PN-ACS-936

Ministry Of Agriculture & Land Reclamation
US Agency For Int. Development
Agricultural Policy Reform Program
Reform Design and Implementation

وزارة الزراعة واستصلاح الأراضي
الوكالة الأمريكية للتنمية الدولية
مشروع إصلاح السياسات الزراعية
وحدة تصميم وتنفيذ السياسات

*Ministry of Agriculture and Land Reclamation*

**AGRICULTURAL POLICY REFORM PROJECT**

***Reform Design and Implementation Unit***

USAID CONTRACT NO. 263-C-00-97-00005-00

***Report No. 53***

# The Effects of Liberalization and Privatization on Employment: *The Case of Rice*

***Prepared by***

**Dr. Ronald D. Krenz**

***With***

**Dr. Abdel Sattar Ahmed Shenashan and Lawrence Kent**

**January 1999**

***Reform Design and Implementation Unit***

*Development Alternatives Inc. Group: Office for Studies & Finance, National Consulting Firm, Development Associates, Cargill Technical Services, The Services Group, Training Resources Group, Purdue University, University of Maryland*

# Table of Contents

## Acronyms

| | |
|---|---|
| AERI | Agricultural Economics Research Institute, MALR |
| ARC | Agricultural Research Center, Ministry of Agriculture |
| APCP | Agricultural Production and Credit Project (USAID) |
| APRP | Agricultural Policy Reform Program (USAID) |
| CAAES | Central Administration for Agricultural Economics and Statistics, MALR |
| CAPMAS | Central Agency for Public Mobilization and Statistics |
| FD | Feddan |
| GOE | Government of Egypt |
| GTZ | German Technical Assistance Program (Deutsche Gesellschaft Fur Technische Zusammenarbeit) |
| HCRFM | Holding Company for Rice and Flour Mills |
| KG | Kilogram |
| LE | Egyptian Pound (unit of money) |
| MALR | Ministry for Agriculture and Land Reclamation |
| MMT | Million Metric Tons |
| MT | Metric Ton |
| MTS | Ministry of Trade and Supply |
| MVE | Monitoring, Verification and Evaluation (APRP) |
| PBDAC | Principal Bank for Development and Agricultural Credit |
| RDI | Reform Design and Implementation Unit of APRP |
| USDA | United States Department of Agriculture |
| USAID | United States Agency for International Development |

# Acknowledgements

This study would not have happened without the efforts of Lawrence Kent in preparing the scope of work, giving it the initial direction and providing sustained direction throughout the study to completion.

The assistance of Abd El-Sattar Shenashan, labor economist of AERI, was essential in gathering data on the public sector from HCRFM and CAPMAS and in providing critical analysis and insight.

Special thanks to Adel Abd El Hafeez Megahad and Ramadan Osama of the Sampling Section, CAAES/ MALR for their assistance in this study. They conducted the survey of village and small commercial rice mills, they organized two field trips to the rice areas, and they provided various other data on cropland areas and on labor use in rice harvesting.

A vote of thanks is extended to Abdel Razik Hassan, Director of Sampling in CAAES of the Economic Affairs Sector, MALR for his assistance with a variety of data issues on rice milling, crop planting data, estimates of the numbers of rice mills, and other items.

The sage advice of Dr. Ragaa El-Amir on matters of changes in the rice industry over a long time period is sincerely appreciated. He is an economic historian of worthy note.

John Holtzman, MVE-APRP, provided assistance in many ways. He made a valuable contribution to the study in terms of data, with his research attitude and aptitude, and with sound opinion on many matters in the rice sector. Particularly helpful was his baseline study of the rice sector and his willingness to share the data he has just recently collected on the commercial rice mills.

Fatma Khatab contributed to the study in several ways, including assisting on the design of the study, with her assistance in making contacts with industry personnel, and in obtaining the data necessary to do the study. Her help is sincerely appreciated.

Special thanks to Faizal Eid Ahmed, General Manager, Marketing Research, of HCRFM for the provision of data on labor use in the public rice mills.

Thanks are also due to these experts in rice policy who reviewed the study's initial findings and provided useful advice:
- Sayed Tantawi, Chairman of the General producers Cooperative for Rice and Cereals
- Mohamad Kamal Ghonaim, Chairman of the HCRFM
- Samir Naggary, Egyptian Rice Union
- Mahmoud Mansour, Head of AERI
- Mohamad El Shahed, Head of CAAES

# Chapter I: Introduction

## Background

Since the Government of Egypt initiated its program of liberalization and privatization in the agricultural sector, there have been concerns about potential negative impacts on employment, particularly in the public sector. Indeed, in an economy such as Egypt where the public sector plays a large role in the employment picture, economic reforms are bound to effect large shifts in labor.

Some public enterprises that are potentially affected by economic reforms in agriculture are cotton textile mills, fertilizer production plants, rice mills, wheat mills, cotton gins, etc. On the one hand the employees in these public enterprises are in danger of losing their jobs, but on the other hand the liberalization of markets will create new job opportunities in the new private enterprises being formed.

In an attempt to discern the direction of employment shifts due to economic reforms, the Reform Design and Implementation (RDI) unit of the Agricultural Policy Reform Project (APRP) commissioned a study of one of the agricultural sub-sectors that has been most dramatically affected by liberalization and privatization – the rice sector. Of particular concern are the employment effects of economic reforms at the producer level and at the rice milling level. The Holding Company for Rice and Flour mills (HCRFM) has had eight companies operating up to 52 rice mills in the past with about 10,000 employees who are potentially affected by these economic reforms.

Prior to 1991 the rice subsector was highly regulated. Producers were required to deliver a portion of their production directly to government warehouses at fixed procurement prices. Producers were allowed to store only half a ton of rice for home consumption. Inter-governorate transport of rice was banned. Milling was allowed only under permit. Private merchants were prohibited from dealing in rice, and only specific public sector mills and marketing companies and certain specified co-operative societies could market rice, including exports.

The crop year 1991 brought major changes to the rice subsector. Mandatory delivery quotas for rice producers were discontinued. Fixed procurement prices for paddy rice were relaxed, and the bans on transport, milling, marketing and storage of rice were also discontinued. Thus, a major revolution in the rice subsector was started in 1991.

Within a few years, major changes had occurred in rice marketing, milling and exports (2, 8). The amount of paddy production increased dramatically. The number of private sector activities exploded. Not all changes were welcome, however, as public sector activities in buying paddy, in milling and in exports declined dramatically.

## Objectives

This study focuses on the impacts on employment of economic reforms in the rice subsector. Estimates were made of the effects of market liberalization and privatization on the demand for on-farm employment in the major rice producing governorates and effects on employment in the rice-milling subsector. Since the major reforms occurred during the marketing season of 1991-92, the year 1990-91 provides the 'before economic reforms' picture with the 1997-98 season representing the 'after reforms' picture.

## Methodology

The study compares labor use in rice production, milling, and trading at two points in time -- before and after economic reforms. In the case of rice production, estimates on the labor requirements to produce a feddan of rice were compared to labor requirements for alternative crops. These estimates were then multiplied by the changes in area planted. In the case of milling, the sector was sub-divided into the various categories of mills: old village mills, new village mills, tractor-powered mills, commercial mills, and public mills.[1] The number of mills and the number of laborers per mill were estimated for each category of mills before and after reforms. Similarly, the volume of rice traded by the private sector after the reforms was compared to the volume before reforms. These individual estimates were finally brought together to give the overall picture.

Solid data are available on the number of mills and the volume of rice milled in the public sector; however, the number of mills and volumes milled in all other categories are uncertain. Estimates from several sources on the number of village mills vary widely. Very little is known about the number of tractor-operated or private commercial mills.

A small survey of both old and new village mills was conducted for this study. Estimates were obtained on labor requirements, tonnage milled, changes in number of mills since 1990-91, ratio of rice area to number of mills, number of tractor-powered mills, and other variables.[2]

The most reasonable estimates of the number of mills and the tonnage per mill in each category were entered into a spread-sheet which reconciled all estimates with total paddy rice available, less an allowance of 1.5 percent for seed.[3] While a large number of possible solutions would give the same total milled output, the numbers presented here are in agreement with evidence obtained from field

---

[1] Some claim that there are small rice mills in people's homes. This may be possible, but none were ever found and no estimates were made for this category.

[2] This survey was conducted by members of the Sampling Section, CAAES, MALR. This survey included operators of 33 village (mawani) mills and 11 small commercial mills located in 40 villages in six governorates. All 11 small commercial mills were using imported mills -- 10 from China, one from Japan.

[3] The spreadsheet results are presented in the Appendix.

observations and with the various official estimates available. Still, the reader must be aware that many of the numbers presented are only estimates.

## Outline

Chapter II is concerned with impacts of economic reforms on labor use on farms in the rice producing areas. Chapter III deals with employment in village mills, both the traditional (*mawani*) mills and the new village mills that have been imported. Chapter IV discusses labor of rice milling with tractor-powered rice mills, while Chapter V deals with private commercial mills of all sizes. Chapter VI examines employment in the public sector rice mills. Chapter VII discusses rice trading and exports. Finally, Chapter VIII brings all of these estimates together to look at the total impacts of economic reform on employment in the rice sub-sector.

