China

Luzhai Fertilizer Plant Construction Project (I) (II) (III) (IV)

Report Date: January 2003

Field Survey: December 2002

1. Project Profile and Japan's ODA Loan

Luzhai County, Zhuang Autonomous Region, Guangxi Province, People's Republic of China

Guangxi Luzhai Chemical Fertilizer Plant

1.1 Background

The food production in the 1980s in China was between 320 and 410 million tons, and the Chinese government set the food production target in 2000 at "500 million tons based on the population of 1.25 billion and 400 kg of food per person a year." In order to increase food production, it was considered indispensable to increase the input of chemical fertilizer, which would greatly contribute to improving food productivity. On the other hand, since there was a great gap between supply and demand of chemical fertilizer in China, a large quantity of fertilizer was imported every year. The imports in 1990 amounted to 16.27 million tons (on a weight basis[1]) with the corresponding foreign exchange payments of 2,610 million dollars. For the purpose of stable supply of fertilizer and saving foreign exchange, it was necessary to promote domestic production of fertilizer. In particular, the production of phosphatic fertilizer was greatly lagging behind; the production ratio between nitrogen and phosphatic fertilizer in 1990 was 1:0.28 and the consumption ratio 1:0.33, falling short of the ideal ratio of 1:0.5.

In order to reduce the gap between supply and demand of chemical fertilizer, the Chinese government plans to construct throughout the nation 10 chemical fertilizer plants (under the jurisdiction of the Ministry of Chemical Industry) with the total production capacity of 2.59 million tons (on a net weight basis[2]) by 1995 under the 8th Five-Year Plan (1991 - 1995), of which 1.425 million tons were expected to come from the yen loan project. The chemical fertilizer plant in Guangxi Zhuang Autonomous Region covered under this project was one of these 10 plants. Fertilizer is constantly in short supply in Guangxi Zhuang Autonomous Region; in 1990, its fertilizer demand was 860,000 tons against mere 410,000 tons produced in the region with the gap imported

[1] The value obtained aggregating the actual weight of all kinds of fertilizer, including nitrogen fertilizer, phosphatic fertilizer, potash fertilizer, compound fertilizer, etc.

[2] The total weight of active fertilizer ingredients (nitrogen, phosphate, potassium, etc.) contained in various kinds of fertilizer.

from other provinces.

1.2 Objectives

This Project is intended to cope with the rapidly increasing chemical fertilizer demand and, furthermore, the demand for increased food production in Guangxi Zhuang Autonomous Region through the construction of a Di Ammonium Phosphate (DAP) fertilizer plant with the annual production capacity of 240,000 tons (on a net weight basis: P205=110,000 tons, N=43,000 tons).

1.3 Project Scope

Construction of a DAP fertilizer plant (240,000 tons/year: on a product weight basis)

The loan covers all foreign currency required for the above.

1.4 Borrower/Executing Agency

Ministry of External Economy and Trade, Government of the People's Republic of China[3]/Ministry of Chemical Industry, People's Republic of China

1.5 Outline of Loan Agreement

	Project (1)	Project (2)	Project (3)	Project (4)
Loan Amount Loan Disbursed Amount	2,898 million yen 2,898 million yen	3,069 million yen 3,069 million yen	3,700 million yen 3,700 million yen	606 million yen 606 million yen
Exchange of Notes Loan Agreement	Sep. 1991 Oct. 1991	Oct. 1992 Oct. 1992	Aug. 1993 Aug.1993	Oct. 1995 Nov. 1995
Terms and Conditions -Interest Rate -Repayment Period (Grace Period) -Procurement	2.6 % 30 years (10 years) General untied	2.6 % 30 years (10 years) General untied	2.6 % 30 years (10 years) General untied	2.3 % 30 years (10 years) General untied
Final Disbursement Date	Nov. 2000	Nov. 1999	Oct. 2000	Dec. 2000

2. Results and Evaluation

2.1 Relevance

At the time of appraisal (1991), this project was appropriate in that it was a project given high priority in line with the basic economic plan under China's 8th Five-Year Plan and that it was targeted to increased production of chemical fertilizer to achieve self-sufficiency from the viewpoint of saving foreign exchange in China. The stabilization of food production continues to be an important policy issue in China that has a huge population, and the significance of domestic production and sale of more efficient fertilizer contributing to enhanced food productivity is not lost even today.

