

PPA:VAN 19054

ASIAN DEVELOPMENT BANK

PROJECT PERFORMANCE AUDIT REPORT

ON THE

MULTIPROJECT LOAN
(Loan No. 766-VAN[Sf])

IN

VANUATU

December 1996

CURRENCY EQUIVALENTS

Currency Unit - Vatu (Vt)

		At Appraisal	At Project Completion	At Postevaluation
Vt1.00	=	\$0.0096	\$0.0084	\$0.0090
\$1.00	=	Vt103.92	Vt119.51	Vt111.20

ABBREVIATIONS

ADF	-	Asian Development Fund
AR	-	Appraisal Report
DLG	-	Department of Local Government
EA	-	Executing Agency
EIRR	-	Economic Internal Rate of Return
ICB	-	International Competitive Bidding
IDA	-	International Development Association
LGC	-	Local Government Council
MOE	-	Ministry of Education
NPSO	-	National Planning and Statistics Office
O&M	-	Operation and Maintenance
PCR	-	Project Completion Report
PEM	-	Postevaluation Mission
PPAR	-	Project Performance Audit Report
PWD	-	Public Works Department
SAR	-	Subproject Appraisal Report
SDR	-	Special Drawing Rights
TA	-	Technical Assistance
UK	-	United Kingdom
VOC	-	Vehicle Operating Cost

WEIGHTS AND MEASURES

km	-	kilometer
m	-	meter

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 PROJECT DATA
Multiproject Loan
Loan No. 766-VAN(SF)

PROJECT PREPARATION/INSTITUTION BUILDING:

TA No.	TA Project Name	Type	Estimated Person-months	Approved Amount	Approval Date
726-VAN	Appraisal of Subprojects under Multiproject Loan	A&O	18	\$270,000	5 Dec 1985

KEY PROJECT DATA (\$ million):	As per Bank	
	Loan Documents	Actual
Total Project Cost	6.40	7.01
Foreign Currency Cost	5.00	6.19
Bank Loan Amount/Utilization	3.00 ^a	3.70 ^b
Bank Loan Amount/Cancellation		^c
Amount of Cofinancing		
International Development Association	2.00	2.49

KEY DATES:	Expected	Actual
Fact-finding		3-19 Jul 1985
Appraisal		18 - 30 Sep 1985
Loan Negotiations		31 Oct 1985
Board Approval		5 Dec 1985
Loan Agreement		18 Apr 1986
Loan Effectivity	18 Jul 1986	19 Sep 1986
Project Completion	30 Jun 1989	30 Nov 1992
Loan Closing	31 Dec 1989	3 Jun 1993
Months (Effectivity to Completion)	35	75

KEY PERFORMANCE INDICATORS (%):	Appraisal	PCR	PPAR
Economic internal Rate of Return			
Project	n.c. ^d	n.c.	neg.
Schools	n.c.	n.c.	4.2
Santo Wharf Bypass Road	n.c.	n.c.	20.0
Sola Landing Stage	)	n.c.	neg.
Narovorovo Wharf	)	n.c.	neg.
Nduindui Wharf	) 10.0 - 14.0	n.c.	neg.
Lolopuepue Wharf	)	n.c.	neg.
Liro Landing Stage	)	n.c.	neg.
Lamen Wharf Bay	)	n.c.	neg.
Malo Road Network	)	n.c.	neg.

BORROWER: Republic of Vanuatu

EXECUTING AGENCY: Public Works Department under the Ministry of Public Works, Communications, Transport, Ports and Marine

MISSION DATA:

Type of Mission	No. of Missions	Person-days
Fact-finding	1	68
Appraisal	1	52
Inception	1	5
Project Administration		
- Review *	5	106
- Project Completion	1	33
- Postevaluation	1	28