# Chapter II: Labor use in production

Economic change in the rice subsector in Egypt began in 1989 when the government began a series of increases in the procurement price for paddy rice. Structural reform began in 1990 when mandatory delivery quotas of paddy rice were reduced to 1.0 MT per feddan. The quotas were completely removed in 1991, as were bans on transportation, storage, milling and trading of rice. [1]

The response of rice producers was almost immediate. The reforms were announced in early 1991, and the area planted to rice expanded roughly six percent that same year. The total area of rice, which remained roughly 967,000 feddans throughout the 1980s, jumped to 1,020,000 in 1990, as farmers responded to the relaxation of delivery quotas and the increasing prices. The area planted to rice in Egypt continued to increase until 1997 at a rate of over five percent per year (2). Between 1990 and 1997, rice yields increased from 3.1 to 3.5 tons per feddan (13 percent.).

***Table 1. Area planted to rice in the seven major rice producing governorates and for Egypt.****

| Year | Seven major governorates | Total Egypt |
|---|---|---|
| | (000) Feddan | (000) Feddan |
| 1990 | 1.020 | 1.036 |
| 1991 | 1.080 | 1.100 |
| 1992 | 1,189 | 1.215 |
| 1993 | 1.248 | 1.276 |
| 1994 | 1.327 | 1.378 |
| 1995 | 1.353 | 1.400 |
| 1996 | 1.354 | 1.405 |
| 1997 | 1,482 | 1.527 |
| 1998 | 1.204 | 1.225** |

Source: CAAES, MALR. * Includes Beheira, Kafr El Sheikh, Dakahliya, Gharbiya, Sharkia, Fayoum and Damietta. **Enforcement by the Ministry of Irrigation of penalties for planting rice in 'illegal areas' resulted in a decline in the official estimate of the area planted to rice in 1998. Some Egyptian agricultural specialists believe that these official estimates of rice area and production are purposely underreported for various reasons.

One might expect that the total cropping area in Egypt is quite fixed, especially in the major rice growing areas, so that any expansion in rice must result in decreases in other summer crops. However, this is not the case. Cotton and maize are the only other major summer field crops in the seven major rice governorates. The expansion in rice did not come at the expense of cotton (Table 2), as the area planted to cotton in these governorates has varied only slightly from year to year with no apparent trend during this period.

[1] During 1986-1989 the mandatory delivery quota had been 1.5 MT/ FD for japonica rice varieties and 2.0 MT/ FD for Filipino varieties.

*Table 2: Area planted to cotton and maize in major rice growing governorates, (1991-98).**

| Year | Cotton | Maize |
|---|---|---|
| | (000) Feddan | (000) Feddan |
| 1991 | 600 | 688 |
| 1992 | 596 | 693 |
| 1993 | 644 | 648 |
| 1994 | 565 | 702 |
| 1995 | 534 | 714 |
| 1996 | 656 | 685 |
| 1997 | 608 | 581 |
| 1998 | 591 | 601 |

Source: CAAES, MALR. * Same governorates as listed in Table 1.

The area planted to maize in these governorates increased between 1991 and 1995 but has declined since then. The expansion in rice resulted in some decrease in maize by 1997 and also some small declines in soyabeans, sunflower, tomatoes, and potatoes (Table 3). Other summer crops not itemized here declined between 1990 and 1997 by 27,000 feddan. However, we also see increases in the area planted to some crops, particularly sorghum. **The most striking element of these data is the overall increase in the total area planted by 303,000 feddans between 1990 and 1997.** This increase in area explains two-thirds of the increase in rice area. Thus, only 158,000 feddans, or about a third, of the increase in rice in these governorates came from reductions in other crops.

*Table 3. Area of summer crops planted in the seven major rice governorates (in feddans)*

| | | | Change |
|---|---|---|---|
| Crops | 1990 | 1997 | 1997 vs. 1990 |
| | | | |
| Rice | 1,020,578 | 1,481963 | 461,385 |
| Cotton | 680,084 | 681,662 | 1,578 |
| Maize | 685,735 | 561,463 | -124,272 |
| Sorghum | 32,108 | 55,603 | 23,495 |
| Peanuts | 8,079 | 10,612 | 2,533 |
| Sesame | 2,817 | 5,841 | 3,024 |
| Soyabeans | 16,928 | 359 | -16,569 |
| Onions | 1,252 | 3,358 | 2,106 |
| Sunflower | 23,232 | 14,328 | -8,904 |
| Potatoes | 39,240 | 35,387 | -3,853 |
| Tomatoes | 65,242 | 55,060 | -10,182 |
| Other summer crops | 472,213 | 445,961 | -27,252 |
| Total summer crops | 3,049,498 | 3,353,594 | 303,096 |

Source: CAAES, MALR. Same governorates as listed in Table 1.

One might ask how it is possible that the total area of summer crops increased during this period, and whether that change is related to the economic reforms in rice. Part of the increase resulted from a greater intensity of land use. Also, some land that lay idle in 1990 may have been used in 1997. And shifts to shorter season crops, such as vegetables, could have affected the increase in the reported

area of crops planted on the same area of land. But there has also been an increase in the area of cropland in these governorates which has come from two sources: the amelioration of old lands and the development of new desert lands, also called land reclamation.[5]

MALR has made major efforts in recent years to drain land that was unproductive due to a high water table, alkalinity, or salinity. In the Delta, 2.2 million feddans have received tile drains since 1970 (8, Table 4.2). Rice is a good crop to grow on land with salinity problems. With proper drainage, some of the irrigation water used in rice production will leach down into the water table and take excess salts with it. Thus, rice can actually be used to reclaim land.[6]

New desert lands have been brought into production in two major rice producing governorates: Sharkia in the eastern delta and Behira in the western delta. Rice is not grown on new desert lands because these soils are sandy, but other crops can be shifted from the 'old lands' to the 'new lands', thus making room for more rice on the heavier clay soils of the delta. A prime example of this is the shifting of potatoes to the new lands in Nuberia (part of Behira) and Salehia (part of Sharkia), partly due to problems of disease control.[7]

An average of 88,000 feddans were reclaimed per year between 1987 and 1998 in the delta.[8] Thus, between 1990-91 and 1997-98 about 620,000 feddans of new desert land have been added to the delta. Not all of this area was added to the rice growing governorates, but most of this addition was in the eastern and western delta governorates of Sharkia and Behira.

In addition, a considerable area of old cropland which became waterlogged or contaminated with salts or alkalinity has recently been brought back into production. Data on the amount of reclaimed land by governorate are not readily available, but it is quite clear that the land area available for crop production in the rice areas has expanded.

While the land reclamation and desert land development efforts of the MALR must be given credit for most of this increase in land area, some unknown share

---

[5] Development of desert lands is referred to as "land reclamation" while bringing land back into crop production that had been previously cropped but was suffering from salts, alkaline, or lack of drainage is called "amelioration".

[6] For a good discussion of this topic see Wailes (8) pages 39-51.

[7] See Krenz, Ronald D. *Horticultural sub-Sector Map*, Project Report No 39. RDI Unit/ APRP/USAID, June, 1998, Page 22.

[8] ***Table 4. Reclamation of desert lands, Delta regions.***

| Region | 1987-92 (Actual) | 1992-97 (Actual) | 1997-2002 (Planned) |
|---|---|---|---|
| East Delta | 200,000 | 249,100 | 281,000 |
| Middle Delta | 50,000 | 21,000 | 88,200 |
| West Delta | 196,000 | 151,700 | 232,000 |
| Total Delta | 446,000 | 421,800 | 601,200 |

Source: CAAES, MALR.

of the increase can be attributed to economic reforms which resulted in greater profits from rice production and thus greater incentives for land development. Similarly, the increase in cropping intensity is also partly due to the greater profitability of rice production caused by the reforms.

## Labor requirements for rice production

The amount of labor needed for crop production in Egypt has been estimated in several studies. Table 5 presents estimates for the major field crops from three studies. Although these estimates differ somewhat, the relative differences between crops are similar. All estimates show that cotton requires the most man-day equivalents of labor per feddan. Rice and maize require approximately the same amount of labor per feddan.

***Table 5. Labor requirements for producing major field crops. (Man-day equivalents)***

| Crops | CSPP* | U/AES** | AERI*** | Average |
|---|---|---|---|---|
| **Summer:** | | | | |
| Rice | 43.6 | 51.5 | 41.5 | 45.5 |
| Cotton | 94.8 | 101.7 | 103.5 | 100 |
| Maize | 52.8 | 41.2 | 43.5 | 45.8 |
| Soyabeans | --- | 27.0 | --- | --- |
| Tomatoes | --- | 60.5 | --- | --- |
| **Winter:** | | | | |
| Wheat | 28.1 | 34.9 | 37 | 33.3 |
| L. Berseem | 39.5 | 48.1 | 42 | 43.2 |
| S. Berseem | 16.5 | 27.8 | 24 | 22.8 |

*Selzer, Thomas. *Results of the 1997 Farm Survey in Dakahleya and Beni Suef, Project* Report = 58, CSPP, GTZ, September 1998.

