

- (3) As to the implementation of the comprehensive resource allocation plan, the government should be responsible for the allocation of such public goods as water and inhabitable land to all sectors, and also for the allocation of the most of resources to such public sectors as education, defense, communication, and the most part of transportation, etc.. However, for a large part of industries where private enterprises participate in, the plan should be looked on as indicative.

It will not be easy to formulate this type of plan and set up the system to implement it efficiently. However, this would be the only way for Egypt to combine the merits of planning mechanism with those of market mechanism and to make its efficient long-term economic development feasible.

TECHNICAL APPENDICES



**Appendix I LONG-TERM POPULATION GROWTH
AND ITS AGE STRUCTURE**

(A) CLASSIFICATION OF THE 1966 POPULATION BY FIVE YEAR AGE GROUPS AND SEX

1-1 The population problem is one of the most critical issues in today's Egypt, and will be the greatest factor impeding her future socio-economic development.

It seems that the population will increase to a considerably high level in the next fifty years. It has often been reported that by the turn of the century the population in Egypt would range between 55 and 70 million. However, these surmises merely forecast the total future population, and detailed factors such as population by sex and age groups, which are indispensable information in order to foresee the overall socioeconomic problems, including manpower and education, have not been clearly analyzed up to date. Thus, the object of this part of our report is to present an estimate of the population with classified by sex and five year age groups up to the year 2026, so as to be able to analyze and forecast the needs and demands of the people in the following part of the report.

1-2 Two censuses have been taken in Egypt in the past two decades -- one in 1960 and one in 1976 -- and a sample enumeration was carried out in 1966. (See Table 1-1).

The report concerning the 1976 census is still in its preliminary stage and only covers three age groups (i.e. 0-11, 12-64, and 65 and over) without differentiation by sex. Moreover, the people outside Egypt and in the occupied areas of the Sinai were excluded from the above age groups when the census was taken, although they were included in the total population. The 1966 sample enumeration is only divided into ten year age groups and sex, and into some specific age groups (i.e. 6-11, 12-14, 15-19, and 60-64). (See Table 1-3). However not detailed, this sample enumeration being the latest and most complete document available, we were obliged to start our projection from it, which is to say from 1966.

Table 1-1 POPULATION IN CENSUS YEARS AND AVERAGE ANNUAL INCREASE OF POPULATION

| Census Years | Population (Thousands) | Average Annual Population Increase |
|--------------|------------------------|------------------------------------|
| 1960 | 26,085 (3) | |
| 1966 (1) | 30,076 (3) | 2.54 % |
| 1976 (2) | 38,228 | 2.31 % |

(1) Sample enumeration

(2) Preliminary report

(3) The population outside Egypt was not included in the census, and we assumed it was negligible.

Source: CAPMAS

1-3 The first step to take in our projection was to check the consistency between the figures of the 1966 sample enumeration and those of the 1960 census, which is the most reliable document giving a classification by sex and five year age groups. (See Table 1-2). However, the difference in age groups and the six year interval between 1960 and 1966 created a technical problem. The solution to this problem was to reorganize both the 1960 and the 1966 results into six year age groups so that they could be compared and analyzed on the same basis.

The procedures used to achieve this reorganization are as follows:

For 1960, each five year age group was divided by five. This gave the average number of people of each age within each five year age group (from 0 to 70 years old and over). Then, the number of people of each age was added at intervals of six years (0-5, 6-11, ..., 72 and over), to form the six year age group.

For 1966, each ten year age group contained in Table 1-4 was divided by ten, except for the group containing the people ranging from 0 to 20 years old, and from 60 years old and over.

The population included in the 0-5 year age group was available by subtracting the population of Table 1-4 from the population of Table 1-3. The population belonging to the 6-11 age group was available directly from Table 1-3.

A different method was used to calculate the other age groups, such as for instance the 12-14 age group which was divided by three, and age groups 15-19, 60-64, and 65-69 which were divided by five instead of ten in order to obtain more accurate figures.

The results, as in the case of 1960, were added at intervals of six years to form the six year age groups.