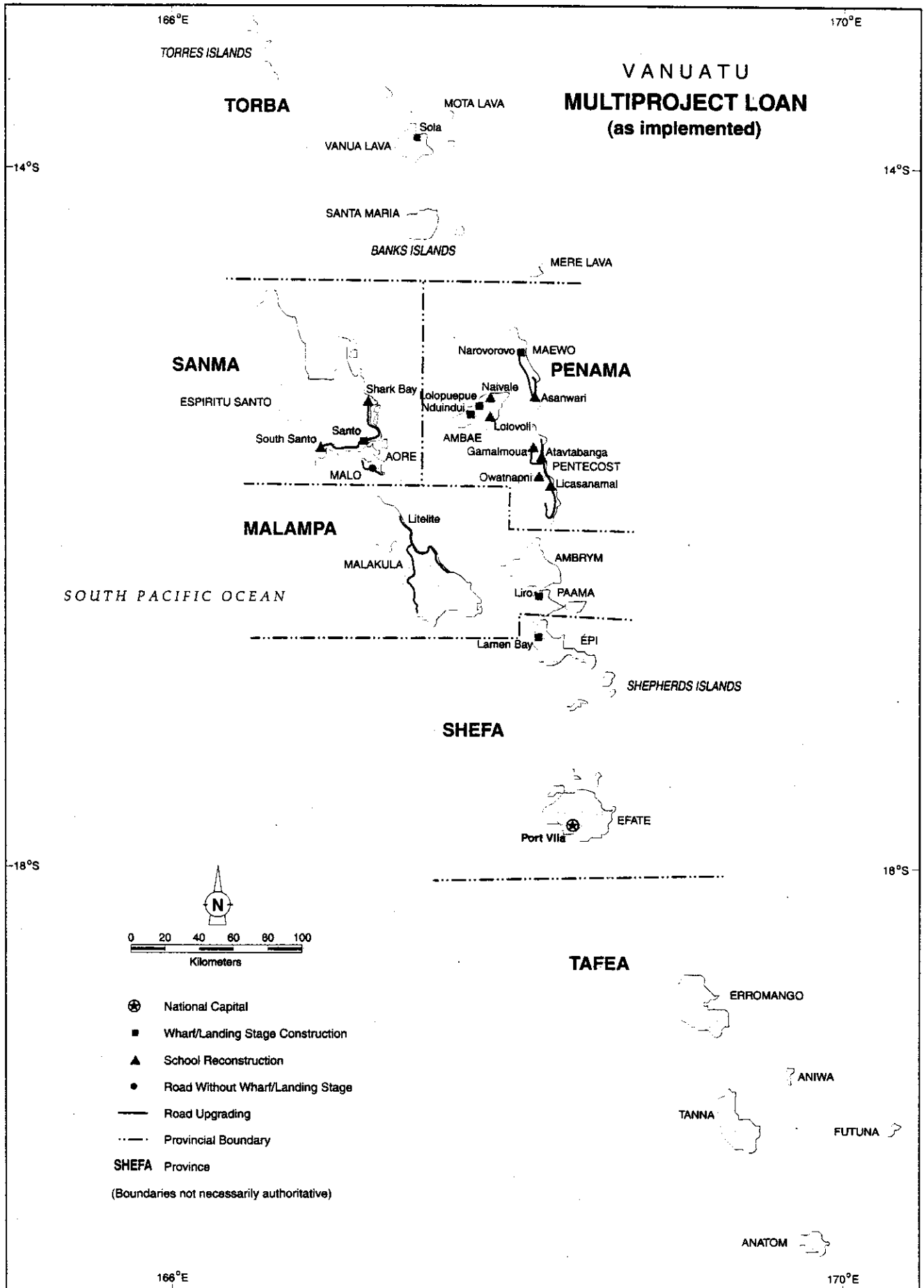
^a Equivalent to Special Drawing Rights (SDR)2,822,000 at the time of loan approval.

^b Equivalent to SDR2,806,362.51 at the time of loan closing.

^c On 3 June 1993, \$22,337.69 was cancelled from the loan amount.

^d n.c. = not calculated.

^e Conducted in conjunction with the Fact-finding and Inception missions for the Santo Port Project.



I. HIGHLIGHTS

1. **Objectives and Scope.** The Project aimed to improve transport facilities for the collection and export of copra and for other purposes, such as providing outer islands with improved access to social and administrative services; and reconstruct and upgrade school buildings destroyed by cyclones. The Project comprised (i) construction of three wharves and three landing stages, (ii) improvement of roads leading to these and other facilities, (iii) preparation of detailed engineering design for Santo Port, and (iv) reconstruction and upgrading of school buildings destroyed by cyclones in 1985.

2. **Cost, Financing, and Schedule.** The actual cost was \$7.01 million, comprising a foreign exchange cost of \$6.19 million and a local currency cost of \$0.82 million equivalent; \$3.7 million of the foreign exchange cost was financed from the Asian Development Fund (ADF), and \$2.49 million was cofinanced by the International Development Association (IDA). The proceeds of the Bank loan and the IDA loan were fully utilized; only a small undisbursed loan balance of \$0.022 million was cancelled. The Project was virtually completed in November 1992 as against the expected completion date of mid-1989.

