ESTIMATING AN EMPLOYMENT "MULTIPLIER" FOR FOOD PROCESSING IN EGYPT
PHASE I FINAL REPORT

Submitted to:

U.S. Agency for International Development

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September 14, 2003

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Acknowledgements

For timely, helpful support and technical assistance we wish to thank:

Med Chottepanda, RRSA Deputy Chief of Party and Team Leader, DA, Cairo, Egypt

Kamal El-Araby, National Account Coordinator, Data Access and Transmission Activity (DATA) Project, GOE, Cairo, Egypt

Doug Olson, Co-Partner, Minnesota IMPLAN Group, Stillwater, Minnesota, USA

Mohamed Omran, Senior Agricultural Economist, EG/CAD, USAID, Cairo, Egypt

Mamadou Sidibe, Evaluation and Assessment Coordinator, DA, Cairo, Egypt

Hussien Soleman, First Under-Secretary of State, Ministry of Agriculture and Land Reclamation, GOE, Cairo, Egypt

Frank Szumilo, Chief of Party, Data Access and Transmission Activity (DATA) Project, GOE, Cairo, Egypt

Mohamed Tantawi, First Under-Secretary of State, Ministry of Planning, GOE, Cairo, Egypt

Safaa Eweda, Under Secretary, Ministry of Planning, GOE, Cairo, Egypt

Acronyms and Definitions

ALEB	Agriculture Led Export Business
CAPMAS	Central Agency for Public Mobilization and Statistics
DATA	Data Access and Transmission Activity
FPIA	Food Processing Industry Association
FTE	Full-Time Equivalent
GAP	Gross Area Product
GDP	Gross Domestic Product
GOE	Government of Egypt
GOFI	General Organization for Industrialization
GRP	Gross Regional Product
IDSC	Information and Decision Support Center
IBT	Indirect Business Taxes
I-O	Input-Output
MALR	Ministry of Agriculture and Land Reclamation
MOP	Ministry of Planning
SAM	Social Accounting Matrix
SEAM	Support for Environmental Assessment and Management
USAID	U. S. Agency for International Development
VA	Value Added
Elasticity	Relative change in an economic variable
Exports	The output disbursements to international markets and domestic markets outside the study area, that is, Egypt or one of the three survey areas.
Farm size	Small, less than 5 feddans or 5 heads of buffalo or milk cows; medium, 5 to 49 feddans or 5 to 49 head of buffalo or milk cows; large, 50 or more feddans or 50 or more head of buffalo or milk cows
Feddan	An area measure equivalent to 4,200.83 square meters, (about 1.038 acres)
Final demand	Purchases of commodity output for final use by local institutions—households, businesses, and government, plus private capital formation and change in inventory—and exports to international markets and domestic markets outside the study area.
Frontier Governorates	Red Sea, El-Wadi El Gidid, Matrouh, North Sinai, and South Sinai

Gross Product	Aggregate value added by all primary production factors—land, labor, and capital, as in GDP or GAP
IMPLAN	IMpact Analysis for PLANing—a proprietary computer program for predicting impact change
Imports	Products originating from outside a given area purchased by area resident businesses, households, and governments
Industry output	Product produced by an industry—a good or a service—shipped to markets outside a given area
Industry transactions	Intermediate or primary input sales and purchases of industry output
Input-output table	Value added payments, as well as final demand purchases of industry output. It provides a framework for deriving individual industry employment multiplier values.
Institution	Established procedure or practice or an important organization.
Intermediate input	Use of commodity output as a production input in economic activity
Intermediate demand	Purchases of commodity output for use in productive economic activity
Labor force	Population of persons 15 years and older employed or seeking employment
Lower Egypt	Damietta, Dakahlia, Sharkia, Kalyoubia, Kafr-El-Sheikh, Gharbia, Menoufia, Behera, and Ismailia.
Middle Egypt	Giza, Beni Suef, Fayoum, Menia,
Primary input	Remunerative purchases of land, labor, and capital services for output-producing economic activity
Multiplier	Ratio with a value of 1.0 or greater that represents the predicted employment change associated with a given change in final commodity demand and output changes.
Output per worker	A measure of labor productivity at the site of production.
Plant size	mall food processing plants have less than 50 employees; medium-size plants have 50 to 499 employees; large plants have 500 or more employees.
Underemployed	Persons employed less than full-time in total employment
Unemployed	Persons 15 years and older not employed but seeking employment.
Upper Egypt	Assuit, Suhag, Qena, Aswan, Luxor
Urban Egypt	Cairo, Alexandria, Port Said, Suez
Value added	Total contribution of primary production inputs, that is, labor and capital, to gross domestic product. It includes labor earnings, consisting of proprietor income and employee compensation. It includes, also, other earnings, consisting of property income and indirect business taxes.

Executive Summary

The objective of Phase 1 is to provide the U. S. Agency for International Development (USAID) and the Government of Egypt (GOE) with an inventory of the data, tools, and techniques needed for estimating the employment opportunities created from demand and related output changes in the Egyptian food-processing sector. The estimated values may be summarized as the employment multiplier effects of commodity demand and output changes. This report addresses its contribution to a better understanding of the nature and consequences of the various linkages within the food processing sectors in Egypt and the related data requirements.

A key source for the needed data is Egypt's Data Access and Transmission Activity (DATA) Project, which has been supporting the efforts of the Ministry of Planning towards the development of the National accounting system including the development of Egypt's 32 sector input and output (I-O) tables. An expanded I-O model for Egypt model would establish its own data classes, based on the available data series. While data gaps exist, available data are sufficient to install the following:

- A 32-sector Egypt IMPLAN model to generate employment multipliers for the food processing and related agriculture sectors and,
- A multi-sector Egypt IMPLAN-SAM model to generate the tables of economic variables patterned after those listed elsewhere in this report. The report presents a detailed discussion of the data requirements and findings of the proposed IMPLAN-SAM models for Egypt.

Food Processing in Egyptian Economy

First, a summary of the food processing economy in Egypt: The total market value of Egypt's food processing industry output in 2000 was 37.1 billion Egyptian pounds, of which 28 billion Egyptian pounds was disbursed to households, 1.4 billion Egyptian pounds to other institutions in Egypt, and 2.3 billion Egyptian pounds exported. Exports of food processed products accounted for less than 14 percent of the total final demand. Shipments to other industries in Egypt accounted for 5.4 billion Egyptian pounds.

Food processing employment, reached 282.2 thousand in 1995, is one of the larger industries in Egypt's manufacturing sector. Food processing is part of the manufacturing and petroleum sector and it counted for 11.6% of the employment in that sector. The projected new jobs from 2001-2995 in the Petroleum and Tourism & Hotels are about 47% of the total projected employment demand for the economy. The bulk of the demand—two-thirds —is for unskilled labor. Technicians account for the highest share of skilled labor demand, followed by services and sales.

Data on the nation-wide distribution of plants and workers in the food-processing sector, by sub-sector and Governorate help locate the dominant food processing industry clusters. Overall, the food-processing industry is characterized by small numbers of workers per facility managed largely as household operations.

The area location of food processing employment correlates closely with the spatial distribution of the employed work force, most closely with projected labor market demand. Although food processing is an important part of the fastest growing sector in Egypt's economy, food imports also are increasing as

Egypt's population grows and the productivity of the food processing sector lags behind its competitors, particularly Australia and the U. S., not simply in global markets, but, also, domestic markets.

Location of food processing sector clusters in or near major metropolitan areas with the most promising growth in jobs and income is consistent with efforts to improve the sector's productivity and its competitive position in local and global markets. The productivity improving efforts in food processing are not necessarily in opposition to improvements in the productivity of the agricultural sectors that provide the food processors with livestock and horticultural products. Additional resources are required, however, to improve access to markets on the part of both the food processors and the agricultural producers, oftentimes in the face of large agricultural subsidies offered in competing countries that lead to sharply reduced market prices for agricultural products.

The metropolitan area location preference for food-processing facilities is further documented in the supporting statistical background. Intertwined with the commodity flows are the changing requirements in processing facility size, services, and access to suppliers and consumers for succeeding in the increasingly competitive agricultural and food products markets. Tracking the numbers showing these changing relationships provides important benefits, like early discovery of bottlenecks and constraints in the flow of agricultural product to processing facilities and ultimately to local and global markets. Changing levels of commodity-specific imports and exports, for example, are indicators of the changing competitive position of local agricultural producers and food processors. These early indicators serve as parts of a continuously operating early warning system for anticipating difficulties ahead and devising ways of dealing with them.

Alternative Approaches

Alternative approaches to estimating employment multipliers for food-processing in Egypt include the use of field surveys for primary data on product outputs, prices paid, cost of production inputs, value of equipment and facilities used in production, plant labor costs or cost of hired workers for the food processing industry as well as agriculture. This information would show, moreover, the intermediate and primary input requirements for food processing and, also, the primary input requirements for agriculture. Again, increases in the final demand for food products convert to increases in income payments to primary inputs for food processing and agriculture that convert, finally, into increases in the demand for food products. These increases in food product purchases are the new "multiplier" effects of the initial increase in food product demand.

The task of estimating employment "multipliers" is accompanied by the important task, also, of evaluating the employment changes predicted by these multipliers. The employment multipliers take into account the workings of the backward and forward linkages from food processing to agricultural production points (farm gates) and marketing as well as the direct linkages to the labor and capital resources engaged in the food processing activities.

Model applications refer to the various results forthcoming from the alternative area modeling approaches. These results include benchmarking of key economic indicators, forecasts of future levels of these indicators, estimates of employment and income multiplier values, and economic impact assessments.

Benchmarking in the proposed framework, starting with 2000/2001 as a base year, is an integral part of the Egypt I-O modeling system table and its derivatives variables. This includes the estimates of industry output and employment as well as output per worker, based on locally-derived full-time equivalent (FTE) labor input measures. This is an integral part of the expanded modeling system.

Forecasting in the proposed new framework refers to the extension of key indicators to future periods. These key indicators include exports to foreign countries and to domestic markets in the rest of Egypt for each of the 32 industries, including sub-industries among the three industries that are the focus of this report. Base year forecasts represent the most likely levels of future demand for products of the food-processing sector. These data, which are currently available for horticultural and livestock products, are essentially supply-based forecasts. Needed, also, are demand-based forecasts that take into account the competitive position of locally processed food products in local and export markets, that is, market destinations outside the given supply area.

Neither benchmarking nor forecasts of key economic indicators alone yield measures of the impact of changes in these variables on employment and income. Use of employment and income multipliers provides the added capability for measuring the impact of the predicted changes in key economic indicators that are associated with changes in the demand for industry output levels of primary inputs, particularly labor earnings and employment.

IMPLAN Modeling Approach for Food Processing

The IMPLAN (IMpact analysis for PLANning) modeling system extends the uses of input-output tables by introducing a Social Accounting Matrix (SAM) that shows the distribution of value added by household income, business ownership, and other differentiating variables. IMPLAN, while confined in past years to U.S. county-level and state-level studies, is now available for other countries. It can, for example, convert the Egypt I-O to its own format, including an Egypt SAM. To provide the added feature, requires estimates of selected control values for Egypt's economy.

Surveys of farms, households, food processing plants, and other businesses are needed to identify information on income sources and linkages to expenditures in order to augment this data contained in the I-O table. Secondary data sources are needed to provide estimates of marketing margins for each commodity group. Households of different income classes have different patterns of employment, earnings, and spending. Thus, an increase in the demand for food processing converts to an increase in employment of workers with varying skills in households of varying income levels and patterns of spending that contribute to varying direct and indirect multiplier impacts on the local economy, as well as varying increases in commodity output. The commodity output increases are sustained by increases in agricultural production in the supply areas of the food processing plants. The data inputs to IMPLAN-SAM are converted into the different measures of direct and indirect effects of the initial demand increases for food products.

Description of IMPLAN - SAM System

The IMPLAN-SAM modeling system has nine "blocks" of activity centers with multiple classes in each activity. Each of the nine "blocks" can be adapted to the household and government configurations

applicable to available databases in Egypt, provided the number of classes and types of transaction are not more than the limits listed.

Data needs vary greatly for the different approaches and their tools and applications. Data needs for benchmarking and forecasting of key economic indicators are replicated in impact assessments. In addition, preparation of an I-O table requires a computer capability for balancing industry outputs and inputs, industry by industry. Impact assessments based on the use of an I-O model also require data on the focus of the impact assessments, for example, the contributions of various program expenditures on area employment and income.

A framework for estimating the direct employment and income indicators for processed food, horticultural, and livestock (buffaloes and milk cows) products follows from the discussion of alternative modeling approaches, tools and applications, and data needs and gaps. This framework includes Egypt's 2000/2001 I-O table and its extensions in model construction and application.

Extensions in model construction include expansion of the number of sub-industries in each of the three major industry groups, based on recommendation of an appropriate expert panel. An initial approach would start with estimates of total output, input requirements, and output disbursements to intermediate demand, local final demand, and exports for each sub-industry. These estimates would be adjusted to their corresponding control totals for each of the three major industry groups

IMPLAN – SAM approach for Assessing Economic Growth Results

The IMPLAN-Sam approach can be applied to show both local and national economic growth impacts by household income class, business ownership, and other differing variables. This requires, however, an augmentation of Egypt I-O tables to create a unique Egypt IMPLA-SAM system for Egypt and its regions. This added feature makes possible IMPLAN-SAM estimates of selected control values for Egyptian economy, including inter-institutional transfers of value added such as employee compensation, proprietor's income, rent, business transfers, dividends, and interest payments to various institutions (businesses, households, government).

