

## Myanmar

### Sugar Mill Project

Report Date: October, 2002

Field Survey: September, 2001

#### 1. Project Profile and Japan's ODA Loan



Project Site :



No. 6 Sugar Mill (Yedashe)

#### 1.1. Background

The government of Myanmar established a policy for the country's economical management in its Fourth 4-year Development Plan (from April 1982 to March 1986). One of the aims of this policy was to encourage and promote the country's manufacturing/processing industry, which increases the value of primary industries such as rice, sugarcane or pulses, in order to switch its economic base from agriculture to agricultural product processing.

The sugar industry in Myanmar consisted of six mills, built between the 1920s and the 1960s. The equipment in these mills was outdated and dilapidated; two were barely operable. As a result, sugar production had stagnated. In addition, due to the foreign currency crunch, sugar imports had been prohibited since 1972; as a result, per capita consumption of sugar was extremely low, 1.4 kg per year. The government planned to increase per capita sugar consumption to 4.5 kg per year, the consumption level prior to the import ban. This project was selected as a key element in the government's development plan.

#### 1.2. Objectives

To construct a sugar mill with daily sugar cane processing capacity of 1,500 tons in order to supply 25,000 tons of sugar annually to the domestic market.

#### 1.3. Project Scope

The project scope consists of the following works:

- 1) Construction of a sugar mill plant with 1,500 tons per day sugar cane crushing capacity,
- 2) Construction of utilities and auxiliary facilities including power generator, water treatment, sugar godown and laboratory,

3) Consulting services.

Japan's ODA Loan was available for the foreign currency portion of the above items.

#### 1.4. Borrower/Executing Agency

The Foodstuff Industries Corporation (FIC)

/ The Foodstuff Industries Corporation (FIC) (currently Myanmar Sugarcane Enterprise (MSE))

#### 1.5. Outline of Loan Agreement

|                                 |                     |
|---------------------------------|---------------------|
| Loan Amount                     | 5,100 million yen   |
| Loan Disbursed Amount           | 3,854million yen    |
| Exchange of Notes               | November 1982       |
| Loan Agreement                  | December 1982       |
| Terms and Conditions            |                     |
| Interest Rate                   | 2.25% p.a.          |
| Repayment Period (Grace Period) | 30 years (10 years) |
| Procurement                     | Partially Untied    |
| Final Disbursement Date         | May 1991            |

## 2. Results and Evaluation

### 2.1. Relevance

The encouragement and promotion of the country's manufacturing/processing industry through the expansion of the sugar industry was addressed in the Fourth 4-year Development Plan, thereby giving this project plan validity. At present, the government of Myanmar places emphasis on sugarcane production as a means, through exports, to acquire foreign currency. Thus, the project is still relevant in view of its role in supplying sugar to the domestic market and in furthering production to acquire foreign currency.

### 2.2. Efficiency

#### 2.2.1. Project Scope

The actual project scope was same as that in the original plan.

#### 2.2.2. Implementation Schedule

The construction of the sugar mill plant and of utilities/auxiliary facilities was originally scheduled for completion within 4 years. Implementation actually required approximately 5 years, mainly due to the longer period required for execution of pre-construction works such as consultant selection and tender preparation. Further, the outbreak of social and political unrest in 1988 shifted the schedule of the test run. Accordingly, commercial operations started from November 1991, after a delay of 4 years and 7 months.

### 2.2.3. Project Cost

The estimated project cost was 9,750 million Yen, while the actual project cost was 9,333 million Yen . The actual cost can be broken down into the foreign currency portion of 3,854 million Yen, which ran under budget by 24%, and the local currency portion of 5,479 million Yen, which ran over budget by 18%. The cost overrun of the local currency portion was attributed to the delay in the construction works.

## 2.3. Effectiveness

### 2.3.1. Amount of Sugar Production at the Project Plant

The project plant (named No. 6 Sugar Mill at Yadashe) was designed to produce 25,000 metric ton per year (MTPY) of sugar, with 253,500 MTPY (1,500 metric ton per day (MTPD)) sugarcane crushing capacity, based on 169 days of crushing operation and 9.9% sugar yield. Myanmar Sugarcane Enterprise (MSE) set the operational targets based upon the aforesaid design target. Table 1 shows the operational targets and actual figures for sugarcane consumption, sugar production and sugar yield of the project plant. Actual sugar production has not yet reached target levels due to insufficient supply of sugarcane.