3. **Implementation.** The Project was implemented with a minor change in scope, after a delay of four years. Wharves and landing stages were constructed in six outer island locations, but design or construction problems affect the proper use of five of the six facilities. The cyclone-damaged schools have been renovated and upgraded. The roads were constructed by the Public Works Department (PWD) using equipment and materials purchased with Project funds. Under two technical assistance (TA) projects, consulting services were provided to PWD for subproject appraisal, engineering design, and construction supervision. The quality of the services and the performance of the consultants were unsatisfactory. A separate team of consultants was also engaged to prepare detailed Santo Port engineering design. Some design deficiencies also surfaced during the implementation phase of the Santo Port Project, requiring the redesign of the wharf deck. In addition, some maintenance problems has affected the operating performance of wharves, the landing stages, and the roads.

4. **Institutional Aspects.** PWD was the Executing Agency (EA) for the Project. The Ministry of Education (MOE) and the Department of Local Government (DLG) had also important roles to play. A Project Coordination Committee was created to assist the Project Coordinator, the Director of PWD, in carrying out feasibility studies and supervising procurement activities. For actual work, however, the Committee and the EA relied on consultants. Supervision of the consultants' work was minimal. The Government plans to establish a subdepot on Ambae Island for regular maintenance of two of the road subprojects; however, there appears to be no progress in providing maintenance for other roads or for the wharves and landing stages. The cost recovery scheme was not implemented. Local Government Councils (LGCs) were to own the wharves and landing stages upon their completion, but LGCs have not taken possession, perhaps because most of the facilities are not operational and there are no sources of revenues for their operation and maintenance. The ownership of the wharves and landing stages at this stage is unclear.

5. **Environmental Impact.** The impact of the Project on the environment is minor.

6. **Cost/Benefit Assessment.** Since five of the six wharves and landing stages are either not used or seldom used, the actual benefits from them have been minimal. Even the remaining one is being used only at about one half to one third of the estimated volume of cargo. There is no reason to expect that the situation will improve in the future. The number of vehicles using the roads either for transporting copra or other purposes is small and has not increased as predicted in the Subproject Appraisal Reports (SARs). The reestimated economic internal rate of return (EIRR) for each of the six systems of wharves and landing stages together with the associated road network, including the Lolopuepue system which is being used, is negative. The Santo Port bypass road and the school reconstruction components are considered to be economically viable. Regardless of the utilization issue, Project benefits at appraisal were exaggerated.

7. **Overall Performance and Sustainability.** All subprojects other than the schools are either not operating or underutilized. This is reflected in disappointing EIRRs, negative for all the transportation components accounting for about 75 percent of the Project cost. The objective of reconstructing and upgrading school buildings destroyed by cyclones has been met. The quality of the engineering design for the Santo Port wharf was not satisfactory. On the basis of the above considerations, the Project is rated unsuccessful.

8. **Feedback.** The Project experience points to the need to improve the quality of appraisal during the processing of a project and subprojects, improve consultant selection, and intensify the supervision of consultants' work by the EA and Bank missions. This is particularly important in countries where institutional capacity is inadequate and construction sites are remote. The Project experience also brings into focus the role of community participation in the siting of wharves and landing stages, the appropriate standard for school buildings, and the use of local materials in school construction. Another issue requiring consideration by the Government is the priority to be given to regional dispersal objectives as against growth objectives. In theory, both objectives can be met simultaneously, but in reality achieving both objectives is difficult in countries with severe fiscal constraints and in the early stages of economic development.

II. BACKGROUND

A. Rationale

9. The rationale for the Project was based on the need to improve internal transportation facilities in most of the copra-producing islands and the interisland shipping facilities. The traditional way of collecting copra involves the use of some 150 anchorages by interisland ships and the use of lighters to collect copra off beaches. This was seen as being slow and costly. The Project was, therefore, to provide wharves, landing stages, and access roads to reduce such inefficiencies. In addition, the Project would provide the outer islands with improved access to educational, health, and administrative services. Many schools on the outer islands were heavily damaged or completely destroyed as a result of two major cyclones in 1985, forcing the Government to relocate students in temporary sheds or to transfer them to other schools. The school buildings destroyed by the cyclones were to be reconstructed and upgraded.

B. Formulation

10. The Project was formulated during the visit of a Fact-finding Mission to Vanuatu in July 1985. There was no Bank TA to prepare the Project, but a study on the development of wharves and landing stages was prepared in 1982 under the assistance of the Overseas Development Administration of the United Kingdom (UK).¹ The project was jointly appraised by the Bank and a mission from IDA.