Estimates of selected or all economic growth indicators relating to So-16 Intermediate Results (IRs) for any past time period from the designated base year (for example, 2000-2001 for which I-O table exists, which can be forecasted to 2002-2003 to reflect the progress to date) can be used for impact assessment and predicting the inter-sector effects resulting from changes in selected economic growth indicators of our interest. Similarly, forecasted values for any target year built into Egypt IMPLAN-SAM model will also help assess potential impacts of these forecasted indicators on local income and employment as well as the rest of the economy.

While the Phase 2 project addresses the technique for estimating direct employment and income multipliers, estimation of the total multiplier effects (direct + indirect + induced multiplier effects) resulting from economic growth results should be considered. The IMPLAN-SAM modeling technique lends itself for this type of impact analysis.

CHAPTER 1

Introduction

This report brings together the data sources and tools for estimating and benchmarking the key indicators of the food processing economy and its related activities in Egypt's regions. We focus on the direct employment multiplier for food processing and the backward-linked crop and livestock agriculture sectors at the farm gate level as well as the forward-linked points of disposition of processed products and services. We address also the benchmarking of the forward-linked infrastructure of transportation, trade, finance and other services required in moving processed food and agricultural products from place of production to intermediate and final markets.

Report Objective

The objective of this work is to provide USAID and the GOE with estimates of the employment created from changes in output in the Egyptian food-processing sector. These effects may be summarized as the employment multiplier effects. This work is expected to contribute to a better understanding of the nature of and linkages within the food-processing sectors in Egypt. The food-processing sector includes processed livestock and horticulture products.

The proposed work on building the analytical and statistical capabilities for estimating the employment multiplier for an expanding food-processing sector focuses on its uses in monitoring the varied effects of changes in supply sources and market demands of this sector. Employment multipliers are the technical tools for measuring the impact of demand changes on both the agricultural and food processing sectors. The regional implications of demand changes for exports and imports of livestock, horticultural, dairy, and other food products can be measured and evaluated with these technical tools. The local and national economic impact of changes in the productivity of the farms and factories producing these products also can be measured and evaluated.

The geographic separation of the agricultural production from its processing into food products presents formidable challenges and opportunities for bringing closer together these two sets of activities. These efforts involve more than simply the infrastructure of transportation, livestock procurement, and food marketing. They involve, also, the resources and capabilities for competing successfully in the various commodity markets with many and varied participants, including those from Australia and the United States. These markets relate largely to Egypt’s major metropolitan areas and their rapidly growing clusters of industry and population that are increasingly dependent on imports of agricultural and food products.

A further separation occurs between the food processing and related industry clusters, including the farm sources of livestock, milk, and horticultural products, and the areas of poverty that are most distant from the growing job opportunities. The principal beneficiaries of the growth in demand for food products are currently in the metropolitan areas.

The regional delineation of agricultural and food processing activities is an important step in assessing the varied impacts of changes in the demand for food processing on the agricultural regions. We focus our study on three regions of Egypt: Upper Egypt, Middle Egypt, and Lower Egypt, along with four metropolitan areas—Alexandria, Cairo, Port Said, and Suez.

Background[1]

The Agricultural Policy Reform Program (APRP), begun in 1996 to assist the Government of Egypt (GOE) in developing, implementing, monitoring and evaluating its policy reform program in the agricultural sector. This program implemented a study to estimate an employment "multiplier" for the agriculture sector and agribusiness system (Mellor 2002 and Sarah 2002). The multiplier estimates provided an essential tool for allocating resources and making policy decisions in economic development, particularly in rural areas. A new USAID project, Agricultural Exports and Rural Incomes (AERI) calls for generating employment and raising incomes in rural areas with a focus on the potential contribution of livestock and horticulture production as an important source of job creation. USAID in conjunction with the Ministry of Agriculture would like to estimate the employment "multiplier" for food processing (livestock and horticulture) for Egypt.

Another USAID-funded project with the Ministry of Agriculture (The Agricultural Technology Utilization and Transfer project) focused on improving horticultural production and post-harvest and marketing technologies. The ATUT project was completed in 2002 and concentrated on the following horticultural crops: grapes, oranges, strawberries, cut flowers, green beans, melons, mangoes, sweet potatoes, artichokes, sweet pepper, cherry and cluster tomatoes, garlic, spring onions, new potatoes and stone fruits.

Horticulture and livestock are important sub-sectors of agriculture in Egypt. Agriculture accounted for 16.3 percent of the GDP in 2001-02 (Central Bank of Egypt, 2003), and the projected relative shares of horticulture and livestock within agriculture for 2006-07 are 35% and 20% respectively (Mellor and Gavian, 1999). Horticultural growth is driven by the demand for horticultural products to meet the domestic and export demand. A major share of the horticultural products is consumed domestically while export demand is assumed to grow at a constant rate of 10 percent per annum (Mellor & Gavian, 1999). Both horticultural and livestock demand are based on population growth and the marginal propensity to consume, with income elasticity of 0.67 and 0.77 respectively (Bouis et al, 1999).

Most livestock production is relatively intensive and concentrated on smaller, subsistence-oriented farms in the irrigated cropping region. They predominate for cattle, buffalo and small ruminants and produce 80% of all beef, 90% of all milk and dairy products, and 70% of all mutton. Livestock comprise of cattle, buffalo, sheep and goat, while a wide variety of poultry are kept on small farms, including chickens, pigeons, ducks, turkeys and geese, along with rabbits. The estimated income elasticity of demand for poultry meat is 1.13, while it is 0.8 for locally produced fresh red meat. About 68% of the population considers frozen meat a necessary substitute for higher priced fresh meat (Boer, et al, 1996)

The Data Access and Transmission Activity (DATA) project, funded by USAID, has been assisting the Ministry of Planning in the development of national accounts for Egypt. As part of this project, a 32-sector input output (I-O) table has been constructed for 2000-2001, which will be the main source for examining the relationship between the sectors and estimating the income and employment multipliers for the horticultural and livestock processing sectors.

[1] From Statement of Work, July 9, 2003.

CHAPTER 2

Food Processing and Rural Income and Employment

Egypt's employed labor force of 17.9 million in 2001/02 was 27.1 percent of its total population of 66 million. [2] The low proportion of total population in the labor force is the result of having a large proportion of the population less than 15 years of age and a small proportion of women employed or seeking employment. Agriculture accounted for 28 percent, or five million, of the total employed labor force[3], while food processing accounts for 10.5 percent (215 thousand) of the manufacturing sector employment.

The food processing industry sector is part of an inter-related cluster of local industries providing intermediate and value-added inputs for the local food processing plants.[4] The total market value of Egypt's food processing industry output in 2000 was 37.1 billion pounds, of which 28 billion pounds was disbursed to households, 1.4 billion pounds to other institutions in Egypt, and 2.3 billion pounds exported. Exports of food processed products accounted for less than 14 percent of the total final demand. Shipments of processed food products to, that is, demand by, other industries in Egypt accounted for 5.4 billion pounds (Egypt I-O Table).

Food Processing in Relation to the Total Economic Activity:

Food processing employment, which reached 282.2 thousand in 1995, is one of the largest industries in Egypt's manufacturing sector, accounting for about 20 percent of the total manufacturing employment (SEAM, 1996). Egypt's manufacturing and petroleum sector account for 11.6 percent of the total national employment which is about the same as in the trade sector and less than half of personal services in 1998 (Radwan, 2003). Two-thirds of the projected change in employment demand from 2001-2005 is in the industry & petroleum and tourism & hotel sectors. Two-thirds of the employment demand is for unskilled labor (Radwan, 2003). Technicians account for the highest share of labor demand among skilled workers, followed by services and sales.

[2] Ministry of Planning, 2001/2002
[3] CAPMAS, 2000
[4] Definitions of plant size and other technical terms are included in the preface section, page ii.

Table 2-1 Employment (1998) and Change in Market Demand for Workers (2001-2005)

Sector	Employed Thousand	Employed Percent	Change in Market Demand Thousand	Change in Market Demand Percent
Agriculture	**8,993**	**42.0**	**65**	**4.6**
Mining	**41**	**0.2**	**7**	**0.5**
Industry & Petroleum	**2,494**	**11.6**	**661**	**46.6**
Electricity	**149**	**0.7**	**3**	**0.2**
Building & Construction	**1,098**	**5.1**	**87**	**6.1**
Transportation	**938**	**4.4**	**50**	**3.5**
Trade	**2,479**	**11.6**	**104**	**7.3**
Financial Services	**327**	**1.5**	**12**	**0.8**
Tourism & Hotels			**275**	**19.4**
Business Services			**11**	**0.8**
Personal Services	**4,900**	**22.9**	**81**	**5.7**
Education			**33**	**2.3**
Health			**32**	**2.3**
Total	**21,416**	**100.0**	**1,419**	**100.0**

Source: Employment: CAPMAS, Labor Force Sample Survey 1998; Labor Market Demand: Radwan, The Demand Side in Egyptian Labor Markets, 2003.

Nation-wide distribution of plants and workers in the food-processing sector, by sub-sector and Governorate, are reported elsewhere (SEAM, 1996). These data help locate the dominant food processing industry clusters, and also provide information on area-to-area differences in plant size distributions. Overall, the food processing industry is characterized by small numbers of workers per facility (Table 2-2) managed largely as household operations (Gavian et al, 2002)

Table 2-2 Food Processing Employment and Facilities, by Type of Product, 1995.

Type of product	Employment Number	Employment %	Facilities Number	Facilities %	Average Emp. per Facility
Meat and fish	**36,091**	**12.0**	**1,417**	**3.7**	**25.5**
Dairy	**14,586**	**4.9**	**3,334**	**8.8**	**4.4**
Grain milling, starch, animal fodder	**68,980**	**23.0**	**14,079**	**37.2**	**4.9**
Other foods*	**163,181**	**54.3**	**18,842**	**49.8**	**8.7**
Beverages	**17,617**	**5.9**	**136**	**0.4**	**129.5**
Total	**300,455**	**100.0**	**37,805**	**100.0**	**7.9**

* Canned and preserved fruits, and vegetables, sugar extraction and refining, and other products.
Source: SEAM Project, 1996

The area location of food processing employment correlates closely with the spatial distribution of the employed work force, most closely with projected change in labor market demand (Table 2-2). Although food processing is an important part of the fastest growing sector in Egypt's economy, food imports also are increasing as Egypt's population increases and the productivity of the food processing sector lags behind its competitors, not simply in global markets, but, also, domestic markets. Thus, food-processing plants are closer to the final markets for food products than their farm supply sources of livestock, dairy, and horticultural products. These facilities also are quite distant from the largest concentrations of unemployed and underemployed rural labor force. Hence, growth in the food

processing sector is several stages removed from the creation of job opportunities in the areas of the highest concentrations of rural poverty, as in Upper Egypt, except for the rural areas served by successful and active backward linkages of the food processing economy to its regional supply sources.

Table 2-3 Ranking of Food Processing Employment (1996)and Projected Employment (2001-2005)

Governorate	Region	Food Proc Employment		Labor Force		Unemployment		Change in Market Demand (2001-2005)	
		Thousand	%	Thousand	%	Thousand	%	Thousand	%
Top 5:									
Alexandria	Urban	46.4	15.5	1,133	6	43	2.9	216	15.2
Cairo	Urban	38.0	12.6	2,426	12.8	117	7.8	492	34.7
Giza	Middle	37.4	12.5	1,337	7.1	52	3.5	248	17.5
Sharkiya	Lower	23.2	7.7	1,332	7.1	127	8.5	72	5.1
Gharbeyia	Lower	17.1	5.7	1,214	6.4	118	7.9	25	1.8
Total (Top 5)		162.1	54	7,442	39.4	457	30.7	1,053	74.2
Next 5:									
Dakahilya	Lower	16.0	5.3	1,458	7.7	174	11.7	29	2
Kalyobiya	Lower	16.0	5.3	1,075	5.7	68	4.5	44	3.1
Monofiya	Lower	13.9	4.6	1,024	5.4	55	3.7	24	1.7
Qena	Upper	13.9	4.6	546	2.9	54	3.6	8	0.6
Beheira	Lower	11.8	3.9	1,270	6.7	167	11.2	21	1.5
Total (Next 5)		71.6	23.8	5,373	28.4	518	34.7	126	8.9
Remaining 17:									
Sohag	Upper	8.9	3	824	4.4	81	5.5	7	0.5
Kafr El Sheikh	Lower	8.2	2.7	710	3.8	73	4.9	14	1
Minia	Middle	7.4	2.5	1,157	6.1	81	5.4	6	0.4
Aswan	Upper	6.8	2.3	262	1.4	50	3.3	5	0.4
Aslut	Upper	5.9	2	719	3.8	79	5.3	7	0.5
Beni Suef	Middle	5.4	1.8	629	3.3	30	2	4	0.3
Fayoum	Middle	5.3	1.8	550	2.9	24	1.6	15	1.1
Damietta	Lower	4.9	1.6	293	1.6	21	1.4	28	2
Ismailiya	Lower	4.4	1.5	231	1.2	19	1.2	54	3.8
Suez	Urban	2.7	0.9	150	0.8	16	1.1	34	2.4
Port Said	Urban	2.4	0.8	187	1	8	0.5	45	3.2
Red Sea	Frontier	0.8	0.3	72	0.4	12	0.8	12	0.8
Luxor	Upper	0.7	0.2	92	0.5	2	0.1	2	0.1
Matrouh	Frontier	0.6	0.2	64	0.3	5	0.3	4	0.3
New Valley	Frontier	0.6	0.2	57	0.3	10	0.6	2	0.1
South Sinai	Frontier	0.6	0.2	83	0.4	6	0.4	2	0.1
Total (17)		65.6	21.8	6,080	32.2	516	34.6	241	17
Total (27)		300.5	100	18,891	100	1,491	100	1,419	100

Source: SEAM, 1996; Radwan, 2003

Location of food processing sector clusters in or near major metropolitan areas with the most promising growth in jobs and income is consistent with efforts to improve the sector's productivity and its competitive position in local and global markets. The productivity improving efforts in food processing are not necessarily in opposition to improvements in the productivity of the agricultural sectors that provide the food processors with livestock and horticultural products. Both must occur if Egypt's food processing sector is to succeed in today's rapidly changing market economy. Additional resources are

required to improve access to markets on the part of both the food processors and the agricultural producers.

