ASIAN DEVELOPMENT BANK **PPA: PRC 21064**

PROJECT PERFORMANCE AUDIT REPORT

ON

LAIWU IRON AND STEEL COMPANY MODERNIZATION AND EXPANSION PROJECT (Loan 1162-PRC)

IN

PEOPLE'S REPUBLIC OF CHINA

January 2003

CURRENCY EQUIVALENTS

Currency Unit – Yuan (Y)

At Appraisal (January/February 1989)			At Project Completion (November 2000)			At Operations Evaluation (October 2002)		
Y1.00	=	$0.1838	=	$0.1208	=	$0.1208
$1.00	=	Y5.44	=	Y8.29	=	Y8.28

ABBREVIATIONS

ADB	–	Asian Development Bank
EIRR	–	economic internal rate of return
FIRR	–	financial internal rate of return
LISC	–	Laiwu Iron and Steel Company
mtpa	–	million tons per annum
OEM	–	Operations Evaluation Mission
PCR	–	project completion report
PRC	–	People's Republic of China
SOE	–	state-owned enterprise
TA	–	technical assistance
tpa	–	ton per annum
WTO	–	World Trade Organization

NOTES

(i) The fiscal year (FY) of the Government and of the Executing Agency coincides with the calendar year.
(ii) In this report, "$" refers to US dollars.
(iii) In the People's Republic of China, the words Yuan and Renminbi are used interchangeably for the currency.

Operations Evaluation Department, PE-618

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APPENDIXES

BASIC DATA
Laiwu Iron and Steel Company Modernization and Expansion Project
(Loan 1162-PRC)

PROJECT PREPARATION/INSTITUTION BUILDING:

TA No.	TA Project Name	Type	Person-Months	Amount ($)	Approval Date
899	Laiwu Iron and Steel Mill Modernization4 and Expansion	PPTA	13.0	227,000	27 Aug 1987
1683	Restructuring of Laiwu Iron and Steel Company	ADTA	40.0	725,000	31 Mar 1992

KEY PROJECT DATA ($ million):	As per ADB Loan Documents Appraisal	Actual
Total Project Cost	328.00	518.40
Foreign Currency Cost	221.00	251.80[1]
Local Currency Cost	107.00	266.60
ADB Loan Amount/Utilization	133.00	131.77
ADB Loan Amount/Cancellation		1.23

KEY DATES:	Expected	Actual
Fact-finding		12–25 Aug 1988
Appraisal		17 Jan–3 Feb 1989
Loan Negotiations		25–26 Sep 1989
Reappraisal		18 Nov–5 Dec 1991
Board Approval		31 Mar 1992
Loan Agreement		21 Apr 1992
Loan Effectiveness	20 Jul 1992	24 Jul 1992
First Disbursement		22 Jan 1993
Project Completion	31 Mar 1996	30 Jun 1999
Loan Closing	30 Sep 1996	21 Dec 1999
Months (effectiveness to completion)	44	84

KEY PERFORMANCE INDICATORS (%):	Appraisal	PCR	PPAR
Financial Internal Rate of Return	15.2	6.9	not recalculated
Economic Internal Rate of Return	22.9	15.8	not recalculated

BORROWER: People's Republic of China

EXECUTING AGENCY: Laiwu Iron and Steel Company

MISSION DATA:

Type of Mission	No. of Missions	No. of Person-Days
Fact-Finding	1	56
Appraisal	2	216
Project Administration:		
- Cofinancing	1	10
- Review	5	32
- Project Completion	1	15
Operations Evaluation[2]	1	26

ADB = Asian Development Bank, ADTA = advisory technical assistance, PPTA = project preparatory technical assistance, PCR = project completion report, PPAR = project performance audit report, TA = technical assistance.

[1] ADB $131.8 million, Exim Bank of Japan $35.0 million, and commercial cofinancing $85.0 million.

[2] The Operations Evaluation Mission, which visited the People's Republic of China between 9–20 September 2002, comprised Richard Simpson (Principal Evaluation Specialist/Mission Leader), Don Jacobson (International Steel Expert), and Yuan Zhao (Domestic Trade Consultant).

EXECUTIVE SUMMARY

In the 1980s, the Government of the People's Republic of China (PRC) embarked on an ambitious program to restructure the steel sector, using a two-pronged approach: (i) rehabilitation, modernization, and expansion of existing iron and steel mills by introducing more efficient and environmentally friendly technologies; and (ii) establishment of large-scale greenfield iron and steel mills using state-of-the-art technologies. In March 1992, the Asian Development Bank (ADB) approved a loan of $133 million to finance the Laiwu Iron and Steel Company Modernization and Expansion Project (the Project), which aimed to upgrade and expand an existing steel plant, introduce international production standards, and satisfy growing domestic demand and compete against foreign imports. The plant, owned by the Laiwu Iron and Steel Company (LISC), was located in the center of the eastern province of Shandong, which had easy access to raw materials and local markets for finished steel products. The Project—the first steel plant to be financed by ADB—was chosen as it offered opportunities to reform the PRC's steel sector through introduction of best practices, modern management programs, and reform of state-owned enterprises (SOEs) through restructuring, closing of noncore businesses and privatization of viable assets.

The major components were: (i) acquisition and development of about 105 hectares of land; (ii) production equipment for LISC's mining and quarrying operations; (iii) processing and production control equipment, and communications and power distribution systems; (iv) modern blast furnace including a sintering plant, converter, and ladle furnace; (v) thermal power station; (vi) oxygen plant; (vii) two lime rotary kilns; (viii) continuous casting mill; (ix) section mill; (x) welded pipe mill; (xi) automatic material stockpiling and transfer facilities; (xii) staff housing; (xiii) water supply and wastewater treatment plant, and related civil works; (xiv) consulting and technical services for detailed design, procurement and installation; and (xv) comprehensive training for LISC management and staff.

The total project cost was estimated at appraisal at $328 million, to be financed by the ADB loan, a cofinancing loan of $35 million from Exim Bank of Japan, a complementary loan from commercial sources of $85 million, local currency loans from domestic banks, equity contributions from Shandong Province, and LISC's internal resources.

The Project was commissioned in June 1999, 39 months behind schedule, and with a $190 million cost overrun. All components were completed except for the welded pipe mill, for which the bid price was substantially higher than the appraisal estimate, at a time when there was also a major oversupply of the product, as small manufacturers had flooded the market with cheaper, but inferior pipes. An alternative had to be found to utilize the steel and, following extensive technical and market research, it was proposed by LISC, and agreed by ADB, to install a medium section mill, which would produce higher value-added products such as H-beams and I-beams for the construction industry, and enhance LISC's competitiveness. This major change in scope resulted in the increased costs and delayed completion, but proved to be essential for the technical and financial success of the Project.

The plant capacity after project completion was estimated at appraisal to be 628,000 tons of finished steel products, which represented a significant increase from the original capacity of about 240,000 tons. The actual plant capacity is expected to be about 2.8 million tons by the end of 2002, of which around 2.2 million tons will be produced by the project-related equipment. This major expansion has been achieved by additional capital expenditures, improved process controls, and higher productivity resulting from product mix optimization and longer production

runs. LISC is currently the 12th largest steel company in the PRC and 78th in the world, with about 10% of production exported.

At the same time, considerable energy savings have been achieved through modern technology; recycling; reuse of waste gas, water, and other effluents; and cogeneration. The current coal gas consumption per ton of steel is only one third of that before the Project. On-site pollution control and monitoring equipment is operating in accordance with standard practices and complies with national safety standards. LISC has been certified to ISO14001 for its environmental management systems.

The major achievements would not have occurred without the ADB-supported Project, as LISC has moved from the production of low-value iron and semi-finished steel products to high-value, quality steel products. The plant is modern and run and maintained to international standards, though not yet to the world's best practices. Management is highly competent and motivated, having initiated the expansion of the plant and the market. Most of the recent expansion has utilized local equipment, designed internally or in collaboration with local design institutes and manufacturers.

The Project also aimed to transform LISC from an SOE to a modern, publicly listed corporation, a first for a steel company in PRC. This has been achieved. ADB technical assistance was utilized to prepare LISC for listing on the Shanghai Stock Exchange, which occurred in 1997 when 18% of the shares were listed with an initial price increase of 44% over the listing price. Subsequently, two further issues were made to finance capital expenditure, such as the installation of an electric arc furnace, which increased the public shareholding to 22%. The stock price has tracked the Shanghai Composite Index, of which LISC is one of the 180 leading companies. Public shareholders total 83,000, including approximately 5,000 staff. LISC has a highly commercial management culture and regularly produces financial and management information.

The Project's financial viability can be assessed by LISC's overall financial performance, which is strong, and by the fact that LISC is currently pre-selling all of its output, and expects this demand to continue until at least the end of the decade. The Project is also economically viable, as all inputs are valued at market prices and all outputs are sold in a free market, without subsidy or protection. LISC is pricing its products very competitively and does not rely on tariffs or other protective mechanisms to compete internationally. The PRC's accession to the World Trade Organization is unlikely to have any major impact on LISC.

Without the Project, LISC would probably not have survived. The Project was a model for modernization of the steel industry and reform and privatization of SOEs, with others following LISC's example both in the steel industry and other sectors. The Project made a major contribution to prosperity in a fairly remote region in Shandong Province, where per capita incomes have doubled since the Project. Additional industrial and commercial infrastructure and investments have generated further employment opportunities. The performance of LISC was excellent, and the contractors and consultants performed generally satisfactorily. The Project is rated highly successful and the attached technical assistance, successful.

