PROJECT PERFORMANCE AUDIT REPORT

CHINA

HEILONGJIANG LAND RECLAMATION PROJECT
(LOAN 2261-CHA/CREDIT 1347-CHA)

MAY 19, 1992

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Operations Evaluation Department

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CHINA

FISCAL YEAR

January to December 31

CURRENCY

Name of Currency: Yuan (Y)
Rate of Exchange: 1983 US$1 = Y1.75 (Appraisal Year)
1984 US$1 = Y2.80
1985 US$1 = Y2.80
1986 US$1 = Y3.72
1987 US$1 = Y3.72
1988 US$1 = Y3.72 (Completion Year)

WEIGHTS AND MEASURES

Metric and Local

15 mu = 1 ha

ABBREVIATIONS

CGB - Central General Bureau of State Farms and Land Reclamation
ERR - Economic Rate of Return
FIMO - Foreign Investment Management Office
FRR - Financial Rate of Return
HGB - Heilongjiang General Bureau of State Farms
ICB - International Competitive Bidding
PCR - Project Completion Report
PPAR - Project Performance Audit Report
MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

SUBJECT: Project Performance Audit Report on China - Heilongjiang Land Reclamation Project (Loan 2261/Credit 1347-CHA)

Attached for information, is a copy of a report entitled "Project Performance Audit Report on China - Heilongjiang Land Reclamation Project (Loan 2261/Credit 1347-CHA)" prepared by the Operations Evaluation Department.

Attachment
# Project Performance Audit Report

**China**

**Heilongjiang Land Reclamation Project**  
*(Loan 2261-CHA/Credit 1347-CHA)*

## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>1</td>
</tr>
<tr>
<td>Basic Data Sheet</td>
<td>iii</td>
</tr>
<tr>
<td>Evaluation Summary</td>
<td>v</td>
</tr>
<tr>
<td><strong>I. Background</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>II. Implementation Experience</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>III. Project Outcome</strong></td>
<td>7</td>
</tr>
<tr>
<td><strong>IV. Findings and Issues</strong></td>
<td>8</td>
</tr>
<tr>
<td>Overview</td>
<td>8</td>
</tr>
<tr>
<td>A. Project Design</td>
<td>8</td>
</tr>
<tr>
<td>B. Spare Parts Acquisition</td>
<td>9</td>
</tr>
<tr>
<td>C. Operation, Maintenance and Repair</td>
<td>10</td>
</tr>
<tr>
<td>D. Organization and Management</td>
<td>10</td>
</tr>
<tr>
<td>E. Environmental Considerations</td>
<td>11</td>
</tr>
<tr>
<td>F. Determinants of Project Success</td>
<td>12</td>
</tr>
<tr>
<td>Table 1: Comparison of Cropped Area, Yields and Production</td>
<td>14</td>
</tr>
<tr>
<td>Attachment: Comments from the Borrower</td>
<td>15</td>
</tr>
</tbody>
</table>

**MAP**  IBRD No. 23369: Heilongjiang Project Sites
This is a Project Performance Audit Report (PPAR) on the Heilongjiang Land Reclamation Project, involving an IBRD loan in the amount of US$35.3 million and an IDA credit in the amount of SDR 41.3 million (US$45.0 million) to the People's Republic of China with the objective of developing some 200,000 ha of unused land for production of food grains and soybean in Heilongjiang Province. The loan and credit were approved on April 19, 1983 and became effective on August 23, 1983. The closing date of December 31, 1987 was extended to March 31, 1989 because of delays in procurement and delivery of equipment. US$10.0 million of the loan was cancelled retroactively to November 26, 1984 because of savings arising from substantially lower bid prices for the machinery and equipment from those estimated at appraisal. Final disbursement was made on August 30, 1989 at which time a further US$0.18 million of the loan, and US$0.01 million of the credit were cancelled.

The PPAR is based on the Project Completion Report (PCR) of the project prepared jointly by the former Asia Region and Borrower and issued in 1990, the Staff Appraisal report, the President's Report, the loan and credit documents, the transcript of the Executive Director's meeting at which the project was considered, on a study of project files, and on discussions with Bank staff. An OED mission visited China in September/October, 1991 and discussed the effectiveness of the Bank's assistance with staff of Central and Provincial Government agencies involved. Their kind cooperation and valuable assistance in the preparation of this report is gratefully acknowledged.

The PCR provides a very good account and assessment of the project experience, and discusses the performance of the Bank and the project executing agencies. The PPAR elaborates on particular aspects such as the improvement which has taken place in the two years since the PCR was written, including the increased yields and production, and the spare parts procurement, maintenance and repair situation.

The draft PPAR was sent to the Borrower for comments. The comments received from the Ministry of Finance are reproduced as an Attachment to the PPAR.

4/ Loan Agreement No. 2261-CHA, dated May 20, 1983.
5/ Development Credit Agreement No. 1347-CHA, dated May 20, 1983.
PROJECT PERFORMANCE AUDIT REPORT

CHINA

HEILONGJIANG LAND RECLAMATION PROJECT
(LOAN 2261-CHA/CREDIT 1347-CHA)

BASIC DATA SHEET

KEY PROJECT DATA

<table>
<thead>
<tr>
<th>Item</th>
<th>Appraisal Estimate</th>
<th>Actual or Current Estimate</th>
<th>Actual as % of Appraisal Estimate</th>
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<td>Total Project Costs (US$ million)</td>
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<td>166.1</td>
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<td>Loan/Credit Amount (US$ million)</td>
<td>80.3</td>
<td>70.1</td>
<td>87</td>
</tr>
<tr>
<td>Date Physical Components Completed</td>
<td>6/30/87</td>
<td>12/31/88</td>
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<tr>
<td>Proportion completed by that date (%)</td>
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<td>76</td>
<td>76</td>
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<td>Economic Rate of Return</td>
<td>23</td>
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<tr>
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<tr>
<td>Institutional Development</td>
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CUMULATIVE ESTIMATED AND ACTUAL DISBURSEMENTS