Table 1-2. TOTAL POPULATION BY SEX AND FIVE YEAR AGE GROUPS, IN 1960

| Age | Number (Thousands) | | | Ratio (%) | | |
|--------------|--------------------|---------------|---------------|---------------|---------------|---------------|
| | Male | Female | Total | Male | Female | Total |
| 0-4 | 2,111 | 2,021 | 4,132 | 16.15 | 15.65 | 15.90 |
| 5-9 | 1,972 | 1,827 | 3,799 | 15.09 | 14.15 | 14.62 |
| 10-14 | 1,651 | 1,527 | 3,178 | 12.63 | 11.82 | 12.23 |
| 15-19 | 1,114 | 1,040 | 2,154 | 8.52 | 8.05 | 8.29 |
| 20-24 | 921 | 874 | 1,795 | 7.05 | 6.77 | 6.91 |
| 25-29 | 860 | 1,054 | 1,914 | 6.58 | 8.16 | 7.37 |
| 30-34 | 807 | 844 | 1,651 | 6.18 | 6.54 | 6.35 |
| 35-39 | 847 | 879 | 1,726 | 6.48 | 6.81 | 6.64 |
| 40-44 | 661 | 614 | 1,275 | 5.06 | 4.75 | 4.91 |
| 45-49 | 567 | 577 | 1,144 | 4.34 | 4.47 | 4.40 |
| 50-54 | 494 | 504 | 998 | 3.78 | 3.90 | 3.84 |
| 55-59 | 323 | 315 | 638 | 2.47 | 2.44 | 2.46 |
| 60-64 | 321 | 354 | 675 | 2.46 | 2.74 | 2.60 |
| 65-69 | 164 | 170 | 334 | 1.25 | 1.32 | 1.29 |
| 70- | 255 | 315 | 570 | 1.96 | 2.43 | 2.19 |
| TOTAL | 13,068 | 12,915 | 25,983 | 100.00 | 100.00 | 100.00 |

Source: CAPMAS

Table 1-3 SIZE OF POPULATION BY AGE GROUPS AND SEX:
SIX YEARS AND MORE (1966)

| | 6- | 12- | 15- | 20- | 30- | 40- | 50- | 60- | 65- | Total |
|--------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|-----------|------------|
| Male | 2,307,212 | 1,224,327 | 1,574,525 | 1,893,127 | 1,785,198 | 1,432,894 | 937,426 | 365,887 | 500,458 | 12,021,052 |
| Female | 2,078,011 | 1,132,724 | 1,435,187 | 2,129,839 | 1,891,207 | 1,379,708 | 915,320 | 417,244 | 543,802 | 11,923,042 |
| TOTAL | 4,385,223 | 2,357,051 | 3,009,712 | 4,022,966 | 3,676,403 | 2,812,602 | 1,852,746 | 783,131 | 1,044,260 | 23,944,094 |

Source: CAPMAS

Table 1-4 SIZE OF POPULATION BY AGE GROUPS AND SEX (1966)

| | -10 | 10- | 20- | 30- | 40- | 50- | 60- | 70- | Total |
|--------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|------------|
| Male | 4,536,058 | 3,605,828 | 1,893,127 | 1,785,202 | 1,432,893 | 937,431 | 586,073 | 280,254 | 15,056,866 |
| Female | 4,226,915 | 3,286,234 | 2,129,831 | 1,891,214 | 1,379,712 | 915,323 | 616,512 | 344,530 | 14,790,271 |
| TOTAL | 8,762,973 | 6,892,062 | 4,022,958 | 3,676,416 | 2,812,605 | 1,852,754 | 1,202,585 | 624,784 | 29,847,137 |

Note: The population of the border governorates is excluded from the above figures.

Source: CAPMAS

1-4 After observing the consistency and trend between 1960 and 1966, we converted the results of the 1966 six year age groups into five year age groups using the same method as the one used to form the six year age groups described in paragraph 1-3, which consists of dividing each age group by six and adding the results thus obtained at intervals of five years.

At the time of conversion a slight difference emerged between the figures of the ten year age group given in the sample enumeration and the figures which were obtained through our calculation method. (To compare, the totals of the five year age groups were added by pairs, e.g. 0-4 and 5-9; 10-14 and 15-19; etc.).

For the 10-14, 15-19, 60-64, 65-69, and 70 and over age groups, the figures could be directly read from the 1966 sample enumeration.

The afore mentioned differences are distributed among any two consecutive age groups from age group 20-24 to age group 55-50 (e.g. 20-24 and 25-29, 30-34 and 35-39, etc.), according to the proportion of original numbers which were reached by converting the six year age groups into five year age groups.