The key recommendations emerging from the evaluation are related to further increasing LISC's annual output and productivity, seeking an international strategic partner and reducing the state-owned shareholding, further improving corporate governance, and disseminating the positive lessons learned to government officials and SOE managers.

I. BACKGROUND

A. Rationale

1. To lay the foundation of a strong industrial structure, the Government of the People's Republic of China (PRC) embarked, in the 1960s, on the establishment of heavy industries. The Government assigned high priority to the iron and steel subsector in implementing this strategy. However, as the emphasis was on rapid expansion of capacity, steel production remained generally inefficient. Many steel plants used obsolete technologies that resulted in poor product quality, inefficient energy use, and high levels of pollution. At the time, it was forecast that demand for steel products, worldwide, would increase, along with steel prices and with developing countries unable to meet demand. The PRC, which had limited foreign exchange resources but comparative advantages in steel making, was anxious to expand local steel production. To address some of these issues and meet the increasing demand for quality steel, the Government adopted a two-pronged approach in the mid-1980s: (i) rehabilitation, modernization, and expansion of existing iron and steel mills by introducing more efficient and environmentally friendly technologies; and (ii) establishment of large-scale greenfield iron and steel mills using state-of-the-art technologies. The Government also adopted a reform and restructuring program to establish a more market-oriented environment for state-owned enterprises (SOEs) to improve efficiency in resource allocation and to increase the role of the non-state sector in anticipation of the PRC's entry into the World Trade Organization (WTO).

2. The 1991 country operational strategy of the Asian Development Bank (ADB) recommended assistance to the PRC in achieving efficient, sustainable and more equitable growth. For the industry sector, the strategy recommended that ADB operations should focus on increased efficiency through improving technology, upgrading technical and managerial skills, and rationalizing and strengthening institutions. Support for the restructuring of SOEs to enable them to operate efficiently in a market-oriented, outward looking commercial environment was also endorsed.

3. The Laiwu Iron and Steel Company Modernization and Expansion Project (the Project)[1] responded to those recommendations by reforming and restructuring an SOE engaged in the manufacture of iron and steel, and by modernizing and expanding its existing iron and steel mill in Shandong Province. It was the first steel project to be financed by ADB.

B. Formulation

4. During ADB's first Country Programming Mission in 1986, the Government requested assistance to expand and modernize one existing iron and steel complex, and to test and demonstrate suitable approaches to modernization, for adoption on a broader scale. ADB and the Government concluded, in April 1987, that the Laiwu Iron and Steel Company (LISC)[2] was the most suitable plant for this purpose as it was located in a remote and poor region, close to abundant natural resources, had growing local markets and was in need of modernization. The

[1] Loan 1162-PRC: *Laiwu Iron and Steel Company Modernization and Expansion Project*, for $133 million, approved on 31 March 1992.

[2] Until the company listed on the Shanghai Stock Exchange in 1997 the English translation of the Chinese name of the company was Laiwu Iron and Steel Company. On listing, the company's name was changed to Laiwu Steel Corporation.

Government submitted to ADB a detailed feasibility study prepared by local design institutes. A technical assistance (TA) grant was subsequently provided to review the feasibility study and reexamine the technical, financial, and economic aspects of the proposed Project.[3] An ADB Fact-Finding Mission, an Appraisal Mission, and a Consultation Mission followed, prior to formal loan negotiations held in Beijing in September 1989. The events of Tiananmen Square in June 1989 resulted in delay in loan processing. Reappraisal was undertaken in December 1991 to revalidate the Project, before the loan was approved in March 1992.

C. Purpose and Outputs

5. The Project aimed at facilitating the transfer of modern technology, raising industrial productivity, improving energy efficiency, reducing pollution, balancing the existing iron and steel-making capacities and auxiliary facilities to expand production, upgrading managerial and technical skills, and introducing good commercial and governance practices. It was located in the existing LISC complex near the city of Laiwu in Shandong Province and involved the technological upgrading and expansion of the production and ancillary facilities of LISC. Capacity of the existing converter steel plant was to be increased from 240,000 tons per annum (tpa) of semi-finished hot rolled carbon and low alloy strip to 628,000 tpa of quality finished structural steel products.

6. The major components were: (i) acquisition and development of about 105 hectares of land; (ii) production equipment for LISC's mining and quarrying operations; (iii) processing and production control equipment, and communications and power distribution systems; (iv) modern blast furnace including a sintering plant, converter, and ladle furnace; (v) thermal power station; (vi) oxygen plant; (vii) two lime rotary kilns; (viii) continuous casting mill; (ix) section mill; (x) welded pipe mill; (xi) automatic material stockpiling and transfer facilities; (xii) staff housing; (xiii) water supply and wastewater treatment plant, and related civil works; (xiv) consulting and technical services for detailed design, procurement and installation; and (xv) comprehensive training for LISC management and staff.

7. A TA grant of $725,000 was attached to the loan to finance advisory services to introduce modern management, financial, and governance procedures as well as to assist in LISC's privatization.[4]

8. The project outputs were expected to increase productivity and efficiency and provide high value-added quality products that would generate net foreign exchange savings through efficient import substitution during the life of the Project. Energy conservation measures incorporated in the Project were expected to result in annual net savings of 130,000–145,000 tons of coal equivalent, valued at about $4.6 million. With the envisaged removal of price controls on raw material inputs and finished steel products, and enterprise restructuring to reduce state ownership and introduce principles of commercialization and accountability, the Project represented an important step in the Government's economic reform policies. The Project was also expected to help generate a large number of permanent skilled jobs in a relatively poor area of central Shandong Province. The financial internal rate of return (FIRR) was estimated at 15.2 %, and the economic internal rate of return (EIRR) at 22.9%.

[3] TA 899-PRC: *Laiwu Iron and Steel Mill Modernization and Expansion Project*, for $227,000, approved on 27 August 1987.
[4] TA 1683-PRC: *Restructuring of Laiwu Iron and Steel Company*, for $725,000, approved on 31 March 1992.

9. As the Project was being implemented, it became apparent there was an excessive supply of welded pipes in the domestic market. Also, the bid prices for the welded pipe mill came in substantially higher than the appraisal estimate ($44–$61 million against $18 million). Consequently, this component became financially and economically nonviable. This resulted in a major change in the project scope, with a medium section mill being substituted for the welded pipe mill. The change to the medium section mill proved to be a sound decision as it turned out to be essential for the technical and financial success of the Project.

D. Cost, Financing, and Executing Agency

10. A summary of project costs, both estimated and at project completion, is shown in Table 1 (for details, see Appendix 1).

Table 1: Project Cost by Component
($ million)

Component	Appraisal	Actual
Civil Works	46.6	225.6
Process Equipment	108.7	213.7
Equipment Installation	20.2	0
Auxiliary Equipment	15.9	0
Other	33.9	43.5
Base Cost	**225.3**	**482.8**
Contingencies	34.3	0
Interest During Construction	41.7	35.6
Working Capital	26.7	0
Total	**328.0**	**518.4**

11. The proceeds of the ADB loan were relent by the Borrower to the China International Iron and Steel Investment Corporation under a subsidiary loan agreement with the same terms and conditions as the ADB loan. The loan proceeds were further onlent to LISC, the Executing Agency for the Project, under another subsidiary loan agreement with the same terms and conditions. LISC assumed the foreign exchange risk. The loan account was closed on 21 December 1999, with a delay of 39 months from the original date of 30 September 1996. A total of $131.8 million was disbursed and $1.2 million was cancelled. The attached TA (footnote 4) was closed in September 1999 and the unutilized amount of $335,000 was cancelled.

12. Supporting finance to meet the foreign exchange requirements was arranged through a cofinancing loan of $35 million from the Exim Bank of Japan and a complementary loan from commercial sources of $85 million. Local currency costs were financed by LISC's internal resources, domestic banks, equity contributions from Shandong Province, and other internal sources (Table 2).

Table 2: Financing
($ million)

Description	Total
Asian Development Bank	131.8
Exim Bank of Japan	35.0
Commercial Cofinancing	85.0
Laiwu Iron and Steel Company	116.8
Shandong Province Equity	19.1
Domestic Commercial Banks	85.6
Laiwu Steel Corporation Development Foundation, Debt Bond, etc.	45.1
Total	**518.4**

E. Completion and Self-Evaluation

13. The project completion report (PCR), which was circulated in September 2000, rated the Project successful. The Project was found to have met its main objective of modernizing and expanding LISC iron and steel production by introducing modern technology and efficient manufacturing processes and by exposure to international good business practices. The competitiveness of LISC was reported to have been strengthened as the Project helped improve labor productivity of the converter steel plant through automation and increased production; reduce production costs by adopting advanced technology, and modern production and management systems; and convert LISC into a partly privatized public company. The Project also prepared LISC to participate effectively in international competitive bidding for the supply of steel products. The substitution of the welded pipe mill significantly delayed project completion and contributed to major cost overrun. Nevertheless, the reevaluated FIRR of 6.9% and the reevaluated EIRR of 15.8%, though both lower than the appraisal estimates, indicated that the Project was still economically and financially viable.

14. The PCR identified several lessons learned, namely, the importance of adopting modern business management and marketing practices and accessing reliable market information for LISC to remain competitive in a market economy, and that LISC should have formally advised ADB of the poor performance of some equipment suppliers.