According to MSE, the insufficient supply of sugarcane can be attributed to the fact that the procurement price of sugarcane is low compared to competitive crops such as paddy and pulses. Table 2 shows the government's procurement price for sugarcane from 1990 to 2002. Even though cane-procurements prices increased every year, farmers have switched their cane fields into fields growing paddy and pulses because of their more attractive price. To cope with the insufficient supply of sugarcane, MSE has made much effort to extend cane-growing areas, taking measures such as distributing fertilizers, lending out tractors, and supplying agri-loans without interest.

**Table 1: Sugarcane Consumption, Sugar Production and Sugar Yield at No.6 Sugar Mill**

| Fiscal Year | Sugar Cane Consumption |             | Sugar Production |             | Sugar Yield (2) |          |
|-------------|------------------------|-------------|------------------|-------------|-----------------|----------|
|             | Target MTPY<br>(1)     | Actual MTPY | Target MTPY      | Actual MTPY | Target %        | Actual % |
| Capacity    | 253,500                | -           | 25,000           | -           | 9.9             | -        |
| 1990/91     | 51,000                 | 48,951      | 4,300            | 4,085       | 8.43            | 8.34     |
| 1991/92     | 131,900                | 151,862     | 9,893            | 12,119      | 7.50            | 7.98     |
| 1992/93     | 225,000                | 200,586     | 16,875           | 17,001      | 7.50            | 8.47     |
| 1993/94     | 200,000                | 203,358     | 15,000           | 18,116      | 7.50            | 8.90     |
| 1994/95     | 206,400                | 152,546     | 17,544           | 14,352      | 8.50            | 9.41     |
| 1995/96     | 210,000                | 182,934     | 16,380           | 14,657      | 7.80            | 8.01     |
| 1996/97     | 210,000                | 187,417     | 16,320           | 16,961      | 7.77            | 9.05     |
| 1997/98     | 220,000                | 195,477     | 19,000           | 17,202      | 8.64            | 8.80     |
| 1998/99     | 220,000                | 196,103     | 19,360           | 15,884      | 8.80            | 8.10     |
| 1999/00     | 193,456                | 102,033     | 17,895           | 8,163       | 9.25            | 8.00     |
| 2000/01     | 180,000                | 141,656     | 15,300           | 12,749      | 8.50            | 9.00     |
| 2001/02     | 180,000                | 155,821     | 15,750           | 12,466      | 8.75            | 8.00     |

Source: Information prepared by No. 6 Sugar Mill (Yedashe) in MSE

Note: (1) Target figures are revised in each year based on the projections of sugarcane availability.

(2) Sugar Yield = Sugar Production ÷ Sugar Cane Consumption

**Table 2: Government Procurement Price of Sugarcane (1990~2002)**

| Year               | Procurement Price (Ks/ton) |
|--------------------|----------------------------|
| 1990               | 270                        |
| 1994               | 1,000                      |
| 1996               | 1,500                      |
| 1997               | 1,850                      |
| 1998 (Present)     | 2,500                      |
| 2002 (Provisional) | 3,500                      |

Source: MSE

Furthermore, the new sugar mill Myohla Factory (2,000 MTPD), which started operations in April 2000, was established 10 miles away from the project plant. As the area that supplies sugarcane to new mill overlaps the area supplying the project plant, the construction of the new mill has possibly affected the supply of sugarcane to the project plant.

Another possible reason for low sugar production could be the low sugar yield (sugar recovery rate) of the plant. While the recovery rate achieved during the commissioning period was 10.38%, it is currently below 9.0%. The target figure is 9.9%.

### 2.3.2. On-Stream Factor

Unplanned shutdowns occurred due to main machine failure and the failure of such equipment as the cyclo drive, boiler water tubes, mill roller shell, juice sulphitor and syrup sulphitor, and to a shortage of consumable spare parts. These shutdowns, however, did not critically affect the project's ability to achieve sugar production targets, since the most critical factor is the shortage of sugarcane.