1-5 The 1966 sample enumeration excludes the population of the border governorates such as the Sinai, Red Sea, Matruh, and New Valley.

The difference between Table 1-1 and Table 1-4 is due to the fact that the former includes the inhabitants of the border governorates while the latter does not.

However, the urban population of the border governorates by sex and ten year age groups was available. (See Table 1-5).

Taking this into consideration, a difference of 106 thousand people still remained, and we reached the conclusion that this difference was attributable to the population of the rural area of the border governorates.

To complete the classification of the 1966 population into five year age groups and by sex so as to reach the total population indicated in Table 1-1, first the figures of Table 1-5 were added to the figures of the 1966 sample enumeration divided by sex and ten year age groups. (See Table 1-4).

The results are shown in Table 1-6.

The rural population of 106 thousand was added to the results given in Table 1-6, and from there we were able to draw up Table 1-7.

Then each ten year age group was split up into five year age groups in the proportion of the results obtained following the method described in paragraph 1-4, that is to say the proportion before adding the urban population of the border governorates.

The final total results of the population in 1966, classified by five year age groups and sex, are given in Table 1-8.

Table 1-5 URBAN POPULATION IN THE BORDER GOVERNORATES (1)
IN 1966

| Age | Male | Female | Total |
|--------------|---------------|---------------|----------------|
| 0-9 | 20,261 | 17,518 | 37,779 |
| 10-19 | 16,417 | 14,617 | 31,034 |
| 20-29 | 7,459 | 9,579 | 17,038 |
| 30-39 | 7,613 | 6,996 | 14,609 |
| 40-49 | 5,719 | 4,451 | 10,170 |
| 50-59 | 3,571 | 2,619 | 6,190 |
| 60-69 | 2,045 | 1,371 | 3,416 |
| 70- | 1,169 | 1,313 | 2,482 |
| TOTAL | 64,254 | 58,464 | 122,718 |

(1) Sinai, Red Sea, Matruh, New Valley Governorates

Source: CAPMAS

Table 1-6 POPULATION INCLUDING THE URBAN POPULATION
IN THE BORDER GOVERNORATES
IN 1966

(Thousands)

| Age groups | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | 65-69 | 70- | Total |
|------------|-------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|--------|
| Male | 4,556 | | 3,622 | | 1,901 | | 1,793 | | 1,439 | | 941 | | 588 | | 281 | 15,121 |
| Female | 4,245 | | 3,301 | | 2,139 | | 1,898 | | 1,384 | | 918 | | 618 | | 346 | 14,849 |
| TOTAL | 8,801 | | 6,923 | | 4,040 | | 3,691 | | 2,823 | | 1,859 | | 1,206 | | 627 | 29,970 |

Source: CAPMAS

Table 1-7 POPULATION INCLUDING THE URBAN AND RURAL POPULATION
IN THE BORDER GOVERNORATES
IN 1966

(Thousands)

| Age groups | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | 65-69 | 70- | Total |
|------------|-------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|--------|
| Male | 4,573 | | 3,636 | | 1,908 | | 1,799 | | 1,444 | | 944 | | 590 | | 282 | 15,176 |
| Female | 4,260 | | 3,314 | | 2,147 | | 1,905 | | 1,388 | | 920 | | 619 | | 347 | 14,900 |
| TOTAL | 8,833 | | 6,950 | | 4,055 | | 3,704 | | 2,832 | | 1,864 | | 1,209 | | 629 | 30,076 |