At present, however, the situation of the project is partially changed. The objective of this project at the time of appraisal was to get rid of the shortage of fertilizer supply in Guangxi Zhuang Autonomous Region under the planned economy through the local production/supply of compound fertilizer (Di Ammonium Phosphate (DAP) which is compound fertilizer consisting of phosphate

[3] The current Ministry of External Trade and Economic Cooperation. Since 1999, the borrower of yen loans has been changed to the Government of the People's Republic of China (Ministry of Finance).

and nitrogen), and the project was a necessity. Subsequently, while the implementation of this project was prolonged, market-oriented economic reform was promoted in China, greatly changing the external environment of the project. The liberalization of sale of fertilizer and increased importation of fertilizer in a market economy have given rise to price/sales competition in which those who cannot provide favorable conditions for a market are meant to be left behind. Under these circumstances, the demand for DAP in the autonomous region at the time of evaluation was still limited due to the fact that the price of DAP has become higher than those of other phosphatic fertilizers and that DAP was still an unfamiliar new product for farmers in the region (supplies to the region accounted for about 10% of the total production of the plant). In this connection, as the executing agency grapples with the reduction of the production management cost and materials cost (see below for further details) against these problems, marketing of DAP has gradually been making progress since 2001 when the project completed. Therefore, it can be said that some measures have been adopted with respect to the changing external environment.

2.2 Efficiency

2.2.1 Project Scope

With regard to the contents of the project, there were changes in the detailed design in implementation. However, a significant change was made neither in the size of the plant design nor in others.

2.2.2 Implementation Schedule

Although the project was planned to be completed in December 1997, it actually completed in November 2001, with a substantial delay of about 4 years. The main cause of the delay was at the stage of engineering works/installation for each plant, which primarily resulted from a delay in the procurement of the local currency. In addition to the start of the engineering works having already been delayed by about 2 years, in 1998, 2 years after the commencement of the work, a delay in the procurement of funds from the originally intended local currency providers (the government committee of the autonomous region, the fertilizer company, the autonomous people's development corporation, various district governments) caused a substantial delay in the engineering works and installation of equipment. During the trial run period, moreover, the operation of the plant did not go well due mainly to the low quality of raw materials, phosphate rocks. Consequently, it further caused the production to be suspended and the product quality to fall short of the standard, requiring significant time for solving the problems. After all, the operation got started along the right lines and the business operation started in November 2001.

2.2.3 Project Cost

With respect to the foreign currency, while the requirements were estimated at 11.4 billion yen in the plan, the actual amount totaled 10.273 billion yen. In the meantime the actual cost in the local currency amounted to 1,510.77 million yuan, or about 4 times the planned cost of 372.62 million yuan. This was due to the following two reasons. Firstly, while the construction work took longer time due to a delay in the procurement of local currency, the Chinese economy shifted from the planned economy to a market one. As a result, substantial rise in prices has happened (the inflation rate between 1993 and 1996, in particular, was about 15% to 24% annually). Secondly, the administrative cost was pushed up due to the prolongation of the project. It is pointed out by the

fertilizer plant, moreover, that it has been discovered through detailed recalculation that there were items which had been underestimated in the calculation of the project cost. Thus, because of various factors, such as the prolongation of the implementation of the project, change in the external economic environment and a shortage in the budget, there was a substantial increase in the local currency required.

2.3 Effectiveness

2.3.1 Actual DAP Production

While the trial run started in September 2000 and the business operation in November 2001, the operation was still unstable at the time of evaluation (December 2002). For the FY 2001, the annual output was 160,000 tons , about 83% of the planned output. For the FY 2002, the output was lower than the FY 2001 at 140,000 tons. This decline can be explained by the fact that the operation was most of the time suspended between June and August 2002. The report from the fertilizer plant identifies two reasons for the suspension of the operation; (1) the quality of raw materials delivered by major providers was not as planed, and (2) the plant was still at the period of adjusting plant equipment and there were some problems in the operation of the plants. The fertilizer plant has adopted the following measures to improve the operation situation since the second half of 2002:

(1) Improvement on the production process
(2) Securing the quality of raw materials/fuel delivered
(3) Strict financial management (reviewing the management system in accordance with the national corporate accounting system)
(4) Establishment of a new corporate management system based on (1) - (3) above

Regarding the production process, training has been provided to unskilled operators and clear operational standards established. With respect to raw materials, phospate rocks that are the main materialsare procured from Yunnan Province (about 60% of the total), Guizhou Province and Hubei Province, and these rocks are put to use after being mixed. While the quality of those from Yunnan Province is good, that of those from the other provinces is poor, containing a large amount of impure ingredients. In the FY 2002, since Yunnan Province increased phosphate rocks exports to foreign countries and the supply to the project plant was reduced temporarily, increasing the mixture ratio of other low-quality phosphate rocks, the operation conditions of the plant deteriorated. At the time of evaluation, stable supply from Yunnan Province (about more than 50% of the total) was secured through negotiations with materials production centers, and supply agreements with other provinces were reviewed so that the quality could be secured. Since the quality of phosphate rocks varies in Guizhou Province, it has been arranged in a way that better-quality rocks can be procured. Moreover, it has become to select better-quality fuel coal (anthracite).