15. The reasons for including a welded pipe mill in the original Project and for significantly underestimating its cost could not be ascertained, and perhaps should have been investigated in more detail at the PCR stage. Although the decision to substitute the medium section mill proved to be correct, a more thorough appraisal process at the project preparation stage might have resulted in it being included in the original scope, or at least considered as a serious option. That would have speeded up the decision-making process when it became apparent that the welded pipe mill was not optimal.

F. OED Evaluation

16. This project performance audit report (PPAR) presents the findings of an ADB Operations Evaluation Mission (OEM) that visited Beijing, Jinan (the capital of Shandong Province) and Laiwu (the steelworks site) in September 2002. The PPAR is based (i) on a review of the appraisal report, PCR and other material in ADB files; (ii) 2 years of additional operational data that is now available from LISC and other sources; (iii) meetings with LISC

executives, national and provincial government officials, and representatives of other agencies; and (iv) an onsite inspection of the project facilities.

17. The scope of evaluation is limited, concentrating primarily on the impact the Project had on the domestic steel industry. Particular attention is given to the decision taken to substitute the medium section mill for the welded pipe mill and the extent to which the benefits of the Project have affected SOEs, the region in which LISC operates, and the private sector in general. Detailed financial and economic analysis is not undertaken, but the OEM considers that the Project remains financially and economically viable as indicated in the PCR.

18. Because of the long period between the time when the Project was first considered (1986) and this evaluation, some of the original documentation is no more available. Certain up-to-date and accurate data was difficult to obtain from government sources and LISC. Discrepancies were also observed between some data received from LISC and information provided in the PCR. In such cases, data from LISC was used. In some areas, this has limited the extent to which an assessment can be made.

II. PLANNING AND IMPLEMENTATION PERFORMANCE

A. Formulation and Design

19. Formulation of the Project was influenced by (i) the PRC's need to expand and modernize its heavy industries, (ii) the PRC's policy of establishing a more market-oriented environment for its SOEs, and (iii) ADB's operational strategy for the PRC of improving economic efficiency, alleviating poverty, and protecting the environment. In the industrial sector, specific areas targeted for ADB involvement included (i) support for key reform experiments and enterprise restructuring, (ii) support for restructuring of SOEs, (iii) support for technology improvements to reduce energy consumption and increase efficiency of utilization of raw material inputs, and (iv) facilitating the transfer of clean technologies and strengthening environmental management and monitoring to reduce industrial pollution. The Project, as implemented, was consistent with all of these needs, policies, and strategies.

20. Project preparation and design originated in the policies and strategies developed by the Government in reforming the steel sector, and in the planning work that had already been done by LISC to expand and modernize its facilities. This work was comprehensive and, with the exception of the decision to include a welded pipe mill, proved to be correct. Although the original documentation is not available, the initial decision to include a welded pipe mill would have probably been seen as a way of adding value to the hot rolled strip the plant was producing. However, the value added was relatively small. The bid price for the welded pipe mill was substantially higher than the appraisal estimate, at a time when there was also a major oversupply of the product. Small manufacturers, located in demand centers, had flooded the market with cheaper, but inferior pipes. An alternative had to be found to utilize the raw steel that would be produced from the expanded steelmaking facilities. Following extensive technical and market research, it was proposed by LISC, and agreed by ADB, to install a medium section mill which would produce higher value-added products for which there was projected to be a ready domestic market. There would be only two steel mills in PRC manufacturing these products.[5] The change in scope resulted in increased costs and contributed to the delay in completion.

[5] The other owned by the Anshan Steel Holding Company.

21. The proposed medium section mill would produce high-quality structural steel, e.g., H-beams and I-beams that were used in the construction industry, where the demand for such products was growing rapidly. When this was recognized, the project design was modified. The technology selected for the Project was in line with international standards for the steel industry.

B. Achievement of Outputs

22. The expected outputs from the amended project components were fully achieved and the purpose of providing high value-added quality products was met. The output of the steel plant was to be increased from the original capacity of 240,000 tpa of semi-finished hot rolled carbon and low alloy strip to a design capacity of 628,000 tpa of quality finished structural steel products. By focusing on the production of high-quality structural steel and by further expansion of the plant and implementing a program of continuous productivity improvements, output of these products has subsequently exceeded the design capacity. With the various additions and improvements, the steel plant will produce approximately 2.8 million tons per annum (mtpa) in 2002. Actual steel production from 1992 to 2001 and anticipated production from 2002 to 2010 are shown in Appendix 2.

23. At the same time, considerable energy savings have been made (Appendix 3, Table A3.1). Coal gas consumption per ton of steel produced after the Project was completed is only about one third of consumption before the Project. Major energy savings have been achieved through continuous production processing, modern technology, recycling, reuse of waste gas, and cogeneration. These processes have since been adopted by other steel plants in the PRC. Of particular note are the technical advances that LISC has made in blast furnace operation since completion of the Project, with the injection of coal and reduction of the amount of coke used per ton of iron. LISC blast furnace operations are claimed to be a leader in the domestic steel industry.

24. Considerable improvements to noise, and air and water quality have resulted from the Project, with all targeted results being significantly exceeded. Data obtained by the OEM for the years 2000 to 2002 show that the positive trends in air and water quality continued, except for total suspended particulate pollution (Appendix 3, Tables A3.2–A3.3).

25. The Project made a significant contribution to the Government's economic reforms, particularly those involving the removal of price controls on raw material inputs and finished steel products for the iron and steel subsector, and enterprise restructuring to reduce state ownership and introduce principles of commercialization and accountability.

26. LISC has adopted modern business management and marketing practices, although obtaining relevant financial data proved difficult. By focusing on improving productivity and producing high-value H-beams, LISC has achieved significantly higher sales revenue than envisaged both at appraisal and in the PCR, using essentially the same facilities.

C. Cost and Scheduling

27. At the time of appraisal, the total project cost was estimated at $328 million equivalent, including a foreign exchange component of $221 million. On completion, the actual cost was $518 million, with a foreign exchange cost of $252 million, representing a cost overrun of $190 million (Appendix 1). The foreign exchange cost overrun was $31 million, and the local currency cost overrun was $159 million. The latter was higher, as a greater number of project

components were procured locally. The cost overrun was attributable to the substitution of the medium section mill for the welded pipe mill that required more expensive equipment and more extensive upgrading of existing facilities, additional civil works costs, higher domestic inflation, and higher staff costs due to the delay.

28. Project implementation commenced in January 1992. Erection of equipment was completed in June 1998, and substantial commissioning in June 1999. The 39-month delay was mainly caused by the major change in the project scope and by inexperience of some suppliers. The delay could perhaps have been reduced if LISC had better understood ADB procedures.

D. Consultant Performance, Procurement, and Construction

29. The need for the major change in the project scope should perhaps have initiated some investigation on the part of ADB into the performance of the consultants engaged under the project preparatory TA (footnote 3). In contrast, the use of domestic consultants, assisted by international consultants, to undertake international procurement was highly successful as LISC was unfamiliar with ADB's *Guidelines for Procurement*. Technical consultants advised on designing and installing production control and monitoring systems. The task was important to synchronize the whole plant operations and to coordinate with the various turnkey contractors. The consultants' performance was satisfactory.

30. The international consultants engaged under the advisory TA attached to the ADB loan (footnote 4) provided satisfactory inputs for strategies for management improvements and listing LISC. When the listing requirements for Hong Kong, China proved too onerous,[6] a decision was made to list on the Shanghai Stock Exchange. Due to extensive delays in obtaining the necessary government approvals to list, the consultants' contract was terminated in June 1997, with cost savings of $335,000. Provincial government officials and LISC staff successfully listed the company in 1997. LISC implemented the changes to management, financial, and governance systems using its own resources.

31. The equipment and materials financed by ADB were procured in accordance with ADB's *Guidelines for Procurement.* Procurement was carried out in a timely manner and no contractual disputes were noted. There were delays in the installation and commissioning of the medium section mill as the equipment supplier had insufficient experience in the commissioning of such large projects. Once fully commissioned, the equipment exceeded its design capacity.

E. Organization and Management

32. The implementation arrangements were in line with those envisaged at appraisal, with LISC using an already established project implementation office. LISC exhibited a high degree of commitment, particularly in its willingness to understand, and operate in accordance with, ADB guidelines and procedures. There was effective communication and coordination throughout implementation. Partly as a result of the Project, LISC has significantly improved its project development capacity and is now designing, building, and funding the next stage of development of the plant.[7] LISC has an organization structure typically seen in an international

[6] For example, the requirement to provide historical financial statements prepared in accordance with international accounting standards.

[7] LISC has proposed and government approval has been received for a $500 million development that will increase capacity of the medium section mill to 5 mtpa by 2005.

steel plant and has adopted modern management and financial processes. Staff are highly skilled and motivated.

33. LISC has successfully listed its shares on the Shanghai Stock Exchange. At the time of appraisal, the company was 100% state-owned. At the time of the OEM's visit, it had divested 22% of the shareholding to private investors. Appropriate corporate governance practices have been introduced.

34. All financial statements and audited project accounts have been submitted regularly to ADB, including the published Annual Reports issued to the shareholders and the Shanghai Stock Exchange.

III. ACHIEVEMENT OF PROJECT PURPOSE

A. Operational Performance

35. The Project, as amended, met or exceeded all of its expected outputs. All plant and equipment inspected at the site were observed to be functioning satisfactorily. Maintenance appeared to be of a high standard. The OEM visit coincided with the scheduled annual maintenance shutdown of the medium section mill. It was noteworthy that this complex task was completed 3 days ahead of schedule, with product quality standards and full output being reestablished within a short time after start-up.