Table 2-4 illustrates the wide variety of food processors in Egypt's agriculture dependent economy. Each type of processor has its own special concerns in improving productivity by increasing the size of facility to a scale large enough to support specialized manufacturing and marketing services.

Table 2-4 Agricultural Processing Companies Classified by Product/ Service Type

Code	Product Categories	Number
A	Frozen Fruits & Vegetables	46
B	Dehydrated Fruits and Vegetables	38
C	Beverages/Juice/Concentrates/ Purees	71
D	Jams and Preserves	29
E	Dairy Products	53
F	Processed Meat Products	20
G	Processed Fish Products	15
H	Processed Poultry Products	30
I	Biscuits, Confectionery and Pastry Products	47
J	Bagged, Canned and Glass Packed Products (value added)	17
K	Pickled Fruits and Vegetables	34
L	Pickled Olives	23
M	Processed Tomato	29
N	Dry Blends, Soup Mixes, Bouillon and Dry Sauce Mixes	20
O	Baby Food	5
P	Edible Oils other than olive oil	16
Q	Olive Oil	14
R	Essential and Medicinal Oils, Flavors and Fragrances	28
S	Pasta Products	14
T	Herbs and Spices	43
U	Fresh Fruits and Vegetables	84
V	Organic, Kosher and Specialty Foods	24
W	Condiments	30
X	Other Selected Items	58

Source: Directory of Food Processing Companies, Service Firms and Associations, Agriculture-Led Export Business (ALEB) – A USAID Funded Project

While a full range of services is most readily available in or near Egypt's large metropolitan centers, services associated with the transportation from farm gates to processing centers present a formidable challenge (Table 2-5). The essential infrastructure of food processing thus includes the backward linkages to the farm gates (points of livestock and horticultural production) that face even greater challenges than before in reaching the processing facilities in the more distant metropolitan areas.

Table 2-5 List of Services Associated with Food Processing Industry[5]

Service	Number of Companies
1. Advertising	40
2. Transport services	28
3. Information technology	14
4. Legal Representation	4
5. Consultants	65
6. Agents and Brokers	29
7. Packaging Materials	70
8. Packaging and Printing	6
9. Packaging equipment	22
10. Packaging Facilities and stations	6
11. Phytosanitary/ Sanitation Products	23
12. Pest control	13
13. Production (field) equipment	2
14. Post harvest Equipment	1
15. Processing Machinery	42
16. Cold Storage	33
17. Bar Coding	4
18. Food Additives	17
19. Management and business training	24
20. Financial services and banks	36
21. Instrumentation and Lab equipment	1
22. Certification, Inspection and Quality control	16
23. Custom Clearance	7
24. Hotels	16
25. Fertilizers	14
26. Pesticides	9
27. Seeds	11
28. Printing	27
29. Industrial Automation	6
30. Export/Import Services	22
31. Other Services	52

Source: Directory of Food Processing Companies, Service Firms and Associations, Agriculture-Led Export Business (ALEB) – A USAID Project

While the importation of quantities of frozen meat as well as the processed frozen meat for consumption have been declining from 1995 to 2000 (Table 2-6), the importation of mutton as well as dairy products in 2001 constitutes a substantial quantity (Table 2-7). The import numbers must be compared with the numbers on exports of agricultural and food products.[6] These comparisons show a large net balance of imports over exports. This trade imbalance remains a continuing challenge to Egypt's agricultural and food processing industries. Export numbers are available from the DATA project cited earlier.

[5] This list represents a sample of food processing service companies that are member companies in the Agriculture-Led Business Project (ALEB) project that can be used in surveying the data according to data gaps (please refer to Chapter 5 of this Report). The employment multiplier study can depend on the above categorization in addition to Ministry of Industry and General Organization for Industrialization (GOFI) categories of food processing related services in measuring the multiplier forward effect.

[6] Sub-sector code definitions and type of products for the food processing sector are presented in the 1996 SEAM Food Processing Sector Report, Tables 2.2 and 2.3.

Table 2-6 Imported Red Meat and Meat Products, 1995-2000 (Tons)

Year	Frozen meat for consumption	Processed frozen meat	Frozen young buffalo meat(betello)	Preserved meat
1995	87660	30628	NA*	2413
1996	60198	28856	440	2821
1997	72733	50417	NA	1046
1998	75365	40703	NA	3013
1999	11158	39923	675	2104
2000	11714	21172	1552	3930

** NA: Not available*
Source MALR, GAVS

Table 2-7 Imported Meat and Milk and Milk Processed Products, 2001 (Tons)

MUTTON	35,388
LIVER AND KIDNEYS	23,150
PRESERVED FOOD	3,131
MILK POWDER	38,920
INFANT MILK	2,625
FAT FREE MILK	10,804
CHEESE	16,901
BUTTER	35,952
GHEE	3,774
CREAM	1,935

Source MALR, GAVS

Food Processing and Rural Employment

The linkages between the production, processing, and final disposition of horticultural and livestock products are presented in graphical form in Figures 2-1 and Figure. Intertwined with the management are the changing requirements in facility size, services, and access to suppliers and consumers for succeeding in the increasingly competitive agricultural and food products markets. Tracking the numbers showing these changing relationships has important benefits, like early discovery of important bottlenecks and constraints in the flow of agricultural product to processing facilities and ultimately to local and global markets. Changing levels of commodity-specific imports and exports, for example, are indicators of the changing competitive position of local agricultural producers and food processors. These early indicators would serve as parts of a continuously operating monitoring system for tracking difficulties ahead and, also, successes in meeting these difficulties.

Figure 2-1 Production, Processing and Marketing of Horticultural Commodities

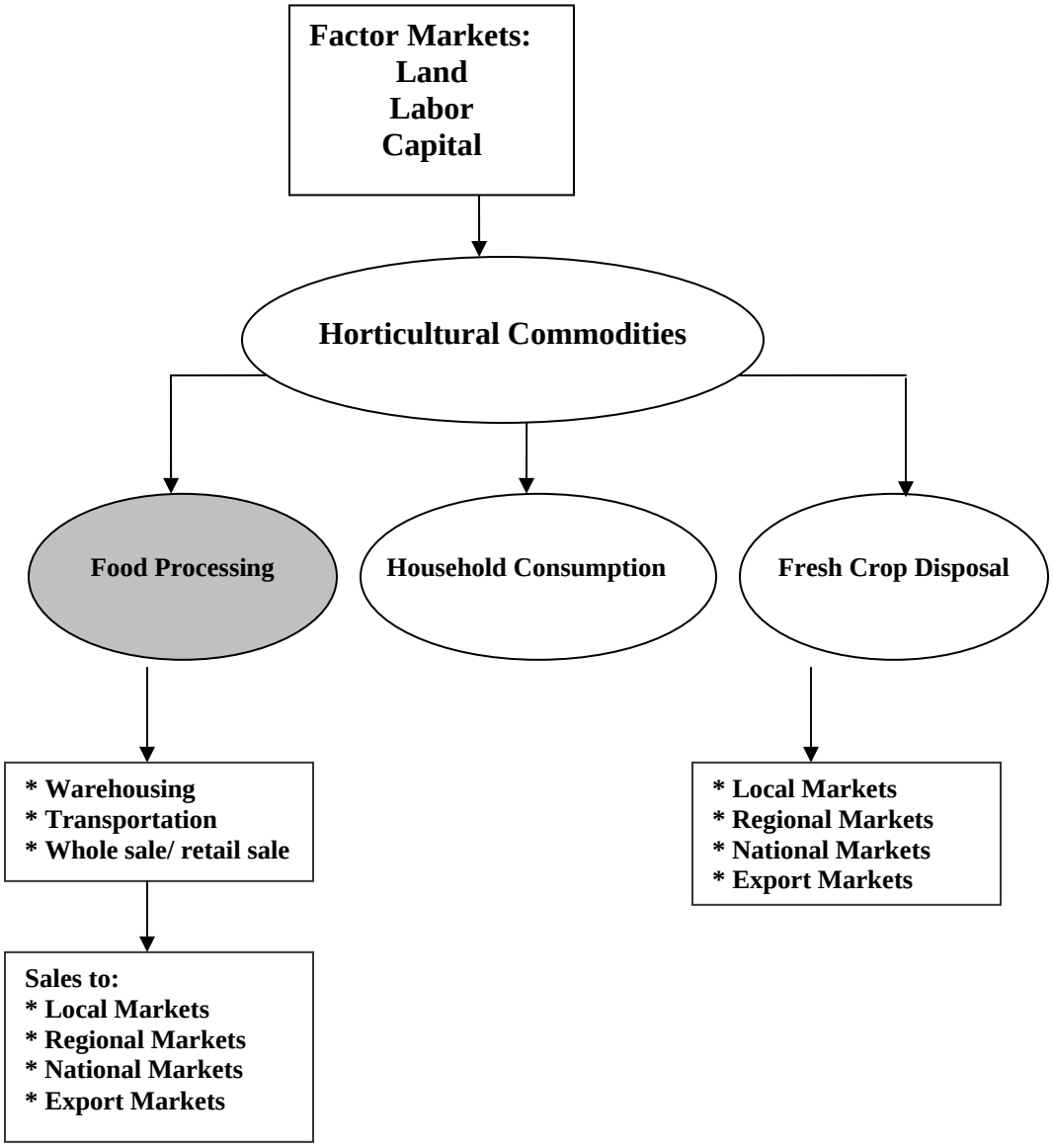
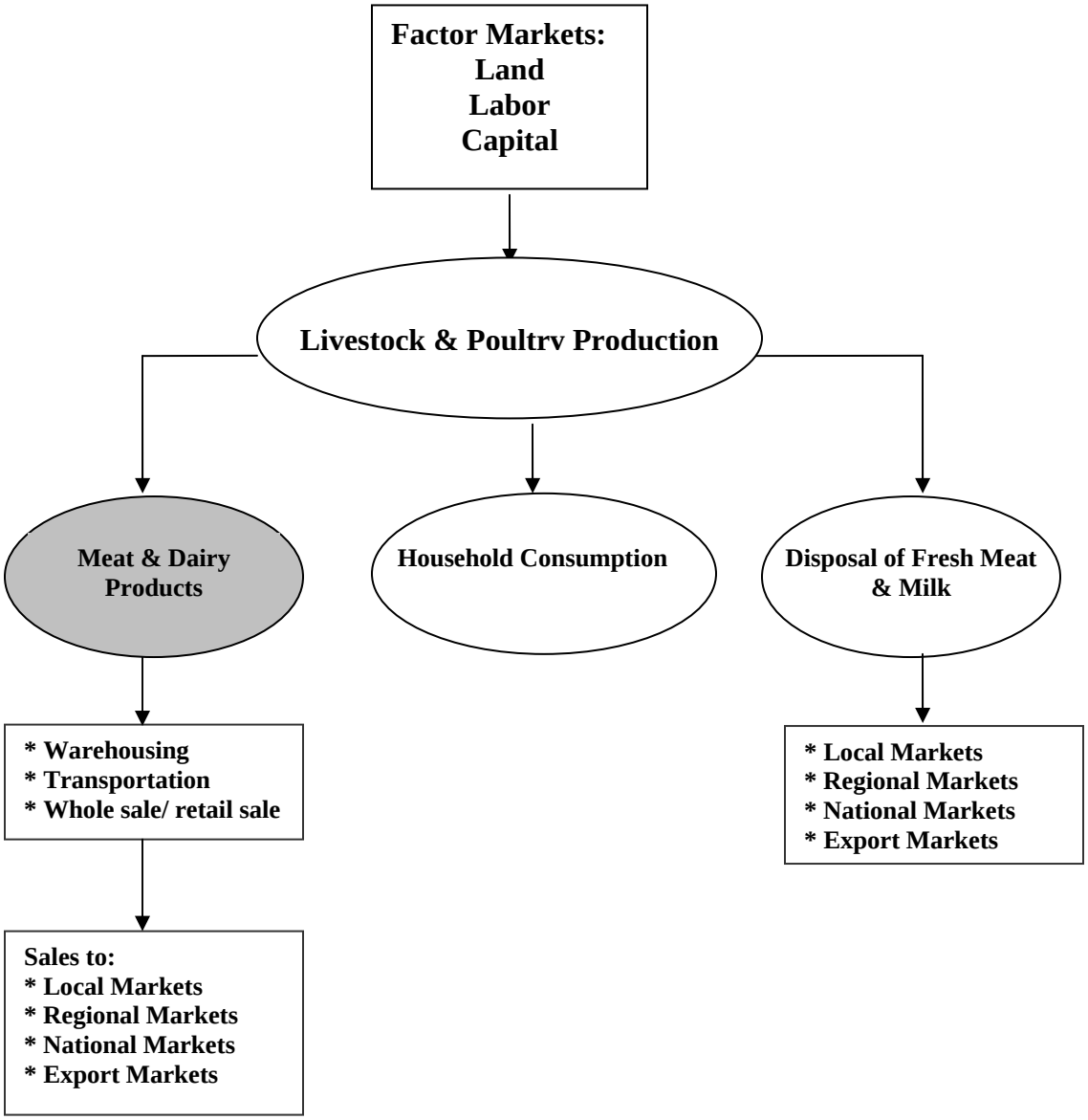


Figure 2-2

Production, Processing and Marketing of Livestock and Poultry



The task of estimating employment "multipliers" is accompanied by the important task, also, of evaluating the employment changes predicted by these multipliers. The employment multipliers take into account the workings of the backward linkages from food processing to agricultural production as well as the direct linkages to the labor and capital resources engaged in the food processing activities.

