

Manpower Projections
for
Planning Education and Training

by

William B. Clatanoff, Jr.

U.S. Agency For International Development

assisted by

Dr. Mamdouh Saleh

Ministry of Manpower and Vocational Training

Dr. Mohamed Ismail

Al Azhar University

Dr. Nadia Makari

Cairo University

Cairo, Arab Republic of Egypt

June 1979

Acknowledgements

This report is the product of a three month assignment by William B. Clatanoff, Jr. to the U.S. Agency for International Development in Cairo. This assignment was arranged through the Development Assistance Group, Bureau of International Labor Affairs, U.S. Department of Labor. The cooperation of the District of Columbia Department of Labor in allowing Mr. Clatanoff to participate in this project is also gratefully acknowledged.

A special recognition is extended to Dr. Hassan Ismail, Minister of Education, for his support of this study. The staff of the Planning Sector, Ministry of Manpower and Vocational Training are to be thanked for their careful and timely work in tabulating the required data. Also, the efforts of Ms. Samaa El Erian in typing this manuscript are appreciated.

Table of Contents

Acknowledgements	1
I. Introduction and Summary	1
II. Forecasts of Employment by Occupation	5
III. Manpower Supply and the Demand for Education	22
IV. Educational Program Projections	27
V. Data Problems and Analytical Limitations	39
VI. Conclusions and Recommendations	46
Appendix Tables	50
Bibliography	52

I. Introduction and Summary

This report was prepared with the assistance of the U.S. Agency for International Development at the request of the Egyptian Ministry of Education. It is an assessment and forecast of manpower supply and demand by education and occupation. Its purpose is to assist the Ministry of Education and other agencies of the Government of Egypt in planning the education and training of the labor force. Particular attention is given to the area of vocational and technical education in order to meet the future manpower requirements of Egypt.

The first step in these manpower projections was to produce an estimate of the existing stock of manpower as distributed by occupation and area of economic activity. Two sets of projections were then made, one for 5 years and one for 10 years of the annual demand for labor by occupation. These projections were based on planned levels of future output and employment by sector of economic activity and an analysis of the existing structure of occupations within each sector.

These forecasts of the future demand for labor by occupation are a key element in planning education and training. For example, Table I is a summary of the forecasted labor demand for the period 1979 - 1984. It shows that education and training facilities should graduate approximately 62,000 persons in professional and technical areas each year to meet that projected demand for labor in Egypt. It is expected that 46,500 of these will be needed as new professional and technical workers each year while another 15,500 will replace workers who die, retire or otherwise leave the labor force. More detailed projections, for individual

Table I

AVERAGE ANNUAL DEMAND FOR LABOR

BY OCCUPATIONAL GROUPS

FORECAST: 1979 - 1984

GROUP	NEW WORKERS	REPLACEMENT DEMAND	TOTAL
0/1 Professional & Technical	46,512	15,577	62,089
2 Managers & Administrators	8,249	2,569	10,818
3 Clerical	35,471	12,711	48,182
4 Sales	45,543	17,683	63,226
5 Service	62,976	25,263	88,239
6 Agricultural	35,252	80,614	115,866
7/8/9 Production & Related	150,175	38,146	188,321
TOTAL	384,180	192,563	576,743

occupations, and the technique used to forecast occupational employment are presented in Chapter II.

The demand for labor was then converted into an estimate of annual required education and training graduates. These estimates were made by confronting the annual demand for labor with an education by occupation matrix -- a matrix relating each occupation to the specific levels and fields of education which prepare such manpower. In this manner, Chapter IV presents forecasts of the annual number of graduates from each educational program required to meet future manpower requirements.

The forecasts of educational requirements, to 1984 and 1989, are then compared with the current numbers of graduates in each educational level and speciality.

This is essentially an analysis of the current manpower supply as compared with the future manpower demand of Egypt. The implications of this analysis for the Ministry of Education are that certain educational areas -- primarily in vocational and technical education -- must greatly expand their numbers of graduates to meet forecasted manpower demands, and that current levels of university graduates are more than adequate for future demands.

These forecasts and projections, as any set of projections, are subject to certain limitations. We do not know the future with complete accuracy. Chapter "V" explains possible problems and sources of error in this report, and cautions that the possible range of error in these projections is roughly plus or minus 20%.

Certain details of methodology and data have been placed in the Appendices so those desiring may have reference to them. Chapter VI presents general conclusions and certain policy recommendations in the areas of education and training. Please note that although this report was prepared for the Ministry of Education, other Ministries and enterprises are involved in the training of manpower so this analysis should be of value to them also. Careful planning and coordination of all educational facilities, universities, training centers, in-service training, and apprenticeship will be required to meet Egypt's future manpower requirements.

II.

Forecasts of Employment by Occupation

An important element in planning education and training is knowing which skills or occupations will be demanded by the productive sectors of the economy. This can never be known with absolute certainty, but certain techniques of labor market analysis allow us to project occupational employment with a relatively high degree of accuracy. The methodology which was used to project Egypt's occupational employment is a modification of a technique developed by the United States Bureau of Labor Statistics and generally known as the "Census-Based Matrix Procedure."

This methodology takes as its starting point a matrix of employment cross-classified by detailed occupation and sector of economic activity.¹ Such a matrix allows us to examine, in both absolute and percentage terms, the occupational structure (skill mix) of each economic activity as it exists at a point in time.

The projection methodology is based upon the following hypotheses, which experience in the United States and other countries in various stages of economic development have proven to be true: Each economic activity (or industry) has its own

1. Called by Bureau of Labor Statistics the "Industry/Occupation Matrix."

occupational structure or skill mix, with significant variations between economic activities. That structure tends to be relatively stable over time, with change occurring gradually rather than dramatically. Such changes in occupational structure as do occur are caused by the introduction of new technology, by changes in the size of enterprises (economies of scale leading to more specialized skills) within sectors, and by the substitution of some skills for others in response to changes in relative wages.

Based on those assumptions, employment by occupation at some future time can be projected by: 1. Forecasting the level of employment in each sector of economic activity, 2. Taking as constant, or modifying slightly to account for change, the occupational structure in relative (percentage) terms within each activity, 3. Multiplying the forecasted level of employment in each sector by its corresponding structure to estimate the number of workers in each occupation in each sector, and 4. Summing each occupation across all sectors to derive the final forecast of employment by occupation. One final step, estimating the number of workers in each occupation who die, retire or must otherwise be replaced, is then needed to convert these projections into true forecasts of the demand for labor by occupation.

It should be seen, therefore, that two elements -- the existing occupational structure of economic activities and the

forecasts of employment within each sector of economic activity -- are very important to our occupational employment projections. Each of these is now discussed in detail.

Occupational Structure

Ideally, a complete and accurate count of the number of workers in each occupation within each economic activity would be derived from a recent census. However, since the full results of Egypt's 1976 General Population and Housing Census were not available in time for this study, an alternative data source was utilized.

The Annual Labor Market Information Program of the Ministry of Manpower & Vocational Training yielded sufficient detail on occupation and economic activity to estimate occupational structure. This data was derived from a survey of all enterprises with 10 or more employees as of December 31, 1976. Thus its time frame was similar to both the Census and the base data used in the Five Year Plan. The survey had the further advantage that data on economic activity was classified by the standard nine major sectors and that detailed (five-digit) occupational information was coded using the Arab Standard Classification of Occupations. Survey data were therefore comparable in both occupational and economic activity aggregations with other data sources needed for sample analysis. The response to the MOMVT survey covered over 1,500,000 employees,

an adequate sample for estimating the occupational structure of each economic activity.²

Because the MOMVT did not survey small (less than 10) enterprises, self-employed proprietors or farmers, synthetic estimates for parts of the Agriculture, Trading and Services activities were made. Such estimates were based on 1960 Census data for detailed occupations and recent CAPMAS sample surveys for broad occupational groups.

Table II shows the final estimate of occupational structure of employment by economic activity and broad occupational groups. For actual computations and forecasts of employment, 191 occupations were used: 2-digit occupations for groups 0/1 through 6 and 3-digit occupations for groups 7, 8 and 9.³

An examination of Table II does clearly reveal the validity of our first hypothesis: occupational structure vary considerably between economic activity. Thus, for example, if employment increases occur in the Construction sector the majority of such workers will be in occupational groups 7, 8 and 9, while employment growth in Services will require workers in groups 0/1 and 5.

Our manpower projections assumed these structures would remain constant during the forecast period.

-
2. Survey response tables are included in the Appendix.
 3. Detailed tables used in this project are available from the MOMVT, Planning Sector.