C. Objectives and Scope at Appraisal

11. The Project aimed to facilitate the collection and export of copra and other agricultural products through the provision of facilities for their collection and transport; improve the distribution of inward general cargo in several key outer islands; provide the outer islands with improved access to educational, health, and administrative services; and reconstruct and upgrade school buildings destroyed by cyclones. The Project comprised (i) construction of three wharves and three landing stages at six sites, (ii) improvement of about 62 kilometers (km) of existing roads leading to those sites and construction of a short bypass road at Santo Port, (iii) preparation of detailed engineering design for Santo Port, and (iv) reconstruction and upgrading of school buildings destroyed by cyclones in 1985.

D. Financing Arrangements

12. The Bank provided a loan of \$3.0 million equivalent in Special Drawing Rights (SDR)² on 5 December 1985 out of its ADF to cover part of the foreign exchange requirement, and IDA provided \$2.0 million equivalent to meet the balance of the foreign exchange requirement. The Borrower was the Government, and it financed the local currency cost estimated at \$1.4 million equivalent at appraisal. A TA³ was associated with the Project to prepare SARs and help implement the Project through the preparation of detailed engineering design, aspects of construction supervision, and a study assessing levies or tariffs for the use of wharves and landing stages.

E. Completion

13. The Project was completed in November 1992 (expected completion date was mid-1989). The Project Completion Report (PCR) prepared by the Bank's South Pacific Regional Office in November 1993 discusses the design, scope, implementation, and operational aspects of the Project, and provides detailed Project information. The PCR is a straightforward document and concluded that (i) the objective of reconstructing and upgrading the schools was met; (ii) the objectives relating to the engineering design for the Santo Port wharf and the construction of roads and purchasing the construction and maintenance equipment were partly met; and (iii) the objective of constructing the wharves and landing stages was not met. The PCR provides detailed findings regarding the construction, use, and disuse of the wharves and landing stages, and the reasons thereof. These analyses remain

¹ The study was carried out by Posford, Pavry and Partners, UK, in association with Peat, Marwick, Mitchell and Co., UK.

² SDR2,822,000.

³ TA No. 726-VAN: *Appraisal of Subprojects under Multiproject Loan* for \$270,000, approved on 5 December 1985.

largely valid to this day. The PCR, however, did not provide much data on the use of roads, and no economic analysis was carried out. Therefore, the assessment of the subprojects was done in terms of prima facie evidence rather than in terms of analysis of cost and benefits.

F. Ex-post Evaluation

14. This Project Performance Audit Report (PPAR) focuses on the findings of a Postevaluation Mission (PEM) during August 1996, and includes an assessment of the Project's effectiveness in achieving its objectives and generating benefits, and of the sustainability of the operations. The PPAR relies, where applicable, on information compiled in the PCR, which the PEM found to be not only factually correct in most parts but also objective. Other reference documents are the Appraisal Report (AR) and material in Bank files; and discussions with staff members of the Bank, the Executing Agency, and other agencies of the Borrower. The PEM found the data provided by PWD on road traffic and maintenance and by DLG and Vanuatu Commodity Marketing Board on copra trading and other aspects of the Project invaluable. Copies of the draft PPAR were given to the Borrower, the EA, and Bank staff concerned for review and comments. Comments received were taken into consideration in finalizing the report.

III. IMPLEMENTATION PERFORMANCE

A. Design

15. Even at the time of Project appraisal in 1985, concerns were raised within the Bank about realizable benefits and the marginality of EIRRs for outer island wharves, landing stages, and the roads. Some doubted an important assumption underpinning the economic viability of the Project: copra production would increase as a result of the Project. The economic appraisal of the wharf, landing stage, and road component was based on the assumption that the current low level of copra traffic in the outer islands was due mainly to bottlenecks in the transport system and that removal of such bottlenecks by the Project would result in higher copra production. It was assumed that the Project would cut down transportation costs for copra and thus would stimulate additional production because of the price elasticity of copra. It was further assumed that once wharves and landing stages were built on the outer islands, almost all copra would be exported through the wharves and stages thus replacing the pre-Project practice of using anchorages, beach landing, and lighterage. These and other key assumptions had no firm basis and turned out to have been unrealistic. A full discussion is in para. 44.