CHAPTER 3

Alternative Approaches in Impact Assessment

Alternative modeling approaches refer to the different ways of systematically organizing data and information for analytical and forecasting purposes. Each approach includes field surveys to acquire primary data on product outputs, prices paid, cost of production inputs, value of equipment and facilities used in production, plant labor costs and cost of hired workers in the food processing industry as well as related agriculture sectors. This information would show the intermediate input requirements of product inputs from other industries and the primary input requirements of land, labor, and capital. Increases in the final demand for food products usually transforms into increases in employment and income payments to primary inputs resulting from increased demand for horticultural and livestock processed food. These increases in processed food product purchases are "direct multiplier" effects of the initial increase in processed food product demand. The direct multiplier effect includes both the services associated with the movement of products from farm gates to the processing units (backward effects) and the movement of processed products to market outlets, both domestic and export (forward effects).

There are three types of multipliers: direct multiplier, indirect multiplier and induced multiplier. Simply stated, an increase in the final demand for processed food will result in an increase in the output of that commodity, as processors react to meet the increased demand. This is the "direct" multiplier effect. As these processors increase their output, there will be an increase in demand on their suppliers such as horticultural commodity and live stock producers. As these producers react to an increased demand, they produce more outputs creating demand on the needed inputs also. This is known as an "indirect" multiplier effect. As a result of the direct and indirect multiplier effects, the level of household income throughout the economy will increase, resulting in increased employment and income, a portion of this increased income will be spent on final goods and services creating more jobs and income. This effect is known as an "induced" effect.

Alternative Modeling Systems

Estimating the impact of change includes input-output modeling, econometric modeling, and field surveys. Input-output modeling based on the use of input-output tables is one approach. An input-output (I-O) model of Egypt (see, Appendix 1) shows the inter-industry transactions, final demand purchases, and final (value added) payments of all industries in Egypt. Multiplier estimation is a special contribution of input-output modeling.

Econometric modeling based on time series data that engages the use of statistical theory and methods in fitting the data series to one or more of several statistics formats. Econometric modeling provides an additional approach to measuring area employment and income changes associated with changes in the final demands for area products. This approach is appropriate when there is lack of appropriate time series.

Multiplier estimation refers to the calculation of the total multiplier, which is the sum of the direct effect multiplier value and the indirect effect multiplier value. The direct multiplier is 1.0, the indirect multiplier is some number larger than zero, and the total multiplier is the sum of the direct and indirect multiplier values. Only direct multiplier estimates for 32 industries are currently available from the Egypt 2000/2001 I-O table. Impact assessment refers to the application of the direct and indirect multipliers in estimating changes in key economic indicators associated with a given change in the final demand for an industry's output or a targeted versus reported change in a given SO16 program. The indirect multiplier adds the contribution of the inter-industry linkages and the associated primary input payments to the direct employment change. Impact assessments are limited currently to direct impacts of demand changes on total output and value added.

The backward and forward linkages for the food processing industry are presented in aggregate form in Egypt's I-O table for 2000/2001. With the tools we now have available to us, however, we can handle much greater detail for the three industry groups in the individual industry analyses than shown in the current I-O table. This table is simply a summary database for showing the inter-industry linkages that allow us to make the impact assessments, including preparation of social and economic accounts, from a total area perspective.

Tracking the I-O based employment multiplier for food processing and related crop and livestock agriculture provides one way, perhaps the most effective way, of predicting the contributions of these industries to job and income creation in Egypt. The extended applications of the Egypt IMPLAN-SAM modeling system include impact assessments by type of jobs in each industry, the added values they contribute to Egypt's economy, and the changing levels of imports and exports.

Model Applications

Model applications refer to the various results forthcoming from the alternative area modeling approaches.[7] These results include benchmarking of key economic indicators, forecasts of future levels of these indicators, estimates of employment and income multiplier values, and economic impact assessments.

Benchmarking in the proposed framework is an integral part of the Egypt I-O modeling system table and its derivatives variables. This includes the estimates of industry output and employment as well output per worker, based on locally-derived full-time equivalent (FTE) labor input measures, which are an integral part of the expanded modeling system.

Forecasting in the proposed new framework refers to the extension of key indicators to future periods. These key indicators include exports to foreign countries and to domestic markets in the rest of Egypt for each of the 32 industries, including sub-industries among the three industries that are the focus of this report. Base year estimates represent the current levels of demand for products of the food-processing sector. These data, which are currently available for all horticultural and livestock products, are essentially supply-based estimates. Needed, also, are demand-based estimates that take into account the competitive position of locally processed food products in local and export markets, that is, market destinations outside the given supply area.

[7] Wilbur Maki and Richard Lichty, Chapter 6, Forecasting, \, and Chapter 7, Social e\Economic Accounts, in Urban Regional Economics, Iowa State University Press, 2000.

Neither benchmarking nor forecasts of key economic indicators alone yield measures of the impact of changes in these variables on employment and income. Use of employment and income multipliers provides the added capability for measuring the impact of forecast or given changes in key economic indicators that are associated with changes in the demand for industry output levels of primary inputs, particularly labor earnings and employment.

Egypt's Product and Income Accounts

Table 3-1 illustrates the aggregate structure of Egypt's product and income accounts for the 2000/2001 fiscal year and the major sector values, in million Egyptian pounds. It represents the estimated income payments made by all economic activities and their distribution among all institutions. This scheme likewise provides additional details concerning the flow of imports and exports to and from an area. The rows in the following show the disbursement of product, columns show the income payments for these disbursements. These accounts typically cover economic activity in both rural and urban areas.

Table 3-1. Product and Income Accounts, by Sector, Egypt, 2000/2001

Producing	Input Purchases (in million Egyptian pounds)				Final	Gross
Sector	Agriculture	Industry	Services	Total	Demand	Output
Agriculture	3,204	22,094	838	26,136	33,830	59,966
Industry	4,714	39,436	30,140	74,289	124,654	198,943
Services	1,575	19,101	20,989	41,664	184,292	225,956
Total	9,493	80,630	51,966	142,089	342,776	484,865
Imported	1,363	33,756	18,592	53,711		
Total	10,856	114,386	70,558	195,800		
Primary inputs	49,110	84,557	155,397	289,064		
Gross inputs	59,966	198,944	225,955	484,865		

Source: Ministry of Planning. Egypt I-O table, 2000/2001

The product and income accounts list an aggregate gross output of nearly 484,865 million Egyptian pounds in 2000/2001. Aggregate final demand of 281.6 billion Egyptian pounds, that is, purchases by households, governments, private capital formation, including inventory adjustments, less exports, was slightly less than total primary inputs of 289.1 billion Egyptian pounds, that is, value added—a statistical indication of a small positive balance in Egypt's current product and income accounts.

CHAPTER 4

Assessing Program Impacts on Rural Areas

Program impacts are commonly measured by changes in a nation's or region's product and income accounts, that is, changes in the levels of industry output, final demand, and value added—the equivalent of gross domestic product or gross regional product. Estimates of program impacts on rural areas are derived from the product and income accounts or representations thereof, for example, an input-output table.

Egypt's Input-Output Models

The building of input-output modeling systems in Egypt has a history that goes back to the 1960s. There were five trials from the Central Agency for Public Mobilization and Statistics (CAPMAS) to construct I-O tables for Egypt. These trials were implemented for the years 1966/67, 1973, 1983/84, 1986/87, 1989/90, and the last one was in 1991/1992. All of these trials were based on actual detailed figures for all economic activities in Egypt.

CAPMAS discontinued the activity of constructing the National Accounts Statistics since 1991/92. The Ministry of Planning (MOP) continued this activity by completing the National Account Statistics beginning 1992/1993 based on United Nations System of National Accounts.[8] I-O table, itself, is published annually from 1992/93, based on targeted/expected figures, through 2000/01.

The 1973 Egypt-National Account Statistics devoted a large part of its introduction to explaining the methodology used and data sources and definitions. In this report, a summary is provided of what is available (Appendix 1) in addition to the information on 1991/92 when the last I-O table was constructed.

Tables 4-1 and 4-2 show the two components of product disbursements to final demand—local production and imports from Egypt's Input-Output model for fiscal Year 2000/2001. These are projected values based on Egypt's 1995/1996 income and product accounts. Changes in final demand may occur because of changes in exports, that is, shipments of local industry production to markets outside the local area. In the 2000/2001 fiscal year industry exports totaled to 61,150 million Egyptian pounds. Local demand disbursements to households, governments, private capital formation, and inventory change totaled to 281,626 million Egyptian pounds. Added disbursements of a given product to any one of these demand centers will generate increases in demand for primary inputs of labor and capital in accordance with the predicted increases based on the employment multiplier values for the given industry. Processed food exports were estimated at 2,190 million Egyptian pounds. Agricultural exports were 978 million Egyptian pounds. Agricultural and processed food exports were slightly more than 3.1 billion Egyptian pounds or about five percent of total exports.

[8] This version of National Account statistics is under revision by MOP and has not been released yet to the public.

Table 4-1. Demand Disbursements of Local Output, by Demand Sector, Egypt, 2000/2000

(million pounds, 2000/2001)

Industry	Intermediate Demand	Final Demand Sector Disbursements						Total Demand
		Household	Gov't	Exports	Investment	Inventory	Total	
Agr-Crops	25,525	1	359	885	46	-	20,759	46,284
	5,6	12,5	243	93	157	0	13,072	18,682
Processed Food	5,425	27,983	713	2,196	193	549	31,634	37,059
	110,309	152,451	5,985	57,976	55,604	5,295	277,311	387,621
Total	146,870	212,926	7,300	61,150	56,000	5,400	342,776	489,646
Local as % of Total	73	94	90	99	78	78	91	85

Source: Study team calculations based on Egypt I-O Table, 2000/2001

Estimated imports to final and intermediate demand sectors, that is, import purchases by industry for production purposes and institutional purchases for final use, totaled to 86,600 million Egyptian pounds in the 2000/2001 fiscal year. Thus, imports exceeded exports by more than 25 billion Egyptian pounds. Imports of intermediate inputs were much larger for agriculture—by 2.2 billion Egyptian pounds--than exports. Exports of horticultural products offer the highest promise of success among Egypt's agricultural products.[9] The livestock sector faces a less promising future as long as agriculture subsidies among Egypt's largest competitors support market competitive prices that are below the costs of production on livestock farms in Egypt.[10] The export deficit was less for food processing on a percentage basis, but still significant at 6.9 billion Egyptian pounds. The meat products component deficit also can be attributed, in part, to the large agricultural subsidies of Egypt's principal competitors. Processed food imports were about equally divided between intermediate and final demand.

Table 4-2. Demand Disbursements of Imports, by Demand Sector, Egypt, 2000/2001

(million pounds, 2000/2001)

Industry	Intermediate Demand	Final Demand Sector Disbursements						Total Demand
		Household	Gov't	Exports	Investment	Inventory	Total	
Agr-Crops	7,521	1,898	8	89	1	52	2,048	9,569
Agr-Livestock	396	375	8	3	121	0	506	903
Processed Food	3,310	3,143	206	70	0	102	3,521	6,831
Other Industry	42,484	8,843	558	788	15,278	1,346	26,814	69,297
Total	53,711	14,259	780	950	15,400	1,500	32,889	86,600
Import as % of Total	27	6	10	2	22	22	9	15

Source: Study team calculations based on Egypt I-O Table, 2000/2001

Measuring program impacts on rural areas start with the predicted program impacts on the final demand sectors, that is, by changes in final demands. These subsequently show as predicted changes in industry output and related changes in industry value added (Table 4-3). Associated with the value added

[9] The World Bank notes: "Since 1997, the horticulture sector has shown significant growth. Production has rapidly increased in response to rising consumer demand." The World Bank notes further that "The main constraint of agriculture is management inadequacy at all levels of production and post-harvest processing, including the owner level. Many important farm owners are businesspeople to other industries and see agriculture as a secondary or tertiary activity" (World Bank, 2002, page 31).