Employment by Economic Activity

The purpose of this report is to provide the Ministry of Education with sufficiently detailed occupational and educational data to assist its planning. For that purpose, it was not necessary to develop independent forecasts of total employment, but rather to assume that other Government of Egypt projections of employment accurately reflect the future demands on the educational system. That is to say, that the educational system must be planned in response to overall plans for the economy. In this manner, an adequate supply of trained manpower can be produced so that labor shortages do not inhibit the attainment of planned levels of output and employment in other sectors.

Three problems were encountered using this approach: First, planned levels of employment were only available for internal (domestic) sectors. Although there are, and will probably continue to be, large numbers of Egyptians working in other countries, no forecast of the external demand for labor was available. This is an unavoidable limitation of this report. Second, the Five Year Plan projections of employment show irregular year-to-year changes in total employment. While this is reasonable, since investment projects are completed and their jobs created on an uneven schedule, it is difficult for schools to respond in that manner. One

cannot reasonably graduate many students one year, then fewer the next, then more the next, etc. Therefore, it was decided to use the average annual demand for labor in the Plan. The final problem was that of selecting the appropriate time horizon for the forecasts. In one sense, the Ministry of Education is in need of short-run forecasts. This information is needed to determine the curriculum and courses of new facilities currently under construction and to assist in allocating the current education budget among various programs. In another sense, educational planning can only be fully implemented in the long run. It is, after all, 12 years before a new student becomes a secondary school graduate, and several years before a new school facility produces its first graduates. On this matter, it was decided to do two sets of projections. The short-run planning purposes are served by forecasting employment growth by economic activity for the period 1979 through 1984, while the long-run forecasts were extended to 1989.

Table III shows base level (1976) employment data and the forecasts of average annual employment growth by sector of economic activity. These are derived from Ministry of Planning employment forecasts⁴ with two needed adjustments. First, the sectors of economic activity were re-combined to

4. Source data for forecasts of employment by economic activity are given in Appendix Table 2.

Table III

Actual and Forecasted Employment by Economic Activity

	Total Employment - 1976		Average Annual Forecasted Growth in Employment			
			1979 - 1984		1979 - 1989	
	Number	%	Number	%	Number	%
Agriculture	4,424,800	43.87%	35,700	9.30%	87,353	16.83%
Mines and Quarries	46,200	0.48	2,080	0.54	3,070	0.59
Industry	1,163,300	12.08	90,000	23.43	104,237	20.08
Gas and Electricity	47,000	0.49	4,240	1.10	5,135	0.99
Construction	434,000	4.51	59,000	15.36	59,109	11.39
Trading	1,031,000	10.71	52,180	13.58	74,125	14.28
Transportation & Communications	422,100	4.38	30,260	7.88	44,037	8.48
Finance and Insurance	106,000	1.10	7,000	1.82	7,622	1.47
Services	2,154,700	22.40	103,720	27.00	134,458	25.90
TOTAL	9,628,200	100%	384,180	100%	519,146	100%

Source: Ministry of Planning data (see Appendix 2) as adjusted.

be consistent with the sectoral definitions used in the MOMVT survey. Next, linear trends for both the five- and ten-year projections were developed from published data and extrapolated to give the desired time horizon. With the exception of the Agricultural sector, there are few major differences between the short-run and long-run growth in expected employment.

These forecasted increases in the employment levels of the various economic sector are one component of the demand for labor. The other component is replacement demand -- the demand for labor to replace current workers who die, retire, or otherwise leave the labor force. In this report, it is assumed that 2 percent attrition from existing employment will occur each year.⁵ Thus, the total annual demand for labor is the sum of employment growth in each economic activity (Table III) plus 2 percent of 1976 employment.

Employment by Occupation

Having derived the occupational structure and expected employment growth of each sector of economic activity, multiplying one by the other yielded estimates of the future demand

5. See Chapter V for a discussion of this issue.

for labor by occupation. These estimates were then analyzed and compared with other data sources to assure reasonableness and internal consistency. Based upon that analysis, certain adjustments were made to selected sectors and occupations in order to reflect economic hypotheses concerning employment trends. Generally, these adjustments were made based upon observed occupational staffing patterns in the private sector and the assumption that over time occupational trends in Egypt would reflect observed trends in developing countries. These adjustments affected employment levels in only 14 of the 191 occupations for which forecasts were made.

The forecasted average annual demand for labor by occupation is shown in Table IV. Analysis of these forecasts reveals the following:

The fastest growing occupations are "Production and Related Workers" (Groups 7, 8 and 9). This is a function of the high rates of growth projected for the Construction and Industry Sectors of the economy which have a preponderance of workers in these occupations.

While the total annual growth in employment is expected to generate twice as much demand for labor as replacement needs, this situation is reversed for Agricultural Workers (Group 6). Here, relatively low growth in employment is forecast, yet over 80,000 workers will be needed to replace current farmers and farm workers each year.

Table IV

FORECASTED ANNUAL DEMAND FOR LABOR BY OCCUPATION

<u>OCCUPATION</u>	<u>1979 - 1984</u>			<u>1979-1989</u>
	<u>New Workers</u>	<u>Replacement Demand</u>	<u>Total Demand</u>	<u>Total Demand</u>
Physical Scientists & Technicians	1,038	145	1,183	1,270
Engineers & Related Technicians	10,297	3,297	13,594	14,498
Aircraft & Ship Officers & Engineers	186	53	239	313
Life Scientists & Technicians	1,260	1,154	2,414	3,592
Medical, Dental, Veterinary Workers	8,350	2,146	10,496	11,714
Statisticians, Mathematicians, System Analysts & Related Technicians	530	40	570	760
Economists	480	32	512	596
Accountants	4,252	1,286	5,538	6,114
Jurists	1,991	530	2,521	2,848
Teachers	13,122	5,448	18,570	20,438
Workers in Religion	493	204	697	842
Authors, Journalists	346	17	363	349
Sculptors, Painters & Other Creative Artists	478	78	556	682
Composers & Performing Artists	220	8	228	302
Athletes, Sportsmen	78	31	109	130
Professional & Technical Workers, N.E.C.	3,391	1,108	4,499	5,284
Group 0/1 TOTAL	<u>46,512</u>	<u>15,577</u>	<u>62,089</u>	<u>69,732</u>
Legislators & Government Administrators	1,122	406	1,528	1,807
Managers	7,127	2,163	9,290	10,874
Group 2 TOTAL	<u>8,249</u>	<u>2,569</u>	<u>10,818</u>	<u>12,681</u>
Clerical Supervisors	1,203	368	1,571	1,877
Government Executive Officials	450	173	623	749
Stenographers, Typists & Card or Tape Machine Operators	1,590	474	2,044	2,357
Book Keepers, Cashiers & Related Workers	15,776	5,303	21,079	24,498
Computing Machine Operators	348	16	364	455
Transport & Communication Supervisors	1,756	490	2,246	3,001
Transport Conductors	2,117	592	2,709	3,672
Mail Distribution Clerks	303	104	407	519
Telephone & Telegraph Operators	1,522	451	1,973	2,490
Clerical Workers, N.E.C.	10,426	4,740	15,166	19,275
Group 3 TOTAL	<u>35,471</u>	<u>12,711</u>	<u>48,182</u>	<u>58,893</u>