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<th>FY84</th>
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<th>FY87</th>
<th>FY88</th>
<th>FY89</th>
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<td>63.7</td>
<td>78.1</td>
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<td>Actual (US$ million)</td>
<td>21.8</td>
<td>43.7</td>
<td>49.6</td>
<td>58.9</td>
<td>66.1</td>
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<td>Actual as % of Appraisal (%)</td>
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<td>63</td>
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Date of Final Disbursement: August 30, 1989

PROJECT DATES

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<td>Effectiveness</td>
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<td>Closing Date</td>
<td>6/87</td>
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STAFF INPUT

(Staff weeks)

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<th>FY85</th>
<th>FY86</th>
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<td>69.6</td>
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<td>Negotiation</td>
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<td>30.8</td>
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<td>22.5</td>
<td>7.0</td>
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<td>TOTAL</td>
<td>122.6</td>
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### MISSION DATA

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<td>E, Ec.</td>
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</table>

### OTHER PROJECT DATA

**Borrower:** People's Republic of China  
**Executing Agencies:** Central General Bureau of State Farms  
Heilongjiang General Bureau of State Farms

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1/ DC = Division Chief; Ag.Ec. = Agricultural Economist; Ag.E = Agricultural Engineer; E = Engineer; Ag.Mach. = Agricultural Machinery Specialist; Ec. = Economist; Ag. = Agriculturalist; Seed = Seed Specialist

2/ 1 = Problem Free or Minor Problems; 2 = Moderate Problems; 3 = Major Problems

3/ 1 = Improving; 2 = Stationary; 3 = Deteriorating (trend ratings were discontinued after 1984)

4/ T = Technical; M = Managerial
PROJECT PERFORMANCE AUDIT REPORT

CHINA

HEILONGJIANG LAND RECLAMATION PROJECT
(LOAN 2261-CHA/CREDIT 1347-CHA)

EVALUATION SUMMARY

Introduction

1. This was the second agricultural sector project assisted by the Bank/IDA in the People's Republic of China to be approved by the Board. It aimed to support the Government in increasing the national output of grain supplies, as a contribution to reducing the country's growing food-grain deficit, through land development using advanced farm mechanization and crop technology. The area chosen for the project was in Heilongjiang Province in northeastern China, where about 1.7 million ha of uncultivated but agriculturally suitable land was known to exist in relatively isolated and sparsely settled areas of the northern third of the Province.

Objectives

2. The project aimed to assist the Heilongjiang General Bureau of State Farms (HGB) in the opening up of 200,000 ha of uncultivated marshlands with the aid of heavy duty, foreign manufactured, equipment and machinery (hydraulic backhoe excavators, large horsepower tractors, self-propelled combine harvesters, grain drying and seed processing equipment, etc.) of a type previously not readily available in China. The project was expected to produce annually 433,000 ton of mixed grains (wheat, soybean and maize) by the time of full development in 1991.

Implementation Experience

3. The construction and land development program fell behind schedule in the first year, when the HGB was dependent on its existing fleet of domestically manufactured equipment pending the delivery of the project-provided foreign machinery. Attainments, in terms of area cultivated and grain production targets, remained about one year behind appraisal estimates for the remainder of the implementation phase. Several design improvements, including a number of changes in project sites (from 30 to 33 farms) and the substitution of mechanical driers in place of the open air drying floors, took place in the early years. The shortfall in area cultivated by year compared with appraised projections was partly offset by better than estimated yields of wheat and soybean.

4. Operational and maintenance standards for the imported machinery were weak in the early years but improved towards the end of the project as a result of close attention to operator training. In the later years of implementation the project was in danger of running short of spare parts, because of a limited initial spares inventory and a shortage of foreign exchange required to effect additional purchases from foreign manufacturers. But by the end of the closing year an arrangement was reached with the Central
Government whereby the implementing agency was allowed to retain the foreign exchange derived from its soybean export quota, which enabled the required purchases to be made.

Results

5. Although the areas cultivated were about one year behind the appraisal estimate through the implementation period, the higher yields, and the lower bid prices offered for much of the foreign machinery by the suppliers, has resulted in an ERR of 22 percent at completion compared to an appraisal estimated 23 percent. By 1990 the combined production of the three main crops, at 389,000 ton, was close to that year's appraisal target (401,000 ton) for the first time. In production terms, the outlook remains promising, with a likelihood that the cultivated area will plateau at around 190,000 ha within the next year or two, when average output should be at least equivalent to the 433,000 ton assumed at appraisal for the three main crops at full development.

Sustainability

6. Capable and experienced management combined with a well-trained and motivated workforce, which evolved during the years of project implementation, provide an assurance that the project investment is likely to remain sustainable, with the proviso that the government takes steps to compensate HGB financially for low prices for grains provided at below the free market price in fulfillment of its quota obligations, and that the HGB continues to have access to the foreign exchange necessary for acquisition of machinery spare parts from foreign suppliers (paras. 4.4-4.5).1

7. More importantly, over the longer term there is the prospect that the government will resume its pricing and marketing reforms, initially introduced in the late 1970's. A program for the future should start with a reform of official grains and its pricing, and an expansion of public investment, to improve the technical efficiency of the state-owned grain distribution system.2

Findings and Lessons

8. Despite shortcomings in the preparation and appraisal phase, the project was satisfactorily implemented, thanks to the adaptability displayed by Borrower and Bank staff towards modifying the appraisal plan on the basis of experience gained in implementation (paras. 4.2-4.3).

9. The high standards of operational care and maintenance now given to the imported machinery suggests that the working lives for these machines could prove to be above industrial norms (paras. 4.7-4.8).

10. The introduction of an incentive based Production Responsibility System in the years prior to project effectiveness, and its continuous refinement during implementation, was an important factor in ensuring project success (paras. 4.9-4.11).

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1/ See Attachment, Point 3, for additional comment on sustainability by Borrower.
PROJECT PERFORMANCE AUDIT REPORT

CHINA

HEILONGJIANG LAND RECLAMATION PROJECT\(^1\)

(LOAN 2261-CHA/CREDIT 1347-CHA)

I. PROJECT BACKGROUND

Context

1.1 Faced with a growing national foodgrain deficit in the late 1970's, the Government planned to increase the marketed crop supply, in part through a major land development program aimed at bringing into production the few remaining areas of agriculturally suitable but uncultivated land on State Farms. It was introduced at a time when China was implementing a progressive rural reform program, initiated in 1978, which was transforming the agricultural sector from a centrally planned to a market-driven system. Higher per capita incomes stimulated a demand for a more diverse and higher quality diet, including higher quality table grains, increased meat intake, and a wider range of fruits and vegetables.