1. Modernization and Expansion

36. In 1992, LISC was a relatively small provincial iron and steel company, using mostly low technology equipment to produce low-quality products for the local market. Ten years later, it is the 12th ranked steel producing company in the PRC,[8] and confidently expecting to be ranked within the top 50 international companies by 2005. It produces high-quality products, dominating the production of construction steel, and is a world leader in anchor chain production. Ten percent of production is exported to countries such as Hong Kong, China; Japan; and Singapore. LISC now produces steel by efficient converter or electric arc furnaces and operates modern rolling mills that are comparable to those operated in countries such as Japan, Republic of Korea, and United States. Continuous casting[9] accounts for over 90% of its production. The decision to include a medium section mill in the Project had a profound impact on the future of LISC, allowing it to enter the market for medium structural sections such as the H-beams that are now the main focus of its production. LISC is one of only two companies in the PRC producing these sections for the construction market, which is highly buoyant and expected to remain so. Profit margins are correspondingly high.

2. Energy and Environmental Issues

37. Very significant improvements have been made in both reducing energy consumption per ton of steel produced, and in reducing environmental pollution. All of the equipment supplied under the Project was observed by the OEM to be operating and maintained effectively with significant improvements having been made. In 2001, LISC was accredited to ISO14001,

[8] According to the International Iron and Steel Institute.
[9] Where liquid steel is converted into finished product in one process.

following introduction and acceptance of its environmental management systems. All water is recycled and all other effluents are treated, reused, or properly disposed of.

3. Managerial and Technical Skills

38. The management and staff of LISC have been wholly responsible for the ongoing development of the plant. There are two aspects to this. One is the process of continual improvement, or innovation, that has enabled the plant to exceed the design capacities, often very significantly. This is outstanding for a company that only 10 years ago was a small provincial steel-maker. The second is the degree of independence that LISC has been able to achieve in its development program.[10] This program is both supported by and supportive of the Government's macroeconomic and sector policies.

4. Commercial and Governance Practices

39. The privatization of LISC has not yet been completed. The listing on the Shanghai Stock Exchange in 1997 took longer than the envisaged 3 years from loan signing. The listing has helped instill a greater sense of financial discipline and accountability among management and employees but with the Government still owning 78% of the shares, no further progress towards full privatization has been achieved. The expectation at appraisal was that it should be an ongoing process, with further tranches of state-owned shares being sold to the public, leading to eventual private sector control of LISC. It is understood that preliminary talks have already been held with some international steel-making companies to take a strategic shareholding, as part of the next phase of expansion.

40. LISC has achieved a high degree of independence from the Government and has improved its governance practices. However, there are some areas of LISC's activities where the Government is perceived to still be influencing what should be purely commercial decisions. LISC has its own in-house Securities Department responsible for compliance with the appropriate regulations and for shareholder relations.

B. Performance of the Operating Entity

41. LISC is now producing steel products, which comply with international standards and are sold in both domestic and international markets, at prices that are equivalent or marginally lower than world prices, and free from protection or subsidies. Demand for LISC's products is expected to remain strong until the end of the decade.

42. Current production is around 2.8 mtpa of high quality steel products[11] (2.2 mtpa from the converter steel plant built under the Project and 0.6 mtpa from electric steel-making). The production focus is on structural sections for the construction industry. As has occurred in other developing countries, the construction industry in PRC is moving away from concrete and brick, towards more efficient steel buildings. LISC has been able to profit from recent changes to local building standards that allow the increased use of structural steel. Approximately 10% of its

[10] The second stage of LISC's development program, which will increase capacity to 2.8 mtpa, has been commissioned in October 2002. The third stage, which will take production up to 5 mtpa, has already received approval from the Government (footnote 7).

[11] Approximately 7 mtpa of steel is produced in Shandong Province. The other two large steel producers are Jinan Iron and Steel Company (producing mostly steel plate) and Qingdao Iron and Steel Company (producing mostly rod and wire).

output is exported, achieving net foreign exchange savings for the PRC, both through import substitution and exports.

43. Considerable improvements in productivity have been achieved by LISC. For instance, the bar and light section mill, with a design capacity of 400,000 tpa and employing 420 staff in 1997, in 2001 employed 380 staff to produce 580,000 tpa. The medium section mill reached its design capacity of 500,000 mtpa in August 2001 and is expected to produce in excess of 600,000 tons in 2002 and 780,000 tons in 2003. However, in terms of one of the most common criteria for productivity of steel producers—tons of crude steel produced per annum per employee—LISC does not rank high internationally, having produced only 165 tons per employee in 2001.[12] Japan's steel producers reached this level of productivity in 1970 and are currently achieving over 600 tons per employee. Nevertheless, LISC's productivity is still superior to that of most other domestic steel producers who are producing less than 100 tons per employee, and it is only the very large modern steelworks such as Shanghai Bao Steel (with 369 tons per employee) that have a higher productivity than LISC.

44. The overall financial position of LISC is sound and expected to further strengthen, with the company generating sufficient retained earnings to finance a large and ambitious capital expenditure program.[13] Since project completion in 1999, sales have increased by 40% from Y4.5 billion to Y6.3 billion, profit after tax by 82% from Y42.4 million to Y76.4 million, and total assets and shareholders funds by 18% and 30%, respectively. A summary of the financial position is shown in Table 3 (for details, see Appendix 4). A slight decline in financial performance was evident in 2001 as operating costs increased significantly (particularly depreciation), due to the major plant expansion that required significant amounts of LISC's internal cash resources. As a result of the increased production capacity and turnover, LISC officials were confident that profits would increase in 2002, and would be sustained.

Table 3: Summary of Financial Performance

Item	1997	1998	1999	2000	2001
Net Sales (Y billion)	3,569	3,764	4,552	5,991	6,252
Operating Income (Y billion)	497	388	414	1,022	1,034
Net Income After Tax (Y billion)	50	55	42	109	76
Net Fixed Assets (Y billion)	3,914	4,404	4,397	6,465	6,360
Return on Net Fixed Assets (%)	3	3	3	4	5
Current Ratio	0.8	0.7	0.7	0.6	0.7
Debt/Equity Ratio (%)	42:58	48:52	48:52	46:54	42:58
Debt Service Ratio	1.1	4.2	2.0	0.7	3.4

[12] Based on production and employee statistics given in the LISC 2001 Annual Report.

[13] The OEM noticed some discrepancies in data provided by LISC, the PCR, and the Annual Report. Prior year adjustments were frequently made to the financial statements and certain adjustments were made when accounting practices were changed and assets were revaluated, and when LISC was restructured prior to the public listing.

45. Government officials claimed LISC to be a leader in the corporatization and privatization process following the Project. The share price has generally performed well, rising sharply after issue by 44%. For the past year, trading volumes in LISC stock, as with most companies with substantial government ownership, have been lower although LISC's share price has tracked the Shanghai Composite Index, comprising 180 top companies. Lower share prices reflect the concerns about flooding the market through large listings of SOEs and the overall decline in prices of companies listed on the Shanghai Stock Exchange.[14] The Government has since withdrawn plans for a mass privatization of SOEs.

46. LISC receives no financial subsidies from the Government. It is free of all price controls, pays local and central government taxes, and is subject to all laws in the same way as a fully privately owned company. Although the State, through the provincial government, owns a majority of the shares, there does not appear to be any significant direct influence in LISC's day-to-day operation. However, government approvals are required for major strategic initiatives. LISC is one of the 512 large- and medium-sized companies identified by the national Government for support.[15] LISC utilizes this support in such areas as fast tracking infrastructure support projects and receiving priority from other SOEs for procurement of equipment, supplies, and services.

47. In accordance with the limited scope of this evaluation, the FIRR and EIRR were not recalculated. It was not possible to clearly isolate the project components from the current overall operations. The original pre-project plant had the capacity to produce about 240,000 tpa, to be increased to 628,000 tpa after completion. The further expansion of the project equipment and production processes and technology improvements, as well as additional facilities, have resulted in the Project producing about 2.2 mtpa, out of LISC's current total capacity of about 2.8 mtpa. The OEM was unable to obtain data, which would allow an accurate calculation of the performance of the project assets and a comparison with appraisal estimates.

48. The PCR mission recalculated the FIRR and EIRR to be 6.9% and 15.8%, compared to 15.2% and 22.9%, respectively, at appraisal, due to the higher project cost and extensive delay. The PCR did not take into account the additional capital expenditure or the significant productivity gains from the project assets and would have, most likely, underestimated the benefits. The OEM considers that the Project's financial viability can be assessed by LISC's overall financial performance, which is strong, and by the fact that LISC is currently pre-selling all of its output, demand remains high, the share price has tracked the market and LISC has strong support from domestic commercial banks.

49. The OEM considers the Project as also economically viable, as all inputs are valued at market prices and all outputs are sold in a free market, without subsidy or protection. The factory price per ton (inclusive of 17% value-added tax) for the major steel products produced by LISC with equipment supplied by the Project is $270 for steel bar, $345 for H-beams, and $309 for I-beams, as against the World Mean Transaction Prices for steel bar, and sections and beams of $291 per ton and $341 per ton, respectively.[16] This indicates that LISC is pricing its products very competitively and not relying on tariffs or other protective mechanisms to compete internationally.