** Undersecretariat for Agricultural Economics and Statistics, MALR, See Krenz, R. *et al. Agronomic and Economic Factors Effecting Cotton Production in Egypt.*

***Private communication, AERI, October, 1998.

An estimate of the total on-farm labor requirements for producing rice can be made as follows:

| Year | Feddans in rice in the seven rice governorates (000) | Labor requirements (days/feddan) | Total labor requirements (man-days) |
|---|---|---|---|
| 1990-91 | 1,020 | 45 | 46 million |
| 1997-98 | 1,482 | 45 | 67 million |
| Increase | 462 | 45 | 21 million |

In the seven major rice producing governorates, the area planted in rice expanded by 45 percent (462,000 feddan) between 1990 and 1997. About a third of this increase (158,000 feddan) can be attributed to farmers replacing maize and other

minor crops with rice on their farms (see table 3). About two-thirds of the expansion of the area planted in rice (303,000 feddan) was made possible through the land reclamation efforts of the MALR and by more intensive land use.

As rice production expanded, on-farm employment in rice production also expanded. Each feddan of rice requires approximately 45 man-days of labor, thus the expansion in rice planting implies 21 million additional man-days of labor per year. Subtracting out the reduction in labor associated with the reduction in land planted in maize and other crops, the net increase in employment is approximately 14 million man-days (54,000 full-time job equivalents).[9]

While the land reclamation efforts of MALR deserve most of the credit for this employment creation, the reforms in the rice sector also played a role. These reforms increased the profitability of rice cultivation and created an incentive to expand the amount of land planted in rice. Increased profitability also contributed to the intensification of production, resulting in a 13 percent increase in the amount of rice produced per feddan. This intensification may also have increased the amount of labor required per feddan. Unfortunately, there is no data available to allow comparisons of the per feddan requirements for labor in rice production before and after this intensification -- we are obliged to use 45 days/feddan in both periods.

[9] The labor requirements for maize (45.8 days) is essentially the same as for rice.

# Chapter III: Village Mills

## Characteristics and capacities of traditional village mills

Prior to economic reforms there were many village mills (*mawani*), but all were of the same basic technology. These traditional mills were manufactured domestically. Since 1990-91, a large number of small rice mills have been imported. In this study these imported mills are called 'new village mills'. We use this label because these mills perform much the same function as the 'traditional village mills', i.e., they mill primarily for farmers, they do not buy paddy rice, and they are located in villages.[10]

The many small village mills, both traditional and new, provide a significant share of the rice milling capacity in Egypt. The older mills, also known as de-hullers or rubbers (*mawani* or *bardani*), are based on a simple, single-pass technology. These mills are relatively inefficient -- the yield percentage is lower and the percentage of broken rice is higher than that produced by the commercial or public mills.[11] These mills operate primarily for farmers and other village residents. Hired rice workers are often paid partially with rice. Survey data indicate that about five to six percent of production was used as payment in-kind to workers for hired services (3, 4). The village mills also mill the paddy rice of these workers.

Most traditional village mills in the rice-producing areas have one mill exclusively for milling rice and a separate stone mill for milling wheat and maize. Some village mills visited in our field trips had two rice mills, but few of these mills now operate more than one at a time, indicating better days in the past. *Mawani* operators may mill rice full-time for two to four months during and after the rice harvest season (October and following months). They primarily mill wheat after the wheat harvest in May and June and mill maize after the maize harvest. They mill all grains on a sporadic or part-time basis the remainder of the year.

Village mills typically mill on a fee basis. None of the village mills surveyed in 1998 purchased paddy rice. They milled for a fixed fee per ton, kilogram, or ardeb (one ardeb = 150 KG). The current fee for milling rice ranges from LE 10-LE 35/MT. Wailes (8) reported that village mill fees varied from LE 12 to 35/MT in 1993-94. El Amir (5) reported an average milling fee in 1994-95 of LE 24/ton. In the 1998 survey the charge for milling varied considerably between governorates, with an overall average rate of LE 20.90/MT. Hence, current village mill prices are about the same as they were in 1993-95, or perhaps lower.

---

[10] In this report, milling for farmers will generally imply milling for rice producers, hired rice workers and other village residents who obtain paddy rice directly from producers.

[11] Wailes, et al (8) reports average yields of 68.3 % and average percentage of broken rice of 11.8 % in 1993-94 for village mills.

In the survey of village mills conducted by CAAES for this study, the village millers reported that 97 percent of the rice they milled was milled for farmers and other village customers and only three percent for private traders. Some farmers are currently taking their paddy rice to the small commercial mills for milling because of the higher quality product they produce, and some tractor-powered mills are also milling for farmers.

The traditional village mills were manufactured by small machine shops in Egypt. Two companies in Mansoura have produced most of the *mawani* that operate in Egypt. Their design has changed very little in 50 years. In field visits made for this study, mills purchased in 1998 appeared to be of the same technical design as those purchased in the 1930s. The average date at which these mills began operations was 1973.

The milling capacity of these traditional village mills is approximately one to three tons of paddy rice per mill per 8-hour day. If operated full time (one shift per day, year-round), the maximum milling capacity would be about 750 MT of paddy per year. However, in 1998, the average traditional mill reported only 1.8 months of full-time operation, a period of 8.6 months of part-time operation, and 1.6 months idle per year. The average village mill reported milling rice for only 615 hours per year, but as reported above, these mills also mill wheat or maize.

A wide range of estimates has been reported for average annual tonnage milled by the traditional village mills. El Miniawy (1) reported an average of 102 MT/yr. of white rice per mill in 1989. Wailes (8) reported an average milling volume of 395 MT of paddy in 1993-94, and El Amir (6) reported an average of 572 MT/yr. of paddy in 1994-95. In the survey of 33 village mills conducted for this study the average volume of paddy rice milled last season (1997-98) was only 112 MT/yr./mill. This varied considerable between mills and between governorates. The range reported for individual mills was from a high of 360 MT/yr. to a low of 20 MT/yr. and the average by governorate ranged from 223 MT/yr. in Kafr El Sheikh down to 28 MT/yr. in Daqahliya. (Note that the mills in Daqahliya also reported the lowest average milling charges.) This study used an estimate of 480 MT/yr. for the pre-reform period and 288 MT/yr. for the post reform period.

## New Village mills

Since economic reforms, Egypt has seen a proliferation of the small, imported mills that we call 'new village mills'. These mills are the main competition for the old-style *mawani* mills and are, to some extent, replacing the older mills in terms of customers and purpose. They serve farmers and farm workers, as do the *mawani*, but they also serve local rice traders. The 1998 survey of new village mills indicated that farmers owned about 60 percent of the paddy milled in these mills and traders owned 40 percent. Operators of these mills generally do not buy paddy rice; they just sell milling services.

Most of the new village mills are manufactured in China, though some are manufactured in Korea or Japan. The Chinese and Korean mills are much lower in investment cost per MT of capacity than the Japanese mills, but they also produce a lower quality product and are predicted to have a shorter mechanical life.

While few, if any, of the new village mills produce an 'export quality' white rice, the quality of the product of these mills is better than that produced by the traditional village mills. Thus, we can say that the average quality of the rice milled by village mills is better now than it was in the pre-reform period.

Village millers who own both a new village mill and a *mawani* mill reported charging a higher rate for milling with the new mill. The average charge reported by the new mills is LE 28.10/MT, whereas the average charge of the old mill is LE 20.94.

New mills, like the *mawani*, are one-unit, one-pass systems. The milling is performed by only one machine. Some mills have added a paddy rice cleaner, which helps to produce a cleaner final product, and some mills also have an elevator to feed the paddy rice into the mill, reducing the labor requirement.

## Number of traditional village mills

Several estimates are available on the number of traditional village mills. One difficulty in estimating the number of mills is the matter of licensing. All mills are legally required to have a license to operate, but many millers operate without licenses in order to reduce costs and avoid taxation.[12] A survey of rice mills conducted by the HCRFM in 1997 enumerated 4,714 mills of which 1,365 (29%) were operating without a license (Table 7).[13] The HCFRM provided an estimate in 1998 of 4,009 *mawani* mills, a 15 percent reduction from 1997.

Table 7 illustrates the number of *mawani* mills in the seven major rice-producing governorates. For comparison, the number of villages per governorate is also reported in the table. Of course there is a relationship between the number of mills and the number of villages but not a one-to-one correspondence. Some small villages have no mills while large villages have several mills.

[12] A license is needed to obtain electricity but those without a license use diesel power or use a small electric motor, which they can add to their home electrical wiring.

[13] Very few of the village mills enumerated for this study reported that they had been enumerated in the HCRFM survey in 1997.