1.2 Prospects for increased food grains production were particularly favorable in Heilongjiang Province of northeastern China, where about 1.7 million ha of cultivable land was known to exist in relatively isolated and sparsely settled areas of the northern third of the Province. Some 700,000 ha of this land lay within the boundaries of large farms under the control of the Heilongjiang General Bureau of State Farms (HGB). The large, uniform expanses of available land combined with the low population densities made these areas especially suited for large scale mechanized farming operations. Experience accumulated since the first farms were set up on virgin land by the Government in the late 1940's had shown that these level marshlands, if surface drained, were capable of producing satisfactory yields of wheat, soybean and maize under mechanized farming conditions during the warm, moist but short summers characteristic of that latitude. By the early 1980's the HGB had about two million hectares under cultivation, all of which had been developed under state auspices.

1.3 Trials with imported farm machinery had demonstrated that foreign equipment was superior to domestically produced machines for large scale farming during the restricted growing season, and provided the justification for a Bank-assisted project which conformed closely with the Bank's strategy for supporting

\(^1\) The name of the project is, in a strict sense, misleading, since "reclamation" implies restoring land to its previous use, whereas in reality the project was bringing virgin land into cultivation for the first time. Similarly, reference as in the project documents to "unused land" or "wastelands" is avoided in this report in favor of "uncultivated land" since the project area was clearly used by abundant resident and migratory wild life, and occasional hunters, trappers and fishermen.
the government's efforts to raise agricultural production through more efficient use of land and water resources.

Objectives

1.4 The project's objective was to increase domestic grain supplies as a contribution to reducing growing foodgrain deficits by opening up and farming 200,000 ha (3 million mu) of uncultivated marshlands, through the introduction of advanced farm mechanization and crop technology.

Design

1.5 The project was designed to be completed in four years (mid 1983 through mid 1987) and reach full development in 1991. It aimed to provide drainage and road infrastructure to 200,000 ha; farm buildings, housing and communal facilities serving about 8,000 families; and imported earthmoving and agricultural, including grain storage and seed processing, machinery to permit efficient cultivation of the newly developed lands. Funds for technical assistance, overseas training and study tours were also included.

1.6 The project as appraised included:

- a) development of 200,000 ha of uncultivated land through drainage and land clearing, including construction and improvement of about 2,100 km. of main and branch drains, 7,800 km. of lateral and sublateral drains, 370 km. of flood embankments, and 24 drainage pumping stations;
- b) construction of about 1,500 km. of rural roads and 2,200 km. of farm roads;
- c) construction of sub-farm and brigade headquarters, including housing for about 8,000 families, community facilities, offices, workshops, stores and utilities;
- d) construction of drying floors and grain silos;
- e) procurement of agricultural machinery to permit full mechanization of farm operations in the project area;
- f) procurement of earthmoving equipment for drain and dike construction;
- g) procurement of seed processing equipment;
- h) technical assistance in the fields of planning, training, equipment maintenance, construction operations, and seed production; and
- i) overseas training and study tours.
1.7 The proposed project sites were distributed over 30 farms, (later increased to 33), chiefly on or around the Sanjiang Plain in the extreme east of Heilongjiang Province, and a few more widely scattered farms in the Lesser Xinganling Region towards the northwest of the province (see map). The project was prepared by HGB staff, with modifications and refinements provided by Bank staff who undertook three missions prior to appraisal.

1.8 The pre-existing state farms organization was made responsible for implementation, with the HGB responsible for design, procurement and construction supervision through a Foreign Investment Management Office (FIMO) located in Jiamusi, on the edge of the Sanjiang Plain. Overall direction and liaison with the Bank rested with a Project Coordinator in the Central General Bureau of State Farms (CGB) in Beijing.

Finance Plan

1.9 Project cost at appraisal was estimated at US$271.0 million, of which the combined Bank loan and IDA credit would contribute US$80.3 million, equivalent to 30 percent of total cost. The balance of US$191 million, or yuan (Y) 334 million was to be provided by a Central Government grant (Y 130 million), the HGB (Y 118 million) and the participating state farms (Y 118 million). Bank/IDA funds were to be used almost entirely to purchase equipment of advanced design not commonly manufactured in China, procured through international competitive bidding (ICB).

Pre-Implementation Processing

1.10 The pre-appraisal stage was short and intense, with three Bank missions visiting Heilongjiang in the nine month period prior to appraisal. The interaction between Bank and HGB preparation staff proved highly productive, with the local experience of the borrower staff blending well with the foreign knowledge of the Bank staff and consultants on the Bank missions. Bank support for the project as prepared was encouraged by the substantial improvements in productivity and farm profitability which had resulted from a major decentralization process set in motion by the Central Government in 1979. Through this reform much of the decision making responsibility and production control had devolved to the farm level, along with the ability to retain profits for essential re-investment. A further important aspect of this reform had been the introduction, on a national scale, of a Production Responsibility System which provided incentives, including bonus payments, for satisfactory work performance.

1.11 Criteria used in the selection of project sites, besides the suitability of the soil for the intended crops, included proximity to rail access and the ease with which adequate drainage could be provided. The experience of Bank mission staff was especially valuable in specifying the details for the foreign equipment to be procured. Appraisal proceeded smoothly in May-June 1982 and was followed by negotiations in March of the following year and Board presentation in April.
1.12 The Board approved the project after receiving assurances from Bank staff regarding the experience and organizational strengths of the HGB and the quality of its management. One Board member asked why the areas selected for development under the project had remained undeveloped when China was understood to be overcrowded and short of cultivable land. It was explained that the sites proposed, which were in a relatively remote and climatically inhospitable region with a short growing season, could be efficiently developed only with the aid of modern drainage equipment and heavy duty land preparation, cultivation and harvesting machines of a type which, while commonplace in large scale farming operations in many other parts of the world, were not manufactured in China and therefore not available for general use.