16. It was also assumed that the Government would be able to appraise individual subprojects and supervise the construction of Project facilities with the assistance of consultants. Apparently, there was no systematic assessment of the institutional capability to carry out such tasks at the time of appraisal. The lack of such institutional capacity turned out to be a critical problem throughout the appraisal, engineering design, and construction supervision of the subprojects. Consultants were provided through TA No. 726-VAN, which was associated with the Project, and a free-standing TA¹ to PWD to augment the capacity of the Executing Agency, but they were not sufficient. What was obviously required was not only

¹ TA No. 901-VAN: *Institutional Strengthening of Public Works Department*, for \$325,000, approved on 29 September 1987.

consultants to carry out specified tasks but also the capacity of PWD to supervise them, and close supervision of the Project by the Bank.

17. Being a multiproject, it should have been possible to substitute subprojects, but the flexibility provided under the Project was not fully utilized. There was no substitution of subprojects, but a minor change in scope, using loan savings, resulted in the addition of roads on Malo Island.

B. Contracting, Construction, and Commissioning

18. Bid invitation documents for the outer island wharves and landing stages were issued in November 1987, and the construction contract was awarded in June 1988 after the Bank's international competitive bidding (ICB) by prequalified contractors. The quality of actual construction raises some doubts whether the facilities were constructed as designed. It is noted in the PCR that incorrect materials were used in some cases (i.e., ungalvanized wire baskets at the Sola landing stage and alleged use of undersized rubble at Lamén Bay), and it is not clear whether the contractor fully met the responsibility for removal of navigational hazards. The inability to confirm whether the wharves and landing stages were constructed at the location specified in the design is another fundamental problem. Several wharves and landing stages do not reach deep water. The absence of as-built drawings makes it impossible to determine whether design errors or construction errors were involved. The domestic contractors who renovated and upgraded the school facilities and the school furniture suppliers performed satisfactorily although there were some delays because of shipping problems and shortage of imported materials (hardware and paint materials).

19. The roads were constructed by PWD using equipment and materials purchased with Project funds. Some small subcontracts for local labor were awarded to small domestic construction firms or villages. They performed well, especially those that used labor-intensive methods. Some work was, however, delayed as a result of bad weather and later arrival of construction equipment to clear vegetation from road routes. Contracts for upgrading of school facilities were awarded to prequalified local construction firms following local competitive bidding procedures. Road construction equipment and school furniture were purchased on the basis of international shopping.

20. TA No. 726-VAN provided consulting services to PWD in April 1986 for the preparation of feasibility studies, including engineering, and economic and financial aspects of all subprojects; layout plans, engineering designs, and specifications; and aspects of construction supervision. The PEM supports the assessment of the PCR that the performance of the consultants was not satisfactory. In the same month, a PWD advisor was appointed as construction supervision consultant under TA No. 901-VAN. Construction supervision was carried out through occasional site visits by PWD staff and/or the consultant under TA No. 901-VAN. PWD admits that such visits were infrequent and supervision was inadequate. The questionable construction quality and the lack of documents related to actual construction mentioned in para. 18 underscore the inadequacy of construction supervision.

21. A separate team of consultants was also engaged to prepare detailed Santo Port engineering design. They started work in September 1986, about six months later than scheduled, and completed the actual work in one year instead of six months provided for in the AR. The detailed engineering design was used in the appraisal and implementation of

Loan No. 843-VAN(SF): Santo Port.¹ Some problems surfaced during the implementation phase of the project. The wharf deck had to be redesigned. This necessitated a supplementary loan (Loan No. 1080-VAN(SF))² to complete the construction of the wharf. The wharf deck is in good condition now, but there are structural damages to the hardstand area. The subsoil condition is currently being tested with a view to redesigning the hardstand area. The Government is said to be considering legal action to recover losses incurred and the cost of remedial works.

C. Organization and Management

22. PWD was the EA for the Project. MOE was involved with PWD in the renovation and upgrading of school facilities and was responsible for the procurement of school furniture. DLG was to play a role in the construction and maintenance of the Project facilities. A Project Coordination Committee, comprising representatives of PWD; National Planning and Statistics Office (NPSO); Ministry of Finance; Ministry of Transport, Communications and Public Works; Department of Ports and Marine; MOE; and DLG, was created to coordinate activities of the agencies involved in carrying out feasibility studies and supervising procurement activities. The Project Coordinator was the Director of PWD. However, the Committee and PWD relied heavily on the consultants provided under TA No. 726-VAN and TA No. 901-VAN for the preparation of feasibility studies, engineering design and bid invitation document, and the supervision of the construction of the outer island wharves and landing stages. The organizational arrangements for the implementation of the Project were appropriate, but PWD lacked the capacity to effectively supervise the work of the consultants. Some individual members of the Coordination Committee raised important issues regarding the quality of construction, economic viability, and the locations of wharves and landing stages, but neither PWD nor the Bank gave serious thoughts to such concerns and no action was taken to comprehensively review the economic rationale or Project design.

