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ASIAN DEVELOPMENT BANK

IN.239-99
11 October 1999

PROJECT PERFORMANCE AUDIT REPORT

The following Project Performance Audit Report prepared by the Operations Evaluation Office is attached for information:

East New Britain Smallholder Development Project
(Papua New Guinea) (Loan No. 852-PNG and 853-PNG[SF])

ASIAN DEVELOPMENT BANK

PPA: PNG 20055

PROJECT PERFORMANCE AUDIT REPORT

ON THE

EAST NEW BRITAIN SMALLHOLDER DEVELOPMENT PROJECT
(Loan Nos. 852/853[SF]-PNG)

IN

PAPUA NEW GUINEA

September 1999

CURRENCY EQUIVALENTS
(as of May 1999)

Currency Unit — Kina (K)

		At Appraisal	At Project Completion	At Postevaluation
K1.00	=	$1.03	$0.75	$0.42
$1.00	=	K0.97	K1.33	K2.42

The exchange rate of the kina is determined on the basis of a weighted basket of currencies, and the value is adjusted daily.

ABBREVIATIONS

ABPNG	-	Agriculture Bank of Papua New Guinea
ADF	-	Asian Development Fund
BME	-	benefit monitoring and evaluation
CCEA	-	Cocoa and Coconut Extension Agency
CCRI	-	Cocoa-Coconut Research Institute
DAL	-	Department of Agriculture and Livestock
DOL	-	Department of Land
EA	-	Executing Agency
EIRR	-	economic internal rate of return
FIRR	-	financial internal rate of return
NCC	-	National Coordination Committee
O&M	-	operation and maintenance
OCR	-	ordinary capital resources
OEM	-	Operations Evaluation Mission
PCC	-	Provincial Coordination Committee
PCR	-	project completion report
PNG	-	Papua New Guinea
PPAR	-	project performance audit report
RDB	-	Rural Development Bank (formerly Agricultural Bank of PNG)
SCF	-	standard conversion factor
t	-	metric ton
TA	-	technical assistance
UNV	-	United Nations Volunteer

NOTES

(i) The fiscal year (FY) of the Government ends on 31 December.
(ii) In this report, "$" refers to US dollars.

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BASIC DATA
East New Britain Smallholder Project (Loan Nos. 852/853[SF])

PROJECT PREPARATION/INSTITUTION BUILDING

TA No.	TA Project Name	Type	Amount ($)	Approval Date
627	Rural Development Technical Assistance	Project Preparatory	350,000	26 Sep 1984

KEY PROJECT DATA ($ million)

	Loan No. 852		Loan No. 853(SF)	
	Appraisal Estimate	Actual	Appraisal Estimate	Actual
Total Project Cost	5.76	5.73	10.94	9.30
Foreign Currency Cost	3.96	3.71	2.48	2.42
Local Currency Cost	1.80	2.02	8.46	6.88
Bank Loan Amount/Utilization	5.00	4.64	5.00	4.85

KEY DATES

	Expected	Actual
Fact-Finding		5–19 Mar 1987
Appraisal		25 May–5 Jun 1987
Loan Negotiations		5–7 Oct 1987
Board Approval		3 Nov 1987
Loan Agreement		18 Oct 1988
Loan Effectiveness	16 Jan 1989	7 Jun 1989
Project Completion	31 Dec 1993	31 Dec 1996
Loan Closing		
Loan No. 852	30 Jun 1994	16 Apr 1997
Loan No. 853(SF)	30 Jun 1994	1 May 1997
Months (Effectiveness to Completion)	60	96

KEY PERFORMANCE INDICATORS (%)

	Appraisal	PCR	PPAR
Economic Internal Rate of Return	13	7.8	14.5
Financial Internal Rate of Return	nc	nc	12.0

BORROWER Papua New Guinea

EXECUTING AGENCY Department of Agriculture and Livestock

MISSION DATA

Type of Mission	No. of Missions	No. of Persons	No. of Person-Days
Fact-Finding	1	4	60
Appraisal	1	5	40
Inception Mission	1	1	16
Loan Review Missions	7	1-2	94
Country Loan Disbursement	1	3	12
Special Project Administration	1	3	16
Project Completion Review	1	3	33
Postevaluation	1	2	28

nc = not calculated, PCR = project completion report, PPAR=project performance audit report, SF = special fund.

EXECUTIVE SUMMARY

The Bank's lending strategy in the agriculture sector of Papua New Guinea (PNG) emphasized the development of smallholder agriculture to accelerate economic development and to improve the quality of life for small farmers. The Project was formulated in 1987 with the main objectives of expanding smallholder cocoa production in East New Britain, increasing and diversifying foreign exchange earnings, generating rural employment, and improving the incomes and living conditions of smallholders in the project area. The Project included the (i) development of 2,318 hectares of improved high-yielding cocoa varieties intercropped with coconut (as shade plant), involving 434 village farmers and 453 settlers;[1] (ii) improvement of the physical and social infrastructure in the project area; (iii) strengthening of agricultural support services, particularly farmer extension and credit; and (iv) provision of consulting services and training.

The total cost of the Project at appraisal was $16.7 million equivalent, of which $6.4 million was the foreign exchange cost and $10.3 million equivalent was the local currency cost. The Bank provided two blended loans totaling $10.0 million: $5.0 million from Asian Development Fund resources and $5.0 million from the ordinary capital resources. The actual project cost was $15.0 million, about 90 percent of the appraisal estimate. The Bank disbursement was $9.5 million; the balance of $0.5 million was cancelled. Despite the loan cancellation, the developed cocoa area exceeded the project target by about 16 percent and fermentaries[2] were provided to all farmers (exceeded project target by 100 percent). The ability of the Project to fund a larger area and provide loans for doubling the number of fermentaries was due primarily to the devaluation of the local currency.

The project rationale and design proved sound, except for the use of a hybrid coconut variety primarily as shade plant. The coconut palms were attacked and destroyed by the rhinoceros beetle and black palm weevil. The target for settlement areas proved too ambitious because of the land titling constraints in PNG. The Project blended well with the sociocultural conditions of the farmers even though no formal social assessment was made at the time of appraisal.

Initial project start-up was delayed substantially due to the unfamiliarity of project staff with the Bank's tendering and procurement procedures and other teething problems associated with project start-up activities. The Project was expected to be completed in December 1993. Two loan extensions were granted to allow completion of additional field development and plantings. The actual completion date was December 1996 or about 36 months behind schedule.

The Project strengthened the Department of Agriculture and Livestock by upgrading its skill in planning, management, and project implementation. The project implementation and extension staff now constitute an important core group in the newly formed Cocoa and Coconut Extension Agency, which is responsible for servicing the needs of the cocoa and coconut smallholders.

The Project has generated significant socioeconomic benefits. The most significant improvement is the substantial increase in annual farm income. The existing village farmers with

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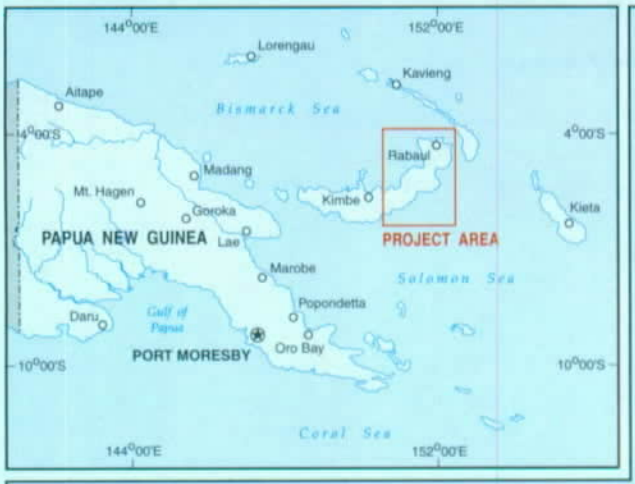
[1] Existing village farmers are indigenous tribal farmers who owned their commune land by customary rights. Settlement farmers are migrants from other provinces who had illegally settled on government-owned land prior to the Project.

[2] Factories where cocoa beans are fermented.

an average 2 hectares farm are now earning about K2,900 per year (compared with about K600 at appraisal), and almost all of this income is in cash. The farmers' cocoa plantations are well established and maintained, and the production of cocoa from project farmers appears sustainable. The marketing system is well established and the farmers are receiving fair prices based on international traded cocoa bean prices. No major issue currently faces the Project. The project benefits are likely to be sustainable because the smallholders themselves are currently expanding their cocoa areas using their own resources. Although there was substantial delay in project completion, the institutional impact on project staff is significant and the economic internal rate of return is high and viable. The Project has achieved most, if not all, of the objectives set out at appraisal, and is rated as generally successful.

The main role of the Government in sustaining and promoting smallholder cocoa development in East New Britain Province is to (i) provide adequate extension support, (ii) maintain and expand the network of farm roads, and (iii) provide additional credit to new farmers to plant cocoa in their farm holdings. Currently, the main shortcoming is the inability of both the national and provincial governments to provide adequate funds for cocoa development and extension services due primarily to the financial constraints faced by the Government. The Project has demonstrated that smallholders in PNG can cultivate this crop successfully: many farmers planted one or two additional hectares of cocoa using their own resources. A carefully designed package of Government assistance (including extension and credit) is necessary to ensure that similar projects can be successfully implemented in other provinces in PNG.

The three main factors responsible for the success of the Project are (i) the choice of crop, (ii) project management, and (iii) extension support. Cocoa cultivation has been widely practiced in PNG and is not demanding in terms of labor. Farmers could adjust their harvesting schedule to fit into their community activities/cultural practices. The frequency of harvest (whether two or three harvests per month) had only a small impact on the total yield obtained. The farmers growing cocoa can still continue their traditional practice of growing food crops for their own consumption. This agronomic practice fitted well into the sociocultural conditions of the local farmers. The major diseases associated with cocoa do not pose a serious problem in PNG, and the technology of growing and fermenting the cocoa beans is simple and could easily be implemented by farmers. Overall, the standard of the farm management practices by farmers has been above average. The project management staff adopted a flexible approach and took appropriate action to change the project design with regard to farm size and selection of beneficiaries and to ensure that all farmers have their own fermentaries. These changes were instrumental in gaining wider farmer acceptance of the Project. The extension services provided by the Project were appropriate and effective.