[14] Of the 1,216 companies that are listed on the Shanghai Stock Exchange, only 82 are fully privately owned. Source: *The Economist*.
[15] It is also one of the 136 'key enterprises' identified by the provincial government.
[16] MEPS, International Ltd. and International Steel Review.

50. As shown in Appendix 5, loan covenants were generally met, except for the debt service ratio covenant that was not met in 1997 and 2000 when the ratio was 1.1 and 0.7, respectively, below the minimum requirement of 1.2. The noncompliance was due to a short-term decline in LISC's income because of lower prices for its products, and to the high cost of the major plant expansion. This was rectified following the opening of the medium section mill, with substantial increases in sales. The project benefit monitoring and evaluation reports that were required to be submitted each year after project completion have not been received. LISC claims to have developed alternative management information systems. However, the OEM had considerable difficulty in obtaining and interpreting data. No loan covenant was modified or waived during implementation.

IV. ACHIEVEMENT OF OTHER DEVELOPMENT IMPACTS

A. Socioeconomic Impacts

51. The Project had a significant impact on the Laiwu region. A construction project of this size, spread over 5 years brings one-off benefits,[17] while LISC's operations bring about substantial economic benefits to local suppliers and employment. LISC also provides extensive social, medical, and educational facilities to the community. The provincial labor department has estimated that per capita income in the region has tripled since the Project began and LISC is making a significantly larger contribution in taxes to the provincial and national governments. From being classified as economically depressed prior to the Project, Laiwu is now classified as a city, with income levels higher than the provincial average.

52. The Project promoted employment both in LISC and in the region. LISC is the largest employer in Laiwu with significant forward and backward economic linkages. The number of employees in LISC increased from 11,700 before the Project in 1996 to 15,600 in 2002. Although 6,000 employees were initially laid off as a result of the Project, all of these were subsequently retrained and reemployed by either LISC or other businesses in the Laiwu Steel Group or other local enterprises. LISC and the local labor department officials estimated that around 10,000 additional new jobs had been created in the region as a result of the Project. Appendix 6 gives details of the total employment by LISC before and after the Project, broken down by mill and department, by education, and by job type. Among the total staff, approximately 11,100 are male staff, and 4,500 are female staff. Many female staff occupy highly skilled technical and managerial positions. Shandong Provincial Government and LISC jointly operate a vocational training center (financed by a 1.5% payroll tax) to assist workers who are laid off. They provide up to 24 months of training and guarantees of job offers, plus topping up social security payments. Local officials and LISC confirmed there was currently no unemployment in Laiwu City. LISC also offers mini MBA-type courses for middle and senior management.

53. The Project also had a positive impact on the region through the establishment or expansion of businesses supplying the steelworks. Although there was a tendency for the best of these new business opportunities to be set up as subsidiaries of the Laiwu Steel Group,[18] other small to medium private businesses have been established to provide goods and services to LISC, other enterprises in the growth area, and the growing local population—thus promoting

[17] An example of this is the new 200-room hotel built in Laiwu City to house construction workers, customers, suppliers, and visitors.

[18] The new businesses established by the Laiwu Steel Group are also likely to be financially viable, have some degree of independence, and are partly privatized.

further private sector development. The OEM noted considerable industrial development taking place, with the establishment of industrial and commercial parks.

B. Environmental Impact

54. A key objective of the Project was to undertake measures for environmental protection and pollution control and for the monitoring of industrial pollutant emissions. An amount of $74.5 million, or 14.4% of the total project cost, was spent on acquiring process technology, equipment and parts for this purpose. At the time of the OEM's visit, this equipment was reported to be operating effectively and appeared to be well maintained. Considerable improvements have been made in the reduction of pollutant emissions in the steelworks. According to LISC's sophisticated monitoring equipment, national environmental standards are currently complied with, with the exception of total suspended particles (TSP), although the local authorities do not have the technical capability to verify this. TSP levels are higher than national standards mainly due to a prolonged drought in the region, resulting in heavy dust rising from the surrounding area, and vehicle pollution (Appendix 3, Table A3.3). In October 2001, LISC was certified as complying with the standards of ISO14001 in its environmental management systems and has adopted a process of continuous improvement.

C. Impact on Institutions and Policy

55. The most obvious impact of the Project was on LISC itself. From being a relatively small provincial iron and steel company, producing low value, low quality products, LISC has been transformed into the 12th largest steel company, producing high-quality products for domestic and international markets. This has involved a number of radical changes to LISC's institutional culture, particularly in areas such as sales and marketing, benchmarking, best industry practices, and corporate governance. For example, LISC did not identify marketing as a core function prior to 1999. It now has a very active marketing department, and distribution systems (which is a major key to success in the PRC), with offices or representation in 26 locations throughout the PRC, plus an international office.

56. For the implementation of the Project, LISC utilized a number of international consultants and equipment suppliers to assist in such functions as feasibility study, design, commissioning, and training. Not only LISC, but other local design and construction institutions that were involved in the Project have learned from this experience to the extent that further expansion is being implemented without foreign assistance and minimal external involvement. This process might have gone too far, with LISC, for example, now having design and construction abilities that might better reside in a separate company that could service the domestic iron and steel industry and possibly export its services in the near future. The accumulation of noncore business activities within LISC was not envisaged in the design of the Project.

57. The success of the Project in transforming a struggling SOE into a successful enterprise, with a significant private sector shareholding,[19] has encouraged the Government to learn from LISC's lessons and to continue with its reform and restructuring program, not just in the iron and steel sector, but also in other sectors.

[19] Currently approximately 83,000 shareholders, including 5,000 LISC staff.

V. OVERALL ASSESSMENT

A. Relevance

58. The OEM determined that project preparation and project goals, purposes, and outputs were strongly relevant to the PRC's development strategy and ADB's country operational strategy at the time of approval. The Project remains highly relevant to the Government's development strategy. For example, it was reported that Jinan Iron and Steel Company was using LISC as the model for its proposed corporatization. ADB's current operational strategy gives higher priority to governance issues and social concerns in general. However, development of the iron and steel industry and privatization/corporatization of SOEs remain as high priorities for the Government. Priority also continues to be given to reducing environment pollution caused by heavy industry, or relocating of polluting plants from urban areas. The Project is considered to be highly relevant.

B. Efficacy

59. The key objectives of rehabilitating, modernizing, and expanding an old and inefficient steel plant, reducing pollution and improving energy efficiency, upgrading managerial and technical skills, and introducing good corporate governance practices were all achieved and, in some areas such as steel production, significantly exceeded. Although there are some areas where LISC has yet to attain international best practice, it has generally reached or exceeded the expectations at appraisal. The Project is assessed as highly efficacious.

C. Efficiency

60. The limited scope of the evaluation did not call for a recalculation of the FIRR and EIRR (paras. 47–48). The investment in the Project and further plant expansion was highly efficient and cost effective, as demonstrated by the project-related equipment significantly exceeding the original design capacity, environmental benefits being achieved, and LISC showing growth in both sales and profitability, and being successfully listed on the Shanghai Stock Exchange. LISC is producing steel products, which comply with international standards and are sold in both domestic and international markets, at prices which are free from protection or subsidies. Demand for LISC's products is expected to remain strong until the end of the decade. The Project is assessed as efficient.

D. Sustainability

61. The sustainability of the Project is demonstrated in several areas. LISC has implemented a program of continuous improvement to its existing facilities, including those financed under the Project, that has resulted in achieving an output that is substantially above design capacity, within less than 5 years, while, at the same time, reducing costs and improving product quality. LISC has been able to position itself in a market where margins are high and there is only one local competitor; a situation that is expected to continue. It is also selling internationally, at ex-plant prices slightly lower or equivalent to world prices.

62. World steel production will reach record levels in 2002, with the PRC's output growing 18% to about 180 mtpa, largely intended for domestic consumption. PRC's accession to WTO is unlikely to have any major impact on LISC or the steel industry in PRC. Steel products and components have not been raised as an issue by WTO or member countries, who are concentrating mainly on machinery parts and agriculture. Currently, tariffs on imported steel are

about 10%, with major imports coming from Republic of Korea, Russian Federation, and Ukraine. Some pressure is being felt by the domestic steel industry as a result of the recent measures by the United States to prohibitively raise tariffs on imports of certain steel products. Working through WTO, the PRC has joined a number of major steel producing countries that seek withdrawal of these measures. In the meantime, some of the affected products are now being dumped in the PRC market. Although the Government has applied some quotas and restrictions on some local steel makers, and is considering increasing duties on selected products, these imports have no effect on LISC.

63. As a result of the experience gained by the Project, LISC has developed an in-house ability, expertise, and technology to implement future expansion projects without external assistance.

64. After its successful corporatization, listing on the Shanghai Stock Exchange and undertaking two successful capital raisings, LISC has the ability to manage the financing of future expansion. LISC is also contemplating a strategic alliance and/or joint venture with appropriate international partners to become a true global competitor. The sustainability of the Project is assessed as most likely.

E. Institutional Development and Other Impacts

65. The Project was effective in changing the culture and business practices in LISC, so that it now provides a model for introducing new technology and efficient management processes, and for the reform and restructuring of SOEs. The economic impact of LISC on Laiwu City and the region has been considerable. Many environmental improvements have also been made. The institutional development and other impacts of the Project are assessed as significant.