*Table 7. Number of villages and estimates of the number of traditional village rice mills in the seven major rice producing governorates, HCRFM, 1997.*

| Governorate | No. of Villages | Licensed Mills | Unlicensed Mills | Total No. Mills | Percent Without License |
|---|---|---|---|---|---|
| K. El-Sheikh | 241 | 404 | 128 | 532 | 24 |
| Behira | 463 | 467 | 285 | 752 | 38 |
| Gharbiya | 314 | 394 | 225 | 619 | 36 |
| Daqahliya | 438 | 1.113 | 367 | 1.480 | 25 |
| Damietta | 59 | 82 | 94 | 176 | 53 |
| Sharkia | 492 | 811 | 220 | 1.031 | 21 |
| Fayoum | 157 | 88 | 36 | 124 | 29 |
| Other | --- | ---- | ---- | ---- | --- |
| Total | 2.164 | 3.349 | 1.365 | 4.714 | 29 |

Source: Number of villages from 1990 Census, CAPMAS. Other estimates from HCRFM.

The MOTS provided estimates in 1998 on the number of rice mills and all grain mills (Table 8). The estimates in Table 8 are quite different from those in Table 7, both in terms of the numbers of mills and in the percentage of mills that are licensed, particularly at the governorate level.

Estimates in Tables 7 and 8 indicate that Daqahliya has the largest number of village mills, which should be expected since this governorate has the largest share of the rice production area (about 30%). However, the rankings of estimates of the number of mills for Kafr El Sheikh, Sharkia, Behira and Gharbiya do not agree with their ranking in terms of production. The estimates for Fayoum and Damietta reflect the fact that these governorates are of lesser importance in rice production.

*Table 8. Estimates of the number of traditional village mills (mawani) in the seven major rice producing governorates, MOTS, 1998.*

| Governorate | Licensed rice mills | Unlicensed Rice mills | All rice mills | Percent Unlicensed | All licensed Mills |
|---|---|---|---|---|---|
| Kafr El Sheikh | 160 | 340 | 500 | 68 | 353 |
| Behira | 233 | 100 | 333 | 30 | 330 |
| Gharbiya | 150 | 7 | 157 | 4 | 352 |
| Daqahliya | 534 | 612 | 1146 | 53 | 575 |
| Damietta | 40 | 45 | 85 | 53 | 56 |
| Sharkia | 664 | 0 | 664 | 0 | 664 |
| Fayoum | 46 | 5 | 51 | 10 | 135 |
| Other | 157 | 271 | 428 | 63 | ---- |
| Total of above | 1.984 | 1.380 | 3.364 | 41 | 2.465 |

Additional estimates of the number of village mills are given in Table 9. The first column lists estimates of the number of licensed mills in 1989. We should expect this to be the lowest estimate since it represents the earliest date. It is quite clear that the number of mills has increased since that time. This estimate applies only to traditional *mawani* mills since the newer village mills were introduced after 1989.

*Table 9. Other estimates of the number of mills in the seven major rice producing governorates.*

| | El Miniawy / El Din, 1989 | MALR* 1998 | MALR* 1998 | CAPMAS** 1996 |
|---|---|---|---|---|
| Governorate | (Licensed rice mills) | (Licensed rice mills) | (Unlicensed rice mills) | (All grain mills) |
| Kafr El-Sheikh | 532 | 396 | 178 | 983 |
| Behira | 343 | 463 | 230 | 1,171 |
| Gharbiya | 151 | 447 | 224 | 1,079 |
| Daqahliya | 538 | 893 | 245 | 1,690 |
| Damietta | 36 | 54 | 35 | 236 |
| Sharkia | 196 | 460 | 92 | 1,780 |
| Fayoum | 22 | 138 | 55 | 493 |
| Other | 86 | --- | --- | --- |
| Total | 1,882 | 2,851 | 1,059 | 7,432 |

* Sampling Section, CAAES, MALR, 1998.
** CAPMAS, Census of 1996.

Estimates of the number of licensed and unlicensed rice mills by governorate were also prepared in 1998 upon our request by the Sampling Section of the CAAES of the MALR (2nd and 3rd columns, Table 9). These estimates, which likely include both the traditional and the new village mills, are similar in total to those presented in Tables 7 and 8 but again differ somewhat by governorate. All estimates by agencies of the GOE tend to underestimate the number of unlicensed mills compared with estimates made by farmers or village millers. It seems that GOE staff are reluctant to admit the extent of unlicensed operations, especially in their own governorates.

The CAPMAS census report (last column, Table 9) includes all private mills that mill grains, not only rice, and all commercial mills. The total number of village rice mills (traditional and new) in 1996 should be represented by this estimate, less the number of grain mills not processing rice and the number of commercial rice mills. The MOTS data indicated that 80 percent of the licensed mills in the major rice governorates were rice mills. Thus, the CAPMAS data would lead us to believe that there were about 6,000 privately owned rice mills, of all types, in 1996, and the number of mills has certainly increased since 1996, especially the number of new village and commercial mills.[14]

The milling capacity of the private commercial sector began to expand immediately after the bans on milling were lifted, but the major expansion occurred after 1995 (see Table 11, Chapter V). Between 1991 and 1995 the expansion in milling was handled by the *mawani*, which had been milling below capacity before then. During this period many private traders went to the village mills to mill the paddy rice they had purchased. In 1993-94, half of the paddy rice delivered to the village mills was reported to have come from private traders

[14] The estimate of 6000 excludes the tractor-powered mills discussed in Chapter IV.

(8, Table 7.3). By 1998, following the rapid expansion in private commercial mills, village mills experienced a reduction in their volume, and by 1998 the *mawani* were again milling primarily for farmers.

## Number and capacity of new village mills

The number of new village mills currently in use is estimated at 1,700. This estimate is based on the estimates reported in Tables 7-9, on the results of the 1998 survey of villages, and on other field observations. For instance, companies in Gharbiya reported importing and selling 350 of these mills in that governorate in 1997 alone. Some of the new village mills do not have licenses.

In the spreadsheet model for 1997-98 (Appendix Table 2), estimates of three MT/day and 170 days of operation were used to give a total tonnage estimate of 867,000 MT for new village mills. Of this total, it is estimated that about 40 percent was milled for traders and 60 percent for farmers and other village customers.

## Pre-reform employment

The number of traditional village rice mills in 1990 (pre-economic reform) is estimated at 3,600. This estimate is based largely on the estimate of 1,882 licensed mills (Table 9) with an adjustment for unlicensed mills as reported by HCRFM and MOTS. Although milling was tightly controlled before economic reforms, it is commonly known that there were a large number of unlicensed village mills. Field interviews for this study indicated that the survey by HCRFM failed to include many unlicensed mills and hence the estimated percentage of unlicensed mills by HCFRM is considered to be low.

It is estimated that traditional village mills milled 1.26 million MT of paddy rice for producers and their workers and 468,000 MT for private traders in 1990-91 (See Appendix Table 1). With 3,600 mills, each mill had to process an average of 480 MT of paddy rice per year. This estimate far exceeds the volume estimates reported in earlier studies, but the early studies did not reconcile the estimates of milling with total paddy production. Also, under-reporting by all private operated mills, both village mills and commercial mills, likely occurred out of fear of taxation. Any smaller estimate of the number of old village mills in 1990-91 would imply a still higher volume per mill, which is considered unreasonable.

Earlier studies of village rice mills did not report any employment data. However, the technology of the traditional village rice mills has not changed since 1990, so the number of workers per mill was assumed to be the same in 1998. On the other hand, the volume processed per mill was estimated to have been considerably greater in 1990-91 than in 1997-98. Thus, some adjustments must be made for the increased hours of operation in 1990-91.

In the 1996 census data reported by CAPMAS, a total of 30,801 workers were reported for the 13,022 grain mills owned by individuals and partnerships. This is an average of 2.37 workers per mill. One must remember that most of these village mills have both rice and wheat-maize mills.

The survey of village mills in 1998 by CAAES estimated 2.03 employees per mill, of which 0.72 were hired and 1.31 were family workers. Hired workers were paid an average annual wage of LE 1,849 and benefits of LE 66. The major benefit was social insurance, the annual cost of which is LE 216 per worker. This indicates that only 30 percent of the workers received this benefit. In the 1998 survey, the same workers operated both the mills for rice and the mills used for milling wheat and maize in 89 percent of the village mills.

Village mills reported milling rice an average of 615 hours during the 1997-98 season. Most mills reported about 35 hours of operation per week, about 45 weeks per year. This gives an estimate of 1,575 total hours for mill operations in 1997-98. Thus, 40 percent of the workers' time was allocated to rice milling with the balance dedicated to wheat and maize milling.

In the estimated 3,600 village rice mills in 1990-91, it is assumed that the higher volume of rice per mill during the pre-reform period required longer work hours per day and more days per year. To mill 2.5 tons a day required a longer workday, and 185 days a year were required to mill 480 MT/mill. This results in about 1,300 hours of operation per mill for 2.25 workers per mill or 1.86 man-years of worker per mill for rice. With 3,600 mills the total employment is estimated at 6,700 man-years for rice milling in old village mills. Of this total, 4,360 man-years are operator or family labor and 2,340 man-years are hired labor.[15] The total value of this employment in 1990-91, based on a value per man-year of LE 1,600, is estimated to have been LE 10.72 million.