PAPUA NEW GUINEA

EAST NEW BRITAIN SMALLHOLDER DEVELOPMENT PROJECT

(as implemented)

PROJECT AREAS

- Existing Settlement Area
- New Settlement Area
- Village Development Area
- Village Development
- National Capital
- Provincial Headquarters
- City/Town
- Community Center/Project Office
- Vudal Agriculture College
- Cocoa and Coconut Research Institute
- Taboi Coconut Mill
- Road
- River
- Provincial Boundary
- International Boundary

Boundaries are not necessarily authoritative.

Wotom Island
Duke of York Group
Rabaul
Bau
Laginioa
Lassul
Ataliklikun Bay
Blanche Bay
Kokopo
Keravat/Tavilo
Mandres
Vudal
Vunapaading
Mope
Rangulit
Warangoi
Sigute
Plateau
Gazelle Peninsula
Merai
Matanakunai
Wide Bay
Saint George Channel
Nambling
Kimbe Bay
EAST NEW BRITAIN
Pomio
Jacquinot Bay
WEST NEW BRITAIN
Lau
Maso
SOLOMON SEA

N

0 5 10 20 30
Kilometers

99-1037 HR

I. BACKGROUND

A. Rationale

1. The agricultural strategy of the Government of Papua New Guinea (PNG) gives high priority to greater productivity and higher farm incomes for smallholders through tree crop development, employment generation in rural areas, expansion of agricultural exports, and reduction of food imports. East New Britain Province has shown potential for increased cocoa production in support of the Government's objectives to increase foreign exchange earnings and accelerate economic development in the area. Ideal soil and cocoa growing conditions as well as availability of land, basic marketing, processing and transport infrastructure, and new high-yielding hybrid cocoa varieties favor the intensification and expansion of smallholder cocoa development in PNG. In addition, there is already a plantation sector with proven good cocoa yields, and many subsistence farmers have some knowledge of cocoa agronomy and production. The Project was conceived to support the Government's agricultural objectives and to tap the development potential in the project area.

B. Formulation

2. The Project was formulated as one of two project proposals under the project preparatory rural development technical assistance (TA 627-PNG) approved by the Bank in September 1984. The Bank-approved TA was designed to improve the agricultural productivity of smallholders in the rural areas of East New Britain. The project design is based on a tested area development model followed by the Government under the World Bank-financed smallholder oil palm development scheme in the adjoining district of West New Britain.[1]

C. Objectives and Scope at Appraisal

3. The Project aimed to accelerate economic development and to improve the quality of life of small farmers in East New Britain Province. The specific objectives were to expand smallholder cocoa production, generate employment, increase and diversify foreign exchange earnings, and improve the living conditions of smallholders in the project area. The Project included (i) the development of 2,318 hectares (ha) of improved high-yielding cocoa varieties intercropped with coconut (primarily as shade plant), involving 434 village farmers and 453 new and existing smallholding settlers; (ii) improvement of the physical and social infrastructure in the project area; (iii) strengthening of agricultural support services, particularly farmer extension and credit; and (iv) provision of consulting services and training. The Rural Development Bank (RDB)[2] was to provide the credit packages to farmers for cocoa development.

D. Financing Arrangements

4. The total cost of the Project at appraisal was $16.7 million equivalent, of which $6.4 million was the foreign exchange cost and $10.3 million equivalent was the local currency cost. The Bank approved two blended loans totaling $10.0 million: $5.0 million from the Asian Development Fund resources and $5.0 million from ordinary capital resources. The Bank loan financed $5.4 million of the foreign exchange cost and $4.6 million equivalent of the local currency cost. The balance, equivalent to 40 percent of the total cost, was to be financed by the

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[1] *World Bank Popondetta Smallholder Oil Palm Development Project*, in the amount of $12 million, approved in October 1976.

[2] Formerly known as Agriculture Bank of Papua New Guinea.

Government ($6.7 million). The Borrower was PNG and the Executing Agency (EA) was the Department of Agriculture and Livestock (DAL).

E. Project Completion

5. The Project was expected to be completed in December 1993. Two loan extensions were granted to allow completion of field development, and the actual completion date was in December 1996 or about 36 months behind schedule. The project completion report (PCR), which was circulated to the Board on 23 December 1997, discussed the design, scope, implementation progress and achievements, and operational aspects of the Project; and reassessed the project benefits and economic impact. However, the Operations Evaluation Mission (OEM) found that some data in the PCR was less than accurate. For example, the total cocoa area planted was 2,688 ha and not 2,747 ha, while the total number of project beneficiaries was 1,088 instead of 1,128. Another inaccurate statement was that the volcanic eruption in October 1994 was the major factor that slowed down the rate of cocoa planting in 1994 and 1995. The actual data indicated that at the time of the volcanic activity, the Project had exceeded the target set for cocoa development. The problem of the failure of farmers to understand the need to repay their loan mentioned in the PCR was not substantiated and was misleading. The PCR rated the Project as partly successful.

F. Postevaluation

6. This project performance audit report (PPAR) focuses on pertinent aspects of the Project and presents the findings of the OEM that visited the offices of concerned Government agencies in PNG and conducted field visits and assessments of project beneficiaries from 14 March to 4 April 1999.[3] The PPAR evaluates the project's effectiveness in achieving its objectives as well as the efficiency of its implementation and operations. It also deals with other important issues related to sustainability and outcomes of the Project.

7. The PPAR is based on a review of the PCR, appraisal report, Bank project files, and discussion with Bank staff, DAL, project management staff, Government officials, private sector businessmen, and project beneficiaries. Field visits were made to various project sites in East New Britain. A sample of 20 farmers and two exporters were surveyed to collect socioeconomic and other production and marketing data. Copies of the draft PPAR were distributed to the Borrower, DAL, Implementing Agencies, and Bank staff for review and comment. The comments received were taken into consideration in finalizing the PPAR.

II. IMPLEMENTATION PERFORMANCE

A. Design

8. The largely appropriate project design contributed substantially toward achieving the objectives of increasing smallholder cocoa production, generating employment, and improving incomes and living conditions of small subsistence farmers. Large areas of both Government and customary village land were available. The soil and climatic conditions were ideal for the growing of cocoa. The existing villagers were essentially subsistence farmers growing food crops for their own consumption. The introduction of cash crops enabled them to produce

[3] The OEM was undertaken in conjunction with the operations evaluation of the West New Britain Smallholder Development Project (Loans 784[SF]-PNG and 785-PNG).

commodities that have a ready market and provided them with regular cash income. The export of the produce also provided the country with a valuable source of foreign exchange.

9. Some minor deficiencies in the project design included (i) the incorporation of hybrid coconut palms as a shade tree for cocoa, (ii) the unrealistic targets set for cocoa planting for the settlement areas, (iii) the emphasis placed on the development of existing settlements as opposed to the development of existing villages, (iv) the inaccurate assumption that there was land scarcity in the village area, and (v) the inadequate provision of smallholding processing facilities.

10. The project component of planting cocoa under coconut was based on the observation that large areas of cocoa planted under existing tall-variety coconut trees received ideal shade from the palm trees. About 20 percent of the selected project areas were already planted with coconut trees and cocoa seedlings were then planted under the trees. However, in the other 80 percent of the project areas, the simultaneous planting of hybrid coconut with cocoa seedlings suffered from two disadvantages: first, cocoa planting was delayed by one year to allow for the establishment of hybrid coconut to provide shade cover, and second, the hybrid coconut seedlings planted in new areas (unlike the traditional tall coconut variety) were highly susceptible to attacks by rhinoceros beetle (*Oryctes rhinoceros and Scapanes australis)*) and the black palm weevil (*Rhyncophorus bilineatus*). About 75 percent of the new hybrid coconut plantings were destroyed by the beetle and weevil, and seedling loss amounted to about $200,000 (or $230 per farmer) for the Project. Replacements of the damaged seedlings were similarly destroyed. Currently, about 60 percent of the project cocoa are grown with little shade. The planting of hybrid coconut without adequate pilot testing proved to be an expensive affair in this Project.

11. There was also a logistic problem in the project design. The target for commencement of field planting was overly optimistic. It allowed only one year for staff mobilization, block area survey, and titling.[4] In reality, the process of block survey and titling took nearly three years to complete, which was the main factor in the initially slow progress in project implementation. The major causes of the delay were (i) strong resistance of existing traditional farmers to initial land titling for settlement farmers (from outside the province), (ii) initial teething problems associated with project start-up activities, and (iii) slowness of the national Government to provide support (adequate funding, etc.) to project management.

12. The project design showed preference for development of existing settlements in the Mandres region where farmers belonging to the Bainings tribe were socially and economically less developed. During project implementation, however, it was found that the land titling issue in this area was more difficult than expected. In consultation with the Bank, the Project shifted its emphasis toward developing land in existing villages. As a result, a large majority of the project beneficiaries are Tolais, who are the existing village farmers.

13. The project design emphasized that 45 percent of the beneficiaries (in existing villages) would receive assistance for only 1 ha while the other beneficiaries (with the exception of 15 farmers in existing settlements having 2 ha) would receive assistance for 4 ha. This large disparity in the level of assistance would result in a large disparity in net farm income, with farmers in existing villages receiving only 25 percent of the benefits enjoyed by farmers in new

[4] Block survey and land titling were necessary for settlement schemes where Government land was provided to settlement farmers. No land titling was needed for existing traditional land of the village farmers.

and existing settlements. The rationale for this proposal was that farmers in existing villages would have insufficient land to plant a larger area of cocoa. During implementation, it was found that the land constraint was not a factor for the existing farmers and they could cultivate additional land, with the approval of the village chief. It was not unusual to find many project village farmers cultivating more than 6 ha. Thus, the project management adopted a flexible policy of setting the minimum farm size receiving assistance as 2 ha. After the farmers had successfully planted their 2 ha crop, they could then apply for additional assistance for another 2 ha. This process could be repeated and the OEM observed that at least 10 farmers received assistance for a total of 6 ha of cocoa planting. Thus, the Project treated farmers in both the villages and settlements equally in terms of assistance for cocoa development.