Occupation	1979 - 1984			1979-1989
	New Workers	Replacement Demand	Total Demand	Total Demand
Managers (Wholesale & Retail Trade)	111	43	154	197
Working Proprietors (Trade)	19,328	9,244	28,572	35,359
Sales Supervisors & Buyers	1,515	470	1,985	2,407
Technical Sales & Manufacturers' Agents	579	183	762	917
Insurance, Real Estate, Securities, & Business Service Sales & Auctioneers	421	165	586	745
Salesmen, Shop Assistants & Vendors	23,392	7,500	30,892	41,750
Sales Workers, N.E.C.	197	78	275	354
Group 4 TOTAL	45,543	17,683	63,226	81,729
Managers (Hotel, Restaurants & Services)	52	15	67	78
Working Proprietors (Hotels, Restaurants & Services)	101	41	142	170
Housekeeping & Service Supervisors	552	171	723	931
Cooks, Waiters, Bartenders	8,191	3,222	11,413	13,783
Maids, Housekeepers & Related Workers	10,321	4,287	14,608	17,666
Building Caretakers & Cleaners	16,384	7,392	23,776	29,471
Laundries, Dry Cleaners & Pressers	2,011	811	2,822	3,408
Barbers, Beauticians & Hair Dressers	4,465	1,866	6,331	7,659
Protective Service Workers	18,890	6,736	25,626	30,280
Service Workers, N.E.C.	2,009	722	2,731	3,274
Group 5 TOTAL	62,976	25,263	88,239	106,720
Farm Managers & Supervisors	729	947	1,676	2,266
Farmers (Proprietors)	13,997	32,838	46,835	66,467
Agricultural & Animal Husbandry Workers	19,984	45,582	65,566	93,452
Fishermen, Hunters & Related Workers	542	1,247	1,789	2,552
Group 6 TOTAL	35,252	80,614	115,866	164,737
Production Supervisors & Foremen	6,254	1,524	7,778	8,670
Miners & Quarrymen	494	200	694	899
Mineral & Stone Treaters	61	25	86	111
Well Drillers & Related Workers	206	72	278	343
Metal Smelting & Furnacemen	266	70	336	384
Metal Rolling-Mill Workers	768	199	967	1,089
Metal Melters & Reheaters	206	55	261	295
Metal Casters	26	7	33	37
Metal Moulders & Coremakers	454	112	566	633
Metal Temperers & Case Hardeners	271	70	341	384
Metal Drawers	665	172	837	943
Metal Platers	85	22	107	120
Metal Processors, N.E.C.	124	25	149	157
Sawyers, Plywood & Wood Processors	96	19	115	121
Paper Palp Preparers	107	28	135	152
Paper Workers	31	8	39	44
Chemical Crushers, Grinders & Mixers	49	13	62	70
Cookers, Roasters, Heat Treaters	338	87	425	479
Still & Reactor Operators	51	13	64	72
Petroleum Refinery Workers	295	91	386	458
Chemical Workers, N.E.C.	1,045	282	1,327	1,502

Occupation	1979 - 1984			1979-1989
	New Workers	Replacement Demand	Total Demand	Total Demand
Fibre Preparers	1,866	492	2,358	2,668
Spinners & Winders	6,799	1,758	8,557	9,633
Weaving & Knitting Machine Setters	572	148	720	811
Weavers	8,291	2,173	10,464	11,801
Knitters	746	195	941	1,061
Bleachers, Dryers & Textile Finishers	1,206	312	1,518	1,709
Textile Workers, N.E.C.	470	137	607	696
Tanners, Pelt & Fur Workers	221	57	278	312
Grain Millers & Related Workers	880	230	1,110	1,253
Sugar Processors & Refiners	482	125	607	684
Butchers & Meat Preparers	221	78	299	361
Food Preservers	261	77	338	397
Dairy Product Processors	127	34	161	183
Bakers, Pastry Cooks & Confectioners	2,196	586	2,782	3,169
Brewers, Wine & Beverage Makers	52	13	65	74
Food & Beverage Workers, N.E.C.	277	80	357	408
Cigar & Cigarette Makers	643	166	809	912
Tobacco Workers, N.E.C.	122	34	156	179
Tailors & Dressmakers	6,897	2,738	9,635	11,572
Milliners & Hat Makers	73	30	103	124
Pattern Makers & Cutters	45	12	57	64
Sewers & Embroiderers	734	231	965	1,121
Upholsterers	734	270	1,004	1,225
Other Tailors, Sewers, etc, N.E.C.	353	136	489	586
Group 7 TOTAL	46,160	13,206	59,366	67,966
Shoemakers & Shoe Repairers	3,183	828	4,011	4,521
Shoe Cutters, Lasters & Sewers	187	49	236	266
Leather Goods Makers	170	44	214	241
Cabinetmakers	2,805	734	3,539	3,539
Woodworking Machine Operators	283	73	356	406
Cabinetmakers & Woodworkers, N.E.C.	877	233	1,110	1,283
Stone Cutters & Carvers	402	88	490	532
Blacksmiths, Hammersmiths & Forgers	1,348	340	1,688	1,974
Toolmakers, Pattern Makers & Metal Workers	2,849	670	3,519	3,925
Machine-Tool Setter Operators	1,794	437	2,231	2,509
Pre-set Machine-Tool Operators	957	957	1,201	1,378
Metal Workers, N.E.C.	844	86	930	920
Machinery Fitters, Assemblers, Maintenance Workers & Repairers	4,842	1,491	6,333	7,310
Watch, Clock & Precision Instrument Workers	73	21	94	111
Motor-Vehicle Mechanics	6,661	1,944	8,605	10,289
Aircraft Engine Mechanics	72	20	92	124
Mechanics & Machinery Repair, N.E.C.	2,762	622	3,384	3,700

<u>Occupation</u>	<u>1979 - 1984</u>			<u>1979-1980</u>
	<u>New Workers</u>	<u>Replacement Demand</u>	<u>Total Demand</u>	<u>Total Demand</u>
Electrical Fitters	4,393	1,132	5,525	6,875
Electronics Fitters	608	36	644	609
Electrical & Electronic Equipment Assemblers	269	98	367	491
Radio & T.V. Repairmen	149	61	210	253
Electrical Wiremen	880	90	970	832
Telephone & Telegraph Installers	1,029	151	1,180	1,357
Electric Linemen & Cable Jointers	701	52	753	741
Electrical Workers, N.E.C.	27	7	34	40
Broadcast Station, Sound & Cinema Equipment Operators	32	13	45	54
Plumbers & Pipe-Fitters	2,587	527	3,114	3,455
Welders & Flame Cutters	1,330	327	1,657	1,881
Sheet Metal Workers	805	218	1,023	1,235
Structural Metal Preparers & Erectors	929	169	1,098	1,144
Jewelry & Precious Metal Workers	302	123	425	513
Glass Formers, Cutters, Grinders	283	72	355	398
Potters & Clay Formers	99	26	125	141
Glass & Ceramic Kilnmen	61	16	77	86
Glass Workers & Potters, N.E.C.	615	249	864	1,041
Group 8 TOTAL	45,208	11,291	56,499	64,626
Rubber & Plastic Product Makers	495	128	623	700
Tyre Makers & Vulcanizers	428	106	534	636
Paper, Paper Board & Box Makers	292	76	368	444
Compositors & Type Setters	640	186	826	934
Printing Pressmen	395	117	512	593
Printing Engravers	30	11	41	51
Photo-Engravers	53	14	67	77
Book-Binders & Embossers	230	69	299	346
Printers & Related Workers, N.E.C.	149	39	188	213
Painters - Buildings & Structures	2,364	366	2,730	2,759
Other Painters, N.E.C.	1,008	235	1,243	1,397
Cotton Ginners	542	161	703	817
Miscellaneous Production Workers, N.E.C.	5,140	1,356	6,496	7,355
Bricklayers, Stonemasons & Tile Setters	3,114	370	3,484	4,333
Concrete, Cement & Terrazzo Workers	2,243	188	2,431	3,213
Carpenters, Joiners & Parguetry Workers	4,248	785	5,033	5,249
Plasterers	2,705	262	2,967	3,761
Insulators	70	12	82	85
Glaziers	185	40	225	240
Construction Workers, N.E.C.	2,529	415	2,944	3,007

<u>Occupation</u>	<u>1979 - 1984</u>		<u>1979-1989</u>	
	<u>New Workers</u>	<u>Replacement Demand</u>	<u>Total Demand</u>	<u>Total Demand</u>
Power Generating Machine Operators	325	85	410	484
Stationary Engine & Equipment Operators	1,189	346	1,535	1,743
Dockers, Warehousemen & Freight Handlers	1,997	588	2,585	3,274
Riggers & Cable Splicers	190	56	246	317
Crane & Hoist Operators	417	98	515	580
Earth Moving & Other Heavy Equipment Operators	774	161	935	3,237
Material & Freight Handlers, N.E.C.	213	67	280	344
Ship & Barge Deck Crew Ratings	1,913	572	2,485	3,237
Ship's Engine-Room Ratings	232	58	290	363
Railway Engine-Drivers & Firemen	494	138	632	840
Railway Brakemen, Signalmen & Shunters	285	80	365	479
Motor-Vehicle Drivers	9,576	2,397	11,973	14,123
Animal & Animal-Drawn Vehicle Drivers	151	57	208	253
Transport Equipment Operators, N.E.C.	848	261	1,109	1,800
Miscellaneous	<u>13,343</u>	<u>3,749</u>	<u>17,092</u>	<u>19,573</u>
Group 9 TOTAL	<u>58,807</u>	<u>13,649</u>	<u>72,456</u>	<u>84,622</u>
 TOTAL ANNUAL DEMAND FOR LABOR	 384,180	 192,563	 576,743	 711,706

The future manpower demands of the Egyptian economy include a very diverse mix of skills. A list of the "highest demand" occupations would include teachers, machinists, medical workers, bricklayers, etc. Clearly, careful planning of the educational system is needed to meet these demands.