D. Actual Cost and Financing

23. The estimated Project cost at the time of appraisal was \$6.4 million equivalent, of which the foreign exchange cost was \$5.0 million and the local currency cost was \$1.4 million equivalent. The Bank was to finance \$3.0 million equivalent in SDR; IDA, \$2.0 million equivalent in SDR; and the Government, \$1.4 million equivalent in local currency. The actual cost was \$7.01 million comprising a foreign exchange cost of \$6.19 million and a local currency cost of \$0.82 million equivalent. Of the foreign exchange cost, \$3.7 million was financed from the ADF, \$2.49 million was cofinanced by IDA, while the Government incurred a local currency expenditure of about \$0.82 million equivalent, which is about \$0.58 million less than the amount envisaged at appraisal. The proceeds of the Bank loan and the IDA loan were utilized, except for an undisbursed loan balance of \$0.022 million. A summary of the appraisal estimates and actual costs is given in Appendix 1.

¹ Approved on 29 September 1987, for the amount of \$5.75 million.

² Approved on 19 March 1991, for the amount of \$3.4 million.

E. Implementation Schedule

24. The loan was approved on 5 December 1985, but loan effectiveness did not take place until 19 September 1986. The Project was originally scheduled to be physically completed by mid-1989. Actual completion was in November 1992 after a total implementation period of six years and three months. A factor affecting timely completion of the Project was cyclone Uma that hit Vanuatu on 7 February 1987, causing serious damage to infrastructure and the buildings on the main island of Efate. PWD's personnel, equipment, and other material resources were diverted to rehabilitation work, which delayed the Project for about 18 months. The Bank agreed to the diversion of resources for post-disaster rehabilitation. Other delays during implementation were caused by lack of suitable vessels to transport road construction equipment and material to the outer islands. In addition, the difficulty encountered by PWD in locating suitable aggregates for road construction on some islands also contributed to other delays of 6-8 months. Diversion of PWD resources to other construction programs also added to the total delay of 8-10 months.

F. Technical Assistance

25. The consultant for TA No. 726-VAN was fielded in April 1986 and the final feasibility study report was submitted in November 1986. Draft bidding documents on an ICB basis were submitted for construction of the outer island wharves and landing stages on 20 July 1987, about six months later than scheduled. The problem with the feasibility study was not so much its timely completion but its quality. The consultant apparently did not anticipate the problems caused by relocation of wharves and landing stages away from the original locations recommended in the Posford Report (see para. 10). The changes in the Sola and Liro landing stages resulted in inadequate water depth and navigational hazards. Some key data used were incorrect and the assumptions regarding the utilization of Project facilities and benefits were overly optimistic. Some methodological errors in estimating benefits were also involved (see para. 44). The changes in the wharf and landing stage sites should have alerted the Bank to potential problems, and the marginality of EIRRs and questionable assumptions should have required the Bank to review the economic viability of the subprojects. However, the Bank's reviews were confined to routine and covenant matters. Construction supervision and documentation regarding actual construction were also inadequate.

G. Compliance with Loan Covenants

26. The following conditions and covenants of the Loan and Project Agreements were not complied with:

- (i) provision of self-insurance by the Government;
- (ii) construction of the storm-damaged Narovorovo wharf;
- (iii) establishment of appropriate wharf tariffs; and
- (iv) regular maintenance of roads.

27. There is, however, a reason why the Government did not rebuild the Narovorovo wharf: the Government doubted that completion of the storm-damaged wharf is

justified from the point of view of economic benefits regardless of the availability of insurance. NPSO questioned the validity of the EIRR indicated in the SAR. The Project Coordination Committee recommended to the Minister of Finance that a waiver of the covenant on rebuilding the Narovorovo wharf be sought from the Bank. Imposition of user charges also appears somewhat academic because most of the facilities are not in use and the cost of collecting charges might be higher than the charges themselves. Furthermore, the rationale for user charges was weak because copra producers and shippers preferred traditional anchorages and landing sites to use of the wharves and landing sites provided under the Project.