14. The plan was for only 50 percent of the beneficiaries to be provided with cocoa fermentaries, with the expectation that the farmers would share the project processing facility. This was an inappropriate recommendation since sharing of a fermentary was not a culturally acceptable tradition. The Project was able to change the recommendation and provided all the farmers with assistance to construct their respective fermentaries. The recommended fermentary (1.83 meter by 1.83 meter) is able to handle the output from 2 ha of cocoa. The reason for establishing 2 ha as the minimum farm size was to ensure that each farmer had a sufficient crop to utilize his fermentary efficiently. This crucial point was not apparent at appraisal.

15. The ability of project management to adopt a flexible approach to overcome the project design deficiencies was one key factor that contributed to the successful outcome of the Project.

B. Contracting, Construction, and Commissioning

16. The performance of local contractors for the construction of the fermentaries was generally satisfactory. However, at the initial stages of project implementation, most of the materials required for the fermentaries had to be imported. The currency devaluation in 1995 raised the cost of the imported materials, and the loan of K1,215 estimated for the smallest fermentary had to be revised to K2,700 from that year onward. Thus, farmers who built their fermentaries prior to 1995 required a much smaller loan than those who built later. Because of the high cost of the imported materials, the contractors resorted to the use of local materials, successfully improvised, and were able to build fermentaries of local materials in recent years. The Project has had a positive impact in expanding the number of qualified contractors who can construct fermentaries in East New Britain.

17. The quality of the buildings and roads constructed under the Project was satisfactory and the required specifications were generally met. All project contracts were awarded to local contractors; their overall performance was satisfactory. All equipment and vehicles were procured on the basis of international shopping and local competitive bidding in accordance with the Bank's *Guidelines for Procurement* and government procedures acceptable to the Bank. Most of the equipment and vehicles are still in good operating condition.

C. Organization and Management

18. DAL assumed the major role in the management of the Project. It established a project office in Rabaul (later transferred to Warangoi) and appointed a project manager who was

responsible for the overall implementation of the Project. Two interagency coordination committees were formed—one at the national level and another in the province. The National Coordination Committee (NCC) chaired by the secretary of DAL consisted of representatives from concerned agencies.[5] The Provincial Coordination Committee (PCC) chaired by the project manager comprised the local representatives of all the provincial agencies represented in NCC. At the initial stage, the two committees did not have any representatives from the Department of Finance and the provincial government. The representatives were invited to attend these meetings only midway through project implementation.

19. The overall management structure was appropriate for this Project. However, neither NCC nor PCC held regular meetings. Hence, problems faced during implementation could not be resolved immediately and there were delays in tackling them. This contributed to delays during the initial period. The main shortcoming in the effectiveness of these committees is the lack of a sense of urgency in resolving problems as soon as they arise. An example of this failure to act in the current situation is the inadequate funding for road and building maintenance. Although these issues were raised as early as 1996, the problem still had not been resolved at the time of the OEM in April 1999.

20. The Bank dispatched seven review missions and two loan disbursement/special project administration missions with the appropriate mix of skills and expertise. The missions were justified and were helpful in their recommendations and advice to adopt a flexible approach in making changes in the project design. The review missions identified the problems causing implementation delay and took action to reduce the delays. They also guided DAL in the initial start-up phase in following the Bank's procurement and disbursement procedures. No midterm review mission was conducted. The Borrower's performance at the national level was less effective, but this was offset by the effective and good work of the Project Management Office. The transfer of project management after completion to the newly formed Cocoa and Coconut Extension Agency (CCEA) had no adverse effect on project activities.

D. Actual Cost and Financing

21. The actual project cost was $15.0 million (Appendix 1) compared with $16.7 million provided in the loan agreement. Bank disbursement was $9.5 million, leaving a balance of $0.5 million, which was cancelled. Government expenditure for this Project was $5.5 million compared with the planned expenditure of $6.7 million. Despite the loan cancellation, the cocoa area developed exceeded the project target by 16 percent. The ability of this Project to fund a larger area and provide loans for doubling the number of fermentaries was due primarily to the devaluation of the local currency since 1995.

E. Implementation Schedule

22. The Project was approved by the Board on 3 November 1987 and scheduled to be effective on 16 January 1989. After three extensions, the loan became effective on 7 June 1989. The reasons for the delay were (i) delay in Parliament approval of the Project, (ii) delay in appointment of the project coordinator and support staff, and (iii) delay in the signing of the financing agreement by the Government and RDB. The Project was due to be completed in December 1993. However, due to delays and the slow release of loan funds, DAL requested

[5] Such as Department of Finance and Planning, DAL, Department of Works, Department of Land, Departments of Health and Education, and the Agricultural Bank of PNG.

three loan extensions, which were granted by the Bank. The request for further project extension was primarily motivated by the desire of the Government to utilize the remaining 25 percent balance of the loan. The extension was also to enable the Project to construct a larger number of fermentaries than planned at appraisal. The Project was eventually completed in December 1996 after a 36-month delay. Part of the reason for the delay was that the project management staff were unfamiliar with the Bank's procurement procedures in the initial phase of implementation and the national Government did not provide the local counterpart funding in a timely manner. Other reasons were lack of adequate and experienced extension staff, and the bureaucratic administration procedures of the national Government.

F. The Technical Assistance

23. The Project provided for the recruitment of an entomologist and a smallholder development specialist as part of project consulting services. The merits of providing a short-term entomologist whose terms of reference duplicated work already in progress at the Cocoa-Coconut Research Institute (CCRI) is questionable, especially since CCRI is located within the project area. It would have been preferable over the long term for the Project to develop a close working relationship with CCRI by supporting work at the institute that is relevant to the project needs. The pest and disease problems of cocoa and coconut in PNG are well documented, and state-of-the-art control measures for the major pests and diseases are already available and constantly updated. The major problem that eventually surfaced could perhaps have been foreseen as rhinoceros beetles and the black palm weevil similarly devastated hybrid coconuts grown by CCRI in the mid-1980s. It was unduly optimistic for the Project to expect the consultant entomologist to propose a practical and cost-effective way to control the two pests in 12 person-months (which was subsequently reduced to 6) when researchers at CCRI had been working on this problem for more than 15 years. Recent work by CCRI using pheromones to trap the pests has proved promising, and it is hoped that this technology can be passed on to the smallholders soon. Although the consultant entomologist provided satisfactory input in working together with CCRI to find a solution to control damage by the rhinoceros beetle, no substantial achievement was made due to the short-term nature of the assignment.

24. The smallholder development specialist (a United Nations volunteer) made a positive and significant contribution to the achievements of the Project. The operational strategy he developed for the field extension service greatly enhanced the effectiveness of the extension workers. The specialist was also involved in training the officers in extension methods. Being in the same locality, the Project had easy and ready access to TA available at CCRI. The link between extension workers and farmers and researchers in CCRI was formalized in 1994 with the formation of the Extension Liaison Section in CCRI. This section organized regular field days and training for extension workers and growers.

G. Compliance with Loan Covenants

25. Overall compliance with the loan conditions and covenants was satisfactory. The main shortcomings in compliance with the loan covenants were the (i) delay in providing counterpart funds for recruitment of extension support staff; (ii) delay in Department of Land's provision of land titles to settlers; (iii) failure of both NCC and PCC to meet regularly, which resulted in less than satisfactory coordination of activities undertaken by several departments; (iv) delay in providing up-to-date financial accounts; and (v) failure of DAL to support RDB with adequate

extension staff. In addition, the delay in issuing land titles also implies that many of the RDB loans did not have land title as collateral. Appendix 2 gives the status of loan compliance.

III. PROJECT RESULTS

A. Operational Performance

26. The Project planted 2,688 ha of cocoa, exceeding the appraisal target of 2,318 ha by about 16 percent. The larger planting area was achieved by targeting village land, which tended to be free of ownership disputes, rather than settlement land. The village cocoa developed area was 1,860 ha, or more than three times the 536 ha originally planned. The planting of coconut (as shade plant) kept pace with that of cocoa and, by the end of 1996, a total of about 2,790 ha had been planted (including areas of rehabilitation). Unfortunately, an estimated 75 percent of the palms, mainly in the existing and new settlements, were destroyed by rhinoceros beetle and black palm weevil attacks.

27. The smallholding cocoa, particularly in the settlement areas, is well established and closely resembles plantation cocoa in growth and shade regime. Yields with fertilizer are above average (about 1 metric ton per ha [t/ha]) due to the rich volcanic soil. In some smallholdings, trees were observed to be overpruned. As most of the coconut seedlings had been destroyed, Gliricidia provided light shade. Low levels of pests such as *Pantorrhytes, Pansepta*, and mirids and black pod disease were observed. Black pod losses can reach 30 percent during the wet season, while continuous infestation by pests can shorten the economic life of the farm to much less than the projected 25 years because of loss of trees.

28. Attempts to establish young coconut seedlings failed as a result of rhinoceros beetle and black palm weevil attacks. The attacks were especially severe in the settlement blocks, where losses approached 100 percent. Overall, losses in the project area were estimated to be 75 percent.

29. The project output of dry cocoa beans is expected to increase significantly as the planted areas come into peak production. In 1998, the existing village smallholders produced about 1,100 t while the settlement smallholders produced about 832 t. Total production from the Project would continue to increase. The OEM estimates that at project maturity (year 2003), the Project will yield an annual incremental output of 2,480 t of dry cocoa, which is marginally higher than the appraisal target of 2,340 t.

30. Road construction proceeded satisfactorily. A total of 60 kilometers (km) of existing farm roads were upgraded, while 55 km of new farm roads and 3 km of access roads were constructed. These figures were about 18 percent more than the targets set at appraisal. The roads provided 105 villages with access to markets and contributed substantially to improvement in the living standard of the project beneficiaries. The Project also constructed five power stations, two police outposts, nine classrooms, 42 staff houses and three aid posts. In addition, the Government provided additional staff for the works (4), education (24), and health departments (3) to improve social services in the project area. The agreement between the national and the provincial government for maintenance of these facilities has been signed. However, adequate annual funding for these services is uncertain in view of the constraints in the current national annual budget allocation.