Finally, the long-run (1979-1989) projection of the demand for labor exceeds that expected in the short-run for virtually all occupations. This derives from the planned growth in employment by economic activity, which envisions the economy becoming more diversified in its outputs with Agriculture representing a declining proportion of total employment over time.⁶ For the purpose of this report, finding that expected growth in occupational employment will be relatively consistent in its composition over the next five- and ten-year periods enables us to concentrate the remainder of our analysis on the short-run manpower projections. In essence, steps taken now by educational planners to meet short-run manpower requirements will also be good long-run planning.

Before converting these forecasts of the demand for labor by occupation into estimates of annual educational requirements (the "social demand" for education), a word of caution is in order. Table IV presents forecasts which are based upon certain data and assumptions. Because of possible errors in the data, or erroneous assumptions, those forecasts are subject

6. Agriculture is forecast to decline from 43.9% of total employment in 1976 to 33.2% in 1989, even assuming the higher levels of employment growth planned over the ten-year period.

to a margin of error. The reader should, therefore, keep that margin of error in mind when using manpower projections to reach policy or planning decisions. Thus, for example, between 1979 and 1984 do not expect an annual demand for exactly 7,778 Production Supervisors. Rather, we forecast an annual demand for more than 6,000 supervisors and probably less than 9,000 supervisors, or roughly the 7,778 figure shown in Table IV plus or minus 20 percent.

These manpower projections, it must be emphasized, are forecasts of the "real" demand for labor by occupation in Egypt. These projections assume that overall economic policy will succeed in eliminating both open and disguised unemployment.⁷ Thus the average annual demand for each occupation is a function of the manpower actually required to produce needed goods and services and does not include an allowance for "excess" workers absorbed in public or government enterprises. Technically, we forecast labor market equilibrium: how many workers in each occupation the Egyptian economy will demand each year, thus how many workers (by occupation) should be supplied to meet those demands.

7. The assumption of full employment is embodied in the planned levels of economic activity in the Five-Year Plan.

Chapter III

Manpower Supply and the Demand for Education

Education and training are crucial factors in the preparation of the population for full economic participation in society. The size, composition, distribution, education and training of the labor force are of critical importance to any economy, but particularly so to a developing economy such as Egypt. This is because manpower supply (along with land and capital) is a factor determining Egypt's productive capacity. How much of which goods and services the economy can produce is directly affected by the quality and size of the labor force. Furthermore, since wages and salaries are the largest component of national income, education and training play a dominant role in determining the level and distribution of income to the members of society.

Questions of manpower supply concern both the economic and non-economic aspects of education. Economic aspects of education affect the quality and quantity of the labor force, the composition of output, and the level and distribution of wages. Education clearly also has non-economic aspects, as evidenced in the importance of a well-educated and well-informed populace to the working of true democracy, and the fact that people read and study purely for enjoyment or religious enlightenment. This report, however, confines its research into the demand for education solely to the economic area.

We are concerned with education as one important method of meeting Egypt's future manpower requirements. The previous chapter developed estimates of the number of workers expected to be demanded by the domestic economy each year in various occupations. Educational programs should be planned to assure that an adequate number of workers with the appropriate occupational skills will be supplied in response to that demand. Proper planning will also assure that the educational system does not produce an excess supply of workers in some occupational areas, resulting not only in a waste of educational resources but also leading to open or disguised unemployment.

There are other sources of trained manpower: children learn many valuable skill from their parents; workers acquire new knowledge on their jobs; many people learn new trades from hobbies, reading or perhaps just watching television; certainly soldiers are taught certain skills by the Army that prepare them for new civilian occupations. Also, in addition to formal educational programs which are the central concern of this study, numerous Ministries operate training centers or apprenticeships in various occupations. Policy and planning must encourage the coordination of all such sources of skilled manpower.

It is rational to center on the programs of the Ministry of Education and the Universities. First of all, in terms of both size of enrollment and levels of expenditures these programs are the most significant in Egypt.

Also, it is for these formal education programs that the Government of Egypt must make crucial decisions of course design, program content and over-all educational policy. Here then, the information which is needed for educational planning must bear on the larger issue of what is best for society as a whole in education, not on what is best for an individual student or an individual enterprise.

We must therefore understand the distinction between private vs. societal costs and benefits of education as well as the distinction between private and societal demand for education.

It is traditional to speak of the "demand for education" in much the same way as the demand for any other good or service: the sum total of private (individual) demands. Thus the over-all demand for education would be simply the total number of persons desiring to attend school, and the demand for a particular educational program would be reflected in the people wishing to enroll in that program. This is not, however, the "societal demand" for educational programs which we will estimate in the following chapter and which should be used as a guide by education planners and policy-makers. The "societal demand for education", as used in this report, refers rather to the interests of society (in aggregate) in assuring that various educational programs produce the proper number of graduates to meet the manpower requirements of the economy.

The distinction between private demand (the sum of individual demand) and societal demand for education arises because there is a sharp difference between the private and social benefits (returns) to education.

Consider an extreme example where the number of students receiving a Ph.D. and going to seek a job greatly exceeds the actual number of Ph.D.'s required by the economy. In such a case, one adjustment which occurs in the labor market is that Ph.D. recipients are employed in occupations actually requiring less skills and education than they possess, and where they "bump" less-educated job seekers. The filtering down process of workers with relatively high levels of education displacing workers with less education from lower-level occupations eventually results in depressed wages and/or unemployment and under-employment. The rational observer, and the educational planner, would conclude that there were "too many" Ph.D.'s -- that the supply (output) of Ph.D. programs exceeded the demand for Ph.D.'s and that those educational programs should be curtailed. This is a correct conclusion, and reflects the societal demand for education.

The paradox, of course, is that in this example the private demand for a Ph.D. would tend to increase. If only Ph.D.'s get the "good" jobs and people with less education are squeezed out of occupations for which they are otherwise qualified, then the rational individual will demand more education. The private individual, concerned with maximizing his own earnings and employment opportunities, demands more Ph.D. programs when

in fact society as a whole should demand fewer Ph.D programs in order to meet the economy's real demand for labor.

This report emphasizes the economic aspects of the societal demand for education. Societal demand and many individual demands for education may at times vary, but it is in meeting the societal demand that the educational planner can assure that resources are efficiently utilized to supply the proper number and types of trained manpower.

Chapter IV

Educational Program Projections

This study assumes that achieving the employment goals of the Five-Year Plan will assure over-all equilibrium in Egypt's labor market. In fact, the total forecasted annual demand for labor (576,000 a year for 1979 through 1984) allows for increasing rates of labor force participation and a declining level of unemployment. Our concern, therefore, is not in comparing the total output of the educational system with the aggregate demand for education, but rather in examining the supply vs. societal demand relationship for individual educational levels and programs. This will provide the Ministry of Education (and other agencies involved in education and training) with specific information needed to plan future educational programs.

Two types of data were required to forecast the societal demand for education by level and program. The first, a forecast of the demand for labor by occupation, was derived in Chapter II. Next, it was necessary to determine specific occupation-to-education relationships in order to convert the demand for labor into a demand for education. Since most occupations can be held by more than one type of graduate and since most school programs prepare their students for more than one occupation, our method of analyzing these relationships was to develop an "education by occupation matrix".

This matrix was derived by analyzing the job content, required knowledge and conditions of employment for each occupation and comparing those

occupational criteria with the curriculum and course content of over ¹ 60 educational programs. An estimate was then made of the percentage of employment in each occupation which would be supplied by each educational program. The education by occupation matrix is thus an array of percentages such that the sum for each occupation is 100%. This essentially views the educational system as producing a series of outputs (graduates of the various levels and programs) which are absorbed into occupations based on the skill requirements of those occupations.

Educational programs were grouped into six levels, some of which were further sub-divided into specific course offerings and areas of educational specialization. The six education levels used in the matrix are:

- Level 1 - Less than Secondary Education: including no formal schooling, Primary drop-outs, those completing Primary school yet not entering Preparatory school, and Preparatory completers who do not enter Secondary school. Implicitly, education level 1 is identified as the educational source for those occupations where the job requires no prior training and also as the source for occupations whose workers learn their skills in Training Centers, on the job, through apprenticeships, in the military, or via other alternative learning methods.
- Level 2 - Recipients of General Secondary Certificates who do not enroll

1. This effort was assisted by various staff members from the Ministry of Manpower and Vocational Training, Ministry of Education and Ministry of Higher Education. Their cooperation and assistance is greatly acknowledged.

in Universities or Higher Institutes.