**Table 3: On Stream Factor at No.6 Sugar Mill**

| Fiscal Year | Operation Days |             | Planned Shut-Down | Unplanned Shut-Down |
|-------------|----------------|-------------|-------------------|---------------------|
|             | Target Days    | Actual Days | Actual Days       | Actual Days         |
| 1990/91     | 169            | n.a         | n.a               | n.a                 |
| 1991/92     | 169            | 166         | 11                | 64                  |
| 1992/93     | 169            | 157         | 16                | 43                  |
| 1993/94     | 169            | 135         | 18                | 30                  |
| 1994/95     | 169            | 98          | 15                | 18                  |
| 1995/96     | 169            | 179         | 18                | 75                  |
| 1996/97     | 169            | 141         | 27                | 39                  |
| 1997/98     | 169            | 155         | 16                | 40                  |
| 1998/99     | 169            | 146         | 16                | 31                  |
| 1999/2000   | 169            | 77          | 12                | 69 (1)              |

Source: Information provided by No. 6 Sugar Mill (Yedashe) in MSE

Note: (1) The plant in FY 1999/2000 closed 69 days earlier than normal year because of sharing the allocated sugarcane with the new factory at its early establishment.

### 2.3.3. Recalculation of Internal Rate of Return

Since the required data were not available, recalculation of Internal Rate of Return was eliminated from this report.

## 2.4. Impact

### 2.4.1. Contribution to Sugar Production in Myanmar

As seen in Table 4 below, the project plant (No. 6 Sugar Mill at Yadashe) has contributed considerably to sugar production in Myanmar.

**Table 4: Contribution to Sugar Production in Myanmar**

| Fiscal Year | No.6 SugarMill     |                                      |   | Total MSE<br>Production<br>(MT) (1) | Total National<br>Production<br>(MT) (2) |
|-------------|--------------------|--------------------------------------|---|-------------------------------------|--|
|             | Production<br>(MT) | Contribution to<br>MSE<br>Production | Contribution to<br>National<br>Production |                                     |  |
| 1990/91     | 4,085              | 21.3%                                | 7.5%                                      | 19,153                              | 54,382                                   |
| 1991/92     | 12,119             | 22.9%                                | 12.8%                                     | 52,936                              | 94,617                                   |
| 1992/93     | 17,001             | 34.0%                                | 16.9%                                     | 50,066                              | 100,347                                  |
| 1993/94     | 18,116             | 42.7%                                | 20.8%                                     | 42,380                              | 86,938                                   |
| 1994/95     | 14,352             | 39.2%                                | 19.1%                                     | 36,577                              | 75,204                                   |
| 1995/96     | 14,657             | 35.4%                                | 17.8%                                     | 41,438                              | 82,122                                   |
| 1996/97     | 16,961             | 34.7%                                | 16.5%                                     | 48,949                              | 102,504                                  |
| 1997/98     | 17,202             | 31.8%                                | 12.0%                                     | 54,126                              | 143,395                                  |
| 1998/99     | 15,884             | 32.8%                                | 12.2%                                     | 48,419                              | 129,947                                  |
| 1999/00     | 8,163              | 14.9%                                | 5.7%                                      | 54,826                              | 142,622                                  |
| 2000/01     | 12,749             | 15.9%                                | 6.8%                                      | 80,047                              | 186,123                                  |

Source: MSE

Note: (1) Sugar output of MSE was deducted from export and repayment sugar.

(2) Total of State and private sector. Sugar production from the private sector is estimated based on the sugarcane acreage and processing ration of the mini-sugar processing plants.

Since 1992/93, the Ministry of Agriculture and Irrigation (MOAI) has placed major emphasis on paddy, pulses, cotton, and sugarcane as the four major economic pillars of the agricultural sector. Accordingly, expansion of the sugarcane and sugar industry has been a high priority. Starting in April 1996, a number of new sugar mills projects were conceived by the MOAI, and 9 new sugar mills were constructed<sup>1</sup> simultaneously. All 9 were commissioned in 1999/2000. As a result, the share of Myanmar's total sugar production produced at the project plant has decreased since 1999/2000.