1.13 The loan and credit agreements were signed on May 20, 1983 and the project became effective on August 23, in accordance with the agreement schedules.

1.14 Issues arising during the pre-appraisal and appraisal phases included the proportionate sum to be expended on spare parts for foreign equipment in the initial procurement contracts, with the Bank recommending 25 percent and the Borrower insisting on a 15 percent limit, later reduced to 10 percent (SAR, Annex 2, Tables 6 and 7), on the grounds that many spares could be locally fabricated. The time required for implementation was also thoroughly discussed, with the Borrower expressing confidence that a three-year period would be sufficient for construction and initial land development, while the Bank foresaw a four-year development period as a minimum. The Borrower was persuaded to drop a proposal for center pivot irrigation equipment on the grounds that the economics of such investment were unlikely to be attractive under the soil and high rainfall conditions characteristic of the project area.

II. IMPLEMENTATION EXPERIENCE

Start-up

2.1 The pre-qualification, tendering, bid evaluation and contract award process for the bulk of the foreign manufactured machinery was carried out in a timely fashion and close to the appraisal schedule, with delivery of the first major consignment concentrated in late 1983 through mid 1984. Meanwhile, HGB had already commenced construction and land development operations prior to effectiveness, but using its existing fleet of locally manufactured machinery. The first supervision mission, in November 1983, reported that flood control embankment construction associated with the field drainage works was behind schedule and that the quality of access roads was below standard due to improper compaction caused by wet conditions at the time of construction.

2.2 Unusually low bid prices for much of the foreign machinery, resulting from intense competition amongst suppliers in a depressed international market, indicated the likelihood of major savings in the loan amount.
Sequence and Design Changes

2.3 By the time of the second supervision, in July 1984 and near the end of the first implementation year, the need to change a few of the project sites became apparent, based on additional data on site suitability acquired since the project was appraised two years previously. As a result of these changes the number of farms benefiting from the project rose from the original 30 to 33, including an HGB college farm of about 7,000 ha in the vicinity of Harbin, the Provincial capital. The land development target remained at 200,000 ha. Delivery of the initial consignments of foreign manufactured agricultural machinery and construction equipment, to the value of about US$32.0 million was almost complete, and advantage was taken of the low bid prices received in the fall of the previous year to order additional equipment, including 90 tractors to better cope with high demand in the peak land preparation period, at the original unit prices.² At the same time agreement was reached to cancel US$10.0 million in the project loan account because of foreign exchange savings resulting from the favorable equipment prices. Equipment operator training programs were in effect, and the tractor supplier was providing assistance in setting up a spare parts depot.

2.4 A Canadian International Development Agency consultant, provided under a parallel technical assistance programs, assisted with the drawing up of specifications for foreign seed processing equipment, two units of which were subsequently procured, and with training of managers and technicians in seed processing through study tours to Canada. A further important change in project design was the substitution of grain driers for the open air drying floors specified at appraisal, which were largely ineffective due to the prevalence of heavy rains at harvest. Two foreign manufactured large capacity grain driers were procured and installed at the two largest sites. The expenditure on these units was fully justified by the high quality of the grain output obtained, and this experience led to other farms being equipped with smaller capacity, locally manufactured driers based on the imported model.

2.5 By mid 1985, when the newly developed land under cultivation had risen to 54,000 ha (only 56 percent of the appraisal target for that year, due to slower than expected construction and development arising largely from an inadequacy of counterpart funding in the first year³) the condition of the main crops was reported to be good, except in a few spots where drainage was sub-optimum. The average yield figures for the main crops at year end proved to be on a par with or well ahead of the appraisal projections (see Table 1), thanks to the high standards of husbandry being practiced on project farms using the new equipment. However, deficiencies were noted in the equipment operational, maintenance and repair standards being practiced. Efforts were therefore redoubled to improve matters through in-service training programs undertaken by the nucleus HGB staff who had benefitted from instruction provided by the equipment suppliers under the terms of their supply contracts.

² Foreign manufactured equipment procured under the project included 453 tractors, 200 combine harvesters, 90 self-propelled swathers and about 200 excavators, together with about 1,700 farm implements and more than 200 items of construction machinery for roads and buildings.

³ See Attachment, Point 4, for an explanation of this initial shortfall by the Borrower.
2.6 Up to this point Bank supervision missions had visited the project on average every six months, but thereafter the frequency of visits was reduced to approximately once a year, based on a judgement that the project, although about a year behind schedule, was being implemented in a reasonably satisfactory manner and intensive Bank supervision was no longer necessary.

2.7 The next (fifth) supervision took place in September 1986 after an interval of 15 months. By this time 130,000 ha had been developed and 93,400 ha was reported to be cultivated (87,000 with the three main crops -- wheat, soybean and maize -- and the rest with other cereals, potato or sugar beet). Although the area under cultivation was only 63 percent of appraisal estimate, it was proportionately better than the previous year (para. 2.4), while average yields comfortably exceeded appraisal expectations in the case of wheat and soybean and were only marginally below in the case of maize. However, the mission, which gave particular attention to engineering aspects of the project, found the spare parts inventory inadequate and the spares distribution system in need of improvement, while training of equipment operation, maintenance and repair technicians was still judged deficient. The mission engineers provided valuable advice to HGB on ways and means for improving the situation. The volume of excavation required to effect satisfactory drainage, reestimated at 68 million cu.m., was proving to be well in excess of the 43 million cu.m. appraisal estimate, and a shortage of excavation equipment was judged to be the principal bottleneck in the land development program. It was agreed that an additional 40 hydraulic backhoe excavators would be procured to speed up the initial drainage work and ensure a sufficient equipment reserve for routine drain maintenance.