31. Details of project achievement are given in Appendix 3. The onset of the Asian financial crisis in mid-1997 did not have any visible adverse effects on project implementation activities. On the other hand, the continued devaluation of the local currency since 1995 has resulted in much higher cocoa prices received by the smallholder.

B. Institutional Development

32. At appraisal, the Bank was not able to make an appropriate assessment of the institutional capacity of the national Government agencies involved in project implementation. At project commencement, the EA at the national level was unable to coordinate the inputs of several Implementing Agencies; this subsequently delayed project completion. During project implementation, the project manager was able to provide effective day-to-day management supervision to achieve the expected outcome at the field level. After project completion, the project extension and administration staff were absorbed into CCEA, which was formed in 1993 to service the cocoa and coconut smallholders in the country. The same project manager is currently the regional extension manager. Although this is seen as a positive step in the development of the cocoa and coconut industries, adequate funding for CCEA's operations remains an uncertainty due to the ongoing financial constraints of the national Government. Presently, funding is mainly through a levy on cocoa and coconut production (para. 52). Project buildings, vehicles, and equipment have all been transferred to the CCEA Regional Office.

33. The project management staff have gained valuable experience in planning and implementing cocoa development schemes for smallholders. The field extension officers received on-the-job training in extension methodology, and this was an effective operational strategy. Training of extension workers provided by the project consultants appears to have had a positive impact on the performance of the extension workers. The Project is regarded by CCEA as a successful rural development project, and it has been the focus of several visits from CCEA senior officers from the four other major cocoa/coconut-growing provinces. Overall, the institutional impact of the Project at the provincial level is significant.

C. Financial Performance

34. Both the appraisal report and the PCR did not conduct any financial analysis on the viability of the Project. Using existing farm operation data, the OEM conducted a farm budget analysis and estimated the financial internal rate of return (FIRR) for the Project. The calculated FIRR is about 12.0 percent for the Project.

35. Farm budget analyses for both the village and settlement farmers are in Tables A4.3 and A4.4 of Appendix 4. At appraisal, the existing subsistence village farmers with about 2 ha of farmland were estimated to earn a household income of about K830 per year (in current prices). It was estimated at the time of the OEM that a similar 2 ha farm would give a household income of about K2,900 per year (in current prices). For the settler farmers, income from a similar farm size is estimated to be about K4,800 per year. This is due to the higher yields from the settlement farmers' holdings (1.2 t/ha compared with 0.8 t/ha for village farmers). Settlement farmers are more hardworking, maintain their farms well with good husbandry practices, and have fertile virgin volcanic soil that contributes to higher yields per ha.

D. Economic Reevaluation

36. Economic reevaluation for the Project was carried out by the OEM using the same general methodology and approach in appraisal and the PCR. However, some assumptions are slightly different because recent data are available (Appendix 4). The project's economic internal rate of return (EIRR) of 13.0 percent estimated at appraisal was judged to be too optimistic by the PCR, which recalculated this figure at 7.8 percent. This disparity in the project EIRR was mainly due to the different assumptions used in the two studies. The EIRR analysis carried out at appraisal and that during the PCR suffered from differences in yield estimates and price projections.

37. The major problem in the appraisal analysis was in inflating cocoa benefits by about 40 percent. The appraisal assumed an average cocoa yield of 1.0 t/ha of dry cocoa beans in computing the farm budget of individual farmers. In computing the project benefits, however, the average cocoa yield used for the 2,300 ha of new planting was 1.2 t/ha, or an increase of about 20 percent. In addition, another 450 t of cocoa obtained from the cocoa rehabilitation program, which was not part of the Project, was included as project benefits. Eliminating this excessive cocoa from the project benefits will reduce the project EIRR from 13.0 percent to about 8.7 percent.

38. The PCR analysis adopted a simplistic approach in evaluating project benefits. It assumed that all cocoa planted under the Project (starting from year 1990) did not produce any yield until 1994. All seedlings planted since 1990 (including those of 1994 plantings of 2,496 ha) were assumed to yield an average 0.2 t/ha in the first year of production (1994). This yield was assumed to increase to 0.4 t/ha for all plantings in 1995 and 1996 and to reach a peak of 0.7 t/ha in 1997. The 1997 yields were assumed constant for the rest of the economic life of the Project. Government salaries for maintenance of the Project (up to the year 2014) were estimated to be four times higher than the current level paid by the project office. These assumptions yielded an EIRR significantly lower than the appraisal estimate.

39. The EIRR computed by the OEM is about 14.5 percent (Appendix 4). This is higher than the appraisal estimate of 13.0 percent and the PCR estimate of 7.8 percent. The significantly higher EIRR value compared with the PCR estimate was mainly attributed to (i) lower yield assumption (para. 38), (ii) recent good price obtained and higher projected cocoa prices (Appendix 4), (iii) higher administrative and maintenance costs, and (iv) recent devaluation of the local currency. Between the period from 1988 to 1999, the kina suffered a 70 percent devaluation against the US dollar. The higher EIRR compared with the appraisal estimate is attributed to the larger cocoa area developed, which provided the additional benefits. A sensitivity analysis with a 30 percent decline in prices gives an EIRR of about 12.4 percent, indicating that the project economic benefits are still high even with a significant price decline.

E. Socioeconomic and Sociocultural Results

40. The Project has generated significant socioeconomic benefits. The most significant improvement is the dramatic eightfold increase in annual net farm income. The average project beneficiaries with 2 ha farms are now earning a net monthly cash income of about K240 (village farmers) to K400 (settlement farmers) per month, and most of this income is in the form of cash. Many farmers with 4 ha farms are earning double this amount and are now in a position to buy food, whereas formerly they obtained close to 100 percent of their food requirements from their

home garden. Their favorite food is now rice and canned sardines, and they spend about K100 per month for these food items. A negative aspect of this significant increase in income is the lack of any project proposal to advise farmers on how to manage their cash income. The Project was able to transform the basically subsistence households into cash-rich households. The head of the household (usually the male or father of the family) has little knowledge of how to manage the cash on hand everytime they sell the beans (twice a month). The consequence was that they spend the bulk of the money (on average about 40 percent) on alcoholic drinks and community contributions to church and relatives' funerals. In many villages, the social problems created by indulgence in alcoholic drinks are significant.

41. About 20 individual farmers throughout the project area and a group of about 40 farmers from one village were surveyed. The main findings of the survey are that (i) the average size of cocoa holding is about 3.0 ha; (ii) the average crop yield of cocoa beans is 1.1 t/ha per year; (iii) about 50 percent of farmers harvest their crop once a month, while the others harvest two or three times a month; (iv) about 75 percent of farmers have repaid their loan, while the rest are still repaying it; (v) on average the farmers only have less than six years of education, but about 50 percent of them have children who are either currently enrolled or have completed high school; (vi) the average family size is 9.0 members; and (vii) about 80 percent of farmers are living within 2 km from education and health facilities. The most significant finding is that all farmers are grateful for the assistance they received for cocoa development. They are enthusiastic about this enterprise and about 80 percent of them are planning to plant an additional 1-4 ha of cocoa using their own resources. They will draw upon their savings from the sale of dried cocoa beans to finance this activity. The cost of developing 1 ha of cocoa is about K1,000.

42. The project area (both project beneficiaries and an equal number of nonproject farmers) also benefited from the improvement in roads and social amenities undertaken as part of this Project.

F. Gender and Development

43. The Project did not specifically provide for any support for women. The Project was not expected to have any impact, positively or negatively, on the status of women. Traditionally, farm work is divided between men and women, with the men doing work requiring strength such as land clearing, fencing, and plowing. Women carry out cultivation and sale of surplus farm produce at the local market and this provided them with a small source of income. Roads constructed under the Project have assisted them in bringing their produce to nearby markets and also provided them with an opportunity to socialize with other women, thus breaking the drudgery of housework. While the women continue to tend their food crop plot to supplement the family's nutrient needs, there are many instances of women abused by their husbands who have acquired the habit of drinking heavily during the week following the sale of cocoa beans.

G. Environmental Impact and Control

44. The terrain in the project area varies from slightly undulating to hilly, and as the volcanic ash soils are prone to water erosion, care needs to be taken to minimize topsoil loss and subsequent degradation of the land. Growing cocoa is unlikely to have any adverse impact on the environment as cocoa under Gliricidia and coconuts (where it has been successfully established) approximates the closed forest system it replaced. In addition, the rapid buildup of

a good leaf litter on the floor minimizes soil erosion risks and conserves soil fertility. Of concern, however, are blocks with little overhead shade where breaks in the cocoa canopy could start a sequence of events leading to soil erosion. Similarly, water runoff from roads in the hilly areas need to be controlled. The constructed farm roads did not contribute to any major soil erosion in the project area.

45. Currently, CCRI does not recommend the use of fertilizers for cocoa, and few farmers use herbicides or pesticides to control pests or diseases. The processing of wet cocoa beans produces sweating, which is initially sugary and later acidic in nature. However, as cocoa is processed on farm in small fermentaries, this is not seen to be a problem. Firewood is used as fuel for drying cocoa beans. Thinned-out Gliricidia trees provide a ready source of wood, while settlement blocks have access to felled timber.

H. Gestation and Sustainability

46. The Project has now reached the end of its gestation period. Many farmers are expanding their cocoa farms using their own resources. All the cocoa plants are now in production and the annual harvest of cocoa beans has reached about 90 percent of its peak levels. There is an ongoing program to train farmers in maintaining their holdings to ensure that their trees will continue to produce at least 1 t of dried cocoa beans per ha per year. The production of cocoa from project farmers appears to be sustainable. The current annual production of 2,200 t is expected to peak at 2,500 t in the year 2003. There is a strong possibility that total cocoa production from the Project will continue to increase to 3,000 t by the year 2010 since about 25 percent of the project farmers are utilizing their savings to plant additional ha of cocoa.