28. There is, however, no prima facie justification for not maintaining the roads regularly except that the cost of maintaining roads in islands with no vehicles or with only a few vehicles has to be weighed against the benefits. Equipment purchased under the loan is not available to the outer islands, and road maintenance is limited to what can be done by manual methods. The cost of shipping major equipment back to those locations for road maintenance is out of proportion to the scale of the Government's expenditure on infrastructure. The Government plans to establish a subdepot on Ambae Island for regular maintenance of two of the road subprojects; however, there appears to be no progress in providing maintenance for other roads or for the wharves and landing stages. The Bank should have reviewed the rationale for and relevance of these covenants, rather than insisting on their compliance merely because they were covenants.

IV. PROJECT RESULTS

A. Operational Performance

1. Utilization of Wharves and Landing Stages

29. Of the six wharves and landing stages built, only one at Lolopuepue is being used regularly. Other facilities are either not used at all or seldom used. The extent of the present usage and the reasons why they are not being used require a review. At Lolopuepue, the estimated volume of outloading is about one third to one half of the volume estimated at the time of appraisal (2,000 tons of copra). The reasons why other facilities are not being used vary.

30. In the Sola landing stage at Vanua Lava Island, the major problem is its location in shallow water behind the reef line. At low tide, it is dry. At high tide, approaching the landing stage is difficult because of the presence of coral heads. The Posford Report had recommended a wharf with berthing face to be located in deep water and causeway to be lined up with the common direction of wave motion. That was not followed. A part of the justification for a wharf in 1982 was the proposal to develop a forestry industry. The SAR found that a wharf at the location proposed in the Posford Report was not justified because logging activities were not being carried out. What was actually built was a landing stage, but its length was not sufficient to reach deep water. The PEM was not provided with a satisfactory explanation why it was built in such a manner. One explanation is budgetary constraints. Another possible explanation is that the landing stage was not built according to design. Since there is no as-built drawing, this possibility cannot be ruled out.

31. The Narovorovo wharf on Maewo Island was nearly completed when it was damaged by a storm. The Government did not fully restore it as a wharf for reasons explained in para. 27. The PEM is sympathetic with the Government's view for reasons discussed in para. 46. The location of the wharf also was changed three times. The wharf is located about 50 meters (m) east of the location proposed by the Posford Report and thus away from the protection offered by Bastion Rock. Again, the reason for this shift is not clear, but the same reasons (cost savings and not building it according to design) are suspected. The location changes made the wharf more vulnerable to waves and storms.

32. The Nduindui wharf on Ambae (Aoba) is rarely used because of insufficient water depth at low tide and high sea swells common on the shores of this island. Another reason is that the deck level is too high. Coastal ships continue to use a harbor landing 200 m east for loading copra and for trading. It is noteworthy that the location of the wharf in this case did not change from that originally proposed in the Posford Report. Again it is not possible to determine whether the error was in design or construction because as-built drawing is not available.

33. The Liro landing stage is not used partly because there is no truck on the island to transport copra from farms to the landing stage and partly because of the presence of some hazardous rocks and coral heads. The landing stage should have been extended beyond the rock in front of the structure. Again, it is difficult to tell whether this was a design error or construction error. Presently, most copra producers prefer to carry their copra to the nearest beach because most villages and coconut stands are on the coastal strip near beach landings. Shipowners also do not show a significant preference for using the landing stage over beach landing. The location of the landing stage changed from that recommended by the Posford Report to that suggested by the Local Council. In this case, the new location is considered suitable: the seabed is more solid than the sandy beach near Liro village as recommended by the Posford Report. However, the location is not optimal from the point of view of delivering copra.

34. The Lamén Bay wharf is rarely used partly because of hazardous rocks and coral outcrops and partly because of insufficient water depth in front of the wharf. Ships' boats could use it but do not because the wharf is too high. The wharf showed various cracks and structural damages during inspection by the PCR Mission. Improper construction was mentioned. According to a 1996 PWD report, it was damaged in the 1993 cyclone. The vehicle access ramp to the wharf was washed away, leaving a gap of 7-10 m between the land and the wharf. Again the location shifted three times. The present causeway is shorter than in the original design, but it is difficult to find out whether the change was due to the desire to reduce the cost or improper construction.

2. Utilization of Roads

35. In all except two cases, the road improvement subprojects are integral parts of wharves and landing stages. The Project upgraded to all-weather roads the fair-weather tracks leading to the six wharves and landing stages mainly to facilitate the transport of copra and other agricultural products. Exceptions are the Santo Port bypass road and new roads added in November 1990 on Malo Island, utilizing expected loan savings from the Project. There has not been a periodic survey of traffic volume on these roads, but PWD made a one-time survey and estimate, prior to the PEM's arrival. In all roads except on the Santo Port bypass road,

traffic volume is extremely low, ranging from no vehicle to 50 vehicles per day. At the time of subproject appraisal, a healthy increase in car population on the islands was projected. The projected traffic volumes on the Project roads have not been realized.