F. Overall Project Rating

66. Overall, the Project is rated highly successful and the attached TA (footnote 4), successful.

G. Assessment of ADB and Borrower Performance

67. The decision part way through implementation to significantly change the scope of the Project had a considerable impact. The original decision to include a welded pipe mill was not adequately explained in the appraisal report.[20] There was no discussion of market conditions and alternative configurations that should have been considered, no detailed breakdown of plant costs, and no justification of the cost estimates. The project preparation was completed according to schedule, but a more comprehensive evaluation of alternative product demand and plant configurations, might have identified the weaknesses inherent in the decision to include a welded pipe mill. Criticism was received from both government officials and LISC of the time taken by ADB to approve the change in project scope. There was a period of 16 months between bid opening for the welded pipe mill and ADB's approval of the request to substitute the medium section mill. It is not evident that ADB carried out any significant due diligence, appointed independent consultants or fielded any missions to investigate the proposal. In hindsight, however, the decision to support to change was correct and the institutional

[20] ADB. 1992. *Appraisal Report on the Laiwu Iron and Steel Mill Modernization and Expansion Project in the People's Republic of China*. Manila. Section IV D, para. 73.

developments supported by ADB proved to be highly successful. Except for its lack of an adequate evaluation relative to the welded pipe mill, ADB's performance in identifying, preparing, and supervising the Project was satisfactory.

68. LISC was fully committed and applied appropriate resources to implement the Project and was responsive to the changing market by substituting the medium sector mill. LISC performance was highly satisfactory.

VI. ISSUES, LESSONS, AND FOLLOW-UP ACTIONS

A. Key Issues for the Future

69. LISC has made considerable progress in its transformation from a small provincial SOE into a large corporation. However, there is still some distance to go in such areas as marketing and corporate governance, particularly shareholder management and introduction of a strategic partner, that need to be addressed if this transformation is to be completed. These are areas that are essentially international in nature and LISC would benefit from an association with an appropriate international corporation that could assist in inculcating these values into LISC's corporate culture. This association could be achieved either by a foreign company with complementary strategic interests taking an equity stake in LISC, or by LISC forming strategic partnerships with one or more appropriate companies. It is understood that LISC has already had some preliminary discussions with international companies.

70. There is still some uncertainty as to the role of government in LISC's decision-making processes and operations. Although there are two (soon to be three) independent Directors on the Board of LISC, and although the OEM was assured that government does not interfere in the day-to-day operations, there is still a perception of involvement by government. The uncertainty about the distinction between government's role as the majority shareholder and LISC's independence needs to be resolved as soon as possible. It could be an obstacle to forming productive relationships with international partners.

71. LISC has, as a spin-off from the Project and with the encouragement of government authorities, developed considerable capabilities in other areas such as project design, construction, and management. It is also undertaking many business activities, such as technical and management training and transportation, that would be considered by most of its international competitors as noncore activities. At the same time, LISC has taken a controlling interest in a start-up carbon fiber company that has no obvious linkages with the steel-making business. With a challenging program for developing its steel business ahead of it, LISC should consider whether these noncore activities should be retained.

B. Lessons Identified

72. This Project is recognized by government officials and LISC management as being the catalyst that changed LISC's culture and provided an example that other SOEs have followed. The OEM considers that, without the Project, LISC would not have survived. The Project was a model for modernization of the steel industry and reform and privatization of SOEs, with other enterprises following both in the steel industry and other sectors. The timing was certainly significant, as was the choice of the company and the support the Project received from all levels of government.

73. During project implementation, the major change of scope resulted in significant changes to the project components and costs, as well as a three-year delay in project completion. This could have been avoided if there had been more attention given to investigating market conditions during project preparation. There is also a question as to why there was such a large difference between the appraisal estimate and bid price for the welded pipe mill and ADB's level of investigation into the proposed substitution. This suggests there were deficiencies in defining the original scope of work for this component.

74. A major component of the Project was devoted to environmental improvements, which proved to be highly effective and provided processes for other SOEs to follow and major benefits for both LISC and the surrounding area. Similarly, the listing on the Shanghai Stock Exchange provided a valuable precedent, experience, and lesson for other SOEs.

C. Follow-Up Actions

75. OEM's key recommendations are:

(i) To be a major player in both domestic and international markets, LISC should achieve, by 2005, an output of 5 mtpa of high-quality, value-added product, while aiming for further reductions in staff and other major productivity gains.

(ii) To become a successful international player, and to secure financing for medium section mill expansion, LISC should form an alliance with an international strategic partner by the end of 2003. As part of this process, the state-owned shareholding should be reduced to less than 50% through the sale of a significant stake to the strategic partner and a further issue of shares to the public.

76. Efforts to further enhance environmental practices, should continue, including the upgrading of monitoring equipment and constant monitoring of the site and surrounding areas. LISC, or provincial authorities, with the assistance of LISC, should improve the environmental monitoring both within and outside the plant boundaries, and, develop appropriate measuring techniques. LISC could assist in the financing of and training local authorities on suitable pollution monitoring standards and procedures.

77. Further improvements are also required in corporate governance, management, and financial autonomy, which will facilitate fund raising and further enhance relations with shareholders. LISC should also continue to comply with ADB covenants and develop appropriate project monitoring and management information systems.

78. Given the success of the Project in transforming a low-technology provincial steel-making company into a highly successful internationally-ranked enterprise, when many other similar steel plants have not achieved this level of success, it is recommended that a seminar be held in the PRC to disseminate the findings of this evaluation to a wider audience and to compare LISC to the performance of other SOEs in a state of transition. The expectation is that government departments and SOEs that are involved in, or are contemplating, a modernization, corporatization, and privatization program could learn from the experiences of this Project. The seminar could be held in the first quarter of 2003, and would involve ADB staff and/or consultants, plus local and provincial government officials and key staff from LISC. If a seminar is not practical, it is recommended that a paper be published to summarize the Project's outcomes and disseminated to government officials and managers of SOEs.

PROJECT COST AND FINANCING

($ million)

Item	Appraisal Estimate			Actual			Change from Appraisal					
	Foreign Exchange	Local Currency	Total	Foreign Exchange	Local Currency	Total	Foreign Exchange	%	Local Currency	%	Total	%
1. Land Acquisition and Development	0.00	4.57	4.57	0.00	7.80	7.80	0.00	0	3.23	71	3.23	71
2. Mine and Quarry Development	1.40	2.25	3.65	0.00	6.30	6.30	(1.40)	(100)	4.05	180	2.65	73
3. Civil Works	26.34	20.35	46.69	76.80	148.80	225.60	50.46	192	128.45	631	178.91	383
4. Staff Housing	0.00	6.19	6.19	0.00	7.10	7.10	0.00	0	0.91	15	0.91	15
5. Process Equipment	95.90	12.78	108.68	140.90	72.80	213.70	45.00	47	60.02	470	105.02	97
6. Auxiliary Equipment	13.95	2.04	15.99	0.00	0.00	0.00	(13.95)	(100)	(2.04)	(100)	(15.99)	(100)
7. Equipment Erection and Installation	14.00	6.19	20.19	0.00	0.00	0.00	(14.00)	(100)	(6.19)	(100)	(20.19)	(100)
8. Consulting Services	2.05	2.20	4.25	0.10	0.90	1.00	(1.95)	(95)	(1.30)	(59)	(3.25)	(76)
9. Technical Services	5.50	0.00	5.50	0.80	4.60	5.40	(4.70)	(85)	4.60	0	(0.10)	(2)
10. Staff Training	2.05	2.20	4.25	0.70	1.10	1.80	(1.35)	(66)	(1.10)	(50)	(2.45)	(58)
11. Project Implementation	0.80	2.20	3.00	0.10	14.00	14.10	(0.70)	(88)	11.80	536	11.10	370
12. Pre-Production Expenses	0.68	1.74	2.42	0.00	0.00	0.00	(0.68)	(100)	(1.74)	(100)	(2.42)	(100)
Subtotal Base Cost	**162.67**	**62.71**	**225.38**	**219.40**	**263.40**	**482.80**	**56.73**	**35**	**200.69**	**320**	**257.42**	**114**
13. Physical Contingencies	15.57	2.78	18.35	0.00	0.00	0.00	(15.57)	(100)	(2.78)	(100)	(18.35)	(100)
14. Price Contingency	12.31	3.47	15.78	0.00	0.00	0.00	(12.31)	(100)	(3.47)	(100)	(15.78)	(100)
15. IDC and Other Charges	30.40	11.32	41.72	32.40	3.20	35.60	2.00	7	(8.12)	(72)	(6.12)	(15)
16. Working Capital	0.00	26.72	26.72	0.00	0.00	0.00	0.00	0	(26.72)	(100)	(26.72)	(100)
Total	**220.95**	**107.00**	**327.95**	**251.80**	**266.60**	**518.40**	**30.85**	**14**	**159.60**	**149**	**190.45**	**58**

IDC = interest during construction.

STEEL OUTPUT OF LAIWU STEEL CORPORATION

Table A2.1: Steel Production 1992–2001
('000 tons)

Products	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Crude Steel Production:										
Converter Steel	546	655	823	922	1,148	1,323	1,488	1,588	1,800	1,920
Foundry Pig Iron	142	154	79	136	113	95	49	70	40	0
Electric Arc Furnace Steel	134	162	197	200	237	341	397	422	400	410
Finished Products:										
Hot Rolled Strip	127	214	151	276	313	376	410	454	528	680
Light and Medium Section	0	0	0	0	0	41	342	456	613	1,680
Total Steel Output	**127**	**214**	**151**	**276**	**313**	**417**	**752**	**910**	**1,141**	**2,360**

Source: Laiwu Steel Corporation.