[10] Elizabeth Becker, writing in the New York Times, cites the forthcoming report, dumping without Borders, by Oxnam International that argues "the large subsidies given American corn farmers allow them to sell their grain at prices far below what it costs to produce." This report notes further, referring to the Mexican agricultural economy, that the large subsidies have to cheap American corn flooding the Mexican market and pushing the poorest Mexican farmers out of business (New York Times, page C4, August 27, 2003).

changes are corresponding changes in industry employment. At this point, the employment is partitioned into the two categories--rural and urban.

Table 4-3. Total Intermediate and Primary Input Purchases of Selected Sectors, Egypt, 2000/2001

(in million Egyptian pounds, 2000/2001)

		Intermediate Demand					Final	Total
#	Sector	1	2	6	Other	Total	Demand	Output
1	Agr-Crops	1,044	6,623	13,899	3,959	25,525	20,759	46,284
2	Agr-Livestock	0	537	4,096	978	5,611	13,072	18,682
3	Ginning	72	0	475	2,973	3,520	942	4,462
4	Mining	0	0	20	702	722	443	1,165
5	Oil	0	0	124	10,483	10,607	7,588	18,195
6	Processed Food	0	2,302	530	2,593	5,425	31,634	37,059
7	Beverages	0	0	0	763	763	2,023	2,786
8	Cigarettes	0	0	0	0	0	4,674	4,674
9	Textiles	81	1	67	8,211	8,360	11,043	19,403
10	Clothes and Leather Shoes	0	0	139	2,029	2,168	21,697	23,865
11	Wood and Furniture	0	0	6	1,009	1,015	3,882	4,897
12	Paper and Paper Products	2	3	111	1,342	1,458	534	1,993
13	Printing and Publishing	5	1	22	338	366	3,550	3,916
14	Leather and Leather Products	0	0	6	849	855	487	1,342
15	Rubber and Rubber products	1	0	11	372	384	285	669
16	Chemical Industry	1,716	32	18	4,865	6,631	7,910	14,541
17	Petroleum Products	222	35	415	5,004	5,676	5,358	11,034
18	Coal Products	0	0	0	310	310	332	642
19	Non Metal Products	20	0	7	8,528	8,555	5,768	14,324
20	Basic Metal Products	7	21	19	8,895	8,942	4,464	13,406
21	Metal Products	27	3	121	3,038	3,189	938	4,127
22	Non Electrical Machines	7	0	24	616	647	311	958
23	Electrical Machines	0	0	13	2,457	2,470	2,622	5,092
24	Transport Vehicle	3	150	3	980	1,136	6,282	7,418
25	Other Industries	2	0	2	867	871	1,886	2,757
26	Electricity	201	91	579	5,711	6,582	2,948	9,530
27	Construction and Maintenance	70	2	54	1,821	1,947	38,759	40,706
28	Transportation	43	28	55	4,960	5,086	32,050	37,136
29	Trade, Finance and Insurance	703	43	783	21,317	22,846	65,473	88,319
30	Restaurants and Hotels	216	148	37	4	405	9,884	10,289
31	Housing and Utilities	4	1	30	522	557	6,931	7,488
32	Services	14	11	97	4,119	4,241	28,247	32,488
33	Total	4,460	10,033	21,763	110,614	146,870	342,776	489,646
34	Imported inputs	1,259	103	9,236	43,113	53,711	32,889	86,600
35	Total intermediate inputs	5,720	10,136	30,999	153,727	200,582	375,664	576,246
36	Value Added	40,564	8,546	6,060	233,894	289,064	0	0
37	Total inputs	46,284	18,682	37,059	387,621	489,646	0	0

Source: Ministry of Planning, Egypt I-O Table 2000/2001

Besides industry value added, Table 4-3 shows purchases of intermediate inputs by the agriculture and food processing sectors and also imports. Livestock agriculture accounted for an estimated 40,564 million Egyptian pounds of value added in fiscal year 2000/2001—by far the largest among the three sectors. Total imports were less than 1.3 billion Egyptian pounds, which compares with 9.2 billion Egyptian pounds for food processing.

The information presented in the above table suggests that a one billion Egyptian pound increase in livestock output demand would have a larger impact on total employment than a similar increase in demand for processed food output, provided earnings per worker were the same. They are not the same, of course, which reduces the impact differential between the two sectors. A correctly derived and applied employment multiplier would show these differential impacts.

Assessing program impacts on rural areas is the task addressed by builders of IMPLAN-SAM from the beginning of its development in the late 1970s. Since then IMPLAN has received widespread use and acceptance in assessing public program impacts on rural areas (Maki et al, 1994; Maki, 1997).

IMPLAN Impact Assessments and Limitations

Program impact assessments start with changes in the final demands for the commodity outputs of an industry—regional or national—that emanate from program activities. These final demand changes are linked to corresponding changes in purchases of intermediate and primary inputs—the latter in turn are linked to changes in household incomes and government revenues.

The IMPLAN-SAM modeling system has nine "blocks" of activity centers with multiple classes in each activity center totaling 44 classes as follows: industries (10 classes), commodities (10 classes), value added (4 classes), households (9 classes), corporations (1 class), government (6 classes), capital (2 classes), and trade (2 classes). In addition, the IMPLAN-SAM model has as many as 91 types of transactions: for example, households (9 classes), government (6 classes). The 44 individual classes among the nine blocks form a 44 by 44 balanced matrix. To obtain the predicted values for the 91 types of transactions requires a set of initial values for each transaction.

Each of the nine "blocks" can be adapted to the household and government configurations applicable for the available databases in Egypt, provided the number of classes and types of transaction are not more than the limits listed.

The task of estimating employment "multipliers" is accompanied by the important task, also, of evaluating the employment changes predicted by these multipliers. The employment multipliers take into account the workings of the backward linkages from food processing to suppliers as well as the direct linkages to the labor and capital resources engaged in the food processing activities.

Data needs vary greatly for the different approaches and their tools and applications. Data needs for benchmarking and forecasting of key economic indicators are replicated in impact assessments. In addition, preparation of an I-O table requires a computer capability for balancing industry outputs and inputs, industry by industry. Impact assessments based on the use of an I-O model also require data on the focus of the impact assessments, for example, the contributions of various program expenditures on area employment and income.

A framework for estimating the direct employment and income indicators for processed food, horticultural, and livestock (buffaloes and milk cows) products, follows from the discussion of alternative modeling approaches, tools and applications, and data needs and gaps. Egypt's 2000/2001 I-O table and its extensions in model construction and application illustrate this framework, in part. We start with examination of the final demand sectors and their data requirements in construction and application. Changes in industry employment start with changes given changes in final demand.

IMPLAN-SAM Modeling System

The IMPLAN modeling system introduces a Social Accounting Matrix (SAM) to show local economic impacts by household income class, business ownership, and other differentiating variables. IMPLAN now converts the Egypt I-O to its own format, including an Egypt SAM. To provide the added feature, it requires estimates of selected control values for the Egypt economy (see, Appendix Table 2). Among these control values are the inter-institutional transfers of value added, including employee compensation, proprietor's income, rent, business transfers, dividends, and interest—to the various institutions—businesses, households, governments, capital formation, and trade.

Consumption, Income-creation, and Capital Accumulation

The more general SAM accounting framework differs from typical input-output studies by the added emphasis given to the consumption, income-creation and capital accumulation sectors, and their interactions with the production sector. The SAM explicitly accounts for the disposition of income as it flows throughout an economy, from production activities to factors.

Many SAM-studies use only labor, capital, and government services as factors of production. An auxiliary industry-occupation conversion matrix and earnings per employee matrix convert the value matrix for occupations to a corresponding number of jobs and the earnings per job in each industry and occupational group. The industry-occupation matrix uses services as a "bridge" for comparing the quantity of labor demanded by local industry in a given local labor market with the quantity of labor available in each occupational category. Its use extends even further in studies of local income distribution.

Whether households, business enterprises, or government agencies, these institutions represent actual decision making units of the economic system. They are the owners of factors of production, the source of entrepreneurship, and the consumers of commodities produced. For this reason it may be more appropriate to give the institutions block first consideration than to follow the traditional pattern of beginning with the production account and then focusing on industries or factors.

Exports and Imports

However, no institutional system in a commercial global economy can exist without remunerative productive activity and trade with the rest of the world--a condition of both joy and sorrow for the residents of any area in this global village. A change in the expected demand directly impacts productive activities of the households. After households, the second institutional group is the private corporate sector, followed by government. Thus, the individual decision making units of any area enter explicitly into the overall analysis, including the analysis of exports and imports.

A broader view of the economy's structure than just focusing upon the production component includes the entire income cycle. That is, if societal institutions like households, governments, and corporations are viewed as important economic agents in accounting for the uniqueness of an area economy, along with productive enterprises, then more than just inter-industry relationships must be included in an economic model. This draws attention to the consumption and accumulation accounts of the input-output table: the final demand and final payments sectors, respectively.

Information on size and type of business in each of the three agricultural regions cited earlier is important, also, for identifying likely sources of regional economic growth. As farm numbers decline

and the numbers of unemployed farmers and farm workers increase, the medium-size and startup businesses enterprises are the most likely locations for future job openings. These jobs, however, require certain work force skills and knowledge of market opportunities as a precondition for these businesses to compete successfully in regional and global markets.

Information on the market destination of food products (base year and forecast year) is needed for estimating industry export/labor-income and export/employment multipliers. Area exports are a measure of the area's economic base. If processed food product exports were to account for one-half of total area exports, for example, then the food processing industry would account for one-half of the area's total employment, according to this measure of employment change.

Factor Earnings and Institutional Income

Job training will be required for many of the displaced farmers, farm workers and, also, many already employed in industry, to ease their transition into a market-driven growth economy. Eventually, information sources on new job openings and the dissemination of this information will become important, also, since many of the job openings at any one time may occur in Central Egypt, for example, rather than Upper Egypt or Lower Egypt.

The classifications used for accumulation and consumption accounts lack an explicit description of important links in the income cycle of a local economy. In particular, relationships between factor earnings and institutional income and consumption are not quickly and readily apparent. Two important relationships are particularly troublesome. First, the distribution of factor earnings among institutions is aggregated, except for size and skill differentiation of business and labor. Second, non-market transfers (e.g., transfer payments, taxes, savings behavior) are difficult to trace. They occur in part as intra-institution transfers and in part as inter-institution transfers. As a result, public policies that affect relationships between factor earnings and institutional incomes or inter-institutional distributions of incomes (e.g., tax rates) are less readily investigated with this set of accounts than a more complete social accounting system with a detailed classification of individual entries in each of the product and income accounts that also covers successive time periods.

Intermediate and Primary Inputs Linkages

Knowledge of inter-industry transactions is important since these transactions are the intermediate and primary input linkages—local and imported, and the product disbursements to local and export demand destinations. Dependable forecasts of new markets start with a clear and realistic understanding of Egypt's current competitive position in processed food product markets and the necessary requirements for sustaining or improving this position.

The IMPLAN (IMpact analysis for PLANning) modeling system extends the uses of input-output tables by introducing a Social Accounting Matrix (SAM) that shows the distribution of value added by household income, business ownership, and other differentiating variables.[11] IMPLAN, while confined in past years to U.S. county-level studies, is now available for other countries. It can, for example, convert the Egypt I-O to its own format, including an Egypt SAM. To provide the added feature, however, requires estimates of selected control values for the Egypt economy.

[11] IMPLAN User Manual

Extensions in model construction include expansion of the number of sub-industries in each of the three major industry groups, based on recommendation of an appropriate expert panel. An initial approach would start with estimates of total output, input requirements, and output disbursements to intermediate demand, local final demand, and exports for each sub-industry. These estimates would be adjusted to their corresponding control totals for each of the three major industry groups. A portion of this task was completed in the background preparation for the Phase 1 Report.

IMPLAN-SAM Product and Income Accounts

Figure 4-1 shows the structure of the IMPLAN-SAM product and income accounts. It follows closely the sector arrangement for Egypt's product and income accounts. Row 1, Industries, corresponds to the total of the three sectors in Egypt's product and income accounts. Row 2 is simply the conversion of industry output into corresponding commodity output. This conversion accounts for an industry producing several commodities to have its output entered into its corresponding commodity sector. Row 3, Value Added, corresponds to primary inputs. Rows 4 to 7 represent the institutional sectors in the IMPLAN-SAM model that show the disbursement of commodity output and value added among institutions. Rows 8 and 9 are the import and export accounts, namely, the purchases of commodity inputs from, and the disbursements of commodity outputs to, the Rest of World.