With these improvement efforts producing good results, production has gradually become normalized. From September to November 2002, 42,000 tons of DAP (about 70% of the monthly designed output) were produced, and at the time of the field survey, the plants were operating normally. An annual production of 200,000 tons is expected under the 2003 production plan (the planned production for the 3rd year of the operation at the time of appraisal was 240,000 tons).

Table 1: Actual production of DAP at Luzhai Chemical Fertilizer Plant

(on a product weight basis)

	Trial run period 2000 (actual Sep. – Dec.)	1st year of operation 2001	2nd year of operation 2002
Period of operation (days/year)	80	226	222 (number of days between January and November)
Planned production (tons/year)	-	192,000	216,000
Actual production (tons/year)	25,000	160,000 (83%)	140,000 (64%)

Source: Data from Luzhai Chemical Fertilizer Plant

Note: A trial run started in September 2000 and commercial operation in November 2001. The planned production is at the time of JBIC appraisal. The percentage in parentheses is a comparison with the planned production at the time of JBIC appraisal.

After checking the results of the product quality test in November 2002, it was found that 84% of the total production passed the domestic standard (GB10205-2001); the remaining 16% failed only because the water content was high. According to the fertilizer plant, the reason lies mainly in a problem of raw materials; that is, the plant has to use remaining phosphate rocks from Guizhou Province with a high content of fluorine. Regarding this problem, as having been explained above, the fertilizer plant is going to change providers in Guizhou Province in 2003 to secure better -quality phosphate rocks. Thus the situation is expected to improve in the future.

2.3.2 Actual Sales of DAP Produced under this Project

At the time of appraisal, all DAP produced under this project was scheduled to be distributed within Guangxi Zhuang Autonomous Region. Looking at the actual result, however, the sales within the autonomous region are still limited (see Table 2). The sales within the region accounted for 4.0% of the total sales (in 2001) and 10.3% (in 2002 up to November). Most of the products of the plant are sold to the northeastern part and the central part (Jiangnan Province, Hebei Province) of the country and exported to other countries (mainly Vietnam and the Philippines).

Table 2: Actual sales of DAP from Luzhai Chemical Fertilizer Plant

Place of sales	2001	2002 (up to November)
Guangxi Zhuang Autonomous Region	5,000 tons (4.0%)	15,000 tons (10.3%)
Shandong Province	40,000 tons (32.0%)	20,000 tons (13.8%)
Henan Province	20,000 tons (16.0%)	15,000 tons (10.3%)
Hebei Province	15,000 tons (12.0%)	15,000 tons (10.3%) (including Sichuan Province)
Northeastern part	10,000 tons (8.0%)	20,000 tons (13.8%)
Northwestern part	5,000 tons (4.0%)	
Exports abroad (Vietnam, Philippines, etc.)	about 30,000 tons (24.0%)	60,000 tons (41.4%) (including sales of stock from the previous year)
Total	125,000 tons (100%)	145,000 tons (100%)

Source: Hearing from the sales company

The reason why the sales in the autonomous region are limited is partly that since DAP is still

not well known to farmers in the region, the demand for DAP there is not yet high. At present, the agricultural technology service department under the fertilizer sales company is conducting a fertilizer test at about 40 places within the autonomous region in cooperation with farmers. It is also marketing DAP in collaboration with fertilizer retailers. As a result of marketing activities started in the financial 2001, the DAP sales which had stood at 5,000 tons in 2001 increased 3 times to 15,000 tons in 2002.

In this connection, several local farmers using DAP were interviewed concerning the effects of DAP and the following responses were obtained:

・Harvest increased 25 - 30%.The quality of the crops was good and the skin and leaves are in good form,and the price of the crops not using DAP is 3.6 yuan/kg while that of those using DAP is sold at 4 yuan/kg (in case of Luzhai (xian) Luorong (zhen) Shuangrentun).

・DAP has immediate effects. the cost has been reduced due to little use of fertilizer. In comparison with other fertilizers, the cost is lower by 10 - 15 yuan/mu (1mu = 0.67 ha); the used quantity of DAP is 15 kg/mu while that of other fertilizer (lime phosphate +ammonia) is 50 kg/mu (In case of Luzhai (xian) Chengguan (xiang) Enxian(cun) Tongmutun).