## Post-reform employment (traditional village mills)

The number of *mawani* has increased as a result of the economic reforms. As reported above, these mills operated at a highly expanded capacity during the 1991-94 period after the bans on private trading, milling, and transportation had been lifted and before the expansion in numbers of other types of mills. Thus the numbers of the traditional village mills expanded during 1991-94, but the average volume per mill has since declined due to the expansion in numbers of commercial mills, new village mills, and tractor-powered mills.

In the 1998 CAAES survey, mill operators were asked to report the number of mills in their village now and in 1990. In the 40 villages visited the total number of mills reported was 96 in 1990 and 169 in 1998. This implies an increase of 76 percent since 1990. However, the new village mills were also included in this estimate.

[15] All workers reported in the 1998 survey of mills were males.

The area of rice cultivated in 1989 for the villages visited averaged 770 feddans per village, one mill for each 174 feddans of rice. On the basis of feddans of rice, this would imply a total of 6,900 rice mills in 1998. However, this procedure produces an upward bias since villages without mills were not included in the sample. As stated above, based primarily on the CAPMAS census of 1996, an estimate of 6,200 private mills at the present time is realistic and reasonable.

Taking all of the above into account, we estimate that in 1997-98 there were 4,500 old village mills and 1,700 new village mills.

As stated in Chapter I, a spreadsheet was used to bring all of the estimates of mill numbers and volumes together to reconcile the quantities milled with total production of paddy rice. In the spreadsheet, an estimate of 4,500 old village mills with an average annual volume of 300 MT per mill is a reasonable estimate (See Appendix Table 2).

With 4,500 *mawani*, 2.25 workers per mill, and 40 percent of the labor allocated to rice, we obtain an estimate of 5,175 man-years of labor in rice milling in the *mawani* in 1997-98. This estimate shows a reduction of 23 percent from the employment estimate for *mawani* in 1990-91, which is reasonable since the quantity of rice milled by this category of mills is about 22 percent less than was milled in 1990-91.

As reported above, the average wage rate reported in 1998 for hired workers in these mills was LE 1.849 with benefits of LE 66/year. The total value of employment in the *mawani* in 1997-98 is estimated at LE 9.9 million.

## Post-reform employment (New village mills)

Data on employment in these mills is limited. The small sample field survey conducted by CAAES in 1998 gave an estimate of 2.5 men per mill, with 54 percent hired workers. The spreadsheet model indicates use of 170 days a year, which represents about 75 percent of full-time. On this basis, the estimate of annual labor use is 1.9 man-years per mill, for a total of 3,230 man-years in the 1,700 mills. Of this total, 1,745 man-years would be hired workers. The average hired wage rate was LE 2,000 per man-year with average benefits of LE 106 per man-year. The total value of this employment (both hired and own labor) in 1997-98 is estimated at LE 6.8 million.

# Chapter IV: Tractor-powered mills

In recent years a modification of an old technology has been brought into the rice milling picture. Tractor-owners (mostly farmers) have begun to take the same type of *mawani* rice mills used in the village mills and power them with their tractors. The mill is usually mounted on wheels to be powered and transported between villages by a tractor. These portable mills fill the milling needs of smaller villages that are without mills. Tractor-mill operators mill paddy for farmers, farm workers, and other village residents who buy paddy from farmers.

Tractor-powered mills have appeared on the scene only in the past six to eight years. One may wonder why people invest in these portable mills instead of the traditional village mills since the machinery involved is identical. There are several possible reasons. Electric motors required to power traditional mills cost up to LE 1000, whereas a tractor, which is already available and sometimes unused at that time of the year, represents no new fixed costs. Furthermore, the portability of these mills allows the miller to go in search of new business. Finally, because the tractor provides the power, there is no need to install electrical service for a motor for the mill, and therefore no need for a license.

Tractor-powered mills are one-man, part-time operations.. Most tractor-powered milling is done during and immediately after the rice-harvesting season, from October to December.

## Number of tractor-powered mills

Data on the number of these mills are, to our knowledge, non-existent, since few if any of these mills are licensed and thus the owner-operators are unwilling to provide data on their operations. Nor do we know what share of tractor owners have such mills.

As reported in Table 7, Chapter IV, there are 2,164 villages in the seven rice growing governorates. Most but not all villages have permanent village mills, and the number of village mills is growing. In a survey of 40 villages conducted in 1998 for this study, 44 percent of the mill operators reported that there were tractor-powered mills in their village.[16] The survey data indicate that there is an average of slightly over two tractor-powered mills in those villages that have such mills, for an average of one tractor-powered mill per village. Thus, the number of tractor-powered rice mills is estimated at 2,000.

## Employment

As stated above, this is a part-time operation occurring mostly from October to December. For tractor operators with rice mills, the additional employment from

[16] This survey was conducted by staff of the Sampling Section, CAAES, MALR.

rice milling is estimated to be two months a year. With a capacity of one MT/day, these mills are estimated to mill 50 MT per mill each year. With 2,000 mills, this group of mills could mill a total of 100,000 MT a year and use 4,000 man-months or 333 man-years of additional employment per year.

The average wage rate for a tractor-operator is estimated to be LE 8 a day or LE 2,400 a year. Thus, the estimated value of this employment in 1997-98 was LE 0.8 million.

# Chapter V: Private Commercial Mills

A fourth major category of rice mills in Egypt is the private commercial mills, most of which sprang up after the economic reforms. 'Commercial mills', as used in this study, refer to those private mills with capacities of at least 10 MT per day. The major portion of the expansion in milling capacity since 1990 has happened in this segment of the milling sector. The number of private commercial mills in 1989 was estimated at 37, which together milled just five percent of total white rice production that year (1).[17] Currently, an estimated 350 mills process 45 percent of total paddy production.

## Pre-reform

Prior to the economic reforms, private commercial mills could operate only with special permission from the GOE, which established quotas for each mill. There is evidence, however, that commercial mills actually milled more than this "illegally" (not under government contract), although no estimates were made of the amount.

Wailes estimated that, in 1993-1994, the capacity of the 37 private commercial mills was between 66,000 and 93,000 MT of white rice per year, a number which likely included only those quantities milled under government contract. But early studies of the rice subsector failed to reconcile milling capacities with the quantities of rice needed to be milled (8, Table 7.1). Surveys for the various tranche reports (3, 4 and 5) indicated that rice farmers sold 21 percent of their production to private traders in 1990-91. In 1990, 21 percent of production amounted to 650,000 MT of paddy rice. The village mills milled a portion of this paddy rice, but given the limited capacity of the village mills, private commercial mills also must have milled a share of this total.

The estimates of milling capacity for 1989 account for only 55 percent of the rice to be milled in that year. The estimated capacity of 66,000-93,000 MT for the commercial sector is therefore believed to represent only that quantity milled for the government under contract.[18]

As reported in Chapter III, to reconcile total milling capacities with rice production, it was estimated that in 1990-91 the village mills milled about 468,000 MT for private traders. This leaves a balance of about 163,540 MT to be milled by the 37 private commercial mills, or a total of about 4,420 MT per mill per year (See Appendix Table 1).

---

[17] Note that in the discussion of village and farm mills the capacity is usually given in tons of paddy rice, as is the custom with these millers, while the commercial and public millers refer to capacity in terms of tons of white rice.

[18] 66,000-93,000 MT of white rice is equivalent to 100,000-140,000 MT of paddy rice. Hence the estimate of 163,540 MT of paddy is only a slight increase over the reported capacity estimates.

A survey of commercial mills conducted by the Monitoring, Verification and Evaluation (MVE) unit of the APRP in 1998-99 reported an average of 11 workers per mill. It is difficult to believe that these older commercial mills were more labor saving than the new commercial mills. Hence, for lack of better data, an average of 11 workers per mill will also be assumed for the 37 commercial mills that existed in 1990-91.

## Post-reform

This segment of the milling sector has experienced the major portion of the expansion in milling capacity since 1990, although estimating the numbers and capacity is difficult. Some firms in this group, particularly at the smaller end of the range, try to avoid registration and licensing to avoid costs and taxation.

Firms in this group have a wide range in milling capacity. Table 10 presents a tabulation of a list of mills, stratified by size. These mills differ widely in capacity and in quality of the final product. Practically all of these new mills were imported from China, Korea, Japan, or Europe.

Commercial mills have a different clientele than the smaller village mills. While commercial mills may mill a small quantity of paddy for farmers on a fee basis, they primarily mill paddy that was purchased by the mill operator, who also is a rice trader or exporter, or they operate on a fee basis for other private traders or exporters.