Table 5 below shows the performance of the state-owned sugar mills in 2000/01. The records of the project plant (No. 6 Sugar Mill at Yadashe) exceeded the average figures for all mills for the volume of cane crushed and sugar produced, and for the sugar recovery rate. MSE officials explained that the project plant has shown the best performance among the 17 sugar mills under MSE, and that they always pick it as an inspection site for foreign/domestic visitors.

<sup>1</sup> The 9 new mills were constructed by the contractors from China and Thailand based on a turn key basis. The cost of mills will have to be paid back in sugar at the prevailing international price.

**Table 5: Performance of the Sugar Mills of MSE in FY 2000/01**

|    | Name of Sugar Mills | Year Comissioned | Crushing Capacity (MTPD) | Cane Crushed (MTPY) | % of targeted procurement | Sugar Production |               | Sugar Recovery (%) |
|----|---------------------|------------------|--------------------------|---------------------|---------------------------|------------------|---------------|--------------------|
|    |                     |                  |                          |                     |                           | (MTPY)           | (% of total)  |                    |
| 1  | Dahatkone           | 1999-2000        | 2,000                    | 52,420              | 30                        | 3,726            | 3.9%          | 7.11%              |
| 2  | Pyinmana No.2       | 1984             | 1,500                    | 122,830             | 65                        | 10,371           | 11.0%         | 8.44%              |
| 3  | Pyinmana No.3       | 1957             | 1,500                    | 82,446              | 55                        | 6,652            | 7.0%          | 8.07%              |
| 4  | Taung Zin Aye       | 1999-2000        | 1,500                    | 54,323              | 31                        | 5,128            | 5.4%          | 9.44%              |
| 5  | Myohla              | 1999-2000        | 2,000                    | 85,595              | 34                        | 7,042            | 7.5%          | 8.23%              |
| 6  | Yadashe             | 1991             | 1,500                    | 141,655             | 64                        | 12,749           | 13.5%         | 9.00%              |
| 7  | Oktwin              | 1999-2000        | 2,000                    | 91,008              | 36                        | 7,307            | 7.7%          | 8.03%              |
| 8  | Zeyawaddy           | 1986-87          | 1,500                    | 50,209              | 39                        | 3,264            | 3.5%          | 6.50%              |
| 9  | Yoneseik            | 1999-2000        | 2,000                    | 87,481              | 35                        | 8,805            | 9.3%          | 10.07%             |
| 10 | Duyingabo           | 1999-2000        | 2,000                    | 74,518              | 30                        | 6,817            | 7.2%          | 9.15%              |
| 11 | Pauk Khaung         | 1999-2000        | 2,000                    | 84,534              | 34                        | 8,039            | 8.5%          | 9.51%              |
| 12 | Nawaday             | 1999-2000        | 2,000                    | 79,530              | 37                        | 7,034            | 7.4%          | 8.84%              |
| 13 | Okkan               | 1999-2000        | 2,000                    | 40,194              | 16                        | 3,505            | 3.7%          | 8.72%              |
| 14 | Bilin               | 1966             | 1,500                    | 57,478              | 48                        | 3,866            | 4.1%          | 6.73%              |
| 15 | Shwenyaung (1)      | 1983             | 300                      | n.a.                | n.a.                      | n.a.             | n.a.          | n.a.               |
| 16 | Kyauktaw            | 1983             | 300                      | 2,385               | 12                        | 119              | 0.1%          | 4.99%              |
| 17 | Namti (2)           | 1956             | 1,000                    | n.a.                | n.a.                      | n.a.             | n.a.          | n.a.               |
|    | <b>Total</b>        | -                | -                        | <b>1,106,606</b>    | -                         | <b>94,424</b>    | <b>100.0%</b> | -                  |
|    | <b>Average</b>      | -                | -                        | <b>73,774</b>       | <b>38</b>                 | <b>6,295</b>     | -             | <b>8.53%</b>       |

Source: MSE

Note:(1) Shwenyaung Sugar Mill was leased to national private company in 1999.

(2) Namti Sugar Mill was handed over to one of the ethnic groups in 1995.