・In comparison with other fertilizers, the used quantity is smaller but the output is higher. The output has increased from 300 - 400 kg/mu to 0.5 - 1 ton/mu. The cost was reduced (in case of a farm managed by an enterprise in the suburbs of Liuzhou City).

As the background of the reports on the effects of DAP mentioned above, there is a situation where since 70% of the soil of the autonomous region is red earth which is acid, phosphatic fertilizers, most of all DAP which has immediate effects, are more effective than other chemical fertilizers as a neutralizer. The results of a crop cultivation test using the fertilizer produced by the Luzhai Chemical Fertilizer Plant have also proved DAP's effect on securing a certain level of crop production with a smaller amount than other chemical fertilizers.

In summary, it is considered that potential demand for DAP is sufficient. In order to realize the potential demand for DAP in future and expand its sales in the autonomous region, it is necessary to continue to make efforts for the stabilization of production and to promote active publicity/sales activities.

The sales company of the Luzhai Chemical Fertilizer Plant expects not only to secure a market in the central part of China but also to carry out sales activities with an emphasis on the supply of products to the southern part including the autonomous region. Moreover, it is planning to promote sales in exports whenthere is no domestic demand.

2.3.3 Project Effect of Easing of the Chemical Fertilizer Shortage in the Autonomous Region

Since the sales of DAP in the autonomous region is limited, this project has hardly any effect on the shortage of the chemical fertilizer in the region. The consumption of chemical fertilizer in the entire autonomous region was about 1.6 million tons in 2001, of which about 44% was produced in the region (see Table 3). The remaining portion, more than half, was imported from other parts of China or from abroad. On the whole, there was no great change in the ratio of the production to the consumption in the autonomous region through the 1990s.

Recently, however, on one hand the ratio of nitrogen and phosphatic fertilizer in the total consumption of chemical fertilizer has respectively declined, on the other hand the ratio of

compound fertilizer has increased. According to Luzhai Chemical Fertilizer Plant, while most compound fertilizers are imported, DAP in particular, one type of compound fertilizer, that is consumed in the autonomous region is produced by the plant.

Table 3: Production and consumption of chemical fertilizer in Guangxi Zhuang Autonomous Region

Unit: 10,000 tons, on a net weight basis

	1990		1995		2000		2001	
(1) Production	41.35		43.12		53.30		73.75	
(2) Consumption	86.24		122.86		157.76		168.11	
of which nitrogen fertilizer	45.03	52%	53.95	44%	56.86	36%	57.51	34%
phosphatic fertilizer	14.74	17%	21.21	17%	22.53	14%	23.33	14%
potash fertilizer	16.33	19%	25.05	20%	36.10	23%	39.36	23%
compound fertilizer	10.14	12%	22.65	18%	42.27	27%	47.91	28%
Self-sufficiency rate (1)/(2)	48%		35%		34%		44%	

Source: Guangxi Statistical Yearbook 2002

2.3.4 Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR)

FIRR and EIRR of this project estimated at the time of appraisal were 11.89% and 12.76% respectively. When recalculation was made on the same items, FIRR was found to be negative due to the fact that the project cost was substantially (about 1.5 times) higher than the planned cost, that the situation of operation up to now has been poorer than assumed, and that while the raw materials cost was relatively high, the selling price of fertilizer was low (explained later in the part of Financial Status in the section of Sustainability). With regard to EIRR, the project cost was high like FIRR, and the price of imported fertilizer has been stagnant (while the price was assumed to be 240 dollars/ton at the appraisal time, it is now about 153 dollars/ton). The situation would remain to be unchanged even if operation performed 100% in 3 years' time. Therefore, assuming that the present cost and price will continue, the internal rate of return will remain negative.

Calculation items of FIRR/EIRR

- Project life: 30 years after the commencement of operation
- Benefit: (FIRR) proceeds from fertilizer sales, (EIRR) value of foreign fertilizer import substitution
- Cost: Investment cost for this project, and production cost

2.4 Impact

2.4.1 Food Self-Sufficiency in Guangxi Zhuang Autonomous Region

Food was procured from other provinces before the implementation of the project, but the region is now self-sufficient in food. This appears to be due to extraneous factors, such as improvement of crop species, development of irrigation, an increase in fertilizer supply outside of this project, and a change in the people's dietary habits, etc. DAP produced under this project is used mainly for

growing rice, sugar cane and mandarin oranges. Since DAP sales in the autonomous region is still limited, however, this project appears to have had hardly any impact on the food self-sufficiency in the region at present.