***Table 10. New private sector commercial rice mills stratified by capacity. (Capacity in MT of white rice/day)***

| Milling Capacity MT/Day | No. of Mills | Capacity (MT/Day) | Cumulative Capacity | Percent of Capacity | Percent of Cumulative Capacity |
|---|---|---|---|---|---|
| 10-18 | 31 | 426 | 600 | 7.0 | 9.9 |
| 20-25 | 23 | 609 | 1,209 | 10.1 | 20.0 |
| 30-35 | 50 | 1,515 | 2,724 | 25.1 | 45.1 |
| 40-45 | 18 | 720 | 3,444 | 11.9 | 57.0 |
| 50-55 | 18 | 900 | 4,344 | 14.9 | 71.9 |
| 60-75 | 8 | 495 | 4,839 | 8.2 | 80.1 |
| 100 | 12 | 1,200 | 6,039 | 19.9 | 100.0 |
| Total | 160 | 5,865 | --- | 97.1[19] | --- |

Source: (2) Data for 1998 based on information obtained from the Rice Branch, Cereals Industry Chamber, KOMPASS, and other industry sources and compiled by J. Holtzman, APRP-MVE Unit.

Some new commercial mills produce exportable rice and some do not. This category of mills is estimated to have a total milling capacity of 2.45 million MT per year, most of which is sold on the domestic market, although much is exported as well (See Appendix Table 2). Egyptian rice exports in 1997-98 were about 400,000 MT.

[19] 2.9% of capacity is milled by commercial mills with less than 10MT of capacity day. For this report, such mills are considered village mills and are included in chapter III.

The smallest private commercial mills observed in the field are mills which have three to four separate milling machines plus cleaners, with an investment cost of LE 60-100,000 and with operating capacity of 10 MT of white rice a day. These mills require four to seven men to operate, not including sacking operations.

Larger mills will have five to six milling machines (steps) plus cleaning and rice polishers with a capacity of 30-50 MT of white rice per day. This type of mill will usually produce export-quality rice.

***Table 11. Commercial rice mills added since 1990 by year of investment.* (Capacity in MT of white rice/day)***

| Year | No. of new mills | Total new Capacity | Cumulative new Capacity | Percent of new Capacity |
|---|---|---|---|---|
| 1991 | 33 | 853 | 853 | 17.2 |
| 1992 | 2 | 58 | 911 | 1.2 |
| 1993 | 0 | 0 | 911 | 0 |
| 1994 | 6 | 362 | 1,273 | 7.3 |
| 1995 | 15 | 305 | 1,578 | 6.1 |
| 1996 | 83 | 2,391 | 3,969 | 48.2 |
| 1997 | 24 | 785 | 4,754 | 15.8 |
| 1998 | 6 | 210 | 4,964 | 4.2 |
| Total | 169 | 4,964 | ---- | 100.0 |

Source: (2) Data for 1998 obtained from the Rice Branch, Cereals Industry Chamber, KOMPASS, and other industry sources and compiled by J. Holtzman, APRP-MVE Unit.
*The data sources for Tables 10 and 11 were identical but data on the year of investment was not provided for 24 of the new mills which thus had to be excluded from Table 11.

Also included in Tables 10 and 11 are five co-operative owned mills. Three co-operatives purchased mills in 1994 with daily milling capacity of white rice of 60 MT a day and two co-operatives purchased new mills of 100 MT per day capacity in 1996. These five mills, with a total daily milling capacity of 260 MT (white rice, 390 MT of paddy) will be included in the estimates in this report as a separate category of mills. These five mills report total employment of 430 workers.

The number of private commercial mills currently in operation is not known. The 1998-99 MVE survey of commercial millers produced an updated list of 230 firms, but this list is known to be incomplete. Surveyors involved estimate that the real number of commercial mills may be 50 to 100 percent higher.

Statistics collected for this study by CAAES provide the following estimates of licensed privately owned commercial mills in the seven major rice-producing governorates:

| Governorate | Number of mills |
|---|---|
| Beheira | 37 |
| Sharquia | 13 |
| Daqahliya | 22 |
| Gharbiya | 43 |
| Kafr El Sheikh | 37 |
| Damietta | 24 |
| Fayoum | 2 |
| **Total** | **178** |

CAAES reports that the actual number of commercial mills is likely to be twice the number reported in the list, because many commercial mills are unlicensed or do not appear in the list for other reasons.

Based on the above and on discussions with representatives of the industry, the current report estimates the number of commercial mills to be 350. The MVE survey found that the average capacity of these mills is 35 tons a day, and they operate for an average of 200 days per year.

The 1998-99 MVE survey indicated an average of eight full time employees and 5.8 part-time employees in the sample commercial mills. Assuming the part-time employees are employed half time, this gives an estimate of 11 employees per mill and a total of 3,850 full-time equivalent jobs currently in this sub-sector.

# Chapter VI: Public mills

Publicly-owned mills dominated rice milling through the 1980s and, until recently, produced all of the export-quality rice. The market share of the public sector has gradually declined since 1990 (see Table 15, Chapter VII). In 1990-91 public procurement, and hence the quantity milled in public mills, was 1.2 million MT of paddy rice, or 38 percent of total production. The market share of the public mills dropped to only two percent in 1996-97 but came back to nine percent in 1997-98.

After the liberalization of the rice sector, the public sector chose not to compete with the private sector in the purchase of paddy rice. Consequently, many of the public mills stood idle or were severely underutilized, and many have been closed (Table 12). Utilization of the milling capacity of the public mills fell to 9 percent in the 1996-97 season. Total procurement by public sector companies during the 1997-98 season was 517,627 MT of paddy, which gave an average capacity utilization rate of only 32 percent.

***Table 12. Estimated annual milling capacity of public mills; 1989, 1994, and 1998.***

| | 1989 | | 1994 | | 1998 | |
|---|---|---|---|---|---|---|
| Milling Company | No. Mills | Milling Capacity (MT/Day) white rice | No. Mills | Milling Capacity (MT/Day) white rice | No.Mills | Milling Capacity (MT Day) paddy rice |
| Alex. | 6 | 740 | 6 | 696 | 4 | 534 |
| Rashid | 8 | 593 | 6 | 504 | 6 | 520 |
| Behera | 6 | 700 | 5 | 624 | 5 | 650 |
| K.Sheikh | 6 | 680 | 6 | 648 | 3 | 710 |
| Gharbiya | 6 | 580 | 5 | 528 | 4 | 623 |
| Daqah. | 7 | 715 | 7 | 816 | 5 | 727 |
| Damietta | 8 | 827 | 7 | 744 | 6 | 469 |
| Sharkia | 5 | 660 | 5 | 552 | 4 | 544 |
| Total | 52 | 5,495 | 47 | 5,112 | 37 | 4,777 |

Source: 1989: Miniawy and El Din (1).
1994: (2) Adapted from El Amir and Gamal El Din
1998: (2) HCRFM.

Public sector companies have gradually reduced operation of their mills by permitting them to stand idle. Early in the liberalization process public mills were offered for lease, and one or two mills were leased in 1993-94, but no public mills have been sold to private owners. Leasing of public mills by private companies has since been discontinued.

Data from CAPMAS show that the public sector rice milling companies had 8,170 permanent employees in 1991 with a payroll cost of LE 44,980,000 or an average annual wage of LE 5,506. In 1994 and 1995 the HCRFM reported that

temporary employees were equal to 23 percent of permanent employees. Thus, the number of temporary employees in 1991 is estimated at approximately 1,880, giving a total of 10,050 employees.

Despite the closing of many public mills between 1990 and 1998, the public rice-milling companies did not reduce their number of permanent employees. In fact, the number of permanent workers at the eight companies expanded to 9,081 in 1998, although the number of temporary employees fell to 650. Government policy prohibited the dismissal of workers.

Under the direction of the HCRFM, the eight public rice-milling companies are now proceeding with programs to convert into employee-ownership companies. This process, which was initiated in 1998, involves several phases including early retirement of permanent employees and conversion of financial control.

Phase one involves the early retirement of female employees of age 45-58 years and males age 50-58 years. All eight companies have completed this phase. The second phase involves compensation for resignation of employees with 10-19 years of experience with the companies. Three companies had completed the second phase in early November 1998, and three more companies were expected to complete this phase by mid-November 1998 (Table 13). The third phase includes determination of the surplus number of employees remaining so that the employee-owned companies can reduce their labor costs to the point where they are financially viable.

***Table 13. Number of permanent employees before and after the voluntary retirement program at the public rice mills, October 1998.***

| | Before Privatization | | 1st Phase retirement | | 2nd Phase retirement | | Total Retirement | | Remaining Employees | |
|---|---|---|---|---|---|---|---|---|---|---|
| Company | Men | Women | Men | Women | Men | Women | Men | Women | Men | Women |
| Alex. | 985 | 270 | 230 | 87 | --- | --- | 230 | 87 | 755 | 183 |
| Rashid | 710 | 88 | 222 | 45 | --- | --- | 222 | 45 | 488 | 43 |
| Behira | 980 | 105 | 221 | 42 | 82 | 14 | 303 | 56 | 660 | 46 |
| K.Sheikh | 805 | 83 | 300 | 29 | --- | --- | 300 | 29 | 505 | 54 |
| Gharbiya | 1,491 | 244 | 263 | 48 | --- | --- | 263 | 48 | 1,228 | 196 |
| Daqah. | 801 | 144 | 223 | 47 | 36 | 13 | 259 | 60 | 542 | 85 |
| Damietta | 959 | 91 | 223 | 28 | --- | --- | 223 | 28 | 736 | 63 |
| Sharkia | 1,305 | 20 | 251 | 13 | 158 | 2 | 409 | 15 | 896 | 5 |
| Total | 8,036 | 1,045 | 1933 | 339 | 276 | 29 | 2,209 | 368 | 5,810 | 675 |

Source: HCRFM

The HCRFM is absorbing the cost of these early retirement programs, estimated at LE 66.4 million to date. Some excess employees will be transferred to wheat-

flour mills under control of the HCRFM. The anticipated savings in employee costs of phases I and II are shown in Table 14.