47. Cocoa cultivation has been widely practiced in PNG, and is not demanding in terms of labor. Farmers can choose when they prefer to harvest the crop. The frequency of harvest has only a small impact on the total yield obtained. In addition, the farmer can process his own bean and the bag of dried beans packed on the farm can be sent via the exporter directly into the cargo ship. The cost of the processing unit (fermentary) is low and processing requires mainly time for gathering wood and watching the fire. There is no necessity for regrading and repacking the farm produce. The farmers growing the crop can still continue their traditional practice of growing food crops for their own consumption. The major diseases associated with cocoa in PNG do not pose a serious problem at this time.

48. The overall project management standard has been good. The Project was able to take appropriate action to change the project design with regard to farm size, selection of beneficiaries, and ensuring that all farmers have their individual fermentaries. These changes were instrumental in gaining wider farmer acceptance of the Project. The project management also played a major role in providing relief to the victims of the volcanic eruption in 1994. The project vehicles provided the means of transportation for many of the relief teams. The project office currently enjoys a high standing in the community.

49. The extension services provided by the Project were effective. Most of the project farmers are knowledgeable in basic agronomic practices required for maintenance of cocoa trees. The extension staff appear to have a good working relationship with the farmers and are continuing to provide additional services such as assistance in transporting farm produce, which is well outside their normal duties.

50. The only factor that may affect project performance is the need for adequate funds from the provincial government for upkeep of the social infrastructure and maintenance of the farm roads. The extension services will also need additional funding from CCEA to expand their activities to cover the entire cocoa area. East New Britain has a total of about 3,500 farmers planting 10,000 ha of smallholder cocoa. There were 20 extension workers during project implementation, but with project completion, the number has declined to 17. With the establishment of CCEA, the project extension workers are now responsible for more nonproject farmers. The ratio of 1 extension worker to 50 farmers observed during project implementation has now increased to about 1 extension worker to 200 farmers. For effective extension, this ratio should be only about 1 to 100. To achieve this target, there is need for an additional 18 extension workers for the province.

IV. KEY ISSUES FOR THE FUTURE

A. Need for Additional Operation and Maintenance Funding

51. The main role of the Government in sustaining and promoting smallholder cocoa development in East New Britain is to (i) provide adequate extension support, (ii) maintain and expand the network of farm roads, and (iii) provide credit to new farmers to develop cocoa holdings. The main weakness is the inability of both the national and provincial governments to provide additional funding for cocoa development in the Province as well as to provide an adequate budget for operation and maintenance (O&M) and extension services.

52. The main source for financing cocoa research and extension activities is the levy on cocoa production. Currently, this levy, which is collected at the point of sale, is fixed at K40 per t of cocoa beans sold. Given that in 1998, PNG produced about 25,000 t of cocoa beans, the total levy collected would amount to about K1 million. Research would receive 50 percent of this amount, the share of extension is 12.5 percent, and the balance is available for Cocoa Board operating expenses. Thus, the annual allocation for extension services from this levy will be about K125,000. This amount is sufficient only for O&M of the extension facilities, and all staff salaries have to be drawn from the DAL budget. Thus, further funding is needed to improve O&M of roads and extension services. In view of the high smallholder incomes and because smallholders are not paying any income tax, the Government may need to review the cocoa levy to raise additional funding for CCEA activities.

B. Credit Disbursement and Recovery

53. The channeling of smallholders' loans through RDB has been a difficult aspect of the Project. The loan package for project beneficiaries—K2,000 to K8,000 and later raised from K3,400 to K10,000 to take care of increases in the cost of the fermentary—was disbursed at an interest rate of 8.5 percent per annum. The loan repayment period was fixed at a maximum of 11 years with a grace period of 4 years, with interest capitalized during the grace period. In the initial stages, lack of Government funding for RDB contributed to some delays in loan disbursement. The need for the land title as collateral for settlement areas while exempting village customary land from this requirement has shifted the main beneficiary group from settlers to villagers. The Project is thus unable to assist the most needy group (settlers) since delays in the issuance of the land title for settlement areas prevent the settlers from receiving RDB loans. At project completion, it was found that village farmers represented 82 percent of the project beneficiaries compared with 49 percent planned at appraisal.

54. At appraisal, it was expected that RDB would provide adequate staff to process loan applications, disburse loans, and monitor loan recovery. However, the assurances have not been fully met and RDB, currently facing a shortfall in its operating budget, is forced to reduce its staff. The volcanic eruption in 1994 destroyed most, if not all, of RDB records and the bank has not been able to update all the individual farmer accounts. Most farmers interviewed in the field claimed that they have fully repaid their loan. This fact is supported by the project office, which maintains a separate record of all the loans disbursed and repayments made by the project farmers. RDB maintains that many farmers are still in arrears in their loan repayment. There is a need for RDB to settle this dispute as soon as possible.

C. Enhancing Benefit Monitoring and Evaluation Capability

55. The project budget provides for baseline and annual surveys of smallholders for the purpose of benefit monitoring and evaluation (BME) of field development activities. In addition, an impact study was planned at the time of project completion.

56. The only BME information available for this Project is from a baseline survey conducted in 1992. The annual survey and impact surveys were not carried out. The socioeconomic data from the baseline survey were very similar to the figures provided by the feasibility study since the farmers had not received substantial benefits from their cocoa plantings. This situation arises from the low priority placed by both the project office and the Bank's project administrative staff in the collection of socioeconomic data. There is a need for the Bank to place greater emphasis on BME activities and provide the Project with additional trained staff primarily responsible for BME. The lack of BME information was also highlighted by the PCR.

V. CONCLUSIONS

A. Overall Assessment

57. The Project has some shortcomings, especially when it was first implemented by DAL staff not familiar with Bank procedures and procurement guidelines. The institutional capability of the national Government was also weak. Nevertheless, the Project has demonstrated that smallholders in PNG can cultivate cocoa crop successfully. A carefully designed package of Government assistance (including extension and credit) has been a key factor in the successful outcome of the Project. The project design had fitted well with the sociocultural practices of the local farmers, though no social assessment was made at the time of appraisal. The agronomic and management skills required for the production and processing of cocoa beans were well within the grasp of the average farmer. Cocoa cultivation does not impose a high demand for labor and, hence, farmers growing this crop can still maintain their practice of traditional food crop production. Most, if not all, project facilities were provided as envisaged at appraisal, and these facilities are currently well utilized and maintained. The institutional impact on the project management staff and field extension workers in developing cocoa schemes and providing appropriate technical advice to farmers is considered significant. The smallholders' cocoa farms are well established and maintained, and they are earning much higher income than envisaged at appraisal. Cocoa production has resulted in the creation of a rapidly expanding cash economy with the resultant expansion of a market for goods and services and subsequent improvements in the standard of living of the farmer beneficiaries. Women's roles have likewise improved since the start of the Project as their activities have expanded from household chores and garden crop cultivation to cocoa production and marketing. The Project has had a positive

impact on the environment since the cocoa plantations provided perennial protection of the land from erosion and other land degradation activities. On the basis of achievement of physical targets, and positive and sustainable socioeconomic impacts, the Project has achieved most, if not all, of its objectives. The reestimated FIRR and EIRR demonstrate that the Project is financially and economically viable. Project benefits are likely to be sustainable and many farmers are currently expanding their cocoa farms using their own resources. The Project as a whole is rated as generally successful.

B. Lessons Learned

58. The Project demonstrated the following lessons:

(i) Project design. The project design is simple and fitted well with the sociocultural conditions of the local community (farmers). Although the Project did not conduct social assessment at appraisal, the simple project design turned out to fit in well with the existing cultures and working habits of the local farmers. On hindsight, the Project confirms the need to conduct a detailed social assessment at the project preparatory stage in accordance with the Bank requirement before deciding on the appropriate project design and approach.

(ii) Social problems created. The high level of cash income earned by smallholders resulted in the social problem of excessive drinking. Future projects should incorporate a component to minimize that problem. Features to be incorporated into the Project to reduce social problems would have to be determined on a case-by-case basis, taking into account the sociocultural practices of the community.

(iii) Interagency cooperation. The Project called for effective interagency coordination at both the national and provincial levels to bring about more effective project implementation activities as well as to ensure timely resolution of adequate funding for O&M and extension services. However, experience indicated that it is difficult to bring about effective coordination in the PNG bureaucratic setup and that Government commitment is weak. It appears that the high-level interagency committees are not effective. A strategy should be formulated at the appraisal stage to ensure that the role of each agency in project implementation is clearly defined.

(iv) Selection of beneficiaries. No clear guidelines were established at the time of appraisal regarding the criteria for selecting the project beneficiaries. In the absence of these guidelines, the project management committee had a free hand in the selection process. Thus, the beneficiaries selected may not have been the most needy farmers. In one of the settlement areas, it was found that at least 30 percent of the settlers were Government staff members who leased out their holdings. The criteria for project beneficiary selection should be mandatory for all future projects.

(v) Capability of the Executing Agency. Project implementation was delayed by about three years due mainly to the weak capability of DAL at the commencement of the Project. The Bank should have had better assessment

and knowledge of the limited capacity of the Implementing Agencies to coordinate and manage the Project as designed. The EA's capability to implement the project needs to be established at appraisal so as to avoid implementation delay.

C. Follow-Up Actions

59. DAL should raise the matter of providing adequate funding for extension services and for road and social infrastructure maintenance with the provincial government as soon as possible. Immediate resolution of this matter is needed to ensure that the project beneficiaries continue to enjoy the full benefits of this Project.

60. DAL and CCEA need to reexamine the levy structure imposed on copra and coconut exports to ensure that funds for recruiting more extension workers for the project area are adequate.

61. The Department of Finance should carry out a detailed study of the weaknesses of RDB and take appropriate action to strengthen the financial resources of that bank. Urgent action should be taken to update the farmers loan account and refund those farmers who have overpaid their loans.