2.4.2 Contribution to Self-Sufficiency in DAP in China (import substitution effect)

The consumption of compound fertilizer, such as DAP, increased remarkably through the 1990s both in China as a whole and in Guangxi Zhuang Autonomous Region (see Table 4). Of the compound fertilizer consumption of 9.837 million tons in 2001 in the whole of China, DAP accounts for about 4.11 million tons. Although the amount of DAP imports are greater than its domestic production, it has sharply declined since 2000, when this project was completed and the domestic production of DAP increased instead (see Table 5). The domestic DAP production in China was 2.17 million tons in 2001, and the production under this project in the same year, the 1st year of its operation, was 0.16 million tons, accounting for about 7.4% of the total production in China. Thus, the production under this project is contributing to a certain degree to China's domestic self-sufficiency in DAP.

Table 4: Compound fertilizer consumption

Unit: 10,000 tons, on a weight basis

Area	1990	1995	1999	2000	2001
Throughout China	341.6	670.8	880.0	917.9	983.7
Guangxi Zhuang Autonomous Region	10.14	22.65	40.8	42.27	47.9

Source: Guangxi Statistical Yearbook (2002)
Statistical Yearbook of China (2002)

Table 5: DAP production and imports in China

Unit: 10,000 tons, on a weight basis

	1998	1999	2000	2001
Domestic production	94.88	102.93	151.75	217.00
Imports	549.50	528.22	359.99	329.00

Source: Chinese Chemical Industry Yearbook (2001-2002)

2.4.3 Environmental Impacts

Together with the construction of the plant, the following environmental measures were taken:

- Dust collection devices were installed at places where the dust discharge exceeded its standard;
- Acid water was discharged after neutralization treatment;
- Dumping sites for waste, such as plaster, were located far from residential areas;
- Aluminum fluoride devices were installed for recovering fluorine generated from phosphoric acid plants.

The facilities passed the acceptance inspection by the National Environmental Protection Bureau after the project completion. Besides, the section in charge of safety and environmental protection in the production department of the plant is conducting environmental monitoring for the purpose of complying with the national discharge standard. According to the report from the plant, the results of

this monitoring show that there is no adverse impact on the environment. Even after the start of operation of the plant, checking is conducted once a year by the Environmental Protection Bureau of Liuzhou district with respect to water, the air, noise, etc., and the facilities passed the monitoring conducted in October 2002. Generally speaking, it is judged that there is no serious impact on the environment for the present.

2.4.4 Social Impacts

With the construction of the new plant, 800 people were newly employed. These new employees were recruited from within Guangxi Zhuang Autonomous Region and living facilities, such as employees' houses, were also built. This means that this project has to some degree contributed to the employment creation and an improvement in the standard of living for local inhabitants.

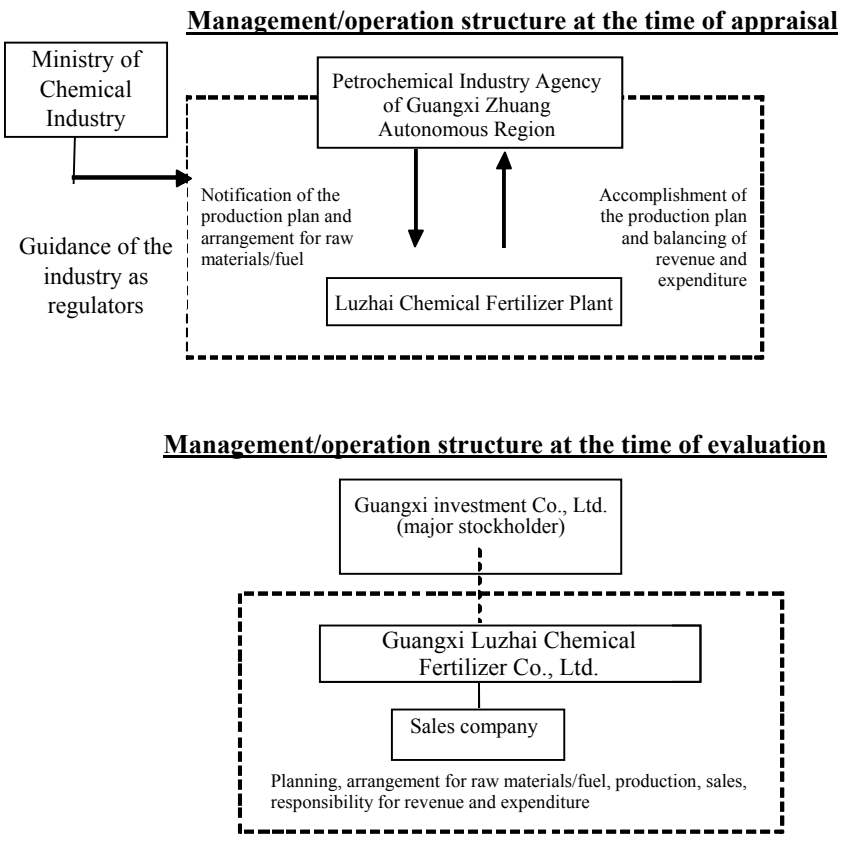
Moreover, although the spread of DAP is limited at present, it has become possible for farmers to purchase good-quality domestic DAP at a lower cost than before the project implementation. Having been reported from the interview with farmers (see 2.3.2), DAP needs only a small amount in crop productions compared to the case of phosphatic fertilizer. Since its increase in input/output ratio decreases the production cost on the whole, it is conceivable that the use of DAP has brought farmers economic benefits.