#### 2.4.2. Sugar Per Capita Consumption

Increased sugar production in the 1990s raised consumption levels. At present, per capita sugar consumption has reached 3.8kg. This is more than double of the amount consumed before the project implementation; however, it could not attain the originally targeted figure, 4.5kg. The amount of per capita sugar consumption of this country is still less than that in many other Asian countries, thus Myanmar's sugar industry should continue its efforts to supply sugar for domestic consumption.

**Table 6: Sugar Per Capita Consumption in Myanmar**

|                                 |         |         |         |         |         |         |         |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|
| Fiscal Year                     | 1981/82 | ~       | 1990/91 | 1991/92 | 1992/93 | 1993/94 | 1994/95 |
| Per Capita Consumption (kg) (1) | 1.63    | ~       | 1.45    | 2.27    | 2.41    | 2.23    | 1.71    |
| Fiscal Year                     | 1995/96 | 1996/97 | 1997/98 | 1998/99 | 1999/00 | 2000/1  |         |
| Per Capita Consumption (kg) (1) | 1.84    | 2.25    | 3.09    | 2.75    | 2.96    | 3.79    |         |

Source: MSE

Note:(1) Per capita consumption includes both centrifugal and non-centrifugal sugar.

### 2.4.3. Sugar Export

Currently, there are no official sugar imports. Sugar exports, which are presently controlled by the government, are registered yearly (see table 7 below). It is said that sugar accounts for more than twenty-three percent of foreign currency earnings from agricultural exports (FY 2000/01). Myanmar's sugar industry is now turning from import-substitution to export-orientation although domestic consumption has not yet attained the originally targeted level.

**Table 7: Export of Sugar**

| Fiscal Year | Sugar Export (MT) |
|-------------|-------------------|
| 1993/94     | 9,350             |
| 1994/95     | 17,036            |
| 1995/96     | 6,020             |
| 1996/97     | 14,773            |
| 1997/98     | 24,106            |
| 1998/99     | 18,153            |
| 1999/00     | 39,863            |
| 2000/01     | 37,697            |

Source: MSE, Some Information on Sugar Industry in Myanmar

### 2.4.4. Rural Development and Employment Promotion

The project has had a positive impact on rural development by providing infrastructure development, such as a 9-mile railway facility and 33 miles of roadways. Also, the project created 645 jobs in commercial operation of the mill.

### 2.4.5. Impact on Natural Environment

The project plant is discharging untreated wastewater into a drain, and farmers in surrounding areas utilize the discharged water for irrigation purposes. As no monitoring has been made so far, the environmental impact by the wastewater is not clear now. MSE reported that they plan to adopt a wastewater monitoring system within a year.

### 2.4.6. Impact on Social Environment

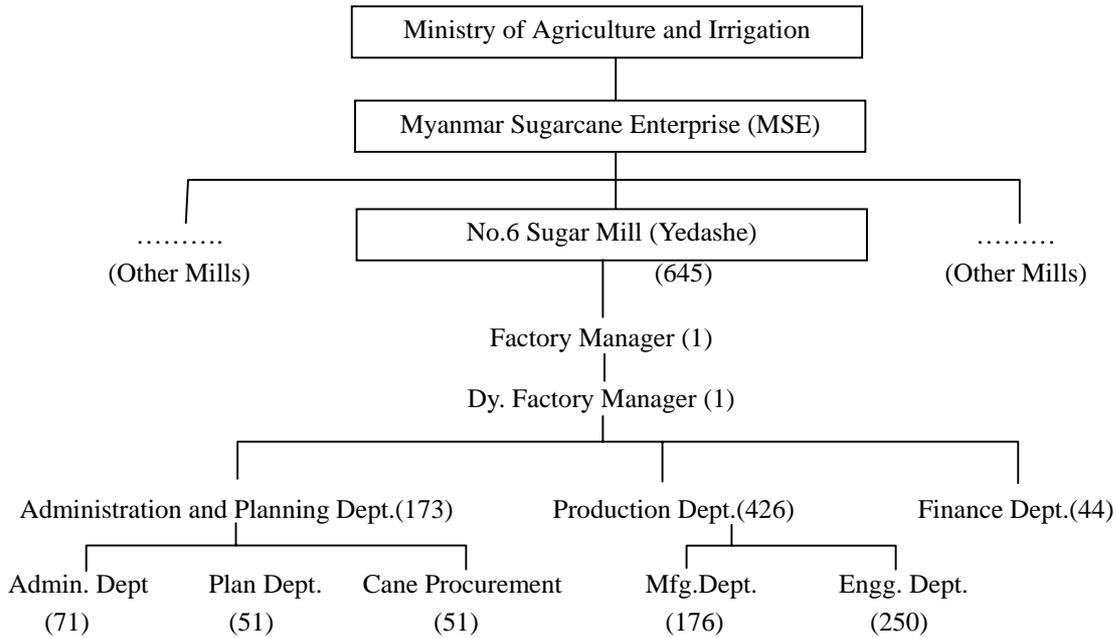
The relocation or resettlement of local residents did not occur.