APPENDIXES

Number	Title	Page	Cited on (page, para.)
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2	Compliance with Loan Covenants	18	7,25
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4	Financial and Economic Reevaluation	26	8,35

Appendix 1

PROJECT INVESTMENT COST
($ million)

Component	Appraisal			Actual[a]		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
Field Development	0.9	3.0	3.9	0.0	3.9	3.9
Agricultural Support Services	1.3	3.4	4.7	2.4	2.8	5.3
Road Infrastructure	1.8	1.1	2.9	1.9	1.2	3.0
Social Infrastructure	0.7	1.6	2.2	0.7	1.0	1.7
Physical and Price Contingencies[b]	0.7	1.1	1.8			
Interest During Construction	1.2	0.0	1.2	1.2	0.0	1.2
Taxes and Duties	0.0	0.2	0.2	0.0	0.0	0.0
Total	**6.5**	**10.3**	**16.7**	**6.2**	**8.9**	**15.1**

[a] Figures have been prorated according to actual expenditures from the Bank and Department of Agriculture and Livestock costs as shown in Department of Finance public accounts. Figures may differ due to rounding.

[b] Physical and price contingencies prorated to individual components.

COMPLIANCE WITH LOAN COVENANTS

Covenant	Reference to Loan Agreement	Status of Compliance per PCR	OEM Remarks
1. The Borrower shall cause the Project to be carried out with due diligence and efficiency and in conformity with sound administrative, financial, engineering, and agricultural practices.	LA, Section 4.01(a)	Partly complied with. Weak administrative and financial management of DAL, DOFP, and ABPNG.[a]	Concurred with PCR
2. In the carrying out of the Project and operation of the project facilities, the Borrower shall perform, or cause to be performed, all obligations set forth in Schedule 5 to this Loan Agreement (LA).	LA, Section 4.01(b)	Partly complied with. National Coordinating Committee ineffective. The Provincial Coordinating Committee is also not effective. Project financial reporting is inadequate.	Concurred with PCR
3. In the carrying out of the Project, the Borrower shall cause competent and qualified consultants and contractors, acceptable to the Borrower and the Bank, to be employed to an extent and upon terms and conditions satisfactory to the Borrower and the Bank.	LA, Section 4.03(a)	Complied with	Concurred with PCR
4. The Borrower shall make arrangements satisfactory to the Bank for insurance of the project facilities to such extent and against such risks and in such amounts as shall be consistent with sound practice.	LA, Section 4.05(a)	Complied with	Not complied with
5. The Borrower shall maintain, or cause to be maintained, records, an asset register and accounts adequate to identify the goods and services and other items of expenditure financed out of the proceeds of the Loan, to disclose the use thereof in the Project, to record the progress of the Project (including the cost thereof), and to reflect, in accordance with consistently maintained sound accounting principles, the operations and financial condition (to the extent relevant to the Project) of DPI and the other agencies of the Borrower responsible for the carrying out of the Project and operation of the project facilities, or any part thereof.	LA, Section 4.06(a)	Partly complied with Project accounts not readily available.	Concurred with PCR Project physical assets have been transferred to CCEA. Assets Register available for 1996.

[a] ABPNG has been reorganized and renamed as the Rural Development Bank of PNG.

Covenant	Reference to Loan Agreement	Status of Compliance per PCR	OEM Remarks
6. The Borrower shall (i) maintain, or cause to be maintained, separate accounts for the Project; (ii) have such accounts and related financial statements audited annually, in accordance with sound auditing standards consistently applied, by auditors acceptable to the Bank; (iii) furnish to the Bank, as soon as available but in any event not later than six (6) months after the end of each related fiscal year, unaudited copies of such accounts and financial statements, and not later than twelve (12) months after the end of each related fiscal year, certified copies of such audited accounts and financial statements and the report of the auditors relating thereto, all in the English language; and (iv) furnish to the Bank such other information concerning such accounts and financial statements and the audit thereof as the Bank shall from time to time reasonably request.	LA, Section 4.06(b)	Partly complied with Requirements not done in a timely manner. 1995 audits are still being undertaken and those for 1996 not yet commenced.	Complied with
7. Without limiting the generality of the foregoing, the Borrower shall furnish, or cause to be furnished, to the Bank quarterly and annual progress reports on the carrying out of the Project and on the operation and management of the project facilities. Such reports shall be submitted in such form and in such detail and within such a period as the Bank shall reasonably request, and shall indicate, among other things, progress made and problems encountered during the period under review, steps taken or proposed to be taken to remedy these problems, and proposed program of activities and expected progress during the following period.	LA, Section 4.07(b)	Complied with	Concurred with PCR
8. Promptly after physical completion of the Project, but in any event not later than six (6) months thereafter or such later date as may be agreed upon for this purpose between the Borrower and the Bank, the Borrower shall prepare and furnish to the Bank a report, in such form and in such detail as the Bank shall reasonably request, on the execution and initial operation of the Project, including its cost, the performance by the Borrower of its obligations under the Loan Agreements, and the accomplishment of the purposes of the Loans.	LA, Section 4.07(c)	Partly complied with Only draft PCR report provided; lacks financial data and economic/financial evaluation.	Complied with The final PCR submitted was comprehensive, covering all aspects of project implementation progress.

Covenant	Reference to Loan Agreement	Status of Compliance per PCR	OEM Remarks
9. The Borrower shall enable the Bank's representative to inspect the Project, the goods financed out of the proceeds of the Loan, and any relevant records and documents.	LA, Section 4.08	Complied with	Concurred with PCR Good cooperation from Government and implementing agencies
10. The Borrower shall ensure that the project facilities are operated, maintained, and repaired in accordance with sound administrative, financial, engineering, environmental, agricultural, and maintenance and operational practices.	LA, Section 4.09	Complied with	Buildings, vehicles, and office equipment were observed to be maintained to acceptable standards.
11. The Borrower shall take all action, which shall be necessary on its part to, enable ABPNG to perform its obligations under the ABPNG Financing Agreement and shall not take or permit any action, which would interfere with the performance of such obligations.	LA, Section 4.11(a)	Partly complied with Delayed action on the part of the Department of Lands to award land titles	Concurred with PCR Land ownership disputes are long-standing obstacles to ABPNG granting loans. Project design should have taken this into account.
12. The Borrower shall ensure that all land, rights to land, and other rights or privileges required for the Project are acquired or otherwise made available on a timely basis so as to avoid delay in project implementation. Specifically, the Borrower shall make available approximately 825 ha of new Government land in the Warangoi sector as agreed upon by the Borrower and the Bank for the purposes of the Project; and shall arrange for an additional 536 ha of customary land and 1,270 ha of existing partially developed settlements schemes to be allocated to the cultivation of cocoa and coconut.	LA, Schedule 5, para. 6	Partly complied with. DOL did not issue all land titles to settlers.	Concurred with PCR Consequently, only 533 ha of new settlements in Warangoi and 292 ha of existing settlements were made available to the Project.
13. ABPNG shall maintain an individual loan account for each Participating Smallholder, which shall be debited with the Participating Smallholder's share of Field Development Costs in accordance with ABPNG's standard procedures currently in effect for smallholder or as may otherwise be agreed to by the Bank. Disbursement of credit shall be in kind, except for the settlement and living allowances of Participating Smallholders in the case of new settlements.	LA, Schedule 5, para. 9(b)	Complied with	Not complied with Records not readily available at RDB.

Covenant	Reference to Loan Agreement	Status of Compliance per PCR	OEM Remarks
14. Repayment of Smallholder Loans shall be effected by each Participating Smallholder making remittances directly to ABPNG to be credited to the Participating Smallholder's Loan account, with total annual repayments for each Participating Smallholder not to exceed 60 percent of the annual net income of that Participating Smallholder.	LA, Schedule 5, para. 9(c)	Partly complied with	Complied with
15. The training programs for extension workers, field staff, and Participating Smallholders under Part II of the Project shall be prepared and implemented by DAL with the assistance of the Project Logistics Officer and the Smallholder Development Specialist to be engaged under Schedule 3 of the Ordinary Operations Loan Agreement.	LA, Schedule 5, para. 15	Partly complied with. Training was provided by DAL, although the Logistics Officer had not been recruited.	Smallholder Development Specialist not recruited. UNV recruited for training of field extension officers.
16. The Borrower shall provide, or cause to be provided, the necessary funds and other support on a timely basis to the agencies concerned with the operation and maintenance of the project facilities, to ensure that the various facilities provided, constructed, or upgraded under the Project are operated, managed, maintained, and repaired, both during the period of implementation and thereafter, by the concerned agencies in accordance with sound administrative, financial, engineering, environmental, agricultural, maintenance, and operational practices.	LA, Schedule 5, para. 16	Partly complied with Project experienced delayed fund releases and lack of maintenance budget.	Concurred with PCR However, budget was available for post-project operation but inadequate.
17. The Borrower shall ensure that all vehicles and equipment financed under the Project are properly operated and maintained and replaced as necessary in accordance with the requirements of the Project.	LA, Schedule 5, para. 17	Complied with	Concurred with PCR Vehicles/equipment well maintained but no allocation for replacement of vehicles written off.

Covenant	Reference to Loan Agreement	Status of Compliance per PCR	OEM Remarks
18. Project benefit monitoring and evaluation activities shall be undertaken in accordance with the Bank's Guidelines on Project Benefit Monitoring and Evaluation for Agriculture, Irrigation, and Rural Development Projects. The Project Logistics Officer shall be responsible for undertaking a baseline information survey among Participating Smallholders in the existing settlements and village areas and shall annually supplement the same with crop area, field production, and income data.	LA, Schedule 5, para. 19(a)	Partly complied with. Baseline survey undertaken but annual supplements not prepared. Aggregate data not prepared. BME not done	Concurred with PCR Logistics Officer not recruited. No BME done
19. In the sixth year of project implementation, DAL and DOFP shall undertake a socioeconomic impact study of Participating Smallholders to determine the success, to that date, of the Project in terms of benefit generation and its impact on the socioeconomic status of the Participating Smallholders.	LA, Schedule 5, para. 19(b)	Not complied with	Concurred with PCR. No socioeconomic study was undertaken.

ABPNG = Agriculture Bank of PNG, BME = benefit monitoring and evaluation, CCEA = Cocoa and Coconut Extension Agency, DAL = Department of Agriculture and Livestock, DOFP = Department of Finance and Planning, DPI = Department of Primary Industry, ha = hectare, OEM = Operations Evaluation Mission, PCR = project completion report, RDB = Rural Development Bank, UNV = United Nations Volunteer.