Table A2.2: Forecast Target Steel Output By Category 2002–2010
('000 tons)[a]

Products	2002	2003	2004	2005	2010
Quality Steel	920	940	1,000	1,200	2,000
Construction Steel	640	1,480	1,500	1,500	2,000
Hot Rolled Strip Steel	600	710	800	800	0
Section Steel	640	760	1,200	1,500	2,000
Total Steel Output	**2,800**	**3,890**	**4,500**	**5,000**	**6,000**

[a] LISC was unable to provide consistent product data between actual production and forecast to 2010.
Source: Laiwu Steel Corporation.

ENERGY AND ENVIRONMENTAL EFFECTS

Table A3.1: Energy Consumption

Item	Before the Project	After the Project
Coal Gas Consumption (m^3/t)	47.98	16.76
Electricity Consumption (kWh/t)	182.14	16.09[a]

kWh/t = kilowatt-hour per ton, m^3/t = cubic meter per ton.

[a] The comparison of electricity consumption before and after the Project shows a significant decline, which cannot be verified. The before-project figure appears to be inaccurate but the trend showing a significant reduction is to be expected. The after-project figure appears to be an accurate assessment of major energy savings.

Source: Laiwu Iron and Steel Company Environmental Unit.

Table A3.2: Air and Water Pollution

Type of Pollution		Unit	Before the Project	Target After the Project	Actual 1999	Actual 2000	Actual 2001
Wastewater Discharge Volume		million t/a	13.00	21.30	6.30	n.a.	n.a.
Pollutant After Treatment	SS	t/a	32,973	6,182	728	439	260
	COD	t/a	3,265	3,242	425	336	351
	Oil	t/a	105	144	22	13	17
	Phenol	t/a	3.9	1.4	0.5	0.2	0.2
	CN	t/a	3.7	2.4	0.2	0.2	0.2
	NH3-N	t/a	300	363	132	n.a.	129
	F	t/a	92	83	2	n.a.	n.a.
Air Discharge After Treatment	Dust	t/a	16,572	16,663	8,404	n.a.	n.a.
	SO_2	t/a	5,232	11,788	7,044	n.a.	n.a.

n.a. = not available.

CN = cyanide, COD = chemical oxygen demand, F = fluoride, NH3-N = ammonia, SO_2 = sulfur dioxide, SS = suspended solid, t = ton, t/a = ton per annum.

Source: Laiwu Iron and Steel Company Environmental Unit.

Table A3.3: Factory Site Air Quality
(mg/m^3)

Pollutant	Location	1990	1997	1998	1999	2000	2001	2002 (Jan-Jun)	National Standards
TSP[1]	Factory Area	1.073	1.019	1.005	1.002	1.625	1.218	1.350	0.50
	Steel Mill		0.638	0.587	0.483	1.429	0.742	1.042	
	Iron Mill		2.051	2.060	1.884	2.278	1.571	1.189	
	Coking Plant		0.632	0.666	0.502	0.653	0.530	0.861	
	Living Area	0.381	0.324	0.374	0.378	0.421	0.406	0.546	0.30
SO_2	Factory Area	0.070	0.117	0.120	0.092	0.073	0.057	0.059	0.25
	Steel Mill		0.147	0.200	0.106	0.061	0.073	0.073	
	Iron Mill		0.089	0.136	0.088	0.070	0.038	0.050	
	Coking Plant		0.087	0.150	0.118	0.072	0.054	0.045	
	Living Area	0.078	0.069	0.080	0.074	0.068	0.071	0.054	0.15
NO_X	Factory Area	0.033	0.049	0.057	0.049	0.058	0.064*	0.063*	0.15
	Steel Mill		0.056	0.057	0.051	0.050	0.061	0.070	
	Iron Mill		0.045	0.050	0.038	0.055	0.079	0.061	
	Coking Plant		0.039	0.045	0.041	0.071	0.067	0.049	
	Living Area	0.028	0.035	0.043	0.041	0.036	0.047*	0.045*	0.10

* = nitrogen dioxide (NO_2).
mg/m^3 = milligrams per cubic meter, NOx = nitrogen oxides, SO_2 = sulfur dioxide, TSP = total suspended particulates.
Source: Laiwu Iron and Steel Company Environmental Unit.

[1] The major reason causing the TSP indicator to be higher has been due to climate change, which has resulted in significant dust in the atmosphere. Together with pollutants from vehicle emissions and other sources, this contributed to the overall TSP increase. LISC reported that TSP pollution was below the standard in the second half of 2002, but figures were not provided to support this. The OEM observed clean air conditions during its visit.

FINANCIAL PERFORMANCE OF LAIWU STEEL CORPORATION

Table A4.1: Income Statement

(Y'000)

Item	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Net Sales	1,199,894	2,173,424	2,158,488	2,377,130	2,957,951	3,568,730	3,764,485	4,552,201	5,990,827	6,252,037
Cost of Goods Sold	939,767	1,438,878	1,777,627	1,930,489	2,446,626	3,071,696	3,376,242	4,138,011	4,969,275	5,218,486
Operating Income	260,127	734,546	380,861	446,641	511,325	497,034	388,243	414,190	1,021,552	1,033,551
Other income	4,532	(8,243)	28,753	19,841	21,148	20,197	139,192	149,368	121,207	151,952
Other Expenses	145,757	503,203	303,708	401,522	0	0	416,366	451,946	931,663	984,715
Interest	14,565	46,517	67,776	109,127	94,718	69,383	89,383	89,220	151,454	227,993
Others	131,192	456,686	235,932	292,395	334,873	341,821	326,983	362,726	783,700	756,722
Profits Before tax	118,902	223,100	105,906	64,960	102,882	106,027	110,069	111,612	208,466	169,097
Income tax			36,101	8,575	32,089	55,863	55,539	69,238	99,176	92,691
Net Income After Tax	118,902	223,100	69,805	56,385	70,793	50,164	54,530	42,374	109,290	76,406
Remittance to Government	22,110	22,110	0	0	0	(42,553)	(40,411)	0	0	0
Indicators:										
Operating Income/Sales (%)	20	31	18	19	17	13	10	9	17	16
Return on Net Fixed Assets (%)	25	26	11	10	8	3	3	3	4	5
Return on Equity (%)	20	22	10	9	8	4	5	4	7	8

Note: Some financial data is different from the project completion report, due to subsequent adjustments made in the financial statements prepared by LISC.

Table A4.2: Balance Sheet
(Y'000)

Item	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Current Assets										
Cash	63,598	117,605	132,706	89,576	171,237	319,374	377,891	385,191	399,127	29,988
Accounts Receivables	88,043	607,252	600,397	466,239	464,065	383,559	592,794	590,388	704,945	648,225
Inventories	237,327	551,621	523,156	635,559	792,418	949,576	1,019,250	1,024,235	1,062,157	1,506,800
Others	109,975	246,656	446,806	463,478	621,165	616,906	606,558	603,143	798,633	1,147,383
Total Current Assets	498,943	1,523,134	1,703,065	1,654,852	2,048,885	2,269,415	2,596,493	2,602,957	2,964,862	3,332,396
Fixed Assets	855,621	1,421,091	1,884,599	2,445,660	3,008,376	5,159,883	5,942,239	5,941,158	8,727,310	9,031,195
Less Depreciation	329,027	392,056	646,850	785,556	954,771	1,245,499	1,538,643	1,544,217	2,261,935	2,671,066
Net Fixed Assets	526,594	1,029,035	1,237,749	1,660,104	2,053,605	3,914,384	4,403,596	4,396,941	6,465,375	6,360,129
Fixed Assets Disposed		1			12				2,750	69
Construction in Progress	556,415	601,235	1,246,165	2,305,226	2,215,282	1,755,362	2,508,240	2,505,092	1,093,508	1,043,781
Fixed Assets Net Loss			710						2,261	4,047
Long-Term Investments	5,406	53,302	100,655	105,417	103,060	132,563	202,501	203,751	110,844	186,117
Intangible Assets		180	1,524	36,942	40,187	41,806	44,076	44,076	534,371	536,897
Total Assets	**1,587,358**	**3,206,885**	**4,288,448**	**5,762,541**	**6,461,007**	**8,113,530**	**9,754,906**	**9,752,817**	**11,163,949**	**11,455,204**
Current Liabilities										
Account Payable	37,018	253,344	465,720	457,536	534,449	677,438	1,181,163	1,181,163	1,447,267	1,047,205
Short-Term Liabilities	7,669	59,863	181,115	293,527	548,994	821,708	860,106	860,106	1,086,535	1,090,430
Current Portion of Long-Term	35,970	159,308	71,550	411,646	138,926	331,490	373,232	373,232	333,055	481,961
Others	243,539	831,466	961,489	1,115,460	972,024	1,090,413	1,451,396	1,450,671	1,731,365	1,963,786
Total Current Liabilities	324,196	1,303,981	1,679,874	2,278,169	2,194,393	2,921,049	3,865,897	3,865,172	4,598,222	4,583,382
Long-Term Liabilities	593,225	686,901	1,171,858	1,606,820	2,255,217	2,197,585	2,810,765	2,810,764	2,993,122	2,874,369
Shareholders Funds	669,937	1,216,003	1,436,716	1,877,552	2,011,397	2,994,896	3,078,244	3,076,881	3,572,605	3,997,453
Total Liabilities and Equity	**1,587,358**	**3,206,885**	**4,288,448**	**5,762,541**	**6,461,007**	**8,113,530**	**9,754,906**	**9,752,817**	**11,163,949**	**11,455,204**
Indicators										
Current Ratio	1.54	1.17	1.01	0.73	0.93	0.78	0.67	0.67	0.64	0.73
Net Fixed Assets/Net Sales (%)	44	47	57	70	69	110	117	97	108	102
Debt/Equity Ratio	47:53	36:64	45:55	46:54	53:47	42:58	48:52	48:52	46:54	42:58