Source: Joint Study Projection

Table 1-8 TOTAL POPULATION BY SEX AND FIVE YEAR AGE GROUPS IN 1966

| Age | Number (Thousands) | | | Ratio (%) | | |
|--------------|--------------------|---------------|---------------|---------------|---------------|---------------|
| | Male | Female | Total | Male | Female | Total |
| 0-4 | 2,551 | 2,407 | 4,958 | 16.81 | 16.15 | 16.48 |
| 5-9 | 2,022 | 1,853 | 3,875 | 13.33 | 12.44 | 12.88 |
| 10-14 | 2,048 | 1,867 | 3,915 | 13.50 | 12.53 | 13.02 |
| 15-19 | 1,588 | 1,447 | 3,035 | 10.46 | 9.71 | 10.09 |
| 20-24 | 1,037 | 1,134 | 2,171 | 6.83 | 7.61 | 7.22 |
| 25-29 | 871 | 1,013 | 1,884 | 5.74 | 6.80 | 6.27 |
| 30-34 | 929 | 1,000 | 1,929 | 6.12 | 6.71 | 6.41 |
| 35-39 | 870 | 905 | 1,775 | 5.73 | 6.07 | 5.90 |
| 40-44 | 777 | 757 | 1,534 | 5.12 | 5.08 | 5.10 |
| 45-49 | 667 | 631 | 1,298 | 4.40 | 4.23 | 4.32 |
| 50-54 | 504 | 490 | 994 | 3.32 | 3.29 | 3.31 |
| 55-59 | 440 | 430 | 870 | 2.90 | 2.89 | 2.89 |
| 60-64 | 368 | 418 | 786 | 2.42 | 2.81 | 2.61 |
| 65-69 | 222 | 201 | 423 | 1.46 | 1.35 | 1.41 |
| 70- | 282 | 347 | 629 | 1.86 | 2.33 | 2.09 |
| TOTAL | 15,176 | 14,900 | 30,076 | 100.00 | 100.00 | 100.00 |

Source: Joint Study Projection

(B) DETERMINATION OF THE FUTURE SURVIVAL RATIOS

1-6 The next step in our projection was to forecast and determine the future survival ratios.

The survival ratios largely depend on the level of medical standards. The recent developments in the medical field in both developed and developing countries have raised the survival ratios.

It is necessary to note that in developing countries the capability to absorb the high pace of development in the medical field depends on the economic and social potentialities. This is applicable up to a certain level, but it has been observed that in developing countries after the economic and social standards have reached a certain level the development of the medical standards accelerates independently of the economic and social development. Therefore, the development of the medical standards enables a developing country to attain a high survival ratio approaching the current level of advanced countries within a relatively short period of time.

For example, in the case of Egypt, it is likely that the socio-economic standard will reach the point which enables the accelerated increase in survival ratios within a relatively short period of time so that these ratios reach the standard of advanced countries such as, for instance, Japan.

Accordingly, in our projection we assumed that by the year 2001 (which is 25 years from the year our projection starts), the survival ratios in Egypt would reach the current level of advanced countries, and thus the figures of Japan in 1970 were used as a basis for our projection of the future survival ratios in Egypt.

It was also assumed that the survival ratios would remain stable during the first quarter of the next century, due to their saturation.

For the estimation of the future survival ratios, only one possibility was projected.^(*)

The survival ratios in 1965 are based on the figures of the "Estimated Life Table for 1965" (CAPMAS) - (See Annex 1-1).

The survival ratios of every five years, starting from 1971, were obtained by linear interpolation using the figures of 1965 and 2001. The survival ratios obtained following this procedure were used as the average survival ratios for each following period of five years in our projection.

The results are given in Table 1-9.

* For the per capita income and fertility rates which are discussed further on, two alternatives were projected, namely Case 1 and Case 2.

Table 1-9 (a) ESTIMATED SURVIVAL RATIOS (Males)