2.5 Sustainability

2.5.1 Organizational System

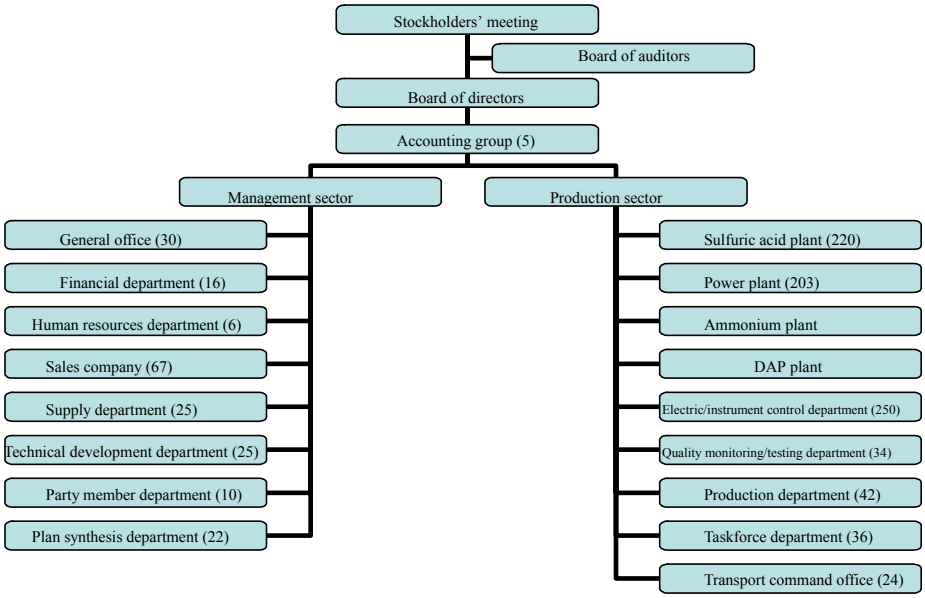
At the time of appraisal, the country was under a planned economy system and, as is shown in Figure 1, the Ministry of Chemical Industry of the central government was in charge of guiding the industry as regulators. It was scheduled that Luzhai Chemical Fertilizer Plant would independently perform operation and maintenance based on the notification of the production plan and arrangement for raw materials/fuel by the Petrochemical Industry Agency of Guangxi Zhuang Autonomous Region. At present, Luzhai Chemical Fertilizer Plant has become an independent company named "Guangxi Luzhai Chemical Fertilizer Co., Ltd." (this company owns the new part of the plant which was built by the Yen loan under this project, while the existed part of the plant not covered by the Yen loan belongs to a separate company). Guangxi investment Co., Ltd., an independent company of the government of the autonomous region, owns 70% of the shares of Guangxi Luzhai Chemical Fertilizer Co., Ltd. Guangxi Luzhai Chemical Fertilizer Co., Ltd. as a whole employs 1,600 workers, of which about 500 are technical managers in various fields (see Figure 2 for the organization).

Figure 1: Change in the management/operation structure



Source: JBIC data, hearing from the executing agency

Figure 2: Organizational chart of Guangxi Luzhai Chemical Fertilizer Co., Ltd.
Number of personnel in parentheses



Under Guangxi Luzhai Chemical Fertilizer Co., Ltd. there is a sales company (consisting of about 40 employees) engaged in selling DAP. The sales company does sales activities through branches established in Guangxi Zhuang Autonomous Region (the branch in the region is in charge of Hunan Province, Fujian Province, Guangdong Province and Hainan Province as well as within the region), Shandong Province, Henan Province, Hebei Province and Heilongjian Province.