Table A4.3: Cash Flow Statement

(Y'000)

Item	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Sources of Funds										
Internal Cash Generation	171,807	334,322	279,276	330,621	308,384	303,009	436,959	390,312	205,447	706,922
Net Income After Tax	118,902	223,100	69,805	56,385	70,793	50,164	95,469	42,374	24,993	24,993
Depreciation	38,340	64,705	141,695	165,109	142,873	183,462	252,107	258,718	13,063	453,936
Interest (Financial Expense)	14,565	46,517	67,776	109,127	94,718	69,383	89,383	89,220	167,391	227,993
Borrowings	311,557	281,716	590,364	622,211	1,065,673	1,128,086	2,750,235	1,851,584	2,016,120	2,559,875
Short-Term	15,000	42,735	143,250	153,979	272,369	320,005	596,175	263,639	262,971	317,015
Long-Term	296,557	238,981	447,114	468,232	793,304	808,081	2,154,060	1,587,945	1,753,149	2,242,860
Total Sources of Funds	483,364	616,038	869,640	952,832	1,374,057	1,431,095	3,187,194	2,241,896	2,221,567	3,266,797
Application										
Capital Expenditures	481,804	656,861	1,165,482	1,691,543	377,747	1,120,105	1,170,257	938,811	1,963,645	3,209,228
Long-Term Borrowing		48,350	54,022	3,653	20,661	29,503	39,939	26,278	207,909	170,506
Debt Servicing	142,408	197,877	176,619	258,897	242,685	274,048	104,431	193,912	296,131	207,343
Repayment of Principal	127,843	151,360	108,843	149,770	147,967	204,665	15,048	104,682	164,677	137,564
Interest (Financial Expense)	14,565	46,517	67,776	109,127	94,718	69,383	89,383	89,230	131,454	69,779
Remittance of Profit to Government	22,100	22,100				42,553	40,411			
Total Applications	646,312	925,188	1,396,123	1,954,093	641,093	1,466,209	1,355,038	1,159,001	2,467,685	3,587,077
Increase/(Decrease) in Cash and Deposits	(162,948)	(309,150)	(526,483)	(1,001,261)	732,964	(35,114)	1,832,156	1,082,895	(246,118)	(320,280)
Indicator:										
Debt Service Ratio (Times)	1.21	1.69	1.58	1.28	1.27	1.11	4.18	2.01	0.69	3.41

COMPLIANCE WITH LOAN COVENANTS

Covenant		Reference to Loan Agreement	Status of Compliance
A.	**Financial**		
1.	Laiwu Iron and Steel Company (LISC) shall (i) maintain separate accounts for the Project and for its overall operations; (ii) have such accounts and related financial statements audited annually in accordance with sound auditing standards by independent auditors acceptable to Asian Development Bank (ADB); and (iii) furnish to ADB not later than 6 months after the fiscal year to which they relate, certified copies of such audited financial statements.	P.A. Section 2.09	Complied with except for 2000.
2.	LISC shall maintain at all times (i) a debt service ratio of not less than 1.2:1; and (ii) a debt-equity ratio of not higher than 70:30.	P.A. Section 2.16	(i) Complied with except in 1997 and 2000 (1.1:1 and 0.7:1). (ii) Complied with.
3.	The Borrower shall ensure that LISC (i) is free to market and sell all of its iron and steel products throughout the country; (ii) purchases all of its inputs and sells all of its iron and steel products at market prices; and (iii) is allowed to retain sufficient earnings to finance its current operations, including maintenance and repairs, and to accumulate adequate reserves to finance a reasonable proportion of its future investment requirements.	L.A.,Schedule 6, para. 4(b)(i), (ii), (iii)	Complied with.
B.	**Policy Reforms**		
4.	Shandong shall ensure that the prices of all raw material inputs and outputs of the iron and steel subsector in Shandong are completely decontrolled by 31 December 1992 and the Borrower shall ensure that the prices of all raw materials inputs and outputs of the Borrower's iron and steel subsector are completely decontrolled by 31 December 1995.	L.A., Schedule 6, para. 7	Complied with.
	a. The Borrower shall not provide any subsidy to loss-incurring enterprises in the iron and steel subsector after 31 December 1992.	L.A., Schedule 6, para. 8(a)	Complied with.
	b. Shandong shall not provide any subsidy to enterprises in the iron and steel subsector (including LISC) after 31 December 1992.	L.A., Schedule 6, para. 8(b)	Complied with.

Covenant			Reference to Loan Agreement	Status of Compliance
C.	**Environmental Protection**			
5.		LISC shall ensure that the project is designed and implemented and that the project facilities are operated and maintained in strict conformity with applicable local environmental protection standards concerning solid, liquid, and gaseous waste disposal.	L.A., Schedule 6, para. 10(a)	Complied with.
6.		LISC shall at all times operate its facilities in accordance with all applicable safety standards. Without limiting the generality of the foregoing, LISC shall ensure that the levels of metal fumes and metal dust at its facilities conform to standards acceptable to ADB.	L.A., Schedule 6, para. 11	Complied with.
D.	**Restructuring of Laiwu Iron Steel Company**			
7.		LISC shall implement an action plan acceptable to the Borrower, Shandong, and ADB for the restructuring of LISC and the introduction of a shareholding system of ownership within 3 years after the date of loan agreement.	L.A., Schedule 6, para. 12	Complied with.
E.	**Reports**			
8.	a.	LISC shall furnish to ADB all such reports and information as ADB shall reasonably request concerning (i) the loan and the expenditure of the proceeds thereof; (ii) the goods, services and other items of expenditure financed out of such proceeds; (iii) the project; (iv) the administrative operations and financial condition of LISC; and any other matters relating to the purposes of the loan.	P.A., Section 2.08 (a), L.A., Schedule 4.04	Complied with.
	b.	Without limiting the generality of the foregoing, LISC shall furnish to ADB quarterly reports on the execution of the Project and on the operation and management of the project facilities. Such reports shall be submitted within 30 days after the end of each quarter.	P.A., Section 2.08 (b)	Complied with.

	Covenant	Reference to Loan Agreement	Status of Compliance
	c. Promptly after the physical completion of the Project, but in any event not later than 3 months thereafter or such later date as ADB may agree for this purpose, LISC shall prepare and furnish to ADB a report, in such form and in such detail as ADB shall reasonably request, on the execution and initial operation of the Project, including its cost, the performance by LISC of its obligations under this Project Agreement and the accomplishment of the purposes of the Loan.	P.A., Section 2.08(c)	Complied with.
9.	LISC shall for the first 5 years after the first month in which full production capacity is reached under the Project, provide to ADB, on an annual basis, a project benefit monitoring and evaluation report. Such report shall encompass (i) an assessment of the actual product output and quality attained as compared with the targeted output and quality; and (ii) an assessment of the extent of the benefits realized in respect of the production aspects agreed to by the Borrower and ADB.	L.A., Schedule 6, para. 13	Being complied with. The first benefit monitoring and evaluation report was received in December 1999.

STAFFING OF LAIWU STEEL CORPORATION

Item		Before the Project	After the Project	By Sep 2002
By Mills and Department	Sintering Plant	1,676	1,867	2,055
	Iron-Making Mill	1,471	1,609	1,818
	Special Steel Mill	3,517	2,617	2,788
	Steel-Making	1,356	2,334	2,385
	Rolling Mill	1,624	1,559	1,633
	Forging Plant	538	980	1,134
	Coking Plant	1,130	842	910
	Medium Section Mill	—	451	572
	Thermal-Power Plant	—	547	645
	Sales Department	—	202	178
	Quality Assurance Department	—	753	734
	Mechanical Power Department	—	7	47
	Raw Material Department	55	177	208
	Corporate Technology Center	—	32	32
	Corporate Headquarters:	174	263	239
	Securities Department/General Administration	53	32	12
	Planning Department	20	14	11
	Production Department	34	69	68
	Human Resources Department	—	14	14
	Finance Department	31	95	91
	Safety and Security Department	36	39	37
	International Trading Department	—	6	6
	Total	**11,715**	**14,549**	**15,617**
By Education	Graduate			
	University Graduate	851	1,169	1,169
	3-Year College Graduates	1,286	1,546	1,546
	Vocational School	3,996	4,199	4,199
	High School Graduates and Below	5,582	7,635	8,703
	Total	**11,715**	**14,549**	**15,617**
By Job Type	Production Staff	9,629	12,448	13,516
	Sales Staff	202	178	178
	Technical Staff	631	487	487
	Financial Staff	95	91	91
	Administrative Staff	1,138	1,330	1,330
	Others (on long illness leave, education leave, etc.)	20	15	15
	Total	**11,715**	**14,549**	**15,617**[a]

— = not available.

[a] Excludes 106 staff in the Tiantai New Material JV (carbon-fiber). Among the total staff, 71% were male staff, and 29% were female staff.

Source: Laiwu Steel Corporation (LSC) Human Resources Department.