2.8 The situation with regard to stocks and distribution of spares, and of excavator operators training, was judged to be much the same at the time of the sixth supervision in 1987. When the seventh supervision took place in October 1988, only two months before the 18-month extended project completion date, the spares situation was reported as having reached an acute stage and urgent measures were recommended to remedy the situation (PCR page 5, para. 5.5). As previously noted (para. 1.14) the problem arose from the fact that the HGB had limited the purchase of manufacturers spare parts to 10 percent for the initial foreign equipment contracts, in the mistaken expectation that a large proportion of the spares could be fabricated locally, and did not have access to foreign exchange necessary to permit procurement of additional items from overseas suppliers after the limited inventories were exhausted. In the closing months the Bank agreed to reallocate unexpended funds from other categories of the loan and credit accounts to finance procurement of urgently needed foreign manufactured spares.

2.9 By the end of 1988, the last crop year before loan and credit closing in March 1989, the project, with only 127,000 ha of wheat, soybean and maize and 26,000 ha of other crops under cultivation, still remained well short of its SAR 1987 planting target of 200,000 ha, while the combined output of the three grains was only 197,000 ton. as compared with the SARs 1988 production target of 359,000

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5/ The value of spare parts actually procured up to the end of 1985 amounted to only 8% of the total agricultural machinery imports. Well below the 25% considered advisable by the Bank at the early preparation stage.
Nevertheless, average yields remained close to appraisal estimates in spite of the fact that 1988 was a year of inclement weather. Using 1987 area and production data, the PCR mistakenly claims that the project had achieved its primary objective of producing about 222,000 ton of mixed grains in that year. In fact there was a shortfall of 30 percent from the SAR estimated target for that year, and of 47 percent from the 433,000 ton, full development target set for 1991. The area cultivated to the three main crops in 1987, at 134,000 ha., was 34 percent short of the 200,000 ha SAR target for that year.

2.10 A final mission in April 1989, which was responsible for preparing the PCR, reported that the Central General Bureau of State Farms in Beijing had reached an agreement with the Ministry of Foreign Economic Relations and Trade for the HGB to retain a portion of the foreign exchange derived from its soybean export quota. This foreign exchange could be used to meet the costs for procuring spare parts, and for repaying the World Bank loan and IDA credit.

III. PROJECT OUTCOME

3.1 The area under cultivation rose more slowly than was estimated in the SAR, with only 135,000 ha under cultivation with all crops in 1988, the year of project completion, and 151,000, 167,000, and 183,000 ha under cultivation by 1989, 1990, and 1991 respectively following the completion of delayed access road and drainage works, compared with the 200,000 ha SAR target expected to have been reached by 1988. However, annual yields of wheat and soybean, the principal crops, have generally exceeded the SAR expectations since 1985, and were considerably above estimates in 1989 and 1990, although they fell back in 1991, which was a particularly wet year. In consequence, the rise in production has been better than the cultivated area figures, which were about one year behind SAR estimates through most of the project implementation phase, would suggest (Table 1).

3.2 More recently, in 1990, the combined production of the three main crops, at 389,000 ton, was close to that year's SAR target (401,000 ton) for the first time. In 1991 (an unusually high rainfall year, in which rainfall in the growing season was twice the average, causing widespread flooding), the output figure for all crops reached 397,000 ton, including 35,000 ton of paddy rice from 9,000 ha and 13,000 ton of sugar beet from 1,000 ha. Small amounts of rapeseed and barley were also harvested. The outlook remains promising, with a likelihood that the area cultivated will plateau at around 190,000 ha, not including about 10,000 ha of windbreak planting which has played an effective role in improving the natural environment in the next year or two when output should be at least

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See Attachment, Point 5, for an explanation of this shortfall by the Borrower.
See Attachment, Point 6, for further elaboration of the current situation by the Borrower.

The SAR does not clearly distinguish between gross area to be developed and net cultivable area, but the 200,000 ha SAR figure apparently refers to the net cultivable. HGB had cleared 200,000 ha. by project completion but estimates that the cultivable area in the future is unlikely to rise about 189,000 ha. The difference of 11,000 ha. is presumed to include ditches, roads, windbreaks, buildings, equipment parks or otherwise uncultivable land.
equivalent to the SAR estimated 433,000 ton average assumed for the three main crops at full development starting in 1991.

3.3 The re-estimated ERR of 22 percent (SAR 23 percent) presented in the PCR therefore appears realistic, and the economic outcome of the project is judged satisfactory.

3.4 From a financial viewpoint, however, the situation is much less satisfactory, with a PCR reestimated financial rate of return of 7.7 percent at completion. This reflects the adverse effect of the prevailing low controlled prices received from the two thirds of project-produced grains purchased by government, which are only partly offset by the higher prices obtained for the other one third which is sold on the free market. The financial viability of the farms is currently maintained through their engagement in other, more profitable crop processing activities. Sustainability could be better ensured if government controlled prices were raised to correspond more closely to free market levels, or perhaps removed completely.²

IV. FINDINGS AND ISSUES

Overview

4.1 This was the seventh Bank/IDA-assisted project for China to be approved by the Board, and only the second agricultural project. The audit noted several aspects of the project experience, including positive features and flaws, which are revealing of the strengths and weaknesses of both the Bank and Borrower. The following discussion of some of these features is presented as a contribution to a better understanding, with possible applicability to present and future projects.

A. Project Design

4.2 As noted in para. 1.10 above, the involvement of Bank staff with the HGB preparation team in the later stages of preparation made a positive contribution to the project design, despite several important shortcomings referred to below. Bank staff and consultants were instrumental in refining the type, quantities and specifications for equipment, and in persuading the borrower to extend the estimated implementation period by one year. More importantly, Bank preparation missions were successful in imparting invaluable advice to HGB staff on the methodology for planning multi-year investment projects. However, the time and staff resources applied by the Bank to the preparation and appraisal phase was insufficient to permit complete coverage of several important technical aspects. Limited opportunities to inspect most of the proposed project sites, due to a combination of geographic dispersion and weather related travel problems, prevented Bank staff from confirming their suitability, which led to

² Free market prices at the time of audit (late 1991) for wheat, soybean and maize were respectively 65%, 22% and 72% above the government controlled prices.
delay in the early implementation phase when a number of sites were found to be unsatisfactory choices and had to be changed. The volume of material to be excavated was grossly underestimated. Insufficient consideration was given, either at preparation or appraisal, to the problem of sun drying of grain under the wet and cool conditions prevailing in the post harvest season, which led to inclusion of an inadequate choice of technology in the form of concrete drying floors, and which was subsequently dropped and replaced by mechanical driers. The possibilities for strengthening the research and extension system were also given less attention than they probably deserved.