2.5.2 Technical Capacity

Employees engaged in production receive vocational training for more than a year before starting work. In addition, each office has them have regular or irregular training and dispatches them for visiting outside facilities and training. Since the project introduced new technology which had not existed before to the plant , there still is a room for improvement on the technical side. In the FY 2002, however, a technical problem related to production was solved in several months' time, indicating that efforts are being made.

2.5.3 Financial Status

In 2001, in comparison with the production cost of 1,570 yuan/ton on the average, the average shipment price was high, 1,553 yuan/ton. Looking at the financial situation at the end of the year 2001, negative net earnings of about 20 million yuan was recorded (see Table 6). The operating cost was 228 million yuan whereas the saleswere 196 million yuan, meaning high cost in the operation. In 2002, the average production cost further increased to 1,861 yuan/ton, while the average shipment price declined slightly to 1,550 yuan/ton. The drop in the average shipment price was due to an increase in the ratio of exports whose price was lower than that of sales in the domestic market.

Table 6: Major financial results/indicators

Unit: 10,000 yuan

Item	2001
Financial results	
(1) Gross capital	225,391
(2) Current assets	16,820
(3) Current liabilities	13,928
(4) Capital	68,355
(5) Amount of sales	19,654
(6) Net earnings	-2,105
Financial indicators	
Total capital profit ratio (%) (6)/(1)	-1%
Net earnings ratio on sales (%) (6)/(5)	-11%
Current ratio (%) (2)/(3)	83%
Turnover of total capital (number of times) (5)/(1)	0.09
Ratio of net worth (%) (4)/(1)	30%

Source: Financial statements of Luzhai Chemical Fertilizer Plant

In response to this situation, the executing agency has reduced power rates, transferred social service-related facilities, such as the ancillary schools and hospitals, to the public sector, and held consultations with raw materials producing centers with respect to the cost of raw materials/securing of quality. Therefore, it can be said that efforts to reduce costs are being made. Moreover, while it promotes efficiency of the production line, it plans technological improvement and production of a new product (a plan to produce a new triple compound fertilizer with potassium mixed (PNK)), and thus it is making efforts to increase profits.

In order to further improve corporate profitability, it is necessary to implement the following measures:

(1) Securing of buyers in neighboring areas including Guangxi Zhuang Autonomous Region (reduction in transport cost)

On the basis of the actual results in the FY 2002, about 40% of the total sales were realized through exports whose price was lower than the domestic price. It will be possible to reduce the transport cost and improve the average shipment price by reducing export sales and selling to areas adjacent to the autonomous region, to which transport distances are relatively short. To realize them, it is necessary to expand DAP marketing and secure buyers in neighboring areas including the autonomous region.

(2) Stock reduction (reduction in administrative cost)

According to the financial statements at the end of the FY 2001, about 70% of the current assets are in stock. It is possible to reduce this stock and administrative cost through further increasing buyers. In order to achieve this, it is necessary, as in the case of (1) above, to bring out potential demand for DAP in the autonomous region by further promoting marketing in the region. In the FY 2001, China imported as much as 3.29 million tons of DAP (see Table 5) indicating that there is sufficient demand for DAP in other areas of China as well. Thus, it is essential that marketing be promoted in other areas (for example, Shandong Province, Henan Province and Hebei Province where DAP is marketed at present) as well to the extent that is possible.

(3) Stabilization of fertilizer production at the plant (reduction in production cost)

It is necessary to reduce the production cost within the enterprise as much as possible through stabilization of fertilizer production. To this end, it appears to be essential to further improve operation and secure the quality of raw materials, whose task is already undertaken by the executing agency as part of its own efforts.

3. Feedback

3.1 Lessons Learned

It is extremely difficult to estimate a risk of market changes of projects in a price control economy, just like this project. Particularly when studying the suitability of the supply and demand analysis of manufacturing projects, thorough collection of information and analysis are necessary at the stage of project planning/appraisal with respect to the direction of the macroeconomic policy and the international product market conditions which can have a great impact on the feasibility and sustainability of the project. Depending on the circumstances, it may also be necessary to study concrete measures to reduce a risk of market changes.

Comparison of Original and Actual Scope

* The rate of conversion into yen used in indicating local currency performance is derived from a weighted average based on yearly disbursement performance.