- Level 3 - Technical Secondary Graduates (three years after Preparatory) broken into Industrial, Agricultural, and Commercial including the Secondary schools for Nursing.
- Level 4 - Technical Institutes (five years after Preparatory) again sub-divided into Industrial, Agricultural and Commercial and including High Institutes such as Social Services.
- Level 5 - Teacher Training Schools (five years after Preparatory).
- Level 6 - University and Higher Education graduates, including all faculties, post-graduate programs and Teacher Training Colleges.

In addition to using these six levels as the basis of the education by occupation matrix, information on the current output (number of graduates for levels 2 - 6) was also collected to represent the current "supply" of education. In aggregate, the output data (see Table V) are not exactly the "supply of labor" for two reasons. First, no allowance is made for non-labor force participation. This is particularly significant in level 1, where a large percentage of those who never attend school also never enter the labor market. Secondly, except for level 1 no estimate is made of the number of drop-outs from each educational level. Presumably, many students do leave school in order to seek employment.

These data omissions on the supply side should not bias our analysis, since our concern is not with total (aggregate) labor market conditions but rather with the desired number of graduates from specific education levels and programs. The education planner must, however, note that the data in Table V compare the current output (graduates) of educational programs with societal demand for graduates of those programs who will then enter the labor market. The societal demand for each specific educational level and program was calculated by taking the percentage of a particular occupation coming from that program multiplied by the forecasted demand for that occupation and then summing across all occupations.²

While the methodology for projecting levels of employment by occupation is fairly standardized, the procedure used to assign percentage coefficients in the education by occupation matrix was necessarily subjective.³ The coefficients are also a somewhat normative judgement concerning what "should be" the future educational requirements of a particular occupation, and not a reflection of current labor supply conditions by occupation. As an example of our reasoning, consider the

-
2. The full education by occupation matrix is available at the Ministry of Education and the Ministry of Manpower and Vocational Training. The somewhat cumbersome size of the matrix (191 x 68) precludes its publication in this report.
 3. Ministry of Education course descriptions do not reference specific occupational areas of preparation.

matrix coefficients for the occupation "Motor Vehicle Drivers" (with a projected total demand of 11,973 per year). Our matrix assigned 100% of this occupation to educational level 1 - Less than Secondary. We acknowledge that some drivers may possess University degrees (level 6), or that some enterprises may wish to hire drivers who have completed the Automotive Technical Secondary school (level 3.1.5) or other programs. However, in our estimation no formal education is necessary to be a Motor Vehicle Driver, thus no societal demand for any particular educational program is generated by the demand for labor for this occupation. In this case, the projected demand for labor for Drivers creates a forecasted societal demand for 11,973 workers with education Level 1.

With this understanding of the methodology and assumptions used to forecast the societal demand for educational programs, we turn now to analyze the results of our projections (Table V) and assess the implications for Egypt's educational system.

Particular care must be given to the interpretation of the data on Education Level 1. Here, current (1978) output exceeds the forecasted demand for those with less than a Secondary level education. This does not mean, however, that enrollment in Primary and Preparatory schools could be reduced without adversely affecting labor market conditions. Note that much of the "output" of level one is those who never attend or drop out of Primary school. Many of these, particularly girls, will never enter the labor force and hence are not available as a supply of

Table V

Current Output vs. Forecasted Societal
Demand for Education by Program

<u>Educational Level and Program</u> (1)	<u>1977 - 1978</u> <u>Output</u>	<u>1979 - 1984</u> <u>Projected Annual Demand</u>
1. Less than Secondary	624,796	313,132
2. General Secondary	47,328	10,317
3. 3- Year Technical Level	114,713	148,642
3.1. Industrial Secondary	30,804	67,291
3.1.1 Mechanical	13,962	23,585
3.1.2 Marine Industries	110	1,301
3.1.3 Electricity	5,226	6,754
3.1.4 Electronics	1,022	1,511
3.1.5 Automotive	1,968	4,244
3.1.6 Decorative Industries	3,547	2,584
3.1.7 Construction & Building Maintenance	1,979	6,032
3.1.8 Textiles	2,963	13,780
3.1.9 Transportation	54	814
3.1.10 Metals	(2)	4,190
3.1.11 Chemistry	(3)	659
3.1.12 Mining & Petroleum	(3)	1,128
3.1.13 Glass, Pottery & Porcelain	(3)	709
3.2. Agricultural Secondary	12,260	11,679
3.2.1 Horticulture	12,260	3,653
3.2.2 Agro-Industry	(2)	2,873
3.2.3 Agro-Mechanical	(2)	1,593
3.2.4 Animal Husbandry	(2)	2,248
3.2.5 Land Reclamation	(2)	656
3.2.6 Laboratory Assistants	(2)	656
3.3. Commercial Secondary	71,649	69,672
3.3.1 General Secondary	71,291	40,296
3.3.2 Legal Assistants	165	1,517
3.3.3 Commercial Practices	193	7,113
3.3.4 Hotel Services	(2)	4,854
3.3.5 Insurance	(2)	7,366
3.3.6 Purchasing & Inventory	(2)	4,026
3.3.7 Mail	(4)	407
3.3.8 Nursing	(4)	4,093

4. 5 - Year Technical Level	5,211	44,551
4.1 Technical Industrial	2,071	27,861
4.1.1 Mechanical	144	4,117
4.1.2 Electricity	76	2,006
4.1.3 Electronics	45	955
4.1.4 Automotive	104	1,228
4.1.5 Construction	253	641
4.1.6 Textiles	(2)	1,982
4.1.7 Marine Industries	(2)	1,332
4.1.8 Agricultural Machinery	(2)	84
4.1.9 Petroleum & Petro-chemicals	(2)	233
4.1.10 Diesel & Heavy Machinery	(2)	1,361
4.1.11 Public Utilities	(2)	797
4.1.12 Cooling & Air Conditioning	(2)	552
4.1.13 Tele-communications	85	845
4.1.14 Industrial Education	(2)	929
4.1.15 Metallurgy	(3)	1,497
4.1.16 Science Technicians	(5) 1,364	6,909
4.1.17 Metal Work	(3)	1,985
4.1.18 Civil Engineering	(3)	408
4.2 Technical Agricultural	(2)	3,889
4.2.1 Food Processing	(2)	2,242
4.2.2 Agro-Mechanization	(2)	823
4.2.3 Land Reclamation	(2)	824
4.3 Technical Commercial	3,140	12,801
4.3.1 Foreign Trade	(2)	759
4.3.2 Secretarial & Managerial	(6) 2,571	3,255
4.3.3 Commercial Insurance	(2)	2,983
4.3.4 Social Insurance	(7) 569	2,865
4.3.5 Banking	(3)	2,181
4.3.6 Customs	(2)	758
5. 5 - Year Teacher Training	6,713	9,285
6. University & Higher Education	80,332 (8)	50,658
6.1 Medical Sciences	(9) 6,490	5,349
6.2 Engineering	9,965	6,942
6.3 Science & Mathematics	3,598	2,335
6.4 Agriculture	6,328	2,997
6.5 Commerce	24,502	11,010
6.6 Literature	11,097	6,893
6.7 Law	4,619	4,345
6.8 Fine Arts	2,630	803
6.9 Religious Studies	1,402	658
6.10 Teacher Training Colleges	6,884	7,427
6.11 Graduate Schools	(10) 2,817	1,899

Notes for Table V

- | | |
|--|---------------|
| (1) Education level 1 output includes: | |
| Six-year olds not entering school: | 225,928 |
| Primary drop-outs: | 278,924 |
| Completed Primary, no Preparatory | 53,208 |
| Completed Preparatory, no Secondary: | <u>66,736</u> |
| | 624,796 |
- (2) Educational program newly instituted or being planned by the Ministry of Education
- (3) Suggested area for new schools
- (4) Program not administered by the Ministry of Education; data on graduates not available
- (5) High Institute
- (6) Private Post-Secondary Institute
- (7) High Institute for Social Services (1977 data)
- (8) All level 6 data are for 1977
- (9) Includes Veterinary Science
- (10) All post-baccalaureate fields are included.

labor to meet forecasted demand. Also, note that our methodology assigned to level 1 all graduates of Training Centers, apprenticeships, etc. These training courses generally require literacy and frequently have basic mathematics and science as prerequisites. Most importantly, it is impossible to increase the output of other educational programs without increasing the number of students who complete Primary and Preparatory schooling. Thus, the correct implication of our manpower projections is that an expansion of Primary and Preparatory graduates is required.