| Age Groups | 1965 | 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 2026 |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|------|------|------|------|--------|
| | 0.8150 | 0.8280 | 0.8540 | 0.8800 | 0.9059 | 0.9319 | 0.9579 | 0.9839 | - | - | - | - | 0.9839 |
| 0-4 | 0.9113 | 0.9178 | 0.9307 | 0.9437 | 0.9566 | 0.9696 | 0.9825 | 0.9955 | - | - | - | - | 0.9955 |
| 5-9 | 0.9892 | 0.9899 | 0.9912 | 0.9925 | 0.9938 | 0.9952 | 0.9965 | 0.9978 | - | - | - | - | 0.9978 |
| 10-14 | 0.9894 | 0.9900 | 0.9911 | 0.9922 | 0.9933 | 0.9944 | 0.9955 | 0.9966 | - | - | - | - | 0.9966 |
| 15-19 | 0.9871 | 0.9876 | 0.9886 | 0.9896 | 0.9906 | 0.9916 | 0.9926 | 0.9936 | - | - | - | - | 0.9936 |
| 20-24 | 0.9838 | 0.9845 | 0.9859 | 0.9873 | 0.9888 | 0.9902 | 0.9916 | 0.9930 | - | - | - | - | 0.9930 |
| 25-29 | 0.9806 | 0.9815 | 0.9833 | 0.9851 | 0.9868 | 0.9886 | 0.9904 | 0.9922 | - | - | - | - | 0.9922 |
| 30-34 | 0.9758 | 0.9769 | 0.9790 | 0.9812 | 0.9833 | 0.9855 | 0.9876 | 0.9898 | - | - | - | - | 0.9898 |
| 35-39 | 0.9682 | 0.9695 | 0.9722 | 0.9749 | 0.9775 | 0.9802 | 0.9828 | 0.9855 | - | - | - | - | 0.9855 |
| 40-44 | 0.9561 | 0.9579 | 0.9614 | 0.9650 | 0.9685 | 0.9721 | 0.9756 | 0.9792 | - | - | - | - | 0.9792 |
| 45-49 | 0.9374 | 0.9398 | 0.9447 | 0.9496 | 0.9545 | 0.9594 | 0.9643 | 0.9692 | - | - | - | - | 0.9692 |
| 50-54 | 0.9107 | 0.9138 | 0.9201 | 0.9264 | 0.9327 | 0.9389 | 0.9452 | 0.9515 | - | - | - | - | 0.9515 |
| 55-59 | 0.8743 | 0.8778 | 0.8849 | 0.8920 | 0.8990 | 0.9061 | 0.9131 | 0.9202 | - | - | - | - | 0.9202 |
| 60-64 | 0.8234 | 0.8269 | 0.8340 | 0.8411 | 0.8482 | 0.8552 | 0.8623 | 0.8694 | - | - | - | - | 0.8694 |
| 65-69 | 0.7466 | 0.7503 | 0.7577 | 0.7651 | 0.7726 | 0.7800 | 0.7874 | 0.7948 | - | - | - | - | 0.7948 |
| 70- | 0.4168 | 0.4275 | 0.4489 | 0.4703 | 0.4918 | 0.5132 | 0.5346 | 0.5560 | - | - | - | - | 0.5560 |

Note: The survival ratios remain stable between the years 2001 and 2026

Source: Joint Study Projection

Table 1-9 (b) ESTIMATED SURVIVAL RATIOS (Females)

| Age Groups | 1965 | 1971 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 2026 |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|------|------|------|------|--------|
| | 0.8177 | 0.8308 | 0.8569 | 0.8830 | 0.9092 | 0.9353 | 0.9615 | 0.9876 | - | - | - | - | 0.9876 |
| 0-4 | 0.8978 | 0.9054 | 0.9206 | 0.9358 | 0.9511 | 0.9663 | 0.9815 | 0.9967 | - | - | - | - | 0.9967 |
| 5-9 | 0.9912 | 0.9918 | 0.9929 | 0.9940 | 0.9952 | 0.9963 | 0.9975 | 0.9986 | - | - | - | - | 0.9986 |
| 10-14 | 0.9916 | 0.9921 | 0.9932 | 0.9942 | 0.9953 | 0.9963 | 0.9974 | 0.9984 | - | - | - | - | 0.9984 |
| 15-19 | 0.9909 | 0.9914 | 0.9924 | 0.9934 | 0.9944 | 0.9953 | 0.9963 | 0.9973 | - | - | - | - | 0.9973 |
| 20-24 | 0.9900 | 0.9905 | 0.9915 | 0.9924 | 0.9934 | 0.9944 | 0.9953 | 0.9963 | - | - | - | - | 0.9963 |
| 25-29 | 0.9874 | 0.9880 | 0.9892 | 0.9905 | 0.9917 | 0.9929 | 0.9942 | 0.9954 | - | - | - | - | 0.9954 |
| 30-34 | 0.9843 | 0.9851 | 0.9866 | 0.9881 | 0.9896 | 0.9911 | 0.9926 | 0.9941 | - | - | - | - | 0.9941 |
| 35-39 | 0.9820 | 0.9827 | 0.9842 | 0.9857 | 0.9872 | 0.9886 | 0.9901 | 0.9916 | - | - | - | - | 0.9916 |
| 40-44 | 0.9789 | 0.9796 | 0.9809 | 0.9822 | 0.9835 | 0.9849 | 0.9862 | 0.9875 | - | - | - | - | 0.9875 |
| 45-49 | 0.9703 | 0.9711 | 0.9730 | 0.9745 | 0.9762 | 0.9778 | 0.9795 | 0.9811 | - | - | - | - | 0.9811 |
| 50-54 | 0.9552 | 0.9564 | 0.9589 | 0.9613 | 0.9638 | 0.9662 | 0.9687 | 0.9711 | - | - | - | - | 0.9711 |
| 55-59 | 0.9317 | 0.9334 | 0.9369 | 0.9404 | 0.9439 | 0.9473 | 0.9508 | 0.9543 | - | - | - | - | 0.9543 |
| 60-64 | 0.8921 | 0.8946 | 0.8995 | 0.9044 | 0.9093 | 0.9143 | 0.9192 | 0.9241 | - | - | - | - | 0.9241 |
| 65-69 | 0.8240 | 0.8277 | 0.8351 | 0.8425 | 0.8498 | 0.8572 | 0.8646 | 0.8720 | - | - | - | - | 0.8720 |
| 70- | 0.4437 | 0.4568 | 0.4830 | 0.5092 | 0.5355 | 0.5617 | 0.5879 | 0.6141 | - | - | - | - | 0.6141 |