In January 1999 the HCRFM reported that 2,335 employees had accepted early retirement under phase I and 810 employees under phase II for a total reduction of 3,145 permanent employees. Thus, 5,950 permanent and 650 temporary employees still remained with the eight milling companies.

*Table 14. Salary costs of rice milling companies before and after voluntary retirement programs, 1998. (LE/year)*

| Milling Company | Before Program | After Program | Savings |
|---|---|---|---|
| Alexandria | 4,935,696 | 3,168,300 | 1,767,396 |
| Rashid | 3,518,244 | 2,116,344 | 1,401,900 |
| Behira | 6,484,400 | 4,197,331 | 2,287,069 |
| K.Sheikh | 5,484,000 | 3,610,902 | 1,873,098 |
| Gharbiya | 5,861,314 | 4,520,102 | 1,341,212 |
| Daqah. | 5,990,000 | 3,866,528 | 2,123,472 |
| Damietta | 5,240,996 | 3,441,200 | 1,799,796 |
| Sharkia | 6,395,000 | 4,018,000 | 2,377,000 |
| Total | 43,909,650 | 28,938,707 | 14,970,943 |

Source: HCRFM, 1998

Phase III specifications of the number of permanent employees needed to operate the eight milling companies had been made by January 1999. The eight milling companies produced an estimate of 3,184 necessary employees, implying that as of January there still remained about 2,754 excess permanent employees.[29] HCRFM management indicated that some of these 2,754 excess workers may still accept early retirement, but the bulk of the remaining excess workers will be absorbed by the wheat-flour mills over the next 4 years.

In summary, total employment prior to privatization of the public rice mills was about 10,050. The target number of employees is 3,184, a reduction of 6,866 jobs. As of January 1999, the total number of employees was 6,600. Hence, employment in the public rice mills has already been reduced by about 34 percent with a goal to reduce employment in these mills eventually by 68 percent.

Even after the transition to employee-ownership, the eight milling companies will not have an easy time competing with the new private mills. The eight public companies currently have milling capacity of over one million MT per year. Assuming these employee-owned companies reach their targets of only 3,184 employees, they would still have a capacity of only 314 MT of paddy rice per employee per year. In comparison, the private commercial mills currently have milling capacity of 636 MT per employee per year. The eight employee-owned companies likely will not be able to pay 3,184 employees and will find it necessary to make further reductions in labor costs to be competitive.

Furthermore, the employee-owned companies will have to pursue a vigorous and competitive program of purchasing paddy rice and marketing of white rice in order to maintain a high utilization rate of their milling capacity. In total, these mills purchased only 518,000 MT of paddy during the 1997-98 season, using 32 percent of their milling capacity and milling just 163 MT of paddy per employee -- not enough for profitable operations.

[29] A slight discrepancy exists between the number who accepted early retirement, the optimal number of employees and the number of excess employees. This discrepancy was reportedly due to normal retirement and deaths.

# Chapter VII: Private Rice Trading and Export

When a government ban on trading is lifted, the number of traders and the volume traded expand rapidly. For example, private trade in cotton went from zero to over 50 percent of the crop within two years.[21] The experience in the Egyptian rice sector is similar.

## Volume of private trade in rice

The share of the rice paddy crop purchased by the public sector has been declining since 1987-88 with concomitant increases in private sector procurement. Over a quarter of paddy is retained by the producer (Table 15). Surveys from 1994-1995 indicate that producers retain some rice for family consumption, for sales to neighbors, for payment of workers (5-6% of the crop) and for seed (2% of the crop).

***Table 15. Disposition of paddy rice, 1987-97.***

| Season | Total Paddy Rice Production | Public Sector Procurement* | Private Sector Procurement | Retained by producers |
|---|---|---|---|---|
| | (MMT) | (Percent) | (Percent) | (Percent) |
| 1987-88 | 2.40 | 48.9 | N.A. | N.A. |
| 1988-89 | 2.13 | 45.4 | N.A. | N.A. |
| 1989-90 | 2.67 | 42.0 | N.A. | N.A. |
| 1990-91 | 3.17 | 38.2 | 20.6** | 41.2 |
| 1991-92 | 3.45 | 25.7 | 23.4 | 50.9 |
| 1992-93 | 3.91 | 23.5 | 51.3 | 25.2 |
| 1993-94 | 4.15 | 13.3 | 52.8 | 33.9** |
| 1994-95 | 4.58 | 12.7 | 58.9 | 28.4*** |
| 1995-96 | 4.79 | 7.1 | 64.5 | 28.4 |
| 1996-97 | 4.90 | 2.0 | 69.6 | 28.4 |
| 1997-98 | 5.42 | 9.6 | 62.0 | 28.4 |

Sources: * HCRFM.
**Wailes *et al* (8) *** El Amir *et al* (6)

While no new surveys on producer retention of rice have been conducted since 1995, retention by farmers since that time is assumed to be a constant percent of the crop. The quantity purchased by private traders for the years since 1994-95 is estimated as the remainder after sales to the public sector and retention by producers. These estimates show a rapidly increasing total volume of rice sales to the private sector. This increase is due to two factors: the removal of the ban on sales to the private sector and expanded output. Total procurement of paddy rice by the private sector, which was just 653,000 MT in 1990-91, expanded to 3.36 million MT in 1997-98, an increase of 515 percent in seven years. The farm level price of rice has also increased since the pre-reform period, and thus the value of sales handled by private traders has increased by 600-700 percent.

[21] Krenz, Ronald D., *Liberalization of Cotton Marketing in Egypt, 1993-97*, Project Report No. 37, CSPP, GTZ, June 1997

## Number of private rice traders

The impact of the increase in the volume of paddy rice traded in the private sector on employment of private traders is very difficult to estimate. Wailes estimated 122 MT of paddy rice per trader in 1993-94, and El-Amir estimated 170 MTper trader in 1994-95. El-Amir's estimate would indicate 16,000 traders in paddy rice in 1994-95 or about eight rice traders in every village that produces rice. This number is possible, but not probable.

In surveys of private traders the volumes of trade reported are always subject to suspicion since traders are often trying to avoid taxation (3, 4). Under-reporting of volumes by traders can be expected. It is reasonable to expect that their average volumes are twice or three times what they reported. Thus, the actual number of traders in 1994-95 was perhaps only one half or one third of the number estimated above, i.e. 5,300 to 8,000 rather than 16,000.

No surveys of private traders were conducted before 1991 and none have been made since 1994-95. Thus the change in number of traders between 1990 and 1998 is difficult to estimate. Using an average volume of 340 MT/trader (twice the estimate reported by El-Amir) we arrive at an estimate of 1,920 traders in 1990-91 and 9,900 traders in 1998. However, we must take into account the fact that the average volume per trader increased considerably during this period, probably doubling or tripling. So again, 8000 may be a reasonable estimate of the number of rice traders in 1998.

A 1998 survey indicated one village trader in wheat for every 242 feddans of wheat.[22] Using the same ratio with the 1.4 million feddans of rice, we arrive at an estimate of 5,800 traders of paddy rice.

Trade in paddy rice, and also white rice, does not constitute full-time employment for these traders. Most traders deal in other commodities (mostly agricultural but also non-agricultural). Also, rice trading is seasonal for most traders. In addition, the expanded activity in rice trading comes at the expense of trade of other commodities which were previously grown on the land now used for rice.

## Rice exports

The number of private exporters increased from 20 firms or individuals in 1991 to 160 entities in 1996 (7). The share of rice exported by the private sector expanded from 14 percent in 1991-92 to 88 percent in 1997-98. Exportation of rice by the private sector was banned before 1991-92, so all of this increase is due to the policy reforms.

Data are not readily available on the number of jobs in the private rice export trade. It is know, however, that many of the larger commercial mills are owned

[22] Krenz, Ronald D. *Wheat Sub-Sector Maps for Egypt*, Project Report No. 47, RDI Unit/APRP/USAID. October, 1998, page 12.

by rice exporters. The MVE survey in 1999 indicated that about 10 percent of the commercial mills surveyed were also exporters. Thus perhaps 35 of the 350 commercial mills are also rice exporters. Although there may be 160 private rice exporters at present, roughly 80 percent of all private rice exports are done by about 20 of the larger firms. Most, but not all, of these large private exporters have there own rice mills. Therefore, the total number of new jobs created in rice exports above those in the private rice commercial milling sector is quite limited. Furthermore, the number of jobs in the public sector in rice exports has declined.