PROJECT PHYSICAL ACHIEVEMENTS

Table A3.1: Physical Achievements: Actual versus Appraisal Targets

Farm Category	1989	1990	1991	1992	1993	1994	1995	1996	Total	Number of Farmers
New Settlement										
Actual (ha)	0	0	58	178	157	84	21	35	533	144
Appraisal (ha)	108	200	200	0	0	0	0	0	508	144
Existing Settlements										
Actual (ha)	0	0	80	145	68	35	10	13	351	58
Appraisal (ha)	48	420	576	300	0	0	0	0	1,344	311
Village Farms										
Actual (ha)	0	18	229	593	601	249	92	80	1,862	928
Appraisal (ha)	36	150	100	125	125	0	0	0	536	434
Total										
Actual (ha)	0	18	367	916	826	368	123	128	2,746	1,130
Appraisal (ha)	192	770	876	425	125	0	0	0	2,388	889
Cumulative Total										
Actual (ha)	0	18	385	1,301	2,127	2,495	2,618	2,746	0	0
Appraisal (ha)	192	962	1,838	2,263	2,388	0	0	0	0	0

ha = hectare.

Table A3.2: Achievements in Physical and Social Infrastructure Actual versus Appraisal Targets

Component	Appraisal	PCR	PPAR
Road Infrastructure (km)			
Minor upgrading	28	2	27
Major upgrading	25	52	33
New construction	47	35	58
Total	**100**	**88**	**118**
Social Infrastructure (unit)			
Community building	3	1	1
Community latrines	3	1	1
Power houses	6	5	5
Double classrooms	8	9	9
Water supply tanks	32	32	32
Aid posts	3	3	3
Rural police center	1	1	1
Total	**56**	**52**	**52**
Housing and Office Buildings (unit)			
Administrative office	1		1
Office store	7	6	6
Garage/workshop	1	1	1
Houses (H90)	2	37	2
Houses (H55)	5		5
Houses (H40)	39		35
Shed and fence	3		2

km = kilometer, PCR = project completion report, PPAR = project performance audit report.

Table A3.3: Achievements in Project Incremental Staffing
Actual versus Appraisal Targets

Agency	Appraisal	PCR	PPAR
Agricultural Bank of PNG			
Accounting Staff	2	2	2
Field Staff	1	1	1
Total	**3**	**3**	**3**
DAL[a]			
Project Manager	1	1	1
Field Coordinator - Overseas	1	1	1
Field Coordinator - National	1	1	1
Logistics Officer - Overseas	1	0	0
Logistics Officer - National	1	0	0
Community Development Officer	1	2	2
Clerk-Typist	2	2	2
Field Supervisor	2	5	2
Rural Development Officer	7	10 [b]	5
Rural Development Technician	3	-	12
Total	**20**	**22**	**26**
Department of Works and Supply			
Provincial Works Manager[c]	0	-	1
Foreman	2	4 [d]	2
Architect[c]	0	-	1
Total	**2**	**4**	**4**
Social Infrastructure and Services			
Community Facilities			
Senior Constable	1	0	0
Constable	1	0	0
Education Facilities			
Education Officer Class 4	3	24 [e]	0
Education Officer Class 3	1	-	1
Education Officer Class 2	3	-	5
Education Officer Class 1	9	-	18
Health Facilities			
Aid Post Orderly	3	3	3
Total	**21**	**27**	**27**
Total Project Staffing	**46**	**56**	**60**

DAL = Department of Agriculture and Livestock, PCR = project completion report, PPAR = project performance audit report, PNG = Papua New Guinea.

[a] Except for the Project Officer, the rest of the staff has been transferred to the Cocoa and Coconut Extension Agency Branch for ENBP.

[b] Includes all rural development technicians.

[c] Positions not in appraisal.

[d] Includes provincial works manager, foreman, and architect.

[e] Includes all education officers.

FINANCIAL AND ECONOMIC REEVALUATION

A. Methodology and Assumptions

1. The methodology used in the economic reevaluation follows the Bank's *General Guidelines for Economic Analysis of Projects* issued by the Economics and Development Resource Center. The main assumptions used in reestimating of the economic internal rate of return (EIRR) are as follows:

(i) All benefits are converted into constant 1999 prices using the World Bank manufacturers' unit value index for international prices and the local consumer price index where appropriate. All benefits and costs are expressed in kina.

(ii) The economic life of the Project for the purpose of financial and economic evaluation is assumed to be 25 years; i.e., from 1990 to the year 2014. The Project started generating incremental benefits in 1993.

(iii) The economic cost of the Project is K18.905 million spread over the period from 1990 to 1997 in constant 1999 terms. Details of this estimation are shown in Table A4.1.

(iv) Actual farmgate prices (adjusted to 1999 constant terms) for cocoa beans are used for the period 1992-1998. For 1999, the average of January to March prices is used as the price for this year. Prices for the year 2000 to 2014 are based on the World Bank commodity price forecast (Table A4.2). The World Bank expects international cocoa prices to rise substantially from the present level of $1,200 per ton (t) to $1,680 per t for the period from 2000 to 2010.

(v) A standard conversion factor (SCF) of 0.9 is used to adjust project cost to international terms. This is the same SCF used in the project completion report. The appraisal report used an SCF of 1.0.

B. Crop Budgets and Yields

2. The crop budgets for 1 hectare (ha) of settlement and village cocoa are shown in Tables A4.3 and A4.4. The average yield for cocoa over the productive life of the crop in settlements (1.0 t/ha) is 30 percent higher than that in villages (0.7 t/ha). From the farmers' viewpoint, investment in cocoa cultivation provides high returns on their investment: 30.1 percent for settlement and 25.8 percent for village cocoa.

C. Reestimated EIRR

3. Based on the above assumption, the EIRR for this Project is reestimated at 14.5 percent. The financial internal rate of return is 12.0 percent (Tables A4.5 and A4.6). Sensitivity analysis shows that the EIRR will not fall below 10.0 percent even with a 30.0 percent decrease in price.

Table A4.1: Summary of Total Project Investment Cost (1999 Prices)

Item	1990	1991	1992	1993	1994	1995	1996	1997	Total
Local Cost									
Current ($ '000)	1,277	1,066	937	1,050	262	411	401	143	5,547
Current (K '000)	1,220	1,015	904	1,027	265	526	529	205	5,691
Adjustment to Border Prices [a] (K '000)	1,098	913	814	924	238	473	477	185	5,122
Consumer Price Index (1999=100)	50.33	54.24	56.01	57.37	58.43	68.96	78.42	83.49	
Constant 1999 prices (K '000)	2,181	1,684	1,453	1,611	408	686	608	221	8,852
Foreign Cost									
Current ($ million)	2,291	1,891	1,677	1,746	432	625	611	217	9,489
International MUV index, 1999=100	1.01	1.01	1.05	1.13	1.08	1.03	0.99	1.00	
Constant 1999 prices ($ '000)	2,318	1,907	1,754	1,975	468	642	603	217	9,883
Constant 1999 prices (K '000)	2,214	1,815	1,692	1,931	473	821	795	312	10,053
Total Cost, Constant 1999 prices (K '000)	4,395	3,500	3,145	3,542	881	1,507	1,402	533	18,905

MUV = manufacturers' unit value.
[a] Using a standard conversion factor of 0.9.

Table A4.2 : Derivation of Economic and Financial Farmgate Prices for Cocoa

(constant 1999 prices)

Item	Actual								Projected			Average
	1992	1993	1994	1995	1996	1997	1998	1999 [a]	2000	2005	2010	2000-2010
Cocoa [b]												
$/t, constant 1990	1,027	1,047	1,267	1,202	1,277	1,496	1,635	1,223	1,730	1,656	1,579	1,683
MUV index,1990 = 100	106.6	106.3	110.2	119.2	114.0	108.9	104.0	105.4	108.1	122.6	138.7	117.5
$/t, constant 1999	1,095	1,114	1,396	1,433	1,456	1,629	1,701	1,289	1,870	2,031	2,190	1,977
Freight, Port Moresby-Europe	139	138	143	155	148	142	135	130	130	130	130	130
FOB prices, Port Moresby, $/t	957	976	1,253	1,278	1,307	1,488	1,565	1,159	1,740	1,901	2,060	1,847
Exchange rate kina per $	0.96	0.98	1.01	1.28	1.32	1.44	2.03	2.38	2.38	2.38	2.38	2.38
FOB prices, Port Moresby, K/t	923	954	1,267	1,636	1,725	2,139	3,178	2,759	4,142	4,525	4,904	4,397
Cocoa Board levy	40	40	40	40	40	40	40	40	40	40	40	40
Exporter margin - 3%	28	29	38	49	52	64	95	83	124	136	147	132
Ex factory price	855	886	1,189	1,546	1,633	2,035	3,042	2,637	3,978	4,349	4,717	4,225
Transport cost	171	170	176	191	182	174	166	160	160	160	160	160
Financial farmgate price [c]												
Dry bean [b] - K/t	684	716	1,013	1,356	1,451	1,861	2,876	2,477	3,818	4,189	4,557	4,065
Wet bean [d] - K/t	267	279	395	529	566	726	1,122	966	1,489	1,634	1,777	1,585
Economic farmgate price [e]												
Dry bean - K/t	784	815	1,114	1,460	1,554	1,965	2,982	2,581	3,926	4,299	4,667	4,174
Wet bean - K/t	306	318	435	569	606	766	1,163	1,007	1,531	1,677	1,820	1,628

FOB = free on board, K/t = Kina per ton.

[a] 1999 prices are average prices for the period from January to March 1999.

[b] World Bank Primary Commodity Forecast, November 1998.

[c] SCF assumed as 0.9

[d] Daily average prices, dry beans, New York and London.

[e] Wet bean assumed as 39 percent of dry beans.

Source: World Bank Primary Commodity Forecast, November 1998.