The forecast shows an excess supply of General Secondary Certificate recipients. The General Secondary curriculum does not prepare the student for entry into very many occupations. Reducing the number of General Secondary Certificates therefore would not create any labor market shortages.

There is an excess demand for 3-year Technical Secondary graduates, indicating in particular that Industrial Technical schools should be expanded. The Mechanical curriculum (level 3.1.1), Marine Industries (3.1.2) and Automotive (3.1.5) programs are all areas for expansion. Because of forecasted labor demand, we have suggested three additional program areas for Industrial Secondary schools: Chemistry (3.1.11), Mining and Petroleum (3.1.12), and Glass, Pottery and Porcelain (3.1.13). Each of these program areas, as well as the new Metals curriculum (3.1.10), should serve to meet future skill requirements of the economy.

Note that a significant excess demand is forecast for both the Construction (level 3.1.7) and Textiles (3.1.8) programs. This forecast occurs despite the fact that relatively low percentages were assigned to education programs as opposed to Training Center preparation for those occupational areas. This suggests that while expansion of these education programs is probably in order, coordination with Ministries and enterprises offering training in these areas is desirable.

Current numbers of Commercial Secondary Graduates (level 3.3) would apparently create a future supply/demand balance for this area as a whole. However, our forecasts indicate an over-supply from the General Commercial program (3.3.1) and possible shortages of more specifically skilled Commercial graduates. This is but one example of a phenomenon which appears in other areas of our educational forecasts and which derives directly from future occupational trends in Egypt: the economy is not only growing, but also becoming more diversified in both its economic activities and required occupational skills. The educational system must therefore diversify its programs to meet these requirements.

The diversity of the future societal demand for education is also reflected at the Five-year Technical level. Here the forecasts indicate a significant expansion in both Industrial (4.1) and Commercial (4.3) programs. The Ministry of Education is planning to expand both enrollments and the number of program offerings in the Industrial area. These plans should definitely be continued.

The future supply of Teachers (levels 5 and 6.10) may not be accurately reflected in the data in Table V. In anticipation of the demand which we have forecasted, enrollments in Teacher training programs have recently been increased. Thus, while the future demand exceeds the 1977 - 1978 output of teachers, no further expansion of these programs beyond that currently under way will probably be required.

Our projections indicate a significant over-supply of University graduates. This is particularly true since the output data in Table V are for 1977, and recent trends in University enrollments mean that even larger numbers will graduate in the next few years. In virtually all higher education programs, the societal demand is less than current (and future) supply.

A review of the supply/demand situation for University education reveals some interesting comparisons. Compare the forecasted excess supply of University scientists and engineers (levels 6.1, 6.2 and 6.3) with the forecasted demands for Technical Industrial graduates (level 4.1) from various specialities. Compare also the output of the Commerce faculties (level 4.3) graduates. These comparisons indicate that unless University programs are curtailed and Five-Year Technical programs are expanded, University graduates are likely to be employed in technical level occupations. Two adverse effects can flow from this situation: First, the economy may suffer because University graduates are unlikely to possess the specific practical skills required by these occupations; and secondly, a significant

expenditure of educational resources will be misallocated in over-producing University graduates.

Education planners should therefore act to increase both Three-Year and Five-Year Technical education programs, giving particular care to diversify into specialized programs. Furthermore, a reduction in higher education could save educational resources yet still meet the societal demand for University graduates.

Chapter V

Data Problems and Analytical Limitations

Before offering some general conclusions and policy recommendations based upon this study, it is important to review certain problems and limitations which are possible sources of error in our analysis.

The basic procedure of this study was to first estimate the occupational structure of current employment by economic activity, project levels of employment and occupational structure in order to forecast demand for labor by occupation, and then to calculate the output of educational programs required to meet that occupational demand.

In this manner, the future demand for education by level and program was compared with the current supply of educational graduates.

These procedures should yield sound conclusions for planning education. However, for three reasons, certain errors or omissions may have occurred which the policy maker should consider in utilizing these manpower projections.

A. Lack of Adequate Data

1. Primarily because the 1976 Census was not available, occupational structures could be calculated only for nine broad sectors of economic activity. A more refined analysis would disaggregate these sectors. For example, one would derive distinct occupational structures if the category of Services were broken into Business Services, Medicine, Education, etc.

While such detail would be available from the Census, it was not collected in the MOMVT survey.

2. Again because of the lack of Census data, we are unable to provide geographic (governorate) level of detail. Thus while this report strongly recommends expansion of technical education, it does not contain sufficient detail to recommend school locations.
3. Perhaps the most serious deficiency of this report is its failure to take into consideration the "external" demand for labor -- the emigration of Egyptian workers to Arab and other countries.

This failure is explicitly acknowledged. However, no procedure could be developed to adequately forecast the external demand for labor by occupation. Little data is available on the occupational structure of workers currently out of the country. Less is known of future manpower trends. No one can predict total size of the labor flow, much less the specific occupational skills which will be demanded in the future. A complicating factor is that most workers return to Egypt after a period of years, so any forecasts would require projections of both manpower supply and demand by occupation.

Lacking accurate forecasts of emigration, the education and training planner should supplement this report with any available information on labor migration before deciding on educational programs designed to produce particular occupational specialists. This is

particularly true when considering an occupation such as Teachers, where external demand may be significant.

4. For all occupations, it was assumed that annual replacement demand would equal 2% of existing employment. This assumption was necessary because of the lack of any data on labor force separation by occupation. Census data giving the age and sex of workers by occupation would enable the calculation of death rates, yet still would not yield accurate information on retirement, disability and other labor force withdrawals.

The 2% figure was chosen to be in excess of the current death rate (1.3%) to allow for these other causes of replacement demand, yet is purely an estimate.

Closely related to the question of labor force attrition is the issue of occupational mobility. If workers tend to leave one occupation and enter another, then that first occupation will have a relatively higher (and the second a lower) replacement demand for labor, especially with respect to the requirements for education graduates to fill those jobs. Again it was impossible to make adjustments in our forecasts because of a lack of data.

5. The occupational structure of each economic activity was calculated from the MOMVT Annual Labor Market Information Survey. It is possible that, because of response or sampling errors, this survey did not collect accurate occupational information for all employments. In particular, note that smaller enterprises with less than 10 employees

were not surveyed, and also that respondents may not have been equally distributed within economic activities by size of enterprise or type of ownership (public, government, private). Explicit adjustments were made to account for survey coverage (in the Agriculture, Trading and Service sectors) but estimation errors of current occupational employment are still possible.

6. The final data problem which was encountered was a lack of good information on the current curriculum, enrollment and graduates of training centers.

Initially, the "education by occupation" matrix discussed in chapter IV was to include training center preparation for various occupations. However, because published data were not current and sufficient time was not available to collect information from all involved ministries, this analysis was limited to more formal educational programs.

Clearly, there is a need to coordinate education and training in order to meet future manpower requirements. One of the first steps in that coordination is the collection and maintenance of accurate and uniform data on Training Centers.

B. The Current Occupational Structure in Egypt

The first step in forecasting employment is to derive an inventory of the current manpower stock by occupation. Traditionally, it is assumed that the existing structure of employment represents an equilibrium

of supply and demand by occupation. Such could not be assumed in this analysis.

The policy of assigning "excess" university and secondary graduates to government and public sector enterprises means that the current occupational structure should not be used to forecast future occupational trends without appropriate adjustments. Although some data on the number of graduates by field who were so assigned is available, the adjustments which were made are necessarily subjective.

The manpower projections in this report are intended to represent estimates of future labor market equilibrium. That is, they are forecasts of employment by occupation that is in response to "real" demand for labor, not a policy of forced employment. Since that is not the current situation, a possible source of error is introduced into our projections.

C. Forecasting Errors

1. The estimates of demand for labor by occupation are essentially based upon planned levels of employment by economic activity. These planned levels may not actually occur.

There may be an insufficiency of total investment to achieve the plan. Alternatively, more projects may be undertaken in one sector than are currently planned, with a corresponding decrease in projects (and employment) in another economic activity. Still another possibility is that increased productivity or a changing capital-to-labor ratio

in an economic activity will mean that desired output can be produced with less employment than is currently envisioned. All of these introduce an element of uncertainty into manpower projections.

2. There may be errors in our projections of the occupational structure within economic activities. It is assumed that such structures change slowly over time, thus future employment is largely a function of current employment. Two factors may invalidate this assumption.

First, rapid technological change, including the introduction of new products, machinery or techniques, may require new skills and occupations within a sector. Secondly, changes in wages induce employers to substitute relatively lower wage workers for workers in other occupations whose wages have risen more. Wage changes will also affect the supply of labor into different occupations.