4.3 Fortunately, these appraisal shortcomings were of little consequence to the eventual outcome, thanks to the adaptability displayed by Borrower and Bank staff towards modifying the appraisal plan on the basis of experience gained in implementation. In fact, it can be argued that, given the high degree of confidence which Bank management and staff quickly developed in the resourcefulness of HGB management and the capability of its staff, additional time and resources devoted to further refining the details of the project for appraisal would have been of limited utility in this instance. Nevertheless, the audit is of the opinion that additional time and attention spent in addressing these issues at the preparation and appraisal stages could well have been justified by improved performance and speedier completion during the implementation phase, which would have been to the benefit of the Borrower. In particular, the Bank, with its greater experience of the time needed to carry out the sequential operations called for in settlement projects (ICB procurement of equipment followed by drainage, road access, land breaking and cultivation), and of the crucial importance of an adequate inventory of manufacturers spares for foreign sourced machinery, should have taken a much firmer position on these matters through the preparation, appraisal and negotiation stages.

B. Spare Parts Acquisition

4.4 In the closing years of implementation much concern was expressed by Bank supervision staff at the declining inventory levels of spare parts for the foreign machinery and equipment. The situation, which was described in the PCR (page 13, para. 14.4) as having reached an acute stage by the time of project completion in early 1989, was attributable firstly to the shortsighted position taken by the Borrower in insisting on an unrealistically low (10 percent) level for foreign equipment spares, and later to the difficulty experienced by HGB in obtaining the foreign exchange necessary to meet supplier's invoices.

4.5 The audit can report, on the basis of inquiries and observations made in the field in late 1991, that the spare parts situation has much improved since project completion and is now adequate. With agreement from the Ministries of Finance and of Foreign Economy and Trade, the HGB is granted annual soybean export quotas and is permitted to retain sufficient foreign exchange from overseas sales to purchase the necessary spares, as well as to meet its Bank loan and credit repayment obligations. The HGB's Materials and Spare Parts Center in Jiamusi appeared adequately stocked with US$2.0 million worth of spares on hand at the time of audit (September, 1991), of which US$1.7 million were replenished in August 1991 alone. A major Hong Kong trading company with an office in Beijing has recently been appointed as HGB's parts agent for the tractors and
combine harvesters and a first delivery, worth US$1.5 million from this source is planned for April 1992. Many parts of acceptable quality are now fabricated in China, particularly bearings, belts and couplings; spares for the Japanese manufactured backhoes are readily available on a consignment basis from a spare parts depot established by the manufacturer within the HGB's Jiamusi Materials and Parts Supplies Center; and two other major international machinery suppliers have established parts and service depots in Beijing.

4.6 The audit found the Jiamusi Center to be clean and tidy and the manually operated acquisition, inventory control and distribution system to be orderly and well organized.

C. Operation, Maintenance and Repair

4.7 Bank supervision missions also expressed concern at the less than satisfactory standard of operation, maintenance and repair prevailing in the mid years of project implementation. The audit can report that the situation, which was noted as improving at the time of the last supervision in 1988, has further improved in the post-implementation period, and is now considered satisfactory. Training programs for machine operators and maintenance technicians are routine and care is taken to ensure that all operators are fully trained prior to assuming their duties. All qualified machine operators are provided with an operating and maintenance handbook which contains detailed machine and attachment instructions. The audit was impressed with the standard of operational care and maintenance attention now given to their equipment by individuals operators.

4.8 The average operating times of between 900 to 1,200 hours per year for tractors and the comparatively low 300 to 350 hours per year for combine harvesters, and particularly the high operation and maintenance standards prevailing, suggests the possibility that the working lives of these machines will prove to be above the industrial norm, despite the harsh climatic conditions to which they are exposed. The hydraulic excavators are operated at high rates of 2,000 to 2,300 hours per year, which reflects the importance attached by HGB to good drainage for maintaining or further improving yield levels. A well equipped hydraulic excavator repair and servicing center staffed by six well trained, full-time technicians is doing a commendable job in maintaining this well used excavator fleet.

D. Organization and Management

4.9 In 1979, four years before the project became effective, the Ministry of State Farms introduced a Production Responsibility System as part of a wider government effort to decentralize decision-making and motivate greater individual job responsibility. The HGB undertook a number of management experiments in accordance with the new policy, and by the time of appraisal it was apparent that the move towards greater decentralization of economic management, and salary and wage incentive systems, was leading to significantly higher farm productivity and profits. The project was well timed to take advantage of the improved policy and economic climate, which in the case of HGB had resulted in the creation of three basic farm production systems, namely small (3-15 ha.) family farms; family group
farms of up to 15 families farming up to 200 ha.; and larger "production brigade farms" of up to 2,000 ha all of which now operate on the principle of maximizing profits rather than fulfilling targets set by Government.

4.10 All the project farms fall within the production brigade farm category, which represents the size of agricultural management unit most suited to settling and cultivating large areas requiring drainage, and to realizing the economies of scale possible with the heavy farm machinery provided through the project. Under this system the brigade leader, while responsible in general terms to the HGB through the farm sub-bureau, has considerable autonomy in organizing his work force and contracting with them for the efficient conduct of field operations. The work force is divided into various teams according to specializations -- accountants, mechanics, machinery operators and general workers etc. -- and each worker receives a monthly income related to his skills level, hours worked and individual productivity, while all employee share in the year end bonus paid from the farm’s annual profit.

4.11 Comparative information provided by HGB shows that the highly mechanized project farms are operating at considerably higher levels of profitability, due to a combination of higher yields and much higher worker productivity, than other, less mechanized farms operated by HGB.

E. Environmental Considerations

4.12 As noted in the SAR, the wetlands of the Sanjiang Plain between the Heilongjiang and Wusuli rivers, wherein the bulk of the project-assisted farms are situated, are rich in wildlife. Five major wildlife reserves encompassing 230,000 ha., including 77,000 ha of marshland ecosystem, were reported (SAR para. 3.22) as having been established within and adjacent to the Sanjiang Plain, and a program of environmental monitoring was to be included in the project's work plan for monitoring and evaluation.