Figure 4-1. Product and Income Transactions, by Originating and Receiving Sector

				Value	Institutions				Rest of World		
No.	**Originating Sector**	**Industries**	**Commod.**	**Added**	**Households**	**Corp**	**Gov't**	**Capital**	**Foreign**	**Domestic**	**Total**
1	Industries	0	T12	0	0	0	0	0	T18	T19	T1
2	Commodities	T21	#	0	T24	0	T26	T27	0	0	T2
3	Value Added	T31	0	0	0	0	0	0	0	0	T3
	Institutions:										
4	Households	0	#	T43	T44	T45	T46	T48	T48	T49	T4
5	Corporations	0	#	T53	0	0	T56	0	0	0	T5
6	Government	0	#	T63	T64	T65	T66	T57	T68	T69	T6
7	Capital	0	#	T73	T74	T75	T76	T77	T78	T79	T7
	Rest of World:										
8	Foreign	T81	#	T83	T84	0	T86	T87	T88	T89	T8
9	Domestic	T91	#	T93	0	0	T96	T97	T98	T99	T9
	Comm. trade#								T_8a	T_9a	TA
	Comm. make#	0	T_2b	0		0	0	0	0	0	TB
10	Total	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10

Add row to each sector to account for direct sector commodity trade and commodity make transfers.
Source: Adopted from Maki and Lichty, 2000, figure 7.1, page 290

The **industries-commodities** block (Row 1, Column 2) shows the contribution of each industry to each commodity group. Exports, like imports, accrue to the industries account.

Commodities blocks show the commodity disbursements to individual industries purchasing sectors. The commodities-industries block shows the disbursement of commodities to industries as intermediate production inputs. The **commodities-households** and **commodities-government** blocks are the marketing margins to convert individual commodities from producer to consumer prices.

The **value added-industries** block shows the disbursements of factor inputs (value added) to individual industries.

Household blocks show the income receipts from each account (other than industries and commodities).

Corporation blocks show income transfers from each account (other than industries and commodities) to corporations

Government blocks show tax receipts and other transfers from each account (other than industries and commodities) to government.

Capital blocks show receipts from each account (other than industries and commodities) to capital accounts and inventories change in each of the accounts.

Foreign trade blocks show receipts from each account to foreign trade entities.

Domestic trade blocks show receipts from each account to domestic trade entities.

Each block includes additional **commodity make** contributions to the commodities sector and **commodity trade** contributions to the trade sectors.

A description of each transaction sub-matrix in Figure 4-1 may help clarify their content and use in the IMPLAN-SAM modeling system, which derives the individual transactions accounts to show the following:

1. Industry Make Account, T12, to show commodity composition of industry output;
2. Industry-Foreign Trade Account, T18, to show foreign exports of industry output;
3. Industry-Domestic Trade Account, T18; to show domestic exports (from one region to another) of industry output;
4. Commodity Use Account, T21, to show the commodity composition of industry use of intermediate inputs;
5. Commodity-Households Account, T24, to show the marketing margins of locally produced commodities for households
6. Commodity-Government Account, T26, to show marketing margins of locally produced commodities for government;
7. Commodity-Capital Account, T27, to show marketing margins of locally produced commodities for capital and inventory accumulation;
8. Value Added-Industry Account, T31, to show purchases of labor and current capital inputs by resident industry
9. Households-Value Added Account, T43, to show transfers of labor and capital payments to resident household account;
10. Households-Household Account, T44, to show income transfers between resident households.
11. Households-Corporations Account, T45, to show income transfers from corporations to resident households.
12. Households-Government Account, T46, to show income transfers to households by resident government institutions.
13. Households-Foreign Trade Account, T49 and T49, to show income transfers to households from Rest of World.
14. Households-Domestic Trade Account, T49 and T49, to show income transfers to households from Rest of World.
15. Corporations-Value Added Account, T53, to show value added income transfers to corporations.
16. Corporations-Government Account, T54, to show government income transfers to corporations.
17. Government-Value Added Account, T63, to show value added income payments to government.
18. Government-Households Account, T64, to show household income payments to government.

19. Government-Corporations Account, T65, to show corporations income payments to government.
20. Government-Government Account, T66, to show income transfers between governments;
21. Government-Capital Account, T67, to show capital income payments government.
22. Government-Foreign Trade Accounts, T68, to show income payments by foreign institutions to government.
23. Government-Domestic Trade Accounts, T69, to show income payments by non-resident domestic institutions to government.
24. Capital-Value Added Account, T73, to show value added income payments to capital.
25. Capital-Households Account, T74, to show household income payments to capital.
26. Capital-Corporations Account, T75, to show corporations income payments to capital.
27. Capital Government Account, T76, to show government income payments to capital.
28. Capital-Capital Account, T77, to show intra-account transfers of capital;
29. Capital-Foreign Trade Account, T79, to show income payments by foreign institutions to capital;
30. Capital-Domestic Trade, T79, to show income payments by non-resident domestic institutions to capital;
31. Foreign Trade-Industry Account, T81, to show income payments by industry to foreign institutions for imported goods and services.
32. Foreign Trade-Value Added Account, T83, to show value added income payments to foreign institutions.
33. Foreign Trade-Households Account, T84, to show household income payments to foreign institutions;
34. Foreign Trade-Government Account, T85, to show government income payments to foreign institutions;
35. Foreign Trade-Capital Account, T86, to show capital transfers to foreign institutions;
36. Foreign Trade-Foreign Trade Account, T87, to show foreign trade balancing transfers.
37. Foreign Trade-Domestic Trade Account, T88, to show transfers between foreign and domestic trade transfers;
38. Domestic Trade-Industry Account, T91, to show income payments by industry to non-resident domestic institutions for imported goods and services.
39. Domestic Trade-Value Added Account, T93, to show value added income payments to non-resident domestic institutions.
40. Domestic Trade-Households Account, T94, to show household income payments to non-resident domestic institutions;
41. Domestic Trade-Government Account, T96, to show government income payments to non-resident domestic institutions;
42. Domestic Trade-Capital Account, T97, to show capital transfers to non-resident domestic institutions;
43. Domestic Trade-Foreign Trade Account, T98, to show transfers between domestic and foreign trade transfers;
44. Domestic Trade-Domestic Trade Account, T99, to show transfers to balance domestic trade transfers;

Thus the transactions table shows the flows of commodities from each of a number of producing sectors to all other consuming sectors, both intermediate and final. Intermediate transactions represent the flow of goods and services that are produced and consumed in the process of current production. Final demand represents the ultimate purchases by consumers or government inside or outside of the region for which the table has been constructed. Final inputs include payments to households (as wages and salaries), proprietor income, business taxes, and imports.

Surveys of households, businesses, and governments are needed to identify income sources and linkages to expenditures. Secondary data sources are needed to provide estimates of marketing margins for each commodity group. Households of different income classes have different patterns of employment, earnings, and spending. Thus, an increase in the demand for food processing converts to an increase in employment of workers with varying skills in households of varying income levels and patterns of spending that contribute to varying direct and indirect multiplier impacts on the local economy, as well as in increase in commodity output. The commodity output increases are sustained by increases in agricultural production in the supply areas of the food processing plants. The data inputs to IMPLAN-SAM are converted into the different measures of direct and indirect effects of the initial demand increases in the demand for food products.

IMPLAN-SAM and Egypt's Input-Output Model

The transactions blocks in Figure 4-1 conform to sectoring of the IMPLAN-SAM the data entries, as shown in Figure 4-2. The sector numbering carries the IMPLAN Code from its 528-sector I-O table of its first entry for the SAM aggregation template. The IMPLAN-SAM sectoring generally conforms to the sectoring in Egypt's current I-O model.

Figure 4-2. Conversion to IMPLAN-SAM Sectoring

No.	Sector	Transfers
1.	Industries	1 to 516 (10 sectors)
2.	Commodities	3001 to 3516 (10 sectors)
3.	Value Added	5001 to 8001 (four sectors)
	Institutions:	
4.	Households	10001 to 10009 (13 sectors)
5.	Corporations	13001 (two sectors)
6.	Government	
	Federal	11001-11003 (14 sectors)
	State/Local	12001-12003 (25 sectors)
7.	Capital	
	Capital	14001 (five sectors)
	Inventory Change	14003 (three sectors)
	Rest of World:	
8.	Foreign	25001 (three sectors)
9.	Domestic	28001 (two sectors)

Source: Figure 4-1 and Appendix 2

For example: The Industries block is represented by Rows 1 to 516 in the IMPLAN-SAM sector listing, Commodities by Rows 3001 to 3516, Value Added by Rows 5001 to 8001, Institutions,-Households by Row 10001 to 10009, Institutions, Corporations by Row 13001, Institutions, Government by Rows 11001-14011, Capital by Rows 14001, 14002, Rest of World, Foreign by Row 25001, and Rest of World, Domestic by Row 28001. The SAM matrix listing of Institutions and Activities tells illustrates the sorts of data used to implement the Egypt IMPLAN-SAM. Of special importance for the SO16 studies are the data for Households (listed by income source for each income class) and Government—

Central and Local (listed by type of revenue and other governmental activities for each of the two government levels).

Descriptions of each institution and its type of transfers are listed in Appendix Table 2 from an IMPLAN-SAM demonstration study for a single state in the USA. Industries and commodities, for example, consist of 10 institutional groups. Each industry may produce one or more commodities. For example, Agriculture as an Industry, Code 1, produces four commodities, listed as Agriculture, Manufacturing, TCPU, and Services. Manufacturing as an Industry, Code 58, produces commodities listed as Manufacturing, TCPC, Services, and Other. Government, as an industry, has entries for six of the 10 commodities, starting with Manufacturing. The range and value of the commodity entries are derived from industry output values with the use of an industry-commodity matrix already available for the study area. Each institution, moreover, has one or more types of transfers associated with it. For example, the lowest income class of Households has 11 types of Value Added-related transfers, plus an additional three transfers relating to Factor and Commodity Trade and Commodity Make. Federal Non-Defense has 14 types of transfers, while State/Local Non-Education has 22 types of transfers. Lack of a particular type of transfer (or institution) will reduce, of course, the total number of transfers in an IMPLAN-SAM model study for Egypt.

Thus IMPLAN-SAM provides a region-specific approach to the estimation of employment multipliers that takes into account region-to-region differences in household and government income and spending patterns.

CHAPTER 5

Data Needs, Availability, and Gaps

Data needs vary greatly for the different approaches and their tools and applications. Data needs for benchmarking and forecasting of key economic indicators are replicated in impact assessments. In addition, preparation of an I-O table requires a computer capability for balancing industry outputs and inputs, industry by industry. Impact assessments based on the use of an I-O model also require data on the focus of the impact assessments, for example, the contributions of various program expenditures on area employment and income.

Basic data needs in benchmarking and forecasting key economic indicators include:

Demographics—population by area, household size and income class, labor force status.

Household status—farm or non-farm; employed or unemployed.

Place of employment—type of place and size; skilled, unskilled; full-time, seasonal.

Earnings—employee compensation; proprietor (owner) income; property income

Production—Type and level; disposition--local, export (international, domestic).

A framework for estimating the direct employment and income indicators for processed food, horticultural, and livestock (buffaloes and milk cows) products, follows from the discussion of alternative modeling approaches. Egypt's 2000/2001 I-O table and its extensions in model construction and application illustrate this framework, in part.

Basic Data Needs

Table 5.1 presents two listings of Egypt's economic activities. The more detailed listing comes from Egypt's 32-sector input-output tables. The short list is an aggregation of the long list, except for housing, utilities, and services, as noted in the accompanying footnotes. Even the 528 sector IMPLAN-SAM, with its four-digit Standard Industrial Classification (SIC), will not aggregate to either the 32 sector or the 12 sector listing of economic activity. Comparisons of input-output results become difficult when the content of sectors differs from one study to the next. An important basic data need is a regrouping of detailed breakdowns of economic activity to facilitate aggregation of input-output sectors into a smaller number of sectors that are consistent with other aggregate economic series. A key source for the needed data is Egypt's Data Access and Transmission Activity (DATA) Project. Principal data gaps occur in the matching of the I-O data classifications with survey and related data on household incomes and worker earnings. The IMPLAN-SAM model for Egypt would establish its own data classes, based on the available data series. It is not restricted to the 528 sector or other current IMPLAN model sectors. Available data are adequate to build both an Egypt IMPLAN model and an Egypt IMPLAN-SAM model.

Table 5.1 Aggregation Template for the 32 Industries in Egypt I/O table.