We can estimate that there may be 160 new export firms, less 35 already counted among the commercial rice mills, and since these are small firms, we estimate only three new full time jobs per firm.

# Chapter VIII: Conclusion – Effects of Economic Reform on Employment

The liberalization and privatization measures that the Government of Egypt took in the rice sub-sector led to significantly positive effects on employment (see Tables 16 and 17).

The main gains in employment took place at the production level, where the number of full-time equivalent jobs is estimated to have increased by 54,000 man-years, or 31 percent. The percentage increase in jobs was less than the percentage increase in rice area planted because of the reduction in areas planted to other crops.

The increase in full-time job equivalents in private trade activities is estimated at 1,000 man-years, an increase of about 300 percent. The net increase in employment from privatization of exports is estimated at 375 full-time man-years.

Currently, the milling sector is providing employment for 19,704 full time equivalent workers compared with 17,157 full-time jobs before economic reforms -- a 15 percent increase. However, the full impacts on employment of privatization in the public milling sector are not yet in place. After employment in the public sector has fully adjusted to privatization, the number of full-time jobs in the milling sub-sector may decline by a further 2,700 jobs. The reforms will then have had basically a neutral effect on the total amount of employment in rice milling, reflecting the increased efficiency in milling by the private sector versus the public sector.

***Table 16. Estimates of employment in the rice subsector before economic reforms, 1990-91.***

| Type of firm | No. of firms | Man-years Per firm | Total Man-years |
|---|---|---|---|
| Rice farms | --- | --- | 177,000 |
| Private Traders | 2,000 | 0.167 | 340 |
| Public mills | 52 | --- | 10,050 |
| Comm. Mills | 37 | 11 | 407 |
| Village Mills | 3,600 | 1.86 | 6,700 |
| Total | --- | --- | 194,497 |

*Table 17. Estimates of employment in the rice subsector after economic reforms, 1997-98.*

| Type of firm | No. of firms | Man-years Per firm | Total Man-years |
|---|---|---|---|
| Rice farms | --- | --- | 231.000** |
| Private Traders | 8.000 | 0.167 | 1.340 |
| Private Exporters | 125 | 3.0 | 375 |
| Public mills | 37 | --- | 6.600* |
| Comm. Mill | 350 | 11.0 | 3.850 |
| Co-op mills | 5 | --- | 430 |
| New village mills | 1.700 | 1.9 | 3.315 |
| Old village mills | 4.500 | 1.1 | 5.175 |
| Tractor mills | 2.000 | 0.167 | 333 |
| Total | 16.789 | | 252.418 |

* Actual employment in public mills, January 1999.

** Net of employment reduction in other crops.

Overall, the reforms have had a significantly positive effect on employment in rice farming, trading, and transportation. Total off-farm employment opportunities are currently estimated at 21,418 full-time equivalents compared to the pre-reform period of 17,497 jobs -- a 22 percent increase. After privatization in the public milling sub-sector is complete, the full-time off-farm employment equivalents is estimated to be at 18,718, which will be an increase of 1,221 jobs compared to the pre-reform period.

Overall, based on official rice production estimates, the current impact on employment is estimated to be an increase of 57,922 full-time jobs, or a gain of 30 percent. After full adjustment, the gain in jobs for the sector will be 55,222 or 28 percent.

## Productivity Increases

The study also yields evidence that the reforms in the rice sector led to significant increases in productivity. Before reforms, an average of 181 tons of paddy was processed per worker employed in rice milling. By 1997, this number had increased to 273 tons per worker-- a 51 percent increase in productivity -- with the productivity of private mills far exceeding those of public mills. This increase in productivity helps explain the increasing competitiveness of Egyptian rice on both domestic and export markets. And according to virtually all economists, increased productivity is the key to sustainable improvement in wages and a nation's standard of living (see, for example, *Global Competitiveness Report*, Michael Porter, 1998).

## Implications for other sub-sectors

This study provides evidence that liberalization and privatization can profoundly affect the structure of employment in a given agricultural sub-sector. It shows

that while reforms can lead to public sector job losses, they also can lead to private job creation and the overall net effect on employment can be positive. Policy makers considering reforms in other sub-sectors of the agricultural economy -- wheat, sugar, feed, cotton, etc. -- should draw hope from these results because the evidence suggest that reform, when carried out correctly, can result in positive net job creation and at the same time enhance productivity.

# Appendix

As stated in Chapter I, some of the estimates of mill numbers were determined with the use of electronic spreadsheets. These spreadsheets were designed to reconcile total milling with the official estimates of paddy rice production in 1990-91, which represents the pre-reform era, and in 1997-98, which represents the post-reform era. The estimated mill numbers were then used in estimating the impacts on employment of the policy reforms in the rice sector.

The spreadsheet results are presented in the following two tables.

**Appendix Table 1: Estimated rice milling capacities and numbers of mills by category of mills, 1990-91. (MT of paddy)**

| Type of mill | No. Mills | MT/mill /day | Days/yr. | MT/mill /yr. | MT/year | Percent of Production |
|---|---|---|---|---|---|---|
| Public mills | 52 | --- | --- | --- | 1,209,400 | 38 |
| Comm. Mills | 37 | 30 | 221 | 4420 | 163,540 | 5 |
| Village Mills* | 3600 | 2.5 | 52 | 130 | 468,000 | 15 |
| Village Mills ** | 3600 | 2.5 | 140 | 350 | 1,260,000 | 40 |
| Total milled | | | | | 3,100,940 | 98 |
| Retained for seed | | | | | 65,060 | 2 |
| Production | | | | | 3,166,000 | 100 |

* Milling for traders (27%).

** Milling for producers and other village members (73%).

**Appendix Table 2: Estimated rice milling capacities and numbers of mills by category of mills, 1997-98. (MT of paddy)**

| Type of mill | No. Mills | MT/mill /day | Days/ yr. | MT/mill /yr. | MT/year | Percent of Production |
|---|---|---|---|---|---|---|
| Public mills | 37 | --- | --- | --- | 517,627 | 9 |
| Co-op mills | 5 | 78 | 221 | 17,238 | 86,190 | 1.5 |
| Comm. Mills | 350 | 35 | 200 | 7,735 | 2,450,000 | 45 |
| Trad. Village mills | 4,500 | 2.5 | 120 | 300 | 1,350,000 | 25 |
| New village mills * | 1,700 | 3 | 68 | 204 | 328,790 | 6 |
| New village mills ** | | 3 | 102 | 306 | 538,210 | 10 |
| Tractor mills | 2,000 | 1 | 50 | 50 | 100,000 | 1.5 |
| Total | 8,592 | | | | 5,370,817 | 98 |
| Retained for seed | | | | | 112,978 | 2 |
| Production | | | | | 5,483,795 | 100 |

*Milled for traders (40%).

** Milled for producers and other village members (60%).

# Selected References


1. El Miniawy, Ahmed, and Ismail Gamal El Din, Economic Working Paper No. APAC (3), 1989, Cairo, Egypt.

2. Holtzman, John S., Charles Stathacos, Abdel-Rahim Ismail. ***Rice Subsector Baseline Study,*** Draft for discussion report. Impact Assessment Program, Monitoring, Verification and Evaluation Unit, APRP, Impact Assessment Report No. 3, June 1998. Cairo, Egypt.

3. Ministry of Agriculture and Land Reclamation. ***Tranche V Monitoring and Verification Report on Performance Under the Agricultural Policy Reform Program, Agriculture Production and Credit Project.*** A report to the U.S. Agency for International Development. June 1992. Cairo, Egypt.

4. Ministry of Agriculture and Land Reclamation. ***Tranche VI Monitoring and Verification Report on Performance Under the Agricultural Policy Reform Program, Agriculture Production and Credit Project.*** A report to the U.S. Agency for International Development. April 1994. Cairo, Egypt.

5. Ministry of Agriculture and Land Reclamation. ***Tranche VII Monitoring and Verification Report on Performance Under the Agricultural Policy Reform Program, Agriculture Production and Credit Project.*** A report to the U.S. Agency for International Development. June 1995. Cairo, Egypt.

6. Mohamed Ragaa El Amir, *et al, **Analysis of Egypt's Rice Marketing System.*** Datex Inc. USAID, March 1996. Cairo, Egypt.

7. Ouedraogo, Ismael and Abdel-Rahim Ismail. ***Progress and Obstacles in Rice Subsector Liberalization in Egypt: A Rapid Appraisal to Verify Policy Benchmarks.*** Monitoring, Verification and Evaluation Unit, APRP, Verification Report No. 4. October 1997. Cairo, Egypt.

8. Wailes, Eric *et al.* ***Impacts of Agricultural Policy Reforms on Rice Production, Milling, Marketing and Trade in Egypt,*** Dept. of Agricultural Economics and Rural Sociology. March 1995, Univ. of Arkansas, Fayetteville.