4.13 The audit, with the help of HGB staff, was able to identify the reported locations of the five reserves totalling 528,400 ha\(^2\) rather than 270,000 ha (see map) and also of a further five reserves totalling 50,933 ha\(^2\) all of which have been established since the project was appraised in 1982. Several of these reserves, including the internationally renowned Xiangkai Lake, are important habitats for migratory cranes and other waterfowl, deer, brown bear and other mammals, and merit carefully regulated conservation in view of the rapid expansion in cultivated land currently occurring in the region, including those areas developed under the project. The audit was unable to identify any evidence of the environmental monitoring expected of HGB in the SAR, but was encouraged to note that four of the five recently designated reserves are in HGB owned lands, and that other agencies of the Provincial and Central Governments

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\(^2\) Heifeng Natural Environment Reservation (NER), 270,000 ha. established 1980; Fenglin NER, 18,400 ha. established 1963; Mudanfeng NER, 40,000 ha. established 1980; Jingbo Lake NER 120,000 ha. established 1980; and Xiangyuan Mountain NER 80,000 ha. established 1981.

\(^1\) Honghe, 14,667 ha. established 1984; Xingkai Lake 6,533 ha. established 1987; Laodeng Mountain, 5,733 ha. established 1989; Dangbi Town, 667 ha. established 1990; and Changlin Island, 23,333 ha. established 1990.
are active in identifying and reserving wildlands for preservation of biological diversity and provision of environmental services important to society. Unfortunately, neither the SAR nor the PCR gave details of the quality or current status of the lands in question or their relationship to surrounding areas, and a review of Bank files and interviews with Bank staff revealed no evidence of follow-up on this matter by supervision mission during project implementation.

4.14 Given the rapid development which has occurred in recent decades, and which is continuing in and around the Sanjiang Plain; the considerable changes in environmental conditions arising from the drainage which precedes much of this development; and the increasing threat to the sanctity of the reservations from these changes, the overall impression gained by the audit is that an environmental assessment for the entire region was warranted during preparation and is even more urgent now. Such an assessment deserves priority consideration by Government as a prerequisite for sound land use planning before further inroads are made into the remaining areas of untouched wetlands environment.

F. Determinants of Project Success

4.15 In summary, this satisfactory project experience is attributable to:

(i) Strong borrower commitment to project objectives at all levels, including the CGB, HGB, sub-bureau and brigade-level;

(ii) Favorable policy climate, which spread decentralization of decision making down to the brigade farm management level (and even extended down to the family farm level in other non-project HGB agricultural lands);

(iii) Introduction of a Production Responsibility System providing motivation towards increased productivity through an improved incentives structure, which related rewards to skills level, time worked, and individual or small team output;

(iv) The adaptability displayed by HGB management and Bank supervision staff in the implementation phase which led to improvements in project design and a strengthening of management capability through experience;

(v) A disciplined workforce which responded well to project related training;

(vi) Realistic, straightforward objectives, easily understood and supported by all project participants;

(vii) Well proven technology using improved foreign manufactured equipment, previously tested and found adaptable to the local conditions;
(viii) effective training in equipment operation and maintenance by suppliers, provided under the equipment supply contracts; and

(ix) Introduction of acceptable levels of operation, maintenance and repair of project-provided equipment in the post-project phase.
## Table 1

### Comparison of Cropped Area, Yields and Production

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1/ Based on PCR Table 10, with the addition of actual data for 1989, 1990, and 1991 obtained during audit.

2/ Annual cropped area of other cereals including paddy rice and barley, potatoes, and sugar beet have not been included. The total area of all crops in 1988, 1989, 1990, and 1991 were reported by BOB as 153,000, 151,000, 167,000 and 183,000 ha. respectively.

3/ Actual: 1983-91

4/ BOB Projected: 1992-2013
COMMENTS FROM THE BORROWER
(Reproduced from a telex dated April 8, 1992)

BEIJING, CHINA
APRIL 8, 1992

FOR MR. GRAHAM DONALDSON
CHIEF
AGRICULTURE AND HUMAN DEVELOPMENT DIVISION
OPERATIONS EVALUATION DEPARTMENT
THE WORLD BANK, WASHINGTON, D.C. USA.