Note: The survival ratios remain stable between the years 2001 and 2026

Source: Joint Study Projection

(C) DETERMINATION OF THE TOTAL FERTILITY RATES AND AGE SPECIFIC FERTILITY RATES : 1966 - 1976

1-7 Since the latest reliable fertility rate made public by the Egyptian government goes back to 1966, our first task was to estimate the fertility rates between 1966 and 1976.

The estimation of probable trends in fertility rates is rather difficult due to the large dependence on social changes. Although some estimations have been made in the past for the above period, they seemed lower than the actual fertility rates, and according to our calculations we noticed the occurrence of an inconsistency between 1966 and 1976.

Thus, in our projection, we relied on the crude birth rates in order to obtain more accurate fertility rates which would be considerably higher than those given in other estimations. The average crude birth rates for the 1966-1971 and 1971-1976 periods were 37.2 and 36.9 per thousand respectively.

Due to the failure to register all the births during the above mentioned periods, and since the exact number of births was thus not reflected, the above figures represent the averages after having made some adjustments.

Given the average birth rates, the total fertility rates during the 1966-1971 and 1971-1976 periods became 6.013 and 5.964 respectively.

The total fertility rates were divided by five to obtain the average of one year for each period. Then, these rates were distributed among specific age groups according to the same proportion as that of the 1966 specific age groups. The age specific fertility rates are shown in Table 1-10 overleaf.

Table 1-10 ESTIMATED AGE SPECIFIC FERTILITY RATES

| Age groups | 1966 | 1966-1971 | 1971-1976 |
|--------------|--------|-----------|-----------|
| 15-19 | 0.0426 | 0.0416 | 0.0412 |
| 20-24 | 0.2349 | 0.2292 | 0.2273 |
| 25-29 | 0.2760 | 0.2693 | 0.2671 |
| 30-34 | 0.2904 | 0.2833 | 0.2810 |
| 35-39 | 0.2158 | 0.2105 | 0.2089 |
| 40-44 | 0.1181 | 0.1152 | 0.1143 |
| 45-49 | 0.0548 | 0.0535 | 0.0530 |
| Σ (1) | 1.2326 | 1.2026 | 1.1928 |
| 5Σ | 6.163 | 6.013 | 5.964 |

Source: 1966: CAPMAS
1966-1976: Joint Study Projection

(1) Average total fertility rate per annum

(D) POPULATION IN 1976 BY SEX AND FIVE YEAR AGE GROUPS

The population in 1976, classified by sex and five year age groups is shown in Table 1-11, and the procedure used to draw up this Table is explained hereunder.

1-8 Taking the basic population, which is the 1966 population distributed by five year age groups and sex, we applied the survival ratios of 1971 indicated in paragraph 1-6 to each age group and sex to obtain the population still alive five years later and thus five years older.

Then, we applied the age specific fertility rates of 1966-1971 given in Table 1-10 to the female population and multiplied the result by five to obtain the number of births during the intervening period of 1966-1971.

These births were classified into male and female births, giving a proportion of 515 males and 485 females per thousand births.

We then multiplied both male and female births separately by the survival ratios of 0.8280 for the males, and 0.8308 for the females. This result represents the number of people in the 0-4 age group in 1971.

Repeating the same process once more, using the survival ratios of 1976 and age specific fertility rates of 1971-1976, we were able to draw up Table 1-11.

The total population resulting from the application of the process described above coincides with the total population figures contained in the 1976 preliminary report.

(See Table 1-1).