Code	Industry in I/O Table	Code	Corresponding Aggregate Industry (CAPMAS)
1	Agr-Crop	A	Agriculture, hunting and forestry
2	Agr-Livestock	A	Agriculture, hunting and forestry
3	Ginning	D	Manufacturing
4	Mining	C	Mining
5	Oil	C	Mining
6	Processed food	D	Manufacturing
7	Beverages	D	Manufacturing
8	Cigarettes	D	Manufacturing
9	Textiles	D	Manufacturing
10	Clothes and leather shoes	D	Manufacturing
11	Wood and furniture	D	Manufacturing
12	Paper and paper products	D	Manufacturing
13	Printing and publishing	D	Manufacturing
14	Leather and leather products	D	Manufacturing
15	Rubber and rubber products	D	Manufacturing
16	Chemical industry	D	Manufacturing
17	Petroleum products	D	Manufacturing
18	Coal products	D	Manufacturing
19	Non metal products	D	Manufacturing
20	Basic metal products	D	Manufacturing
21	Metal products	D	Manufacturing
22	Non electrical machines	D	Manufacturing
23	Electrical machines	D	Manufacturing
24	Transport vehicle	D	Manufacturing
25	Other industries	D	Manufacturing
26	Electricity	E	Electricity and Gas
27	Construction and maintenance	F	Construction and building
28	Transportation	I	Transport, warehousing and communication
29	Trade , finance and insurance	G	Financial intermediaries
30	Restaurants and hotels	H	Hotels and restaurants
31	Housing and utilities	[12]	
32	Services	[13]	

Sources: Directory of Economic activity codes, CAPMAS, 1996

Additional data detail, up to the limits shown in Appendix 2, would add to the usefulness of IMPLAN-SAM findings for particular economic and social categories of employment and population. While data gaps exist, we can now conclude that available data are sufficient to install (1) a 32-sector Egypt IMPLAN model to generate employment multipliers for the food processing and related agriculture sectors and (2) a multi-sector Egypt IMPLAN-SAM model to generate the tables of economic variables patterned after those listed in Appendix 2. The output variables will differ from those listed in Appendix 2. They will include, however, variables representing comparable sectors of Egypt's total economy.

[12] Utilities are listed under code f (building and construction). Housing is either under code f or code k (business service, renting and mortgage)

[13] Services include codes o (social services, personal…) and p (housing services)

The DATA project has the main I-O tables as follows:

1. I-O table with unallocated imports represented by a single row in the inter-industry transactions table.
2. Total imports matrix

Production coefficients tables were derived from the two tables—the one without imports, the other with imports.

CAPMAS export series for all food processing, horticulture, and livestock includes over 150 items. They may be different in definitions from local data. Therefore, during Phase 2, export data will be matched with production data in this sector to get a unified series.

Population and Labor Force

Data on demographics, household status, location of employment by Governorate, and production are available at CAPMAS. 1996 census data is also available for all governorates. Earnings data will require further investigations and only consumption data will be available as a proxy. CAPMAS also conducts annual household expenditure and consumption surveys.

Employment data covered in Egypt is represented by type of activity and of occupation categories as shown in Table 5.2

Table 5-2 Main Occupation Categories for Extended IMPLAN-SAM Applications

Code	Occupation categories
1	Directors, Officials, legislative
2	Professionals
3	Technicians and Assistant professionals
4	Administrative workers
5	Salesmen and service workers
6	Farmers, Farmer workers and specialized fishermen
7	Craftsmen
8	Factories workers
9	Unskilled
S	Unclassified

Source: CAPMAS

Horticulture Crops and Processing:

Horticulture crops are categorized into vegetables (over 45 crops) and fruits (over 22 crops), Aromatic & Medicinal crops (over 30 crops). The following Agriculture data is available on annual basis and for all governorates in Egypt [14]

Cropping:

Cropping Pattern for Agriculture, Farms: Small, Medium, Large &Work Force

[14] Agricultural Crops Statistics , CAPMAS and Economic Affairs, Ministry of Agriculture and Land Reclamation

Total Horticulture: Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, and Upper Egypt).

Total Vegetables: Planted area (over 45 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, and Upper Egypt).

Total Fruits: Planted area (over 22 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Total Aromatic & Medicinal: Planted area (over 30 crops), Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt).

Yield

Total Horticulture: Yield (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt)

Total Vegetables: Yield (over 45 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, and Upper Egypt).

Total Aromatic & Medicinal: Yield (over 30 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, and Upper Egypt).

Total Fruits Yield (over 22 crops): Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Production

Total Horticulture: Production (old land & new land) in the three parts of Egypt (Lower, Middle, and Upper Egypt).

Total Vegetables: Production (over 45 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, and Upper Egypt).

Total Fruits: Production (over 22 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Total Aromatic & Medicinal: Production (over 30 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Cost of Production

Horticulture (old land & new land) in the three parts of Egypt (Lower, Middle, and Upper Egypt). Cost of Production includes Labor wages, machinery, fertilizers and other expenses in addition to rent)

Fruits (over 22 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Aromatic & Medicinal (over 30 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Labor Force

Vegetables (over 45 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt)

Fruits (over 22 crop) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt)

Net Return

Horticulture (old land & new land) in the three parts of Egypt (Lower, Middle, and Upper Egypt).

Vegetables (over 45 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Fruits (over 22 crop) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Aromatic & Medicinal (over 30 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Value of Production & Income

Horticulture (old land & new land) in the three parts of Egypt (Lower, Middle, and Upper Egypt).

Vegetables (over 45 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Fruits (over 22 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Aromatic & Medicinal (over 30 crops) Planted area (old land & new land) in the three parts of Egypt (Lower, Middle, Upper Egypt

Food Balance

Production For each horticulture crop

Imports For each horticulture crop

Exports For each horticulture crop

Waste For each horticulture crop

Food (Local consumption) for each horticulture crop

Horticulture crop processing is defined as any changes to its characteristics by one or more of the following:

Sorting and grading

Packing

Processing, including:

2.1 Cooling and Refrigeration

2.2 Freezing

2.3 Dehydrating

2.4 Canning

i. Juice

ii. Sugared or Sacharized

iii. Concentrates

v. Jams

vi. Pickling

vii. Extraction

Data on the food processing sector is available for some types of processing for the following items:

Total Production for some of Food Processing types[15]

Production of Processing Factories

Labor Force for each Processing Factory

Cost of Production and value added

Total value of production

Exports by types of process[16]

Labor Force in the Food Processing Industry (skilled and unskilled)

Livestock and Livestock Food Processing:

1. Livestock at farm level

Livestock definition for this study includes cows and buffaloes only. The total number of livestock (buffaloes and cows) in Egypt is about 7.3 million heads. Both species are approximately equal in number. The total holders are about 1.8 million. Percentage of those who have less than 10 animals is 97.13% and they own about 85% of the total animal number while those who have more than 50 animals is about 0.07% and they have about 4% of the total animal number. Percentage of female buffaloes that aged more than 2 years is about 45% while in the case of cows is about 40%. Amount of milk produced that year was about 3.8 million tons from which buffaloes produced 2.2 million tons.[17]

The following Agri-Livestock data is available on annual basis and for all governorates in Egypt:

[15] Comprehensive data of food processing industry requires permission from CAPMAS to acquire this data in addition to a survey.

[16] Export data are available at the national but not the regional level

[17] Estimated in the year 2001 -Source is MALR)

1.1 Fresh Milk

Table 5.3 Data Available on Fresh Milk at Governorate Level[18]

	Number of Holders			Total Animals			Amount of Milk (tons)			Total Value of Milk						Employment in Production		
													On Farm	Processed		Family	PT[19]	F T[20]
	S	M	L	S	M	L	S	M	L	S	M	L		Domestic	Export			
Cows	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Buffalo	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Total	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Source: Economic Affairs, MALR

X: Available

1.2- Slaughtered Animals

Number of fattened animals in the year 2001 was accounted for 1.9 million heads with a live body weight of 809 000 tons which was more than the previous year by about 8.2%. Number of the slaughtered animals in the slaughterhouses was about 0.9 million heads with a capacity of 47% as a percentage from the total capacity rough estimate for number of animals that are slaughtered outside of the slaughterhouses is about 10%. Number of fattened animals at large scale level (those holder who has more than 50 heads) was about 12% of total national production (the aforementioned 1.9 million heads) with a live body weight of about 96000 tons while at less than 50 heads the percentage was about 88%with a live body weight of about 713000 tons. Buffaloes represented about 45% from the total fattened animal heads with a percentage from the total live body weight of about 49%. Imported carcasses number in 2001 was 132 000while in the year 2000 they were 159000.The number were reduced in 2002 to 76000.

[18] All requested data in table (1) are available with the following notes
1. Data in columns 1 and 2 representing the holders of and the number of all animals males and females since medium scale holder is defined as the animal holder who has from 11 to 50 animal heads (total of all males and females he has). Data of columns three and five will be calculated due to the current market prices of animals and fresh milk.
2. Fresh milk is defined herein as the milk secreted from the mammary gland of the animal without any manipulation in its nature or its chemical composition.
3. Column 6 (Disposition of the production needs verification by many field visits at governorate level.
4. Employment data at farm level (family-temporary hired-full time hired) are available as sample survey data and the references are at highly confidence level. Data of labor force at total agricultural activity level are well officially documented.
[19] Part-time
[20] Full-time

Table 5.4 Data Available on Slaughtered Animals[21]

	No. of Slaughtered Animals[22]		Total Value (LE)		No. of Imported Animals	Total Value (LE)	Disposition of Production		Employment in production	
	LF[23]	SMF[24]	LF	SMF			on farm	processed	PT[25]	FT[26]
Cows	X	X	X	X	X	X	X	X	X	X
Buffaloes	X	X	X	X	X	X	X	X	X	X

Source: MALR

X: Available

2. Processed Milk and Meat

2.1 Processed Milk[27]

Processed milk is the milk after exposing to a treatment that manipulates its nature or its chemical composition. Commercial products are now as important as unbranded, artisan products. Local production has gone from 22% to50% (LME BASIS) in just over a decade. Main growth is from UHT liquid milk, eating and drinking yogurt. HDPE bottles are introduced for long life milk. White cheese also represents a big portion from processed milk products. Number of processing plants for this industry is 860 plants with an amount of production reached 68 thousand tons in 2001 with an increase from the previous year of 32%.

[21] Notes: All data are available with following considerations:
1. Employment data need official permissions and will be limited on skilled and unskilled labor.
2. Total values will be determined at the current market price by the calculation.
3. Disposition of production (LE) will be limited on domestic and export market, not at on farm level.
4.processes will be grouped due to definite criteria such as fat content or water content

[22] Notes:
1. Data of slaughtered animals at small-scale holder level are gathered in the official statistics with medium scale holder level data. However, it is well documented at nationally wide level and as total numbers at governorate level.
2. Disposition of production needs field visits.
3. Employment data need official permission in order to be collected from many authorized establishments.

[23] Large farms (50 head or more)

[24] Small and medium size farms (less than 50 head)

[25] Part-time

[26] Full-time

[27] Effect of Breeding System on the number and quantity of outputs: In addition to improving feeding levels of lactating animals to increase milk yield by about 25-30% and reducing stress due to internal and external parasites, we have the following phases:
In short term (two years): Importation of about 100000 heads of American Holstein Friesian pregnant heifers to increase milk production above the current level by about 20% to meet the increasing local demand on milk and milk products and to export processed products to other markets.
In medium term (3-10 years): Promote establishing medium size dairy farms representing ca 15% to reach 30% or more; crossing local cattle with Holstein Friesian or dual purpose cattle on the level of small holders (2-3 heads) and keeping the genetic merits of local cattle at the same time; intensive use of Crossbreeding will help small farmers in raising their living standards and nutritional levels of their families in rural areas and to get more money through selling surplus milk produced; Identification of milking buffaloes in medium sized herds (including flying herds) to assist in selecting outstanding producers due to their high genetic merit. This in turn will provide data for selecting genetically superior sires to be used through artificial insemination for genetic improvement. Import of frozen semen from buffalo raising countries may accelerate genetic improvement.

2.2 Processed Meat

Animal protein per capita in 2001 is 21 gram daily. Annual consumption per individual from meat and meat products, and milk and milk products are 8 and 56 kg in the year 2001 respectively. The corresponding values in the year 1981 are 8 and 42-kg orderly.

Table 5.5 Data Available on Processed Meat Products[28]

	No. of Processors			Amount of Production			Total Value			Disposition of Production		Employment in Production	
	S	**M**	**L**	**S**	**M**	**L**	**S**	**M**	**L**	**Domestic**	**Export**	**Skilled**	**Unskilled**
Cows	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Buffaloes	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

Food Processing Industry:

Data available to measure changes in the food processing industry include:
1. Number of companies
2. Total number of workers
3. Total wages, social insurance, and other benefits
4. Total cost of production and depreciation
5. Production at factor cost
6. Value of production
7. Net value added

These data are available from CAPMAS for the 29 sub-sectors of Egypt's food processing industry.

Extended Input-Output Data Needs[29]

Appendix 2 of the report illustrates data gabs for SAM-IMPLAN as compared with Egypt National Accounts –SAM.
Additional data are available from the following sources:
General Authority for Industrialization; Food Processing Industry Association; Cabinet, Information and Decision Support Center (IDSC); Egyptian Industrial Federation (Chamber of the Food Processing Industry); Leadership Support Center; Industrial Registry; Ministry of Industry; USAID Library; AUC Library; Egyptian Planning Institute; Central Agency for Mobilization and Statistics (CAPMAS); General Authority for Import and Export Control; General Authority for Investment (GAFI); Agriculture Led Export Business Project (ALEB); Horticulture Exports Association (HEIA)

Egypt Social accounting Matrix (SAM) Data

[28] NOTES: All requested data are available but some official permission is needed.
[29] Data source list can help fill data gaps for some subcategories of food processing sector and other relevant sectors. For example: General Organization for Industrialization (GOFI): A governmental org. that can provide detailed data on employment in specific food processing categories that we fail to get data on from CAPMAS concerning Employment, production. Food Processing Industry Association (FPIA) has secondary data, studies, reports and background information on the sector's problems, constraints, competitiveness, and related issues. IDSC is the Cabinet information center--a major source for data in case of data gaps especially in income, employment. APRP, ALEB, HEIA, and USAID projects may have conducted similar studies. The main economic activity codes follow the Arabic countries unified SIC codes. Number (03/113/96). Employment definition for these economic activities includes full time hired labor and it excludes part time labor, trainees, and others.