Item	Initial Plan (Phase 1)	Revised Plan (Phase 2)	Revised Plan (Phase 3)	Revised Plan (Phase 4)	Actual
1. Project Scope 1) Procurement/installation of fertilizer production plants	1) Ammonium plant (200 tons/day), sulfuric acid plant (1,200 tons/day), phosphoric acid plant (400 tons/day), diammonium phosphate (DAP) plant (800 tons/day), ALF3 plant (20 tons/day)	As left	As left	As left	1) As planned
2) Utilities	2) Power generation equipment, feed water and drainage equipment, power distribution equipment, communications equipment, equipment ancillary to production (putting things into bags, etc.), sidetracks, roads, others				2) As planned
3) Training	3) Domestic training (1,273 persons), overseas training (60 persons)				3) As planned
2. Implementation Schedule	Jan. 1990 – Sep. 1995	Jan. 1990 – Dec. 1996	Jan. 1990 – Jan. 1997	Jan. 1990 – Dec. 1997	Jan. 1990 – Nov. 2001
3. Project Cost Foreign currency Local currency Total ODA loan portion Exchange rate	 11,400 million yen 9,763 million yen (372.62 million yuan) 21,163 million yen 11,400 million yen 1US$ = 146 yen 1 yuan = 26.2 yen as of 1991	 11,400 million yen 10,063 million yen (601 million yuan) 25,463 million yen 11,400 million yen 1 yuan = 23.4 yen as of 1992	 11,400 million yen 9,763 million yen (716.90 million yuan) 26,384 million yen 11,400 million yen 1US$ = 121 yen 1 yuan = 20.9 yen as of 1993	 10,273 million yen 8,389 million yen (717 million yuan) 18,662 million yen 10,273 million yen 1US$ = 100yen 1 yuan = 11.7yen as of 1993	 10,273 million yen 20,093 million yen (1,510.77 million yuan) 30,366 million yen 10,273 million yen 1 yuan = 13.3 yen weighted average for 1994 - 2000

Third Party Evaluator's Opinion on

Luzhai Fertilizer Plant Construction Project (I) (II) (III) (IV)

Dr. Lei Jiasu
Professor
School of Economics and management, Tsinghua University

Relevance

(1) The project of Guangxi Luzhai Chemical Fertilizer Plant (GLCFP) is relevant to the countries' economic development plan of china since the 90s. In the 8th Five-Year Plan, the 9th Five-Year Plan, and the 10th Five-Year Plan, the plant industry is emphasized in the development. The development of Chinese plant industry mainly depended on five factors(good-seeds, weather, chemical fertilizer, irrigation, the innovation of agriculture organization), the chemical fertilizer is the specially important factor. So, the project of GLCFP is extremely relevant to the countries' economic development plan of china.

(2) In a long time, the supply of the chemical fertilizer in china is short, especially in the western provinces of china (including Guangxi). So, the implementation of GLCFP is propitious not only to increase the supply of chemical fertilizer in Guangxi, but also to improve the shortage of the entire Chinese chemical fertilizer, and at the same time is propitious to economize the foreign currency used for importing chemical fertilizer demanded.

(3) Since the implementation of GLCFP project, there are not similar projects that are supported by other positive factors. During the period of the implementation of the project, the economic system of china has changed greatly, from planned economy to market economy, but this doesn't change the shortage of Chinese chemical fertilizer. So, the Japan Bank for International Cooperation (JBIC) support to set up the GLCFP project is extremely necessary.

Impact

We must pay most attention to the impact of the GLCFP project in the aspect of technology, system, economy, environment and society etc:

(1) No doubt, GLCFP project improves the technology level of Di Ammonium Phosphate (DAP) chemical fertilizer production in china.

(2) The GLCFP project has directly and indirectly contributed to the self-sufficiency of corns in Guangxi province. Before the implement of the project, a plenty of corns in Guangxi depended on imports from other provinces, and now they can be self-sufficient. No doubt, this is caused by a lot of factors, but we could not ignore the effect of GLCFP project.

(3) Along with setting up the GLCFP project and the increasing of other DAP productions made in our country, since 2000, the imported quantity of DAP in china has observably decreased. It is obvious that the GLCFP project has contributed to the DAP's self-sufficiency in china.

(4) GLCFP project adopted a series of environment protection measure, and passed the examination of country and Liuzhou city environment protection office. It is obvious that the production process of GLCFP could not impact negatively to the environment.

(5) GLCFP project has contributed to increasing the local employment. For example, because of the construction of the project, GLCFP employed 800 people in Guangxi, and provided them comfortable work and life condition.