Thus, to the extent that there are significant shifts in technology and/or wages, there will be changes in the occupational structure of the economy that this report may have omitted.

3. The final warning to the user of this report concerns the assumptions embodied in the education to occupation matrix. In general, for each occupation an estimate was made of the percentage of workers in that occupation who would be supplied specific educational programs. These percentage estimates are subjective and may be in error. Also, no explicit accounting was done for Training Center graduates, apprentices, recipients of on-the-job training, or other sources of

trained labor supply. Finally, and perhaps most importantly, only current or immediately planned education programs were considered. Changes in curriculum may change the qualifications and occupations of some graduates. Entirely new programs may be developed. Any of these will impact forecasted supply/demand relationships for various educational programs.

These problems with data and possible sources of error mean that absolute certainty cannot be imputed to these forecasts. Nevertheless, these manpower projections should be of value to the planning of education and training in Egypt.

Chapter VI

Conclusions and Recommendations

It is appropriate to conclude this study by offering several specific recommendations for Egyptian education as well as two general observations on education and manpower training.

The first observation is that there does not appear to be an adequate, current and comprehensive system of collecting and tabulating all statistics necessary for planning education and training. Data on employment, education and training are often fragmentary, lack common definitions and concepts, and are seldom current or readily available to the manpower planner. Such data problems not only limit the accuracy of manpower projections but also inhibit truly effective planning of education and training programs.

Secondly, there is an apparent need for closer coordination of all Ministries and enterprises involved in producing skilled manpower. We have noted numerous sources of manpower supply: the Ministry of Education, Universities, training centers, on-the-job training, the Military services, etc. Lack of data is an obstacle to effective coordination, but current efforts to develop a truly comprehensive manpower planning and training policy must be continued and made fully operational. This observation is not meant to imply that any one Ministry should control or operate all methods of education and training. On the contrary, because the skill requirements of the Egyptian economy are becoming more diverse and highly specialized it is likely that a more specialized system of meeting those

requirements is called for. Greater diversity and specialization among education and training institutions, however, merely heightens the necessity for more cooperation and coordination.

The following specific recommendations for the Ministry of Education should be viewed in the light of the over-all conclusions on the need for better data on, and closer coordination of, all education and training programs:

1. Because successful completion of Preparatory schooling is necessary for further formal education, and because Training Centers and other sources of skilled manpower supply generally require literacy and other basic skills, the Ministry of Education should enhance its efforts to enforce compulsory education. This includes expanding the percentage of six-year olds who enroll and reducing Primary and Preparatory drop-outs.
2. Because completers of General Secondary schooling are ill-equipped to directly enter the labor market, and there is no societal demand for more university enrollments, the number of students admitted to General Secondary schools should be reduced. Further study on the employment problems of General Secondary students who do not enroll in universities is recommended, as well as potential curriculum changes to include pre-vocational courses.
3. Expand both Three-Year and Five-Year Industrial Technical Education in order to meet future manpower requirements of the economy. In this effort, particular care should be taken to: (a) Identify the appropriate geographic location for specific programs, (b) Coordinate industrial education programs with plans for future Training Centers, and (c) Assure appropriate curriculum design and quality of education by consulting with employers

on specific skills to be taught in these programs.

4. Diversify Commercial secondary programs to meet more specific occupational demands. Again consultation with employers is recommended to assure the correct curriculum and quality of these programs.
5. Expansion of agricultural output is clearly a high priority in Egypt. Such an expansion will clearly have manpower implications. However, there is an apparent conflict between the growth in agricultural employment planned for the next five years and the much higher forecast for the next ten years. There is further uncertainty over technical trends in agricultural mechanization and the future of agro-industry labor requirements. Because of these doubts, we recommend a comprehensive study of Agricultural Technical schools and their graduates. Such a study would include a follow-up of Agricultural graduates to determine the sectors of economic activity in which they are employed.
6. Enrollments in Five-Year and University level Teacher training programs have recently been expanded. There has been a large external demand for Teachers from other Arab countries which may or may not continue into the future. Therefore, care must be taken to closely monitor the future supply/demand relationship for Teachers.
7. Based on these manpower projections and the forecasted societal demand for education, there should be no further expansion of University enrollments and the number of graduates of some programs should actually be reduced.

8. The transition of Egypt from a state of mobilization to a peace-time economy will certainly affect future trends in employment by economic activity. Publication of the 1976 Census, and comparison of Census data with manpower surveys conducted in 1979 and/or 1980 should yield valuable insights into the occupational structure of employment. Improved coordination should make available better data sources of manpower supply. Given more complete data to test the assumptions and hypotheses of the methodology used in this report, this study should be re-done within the next two to three years. Thus, more accurate and complete manpower projections will be available for planning education and training in Egypt.

APPENDIX TABLE 1

SURVEY RESPONSE: 1976 ANNUAL LABOR MARKET INFORMATION PROGRAM

MINISTRY OF MANPOWER AND VOCATIONAL TRAINING

ECONOMIC ACTIVITY	SECTOR				
	Public	Government	Private	Total	Survey ^{1/} Coverage
Agriculture, Hunting and Fishing	18,941	55,452	15,339	89,732	2.12%
Mines and Quarries	11,938	-o-	2,899	14,837	32.11
Industry	531,114	335	76,819	608,268	52.29
Gas and Electricity	1,748	5,263	61	7,072	15.05
Building and Construction	24,679	9,513	2,438	36,630	8.44
Trading, Restaurants and Hotels	54,016	64	17,305	71,385	6.92
Transportation and Communication	46,537	14,122	3,922	64,581	15.30
Finance and Insurance	40,825	5,532	188	46,545	43.91
Social, Personal and Public Services	10,676	538,542	14,337	563,555	26.15
Total Employment Reported in Survey	740,474	628,823	133,308	1,502,605	15.61%

^{1/} Reported Employment as a percentage of 1976 total employment by economic activity.

APPENDIX TABLE 2

EMPLOYMENT BY ECONOMIC ACTIVITY - MISCELLANEOUS ESTIMATES AND FUTURE PLANS

Economic Activity	1960	1966	1975	1976	1977	1982	1987
Agriculture	3,689,845	3,973,710	4,424,800	4,223,900	4,103,500	4,282,000	5,168,800
Mines and Quarries	20,489	17,659	13,100	46,200	47,000	57,400	79,100
Industry	671,387	1,026,325	1,296,100	1,163,300	1,198,300	1,462,400	2,295,600
Gas and Electricity	36,349	50,984	46,000	47,000	53,900	63,000	107,800
Construction	155,256	203,517	247,500	434,000	457,000	805,000	1,099,600
Trading	611,801	590,813	842,000	1,031,000 ^{1/}	1,050,600 ^{2/}	1,346,500 ^{3/}	N/A ^{3/}
Transportation and Communications	254,483	337,223	420,400	422,100	444,300	595,600	925,600
Finance and Insurance	N/A	N/A	83,300	106,000 ^{1/}	N/A ^{2/}	N/A ^{2/}	N/A ^{3/}
Services	1,245,886	1,191,620	1,557,600	2,154,700 ^{1/}	2,364,500	2,883,100	5,667,500
Unknown/Not Classified	95,023	243,557	333,300	-o-	-o-	198,000	-o-
Total Employment	6,780,519	7,635,408	9,264,100	9,628,200	9,719,100	11,693,000	15,324,000

Sources: 1960 Census
1966 CAPMAS Sample Census
1975 CAPMAS Sample Survey
1976 and 1987 Five-Year Plan: 1977-1982; Volume Two, pp. 177-186
1977 and 1982 Ministry of Planning, "Employment and Wages in 1982"

Notes: ^{1/} 1976 data combined Trading and Finance into Services. These are independent estimates.
^{2/} Trading and Finance given as one activity
^{3/} Trading and Finance included in Services

N/A - Data Not Available

Bibliography

- Berry, A. and R.H. Sabot, "Labor Market Performance in Developing Countries: A Survey," World Development, Vol.6, pp.1199 - 1242. Pergamon Press, London, 1978.
- Birks. J. S. and C. A. Sinclair, International Migration Project Country Case Study: Arab Republic of Egypt. University of Durham, Durham, 1978.
- Central Agency of Organization and Administration, Employment in the Government and Public Sectors by Activity (February 1977). A.R.E., Cairo, undated.
- Central Agency for Public Mobilization and Statistics, Directory of the Arab Standard Classification of Occupations. A.R.E., Cairo, 1969.
- , Directory of the Standard Arab Classification of Economic Activity. A.R.E., Cairo, 1970.
- , General Census of Institutions of October 1976. A.R.E., Cairo, 1978.
- , Manpower Research by Sample Round of May 1975. A.R.E., Cairo, 1977.
- , Population and Development, A study on the Population Increase and Its Challenges to Development in Egypt. A.R.E., Cairo, 1978.
- , The Preliminary Results of the General Population and Housing Census, 22/23 November 1976 in Egypt. A.R.E., Cairo, 1979.
- Choucri, Nazli, Richard S. Eckaus and Amr Mohie-Eldine, Migration and Employment in the Construction Sector: Critical Facotrs in Egyptian Economic Development. Cairo University/Massachussetts Institute of Technology, Cairo, 1978.
- Department of Statistics and Census, 1960 Census of Population, Vol.II. United Arab Republic, Cairo, 1963.
- Ecevit, Zafer H., "International Migration in the Middle East and North Africa-Trends, Effects and Policies", presented to the Rockefeller Foundation Conference on Migration, Bellagio, Italy. The World Bank, Washington, 1979.
- Evans, David P., The Development of a Human Resource Information Planning and Policy System for Egypt: A Feasibility Study.U.S. Department of Labor (mimeograph), Washington, 1978.