The disaggregated Egypt Social Accounting Matrix (SAM) constructed by the International Food Policy Research Institute (IFPRI) for 1997 needs to be reviewed. This database has 28 productive sectors (activities), 36 commodities, 10 households, 5 factors, a government account and a rest-of-the-world account, 14 agricultural sectors producing agricultural commodities. The SAM also differentiates between urban and rural households by quintiles, allowing welfare, inequality and poverty analysis, in addition to distinguishing agricultural labor and capital from that of non-agricultural labor. Even though the data is more than five years old, the relationships between the sectors in 1997 could help augment the I-O table for 2000-2001 with three additional sectors needed for Phase 2.

Recommendations for later extensions in model construction include the following:

1. New and additional data for construction of regional input-output models for each of the three regions—Upper Egypt, Middle Egypt, Lower Egypt, and the two metropolitan areas—Cairo and Alexandria--that are the preferred locations for the food processing sector as well as the major growth areas in labor market demand. Extensions in model application include use of both direct and indirect multipliers in measuring program effects on area employment and income and additional detail in household and government sectors.[30]
2. New and additional data for the construction of industry-occupation tables showing base year distributions of occupations in each industry to convert estimates of industry employment to employment by occupation. Existing industry-occupation tables may need some modification in the number and type of occupation categories available for representing rural industries that differ from their larger counterparts in metropolitan areas.
3. New and additional data for construction of industry-business tables showing base year distributions of business types, e.g., small, medium, and large, in each industry.

[30] . Expansion of the number of sub-industries should take into account the importance of a sub-industry at its regional level of aggregation, based on recommendation of an appropriate expert panel.

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Appendices

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Appendix 1. Egypt's Input-Output Models: Documentation

Model No. 1: Input- Output (I-O) Table, 1973

Input-Output analysis is extremely powerful in explaining direct and indirect relations between different components of the economic system. This table lists the value of the goods produced by each sector In the Egypt case; the I-O table includes the following three matrices:

1.1 Intermediate Consumption Matrix (U)

This matrix includes both local and imported non-durable goods and services (commodities) used for intermediate consumption of industries in the production process.

1.2 Value Added Matrix (Y)

This matrix includes primary inputs that exist as stock providing services that contribute to production. The stock is not used up in production, although it may deteriorate with use, providing a smaller flow of services later. Value added includes labor compensation, operating surplus, consumption for fixed capital, indirect taxes, and subsidies.

1.3 Final Demand Matrix (E)

This matrix includes all commodities produced locally and imported that are used (consumed) by final demand institutions. This matrix includes the following uses:

1.3.1 Private consumption: including resident household consumption, consumption of non-profit institutions serving households, matrix C
1.3.2 Government final consumption expenditure, included in matrix C[31]
1.3.3 Increase in stocks, matrix S
1.3.4 Gross fixed capital formation, matrix K
1.3.5 Exports (F.O.B.): value of the Rest of World purchases of local commodities, matrix X
1.3.6 Imports: Value of Country purchases of commodities from Rest of World, matrix M

1.4 Imports Matrix (M)

Value of Country purchases of commodities from Rest of World, matrix M

1.5 Direct Primary Input Matrix (YC)

This matrix includes direct uses of primary inputs in all final demand institutions

[31] According to 1991/1992 Egypt-National Account Statistics, Government includes central government, local government, social insurance, and government services institutions.

Model No. 2: Source and Destinations of Commodity Supplies Table, 1973

It shows sources and uses of all commodities between make- sectors and use- sectors. This model consists of two matrices:

2.1 Commodity and Supply Matrix, V and M

Matrix V includes all locally produced commodities in all economic activities. Because it is difficult to determine type of commodities that is produced by government institution and non-profit private institution (v*, v**), these two items were separated in a column outside matrix v and was devoted totally for household. M is commodity imports and q = m+ v, total supply of commodities (goods and services).

2.2 Commodity Destination Matrix

Includes uses of all commodities by industries and institutions. It includes intermediate demand for industries in addition to the final consumption of households, change in stocks, fixed capital formation and exports.

Direct purchases from abroad by government, and households are neither included in commodity imports (M) nor included in intermediate demand by government (C3) nor included in final demand by households in local market (C1)

Purchases of non- resident households from local markets are also not included in commodity exports (X); rather they are included in final demand by households in local market (C1)

Model No.3 Simplified Presentation of Commodity Flows and National Accounts, 1973

This model illustrates commodity sources from local production and imports and commodity uses in all sectors.

Appendix 2. IMPLAN-SAM Input-Output Sectors and Data Availability

Institution Receipts	Description	Type of Transfer	Type Codes_1.Description	From Egypt's 2000/2001 I-O Industry Classification for 32-Sector Model
1	Agriculture	15052	Commodity Make	Sectors 1 and 2
28	Mining	15052	Commodity Make	Sectors 4 – 5
48	Construction	15052	Commodity Make	Sector 27
58	Manufacturing	15052	Commodity Make	Sector 3, Sectors 6 – 25
433	TCPU	15052	Commodity Make	Sectors 26 and 28; part Sector 31
447	Trade	15052	Commodity Make	Part Sector 29
456	FIRE	15052	Commodity Make	Part Sector 29; part Sector 31
463	Services	15052	Commodity Make	Sectors 30 and 32
510	Government	15052	Commodity Make	Special Sector
516	Other	15052	Commodity Make	Special Sector
3001	Agriculture	15050	Commodity Use	
3028	Mining	15050	Commodity Use	Use industry-commodity matrix to convert
3048	Construction	15050	Commodity Use	Industry-commodity matrix to commodities.
3058	Manufacturing	15050	Commodity Use	
3433	TCPU	15050	Commodity Use	
3447	Trade	15050	Commodity Use	
3456	FIRE	15050	Commodity Use	
3463	Services	15050	Commodity Use	
3510	Government	15050	Commodity Use	
3516	Other	15050	Commodity Use	
5001	Employee Compensation	15053	Factor Receipts	DA
6001	Proprietary Income	15053	Factor Receipts	DA
7001	Other Property Income	15053	Factor Receipts	DA (combined with proprietary income)
8001	Indirect Business Taxes	15053	Factor Receipts	DA
10001	Households LT10k	15002	Emp Comp (Wages/Salary w/o Soc Sec)	DA
		15003	Employee Comp (Other Labor Income)	DA
		15004	Proprietors Inc (w/o Soc Sec & CCA)	DA
		15005	Rent with Capital Consumption Adj[32]	
		15006	Business Transfers[33]	
		15007	Dividends	DA
		15008	Interest (Net-from Industries)	DA
		15009	Interest (Gross)	DA
		15010	Transfers	DA (combined with interest, net)
		15011	Surplus or Deficit	DA
		15037	Factor Trade[34]	
		15051	Commodity Trade[35]	
		15052	Commodity Make[36]	
11001	Central Government NonDefense	15011	Surplus or Deficit	
		15013	Wage Accruals Less Surplus	DA
		15014	Social Ins Tax- Employee Contribution	DA
		15015	Social Ins Tax- Employer Contribution	DA

[32] Rental income is payment to households primarily for rental properties from the real estate and owner occupied dwelling sector. Capital consumption adjustment is the difference between real depreciation and tax depreciation on rental properties.
[33] Business transfer payments include corporate gifts to individuals, medical malpractice payments, and insurance payments.
[34] Factor (i.e., primary inputs or value added) payments to rest-of-world, which are found in net rest-of-world payments to households (and payments of dividends to rest-of-world—not included since these are hidden).
[35] Household purchases from rest-of-world.
[36] Commodity output of producing household or government sector not included in industry-commodity matrices.

Institution Receipts	Description	Type of Transfer	Type Codes_1.Description	From Egypt's 2000/2001 I-O Industry Classification for 32-Sector Model
		15016	Surplus-Subsidy- Govt Enterprises	DA
		15017	Indirect Bus Tax: Excise Taxes	DA
		15018	Indirect Bus Tax: Custom Duty	DA
		15019	Indirect Bus Tax: Fed NonTaxes	DNA
		15026	Corporate Profits Tax	DA
		15027	Personal Tax: Income Tax	DA
		15028	Personal Tax: Estate and Gift Tax[37]	
		15029	Personal Tax: Non Taxes (Fines-Fees	DA
		15051	Commodity Trade[38]	
		15052	Commodity Make[39]	

* DA: Data Available

* DNA: Data Not Available

[37] Personal tax payments to central government on wealth transferred to beneficiaries.
[38] Central government purchases from rest-of-world.
[39] Commodity output of producing central government sector not included in industry-commodity matrices.

IMPLAN-SAM Sector Descriptions (concluded)

11002	**Central Government Defense**	**15010**	**Transfers**	**DNA**
11003	**Central Government Investment**	**15010**	**Transfers**	**DNA**
12001	**Local Govt Non Education**	**15007**	**Dividends**	**DNA**
		15010	**Transfers**	**DA**
		15011	**Surplus or Deficit**	**DA**
		15013	**Wage Accruals Less Surplus**	**DA**
		15014	**Social Ins Tax- Employee Contribution**	**DA**
		15015	**Social Ins Tax- Employer Contribution**	**DA (combined with employee contributions)**
		15016	**Surplus-Subsidy- Govt Enterprises**	**DA**
		15020	**Indirect Bus Tax: Sales Tax**	**DNA**
		15021	**Indirect Bus Tax: Property Tax**	**DNA**
		15022	**Indirect Bus Tax: Motor Vehicle Lic**	**DNA**
		15023	**Indirect Bus Tax: Severance Tax**	**DNA**
		15024	**Indirect Bus Tax: Other Taxes**	**DNA**
		15025	**Indirect Bus Tax: S/L NonTaxes[40]**	
		15026	**Corporate Profits Tax**	**DA**
		15027	**Personal Tax: Income Tax**	**DNA**
		15028	**Personal Tax: Estate and Gift Tax[41]**	
		15029	**Personal Tax: NonTaxes (Fines- Fees**	**DNA**
		15030	**Personal Tax: Motor Vehicle License**	**DNA**
		15031	**Personal Tax: Property Taxes**	**DNA**
		15032	**Personal Tax: Other Tax (Fish/Hunt)**	**DNA**
		15051	**Commodity Trade**	**DNA**
		15052	**Commodity Make**	**DNA**
12002	**Local Govt Education**	**15010**	**Transfers**	**DNA**
12003	**Local Govt Investment**	**15010**	**Transfers**	**DA**
		15011	**Surplus or Deficit**	
13001	**Enterprises (Corporations)**	**15001**	**Corporate Profits with IVA[42]**	
		15010	**Transfers**	**DA**
14001	**Capital**	**15011**	**Surplus or Deficit**	**DA**
		15033	**Capital Consumption Allowance[43]**	
		15035	**NIPA Statistical Discrepancy[44]**	
		15051	**Commodity Trade**	**DNA**
		15052	**Commodity Make**	**DNA**
14002	**Inventory Additions/Deletions**	**15011**	**Surplus or Deficit**	**DNA**
		15051	**Commodity Trade**	**DNA**
		15052	**Commodity Make**	**DNA**
25001	**Foreign Trade**	**15010**	**Transfers**	**DA**
		15011	**Surplus or Deficit**	**DA**
		15051	**Commodity Trade**	**DA**
28001	**Domestic Trade**	**15037**	**Factor Trade**	**DNA**
		15051	**Commodity Trade**	**DNA**

[40] Business licenses and documentary and stamp taxes; donations.
[41] Personal tax payments to central government on wealth transferred to beneficiaries.
[42] Interest payments (interest value added) paid by businesses.
[43] "Tax return-based depreciation for corporations and non-farm proprietorships and historical cost-depreciations for farm proprietorships, rental income of persons and nonprofit institutions" (page 8).
[44] National Income and Product Accounts (NIPA) adjustment to balance accounts.

Appendix 3. Sectors for Egypt's Input-Output Tables in year 1991[45]

Sectors for the 1991 I-O tables include the following:

1. Agriculture-Food crops
2. Agriculture-non-food crops
3. Livestock
4. Oil and Natural Gas
5. Mining
6. Food Processing
7. Beverages
8. Tobacco
9. Cotton Ginning and Sweeping
10. Textile
11. Ready-made clothes
12. Leather and Leather Products
13. Shoes
14. Wood and Wood products (excluding furniture)
15. Furniture
16. Paper and Printing
17. Chemical products (excluding petrochemical industries)
18. Oil Refinement
19. Rubber and Rubber Products
20. China and Porcelain products
21. Glass products
22. Non metal mining products
23. Basic metal products
24. Machines and equipment
25. Transport vehicles
26. Other manufacturing
27. Electricity, Gas and water
28. Building and construction
29. Wholesale and retail business
30. Hotels, restaurants, and coffee shops
31. Warehousing and transport
32. Transportation
33. Financial intermediaries
34. Insurance
35. Mortgages, business and household services
36. Social services
37. Entertainment and culture
38. Personal services

[45] In the most recent Egypt I-O table for targeted/expected figures for year 2000/2001, only 32 sectors are included as shown in report main document.