Table A4.3 : Cocoa Farm Budget for Settlement Farmers

(K/ha)

Item	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009-2014
Labor input - person-days/ha	150	36	50	86	92	96	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Cost																				
Labor at K5/person-day	750	180	250	430	460	480	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Planting material [a]		360	22																	
Fertilizer	5	8	10	25																
Others [b]	95	150	90	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
Fermentary [c]					1,350															
Total cost	**850**	**698**	**372**	**510**	**1,865**	**535**	**555**	**555**	**555**	**555**	**555**	**555**	**555**	**555**	**555**	**555**	**555**	**555**	**555**	**555**
Benefits																				
Yield - kg/ha dry beans					400	800	1,000	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,000	1,000	1,000	1,000	900
Price K/kg					1,013	1,356	1,451	1,861	2,876	2,477	3,818	3,892	3,967	4,041	4,115	4,189	4,263	4,336	4,410	4,483
Total revenue					405	1,085	1,451	2,233	3,451	2,972	4,582	4,671	4,760	4,849	4,938	4,189	4,263	4,336	4,410	4,035
Net revenue	(850)	(698)	(372)	(510)	(1,460)	550	896	1,678	2,896	2,417	4,027	4,116	4,205	4,294	4,383	3,634	3,708	3,781	3,855	3,480
Gross margin [d]	(100)	(518)	(122)	(80)	(1,000)	1,030	1,396	2,178	3,396	2,917	4,527	4,616	4,705	4,794	4,883	4,134	4,208	4,281	4,355	3,980
FIRR (%)	30.12																			
NPV @ 10%	12,300 kina																			

FIRR = financial internal rate of return, ha = hectare, K = Kina, kg = kilogram, NPV = net present value.

[a] Planting material cost includes cost of hybrid coconut seedlings damaged by insects.

[b] Other costs include cost of harvesting tools and bags.

[c] Fermentary built for 2 ha, but the total cost is quoted above on a per ha basis.

[d] Gross margin is defined as net revenue plus the imputed cost of farm labor.

Table A4.4 : Cocoa Farm Budget for Village Farmers

(K/ha)

Item	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009-2014
Labor input - person-days/ha	85	24	44	80	74	76	94	94	94	94	94	94	94	94	94	94	94	94	94	94
Cost																				
Labor at K5/person-day	425	120	220	400	370	380	470	470	470	470	470	470	470	470	470	470	470	470	470	470
Planting material [a]		240	22																	
Fertilizer	5	8	10	25																
Others [b]	95	150	90	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
Fermentary [c]					1,350															
Total cost	**525**	**518**	**342**	**480**	**1,775**	**435**	**525**	**525**	**525**	**525**	**525**	**525**	**525**	**525**	**525**	**525**	**525**	**525**	**525**	**525**
Benefits																				
Yield - kg/ha dry beans					200	400	600	700	800	800	800	800	800	800	800	800	800	800	800	700
Price K/kg					1,013	1,356	1,451	1,861	2,876	2,477	3,818	3,892	3,967	4,041	4,115	4,189	4,263	4,336	4,410	4,483
Total revenue					203	542	870	1,303	2,301	1,981	3,054	3,114	3,173	3,233	3,292	3,352	3,410	3,469	3,528	3,138
Net revenue	(525)	(518)	(342)	(480)	(1,572)	107	345	778	1,776	1,456	2,529	2,589	2,648	2,708	2,767	2,827	2,885	2,944	3,003	2,613
Gross margin [d]	(100)	(398)	(122)	(80)	(1,202)	487	815	1,248	2,246	1,926	2,999	3,059	3,118	3,178	3,237	3,297	3,355	3,414	3,473	3,083
FIRR (%)		25.78																		
NPV @ 16%		2,542	thousand kina																	

FIRR = financial internal rate of return, ha = hectare, K = Kina, kg = kilogram, NPV = net present value.

[a] Planting material cost includes cost of hybrid coconut seedlings damaged by insects.

[b] Other costs include cost of harvesting tools and bags.

[c] Fermentary built for 2 ha, but the total cost is quoted above on a per ha basis.

[d] Gross margin is defined as net revenue plus the imputed cost of farm labor.

Table A4.5: Estimate of Financial Internal Rate of Return (FIRR)

Item	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009-2014
Area planted (ha)																				
Settlement		137	308	207	100	28	46													
Village	18	229	593	601	249	92	80													
Total area (ha)	18	366	901	808	349	120	126													
Cost (K '000)																				
Production Cost																				
Settlement		116	357	442	1,914	1,815	1,506	1,621	3,867	1,435	1,498	1,437	1,438	1,438	1,438	1,438	1,438	1,438	1,438	1,438
Village	9	201	669	1,025	1,118	1,610	2,403	2,302	1,746	1,524	1,558	1,400	1,411	1,411	1,411	1,411	1,411	1,411	1,411	1,411
Total production cost (K '000)	9	318	1,026	1,467	3,032	3,425	3,909	3,922	5,614	2,959	3,056	2,837	2,849	2,849	2,849	2,849	2,849	2,849	2,849	2,849
Houses		154	347	233	113	32	52													
Infrastructure [a]	889	880	979	976	494	501	236	236	236	236	236	236	236	236	236	236	236	236	236	236
Agriculture support	988	734	816	814	550	558	576	365	365	365	365	365	365	365	365	365	365	365	365	365
Total cost (K '000)	**1,887**	**2,087**	**3,168**	**3,489**	**4,188**	**4,516**	**4,773**	**4,523**	**6,214**	**3,560**	**3,656**	**3,438**	**3,450**	**3,450**	**3,450**	**3,450**	**3,450**	**3,450**	**3,450**	**3,450**
Output (t dry beans)																				
From settlement					54.8	232.8	466.2	678	832.2	923.2	967.2	982	991.2	991.2	991.2	963.8	902.2	860.8	840.8	821.5
From village				3.6	53	221	507.4	820.7	1,091.3	1,294.9	1,414.3	1,464.4	1,481.6	1,489.6	1,489.6	1,489.6	1,489.6	1,489.6	1,487.8	1,464.9
Total output				**3.6**	**107.8**	**453.8**	**973.6**	**1,498.7**	**1,923.5**	**2,218.1**	**2,381.5**	**2,446.4**	**2,472.8**	**2,480.8**	**2,480.8**	**2,453.4**	**2,391.8**	**2,350.4**	**2,328.6**	**2,286.4**
Price (K/kg)				716	1,013	1,356	1,451	1,861	2,876	2,477	3,818	3,892	3,967	4,041	4,115	4,189	4,263	4,336	4,410	4,483
Total Revenue (K '000)				3	109	615	1,412	2,789	5,532	5,493	9,093	9,522	9,809	10,025	10,209	10,278	10,196	10,192	10,269	10,250
Net Revenue (K '000)	(1,887)	(2,087)	(3,168)	(3,486)	(4,079)	(3,900)	(3,361)	(1,734)	(682)	1,933	5,436	6,085	6,359	6,575	6,759	6,828	6,746	6,742	6,819	6,801
FIRR (%)		11.98																		
NPV @ 10%		3.63	million Kina																	

ha = hectare, K = Kina, kg = kilogram, NPV = net present value, t = ton.

[a] Annual infrastructure maintenance cost assumed as 5 percent of total cost from year 1996 onward.

Table A4.6: Estimate of Economic Internal Rate of Return (EIRR)

Item	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009-2014
Area planted (ha)																				
Settlement		137	308	207	100	28	46													
Village	18	229	593	601	249	92	80													
Total area (ha)	18	366	901	808	349	120	126													
Cost (K '000)																				
Production Cost																				
Settlement		105	322	398	1,723	1,634	1,355	1,458	3,481	1,292	1,348	1,293	1,294	1,294	1,294	1,294	1,294	1,294	1,294	1,294
Village	9	181	602	922	1,006	1,449	2,163	2,071	1,572	1,372	1,402	1,260	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270
Total production cost (K '000)	9	286	924	1,320	2,729	3,083	3,518	3,530	5,052	2,663	2,750	2,553	2,564	2,564	2,564	2,564	2,564	2,564	2,564	2,564
Houses		139	312	210	101	28	47													
Infrastructure [a]	800	792	881	878	445	451	212	212	212	212	212	212	212	212	212	212	212	212	212	212
Agriculture support	890	661	735	732	495	502	519	328	328	328	328	328	328	328	328	328	328	328	328	328
Total cost (K '000)	**1,698**	**1,878**	**2,851**	**3,140**	**3,770**	**4,064**	**4,296**	**4,071**	**5,593**	**3,204**	**3,291**	**3,094**	**3,105**	**3,105**	**3,105**	**3,105**	**3,105**	**3,105**	**3,105**	**3,105**
Output (t dry beans)																				
From settlement					55	233	466	678	832	923	967	982	991	991	991	964	902	861	841	822
From village				4	53	221	507	821	1,091	1,295	1,414	1,464	1,482	1,490	1,490	1,490	1,490	1,490	1,488	1,465
Total output				**4**	**108**	**454**	**974**	**1,499**	**1,924**	**2,218**	**2,382**	**2,446**	**2,473**	**2,481**	**2,481**	**2,453**	**2,392**	**2,350**	**2,329**	**2,286**
Price (K/kg)				815	1,114	1,460	1,554	1,965	2,982	2,581	3,926	4,001	4,075	4,149	4,224	4,299	4,372	4,446	4,519	4,593
Total Revenue (K '000)				3	120	662	1,513	2,944	5,736	5,725	9,351	9,787	10,077	10,294	10,478	10,547	10,458	10,450	10,524	10,501
Net Revenue (K '000)	(1,698)	(1,878)	(2,851)	(3,137)	(3,650)	(3,402)	(2,783)	(1,126)	143	2,520	6,060	6,694	6,972	7,189	7,373	7,442	7,353	7,345	7,419	7,396
EIRR (%)		14.47 [b]																		
NPV @ 10%		7.92 million Kina																		

ha = hectare, kg = kilogram, K = Kina, NPV = net present value, t = ton.

[a] Annual infrastructure maintenance cost assumed as 5 percent of total cost from year 1996 onward.

[b] Sensitivity analysis with a 30 percent decline in cocoa bean price was conducted. The EIRR was 12.4 percent.