- Ministry of Education, Department of Statistics, Educational Status in the Arab Republic of Egypt through the General Certificate Results (1977 - 1978). A.R.E., Cairo, 1979.
- , Preparatory Education: Internal Statistics 1978 - 1979. A.R.E., Cairo, 1979.
- , Primary Education: Internal Statistics 1978 - 1979. A.R.E., Cairo, 1979.
- , Secondary Education: Internal Statistics 1978 - 1979. A.R.E., Cairo, 1979.
- Ministry of Manpower and Vocational Training, Annual Labor Market Information Program for December 31, 1976. A.R.E., Cairo, undated.
- Ministry of Planning, "Employment and Wages in 1982", (memorandum). A.R.E., Cairo, 1978.
- , The Five-Year Plan 1978 - 1982, Volume Two, The Egyptian. A.R.E., Cairo, 1977.
- Mongi, Mohamed Abdel Farah, The Imperative Concern of the Public Sector with Industrial Education and Its Expansion. Institute of National Planning, Cairo, 1976.
- , and M. N. Hanafi, Labor Absorption in the Egyptian Economy. Institute of National Planning, Cairo, 1973.
- Saleh, Mamdouh, The Economics of Education in Developing Countries (With Emphasis on Manpower Planning). University of Paris II, Paris, 1977.
- Salt, Allan F., An Assessment of Egyptian Manpower Planning and Information Programs Relevant to Technical Education and Vocational Training. U.S. Department of Labor (mimeograph), Washington, 1977.
- Szyliowicz, Joseph S., Education and Modernization in the Middle East. Cornell Univeristy Press, Ithaca, 1973.

Final Report of
William B. Clatanoff, Jr.
Manpower Advisor
to the
United States Agency for International Development
and the
United States Department of Labor
Bureau of International Labor Affairs.

I. Terms of Reference

These activities were conducted at the request of the Government of Egypt, Ministry of Education, under the terms of a Participating Agency Service Agreement (PASA No. DL/Egy - 0025-5-78) between the U.S. Agency for International Development and the U.S. Department of Labor. The advisor was detailed to U.S. DOL from the District of Columbia, Department of Labor. Work was performed under PIO/T 263-025-2-70308.

II. Duration of Mission

12 March, 1979 through 22 June, 1979.

III. Purpose

Prepare a preliminary manpower needs assessment and data base to enable the Government of Egypt, Ministry of Education, to better plan its Technical and Vocational Education over the next five year period.

IV. Specific Objectives

- A. Collect, compile, organize and analyze manpower information and data.
- B. Develop a skilled manpower inventory by category and occupational level.
- C. Identify current skill shortages by occupation.
- D. Determine skilled manpower supply and demand projections for the next three to five years (within a factor of plus or minus 20 percent).

V. Accomplishments

A. Formal

1. "The Education and Training of Egypt's Labor Force: A Policy Analysis" was completed in April and given a limited distribution within AID/Cairo and to U.S. DOL staff prior to their visit to Egypt.
2. "Manpower Projections for Planning Education and Training" was completed in June and given to GOE, Ministry of Education and AID/Cairo. This report effectively fulfilled the purpose of the Mission and met all of its specific objectives. A brief (15 page) Arabic language summary of the report, containing aggregate data, and all specific planning recommendations, was also prepared and given to the Ministry of Education.
A copy of both the full (English Language) study and its Arabic summary are attached to this final report. Full dissemination of the study will be accomplished by AID/Cairo.

21

B. Informal

1. Participated in various briefings and meetings of U.S. DOL, U.S. Department of State and AID staff concerning potential projects or other assistance to Egypt in the areas of vocational training and/or in manpower planning.
2. Gave technical assistance and training to the Research and Statistics staff, Ministry of Manpower and Vocational Training, on various aspects of labor statistics, employment projections and labor market analysis.
3. Encouraged closer inter-Ministry cooperation in the area of Manpower planning. As evidence of this, the three individuals assigned to assist the advisor (Dr. Mamdouh Saleh, Dr. Mohamed Ismail, Dr. Nadia Makari) will be joined by Dr. Mohamed Mongi (Institute of National Planning) as the technical team performing the manpower planning component of the current World Bank loan for vocational education.

VI. Factors Inhibiting Accomplishments

A full discussion of this issue is contained in Chapter V of "Manpower Projections for Planning Education and Training." Briefly, the major problem was obtaining accurate data. The 1976 Census has not been tabulated and published, and data on the supply of trained labor (particularly from Training Centers operated by other Ministries) are fragmentary, often inaccurate, and not timely.

VII. Recommendations

1. There exists a need for greater coordination and cooperation among the various Ministries involved in vocational and technical training. Despite the existence of the "Supreme Council on Manpower Planning and Vocational Training", most Ministries operate their own training programs without reference to the plans or activities of other organizations. At least part of this problem could be resolved by providing the "Supreme Council" with a permanent staff or secretariat charged with gathering a data base and disseminating planning information.
2. The Ministry of Education gives every indication of increasing its emphasis on vocational and technical education at the secondary level. This is clearly desirable, given the current skill shortages in the domestic economy. However, greater care should be given to the curriculum design and quality (skill level) of these programs. There appears to be no communication between the Ministry of Education and employers (public or private) as to actual skill requirements of entry-level employees. This situation could lead to employment problems for vocational/technical graduates and/or added costs to the economy in the form of on-the-job retraining by employers.

55

A closely related issue, which should be the subject of a research study, is the content of Agricultural education. Agriculture is seen by the Government of Egypt as a key sector in the economy. The goal is both self-sufficiency in food as well as export earnings. One method of accomplishing significant increases in marketable agricultural output is to train/educate the farm population: transform peasants into farmers. The existing agricultural curriculum does not accomplish this. A comprehensive study of technical agricultural secondary schooling is therefore recommended.

3. Truly effective human resource planning, training program design and labor market policies will be impossible in Egypt without an improved data base. The crux of this problem lies with the Central Agency for Public Mobilization and Statistics (CAPMAS). Two courses of action could improve this situation. First, unlike statistical agencies in the United States (Bureau of the Census, Bureau of Labor Statistics) CAPMAS does not seem to understand the data users and therefore does not meet their needs. A statistical agency produces data but does not necessarily consume that data. Therefore, an advisory committee composed of academic researchers, private sector concerns, public enterprises, and other GOE Ministries should be established. This advisory committee would consult with CAPMAS on the types of data it collects, their frequency, level of detail, timing, etc. in order to better meet the needs of data users. Finally, it is evident that not only manpower planning but other areas of economic assistance are hampered by the lack of timely and accurate data on various aspects of the Egyptian economy. A major program of technical assistance to CAPMAS is therefore recommended. Such a program would include assistance in the areas of sample design, survey procedures, data processing, statistical concepts and measurement, and perhaps most importantly data presentation and analysis. This technical assistance could perhaps best be delivered by assembling a "team" from numerous U.S. Agencies (Bureau of Economic Analysis, Bureau of the Census, Agricultural Research Service, National Center for Educational Statistics, Bureau of Labor Statistics). Here again, the emphasis of this team would be on advising CAPMAS on how to best meet the needs of data users.

VIII. Conclusion

The advisor feels his mission was a success. A set of projections of labor market supply and demand was prepared, analyzed and presented to GOE officials along with policy recommendations in the areas of education and training. While data problems limit the probable accuracy of the projections, they should prove useful for planning vocational and technical education, thus the purpose of the mission was fulfilled.