## 2.5. Sustainability

### 2.5.1. Operation and Maintenance Organization

At the time of appraisal, the Foodstuff Industries Corporation (FCI) was to assume responsibility for operation and maintenance. The Myanmar Sugarcane Enterprise (MSE), which is under the Ministry of Agriculture and Irrigation, took over this role in 1994. MSE employs about 5,050 personnel, and is headed by a Managing Director. Of this number, some 645 MSE employees, led by a Factory Manager, work on this project plant. The organizational structure is elaborated in Figure 1. MSE is responsible for sugarcane supply, sugar marketing and budgeting. No.6 Sugar Mill is responsible for production and plant maintenance.

**Figure 1: Operation and Maintenance Organization (Actual)**



Source : Information prepared by No.6 Sugar Mill (Yedashe) in MSE

### 2.5.2. Financial Status

The government controls sugarcane procurement and sugar selling prices<sup>2</sup> for all sugar mills under MSE. Each mill does not take responsibility for its profitability. Financial data for neither MSE nor No.6 Sugar Mill were available.

### 2.5.3. Prospective Sustainability

The sugar industry in Myanmar is a promising sector, and the government has expected it become a source of foreign currency earnings. Though the insufficient supply of sugarcane has restricted sugar production at the project plant, the plant has performed better than other sugar mills under MSE. At this time there appear to be no critical issues threatening the sustainability of the project.

<sup>2</sup> In the private sector, cane purchasing and sugar selling are based on market prices.

### Comparison of Original and Actual Scope

| Item                              | Plan   | Actual                            |
|-----------------------------------|--|-----------------------------------|
| <b>1. Project scope</b>           |  |                                   |
| Sugar Mill Plant                  |  |                                   |
| - Sugar Cane Crushing Capacity    | 1,500MTPD  | - Same as Plan -                  |
| - Sugar Production Capacity       | 25,000MTPY   | - Same as Plan -                  |
| Utilities & Auxiliary Facilities  | Power Generator<br>Water Treatment<br>Sugar Godown<br>Laboratory | - Same as Plan -                  |
| <b>2. Implementation Schedule</b> |  |                                   |
| Consultant Selection              | Jan. 1983 – Jun. 1983  | Nov. 1983 – Jun. 1984             |
| Tender Document                   | Jan. 1983 – Dec. 1983  | Sep. 1985 – Mar. 1986             |
| Site Preparation                  | Jan. 1983 – Aug. 1983  | May. 1986 – Jan. 1987             |
| Buildings and Infrastructure      | Aug. 1983 – Jan. 1986  | Oct. 1986 – Nov. 1988             |
| Sugar Mill Plant & Facilities     | Jan. 1984 – Dec. 1986  | Oct. 1987 – Oct. 1988             |
| Test Run                          | Dec. 1986 – Mar. 1987  | Dec. 1990 – Mar. 1991             |
| Commercial Operation              | Apr. 1987  | Nov. 1991                         |
| <b>3. Project Cost</b>            |  |                                   |
| Foreign Currency                  | 5,100 Million Yen  | 3,854 Million Yen                 |
| Local Currency                    | 4,650 Million Yen  | 5,479 Million Yen                 |
| Total                             | 9,750 Million Yen  | 9,333 Million Yen                 |
| ODA Loan Portion                  | 5,100 Million Yen  | 3,854 Million Yen                 |
| Exchange Rate                     | 30.3 Kyats / Yen (as of 1982)                                    | 21.8 Kyats / Yen (Period Average) |

Source: Data from MSE and JBIC