COPIED TO MR. JOSEPH GOLDBERG, CHIEF, AGRICULTURE DIVISION,
CHINA AND MONGOLIA DEPARTMENT, THE WORLD BANK

RE COMMENTS ON PROJECT PERFORMANCE AUDIT REPORT OF CHINA
HEILONGJIANG LAND RECLAMATION PROJECT (LOAN 2261-CHA/CREDIT
1347-CHA)
WE ARE PLEASED TO INFORM YOU THAT AFTER CONSULTATION WITH
DEPARTMENTS CONCERNED WE FIND WITH SATISFACTION THE AUDIT REPORT
ATTACHED TO YOUR LETTER OF JANUARY 21, 1992 COMPREHENSIVE AND
OBJECTIVE, AND WE GREATLY APPRECIATE IT.
HOWEVER, WE WOULD LIKE TO PUT FORWARD SIX POINTS AS REVISIONS/
SUPPLEMENTS TO THE AUDIT REPORT AS FOLLOWS:
1. PARA. 4.10 10TH LINE, #A MONTHLY WAGE# SHOULD BE #A MONTHLY
   INCOME#.
FOR THE RESPONSIBILITY SYSTEM CARRIED OUT IN PROJECT AREA HAS
COMPLETELY CHANGED THE FORMER SYSTEM OF FIXED MONTHLY WAGE.
2. PARA. 3.2, WE WOULD LIKE TO ADD THE FOLLOWING SENTANCE
QUOTE THE PROJECT HAS NOT ONLY DEVELOPED WASTELAND, BUT ALSO
CARRIED OUT THE PROGRAMME OF WINDBREAK PLANTING (ABOUT 10,000
HA.), WHICH HAS PLAYED AN EFFECTIVE ROLE IN IMPROVING THE
ECOLOGICAL ENVIRONMENT IN LAND RECLAMATION AREA UNQUOTE.
3. EVALUATION SUMMARY, PARA. 6, WE WOULD LIKE TO ADD THE FOLLOWING
QUOTE ABOUT THE SUSTAINABILITY, FOREIGN INVESTMENT 5-PROJECT
OFFICE, BUREAU OF STATE FARMS, MOA AND PROJECT OFFICE, BUREAU OF
HEILONGJIANG LAND RECLAMATION WERE RESPONSIBLE FOR THE PROJECT
MANAGEMENT AND COORDINATION, PROJECT OFFICE OF MOA HAS DONE A LOT
OF WORKS IN FARM MACHINE MANAGEMENT, APPLYING SOYBEAN EXPORT QUOTA
TO PROCURE SPARE PARTS AND REPAYMENT OF LOAN. AND ALSO, PROJECT
OFFICE OF HEILONGJIANG BUREAU HAS CONTRIBUTED TO THE SOLVING OF
VARIOUS PROBLEMS AND THE IMPROVING OF PROJECT BENEFITS UNQUOTE.
4. PARA. 2.5, ABOUT THE ISSUE OF INSUFFICIENCY DOMESTIC FUND, THE
TOTAL BUDGETARY ESTIMATE IN THE REVISED PROJECT DESIGN REPORT IN
THE YEAR OF 1984 WAS RMB 327 MILLION, BUT LATER ONLY RMB 260
MILLION WAS ON BUDGETARY SCHEDUAL, DEFICIT OF RMB 67 MILLION.
DURING THE PROJECT IMPLEMENTATION PERIOD, FOR THE REASONS OF
PRICES RAISING BY A BIG MARGIN, THE CAPITAL NEEDED FOR THE PROJECT
CONSTRUCTION WAS 48 MILLION ABOVE THE BUDGETARY ESTIMATE, SO,
THE TOTAL CAPITAL DEFICIT WAS 115 MILLION. THE ECONOMIC BENEFIT OF THE WHOLE PROJECT HAS BEEN EFFECTED BY THE INSUFFICIENCY OF DOMESTIC FUND, FOR EXAMPLE, SOME OF THE CONSTRUCTION CAN'T MEET THE DESIGN REQUIREMENT. SINCE 1989, PROJECT COMPONENTS SHIFTED TO DAILY OPERATION, BROUGHT IN GOOD ECONOMIC BENEFIT, PROJECT UNITS TRIED TO COMPLETE THE CONSTRUCTION WHICH CAN'T MEET THE REQUIREMENT BY THE WAY OF SELF-ACCUMULATION OF FUND, SELF-PERFECTIONING AND SELF-DEVELOPMENT YEAR BY YEAR.

5. PARA. 2.9, ABOUT THE ISSUE OF GRAIN PRODUCTION IS SHORT OF ITS SAR. ACCORDING TO EVERY YEAR'S STATISTICS, THE YIELD OF SOYBEAN HAS REACHED OR OVER THE TARGET IN SAR. ONLY THE AREA OF CORN IS BELOW THE TARGET, AND SO IS THE YIELD OF CORN. THE REASON IS THAT SAR OVER ESTIMATE THE AREA OF CORN PLANTING AND ALSO THE YIELD. THE SITUATION IN LAND RECLAMATION AREA IS THAT IT HAS PLENTY OF LAND BUT LACKING OF LABOR, AGRICULTURAL PRODUCTION DEPENDS ON AGRICULTURAL MACHINERY. BUT FOR CORN PLANTING, MANAGING AND HARVESTING, FARM MACHINE HASN'T BEEN FULLY MATCHED, SO A LARGE NUMBER OF LABOR SHOULD BE NEEDED. SECONDARY, CORN SALING PRICES IS LOW, THERE IS CERTAIN DIFFICULTIES IN STORAGE AND MARKETING. SO, THE DEVELOPMENT OF CORN AREA AND YIELD IS QUITE SLOW. NOW, THE PROBLEMS HAS GAINED THE AUTHORITIES ATTENTION, AND PRIVILEGE POLICIES ARE GIVEN TO FARMS WHO PLANT CORN TO DEVELOP GRAIN PRODUCTION.

6. PARA. 2.10, ABOUT THE ISSUE OF SPARE PARTS SUPPLY. SPARE PARTS NEEDED ACCOUNTED FOR 10 OF THE MAIN MACHINE COST IN THE FIRST BATCH OF CONTRACT. BESIDES THE PROBLEM CAUSED BY RELATIVELY SMALL RATION, THERE ARE ALSO OTHER PROBLEMS IN VARIETS SELECTION AND SUPPLY. INACCURATE ESTIMATION OF THE NEEDS CAUSED THE RESULT OF LACKING OF SOME SPARE PARTS WHILE OTHERS OVERSTOCKING. AND THE SHORTAGE OF OVERALL ARRANGEMENT CAUSED THE PROBLEM OF SOME PROJECT UNITS HAVE SPARE PARTS MORE THAN NEEDS WHILE THE OTHERS HAVE NO SPARE PARTS NEEDED. RECENT YEARS, THE PROBLEM OF SPARE PARTS HAS BEEN ON AUTHORITIES WORKING AGENDA, AND SOME PRACTICAL AND EFFECTIVE MEASURES HAVE BEEN CARRIED OUT, SUCH AS, USD 1.2 MILLION TO 2 MILLION FROM ENTERPRISES OWN NEEDS FOREIGN CURRENCY WERE USED TO PROCURE SPARE PARTS AND 5,000 TON MORE SOYBEAN EXPORT QUATO WAS ADDED TO THE REPAYMENT SOYBEAN EXPORT QUOTA TO GUARANTEE THE NEEDS OF PROCURING SPARE PARTS. PRODUCERS OF FARM MACHINES (LIKE HITACHE AND JOHN DEER) OPERATED THEIR SPARE PARTS SALING CENTERS IN LAND RECLAMATION AREA. IT IS OPTIMISTIC TO SOLVE THE PROBLEM OF SPARE PARTS.

BEST REGARDS,
LUO QING
DIRECTOR
WORLD BANK DEPARTMENT, MINISTRY OF FINANCE
P.R. CHINA