36. On the entire island of Vanua Lava, there are only three trucks and the estimated traffic volume on the road to the Sola landing stage is only three vehicles a day according to a PWD survey. The Kereimbei-Narovorovo road on Maewo Island carries 14 vehicles a day. The road on Ambae Island (from Devils Rock through Walaha to Nduindui) has a traffic volume of 2 vehicles a day on the stretch between Devils Rock and Walaha and 12 vehicles a day on the Walaha-Nduindui stretch. The daily traffic count on the road from Lolowai to Lolopuepue is estimated at less than 12 vehicles. There is no vehicle on Paama Island on which the Liro landing stage is located. The road between Cape Foreland through Ringdove and Lamen Bay wharf on Epi Island carries 12-24 vehicles a day. About 50 vehicles use the roads on Malo Island each day. See Appendix 2 for further information on the conditions and use of the roads.

37. The Santo Port bypass road on Espiritu Santo is a well-traveled urban road, with an estimated 2,161 vehicles a day. The former road was adequate from the point of view of traffic, but the bypass was built because the pre-Project road, which passes through Santo Port, presented security risk to the port and to, a certain extent, the road traffic interfered with the operation of the port. There is no record on incidence of theft or road conditions prior to the construction of the bypass.

3. Utilization of Schools

38. The nine elementary schools comprising 9 classrooms, 13 staff housing units, 3 bathrooms, and 1 dormitory have been built and are being used as intended. Rebuilt at a cyclone-proof standard, they have successfully withstood the test of cyclones that passed through the islands since their construction. To this extent, the objective of this subproject has been met.

B. Institutional Development

39. It was envisaged that LGC would take over the responsibility for the operation of the outer island wharves and landing stages. No such transfer of ownership took place. It was also envisaged that levies or tariffs would be established under the Project. This practice too was not institutionalized. No other specific institutional agenda or strengthening measure was incorporated in the Project design. There is no evidence that the Project experience has strengthened PWD or other agencies concerned, and they are aware that the Project failed to achieve its purposes. From this experience, they appear to have learned some lessons.

C. Financial Performance

40. The Project has not generated any cash flow for the Government although recovery of the cost of the wharves and landing stages was envisaged at the time of appraisal. The SAR for each wharf and landing stage included tariff studies and proposals, but the Government has not implemented them. Since five of the six wharves and landing stages are not being used and even the sixth wharf is not used as heavily as estimated at appraisal, the Government may have decided against user charges. Shipowners have also reportedly

indicated that they would stop using the Project wharves and landing stages, if charges were introduced. The Government has subsequently imposed registration fees on interisland shipowners. Whether this has any relationship to the costs of operating and maintaining wharves and landing stages is not clear, but the rationale for and practicality of imposing user charges are weak. A study on Vanuatu interisland shipping carried out in 1995 under TA No. 1525-VAN casts doubts on the idea that using wharves saves enough costs to rationalize paying any direct user charges. In fact, the study indicates that the cost of lightering freight and passengers to ships at the outer islands is about one third of the cost of using jetties, and that it is unlikely that jetties are justified except in locations where traffic is high and where geographic conditions provide no alternative. Under the circumstances, indirect charges appear a practical means of cost recovery. None of the facilities has been taken over by LGC for operation. It is unlikely that such transfer will take place because these facilities are not operational except in one area, and there is no source of funds to cover the cost of operation. PWD is responsible for their maintenance, but there is no regular maintenance of these facilities.

D. Economic Evaluation

41. The AR estimated the EIRR for each of the wharves and landing stages, together with the associated road network. The road building equipment used in the construction of the roads was allocated to the road costs for the purpose of economic analysis. Together, they account for 70 percent of total Project costs. However, no quantitative economic analyses were conducted of the outer island schools, the Santo Port bypass road, and the Santo Port design study at the time of appraisal.

42. The main benefits of the port and transport facilities envisaged and quantified in the SARs were increased copra production in the outer islands and savings to the farmers because of lower transportation costs, savings in ship turnaround time at the outer island because of the use of wharves and landing stages instead of traditional anchorage, reduced damage to produce, and savings to road users from improved roads such as vehicle operating cost (VOC) savings. On the average, the distribution of the benefits estimated at subproject appraisal was 50.9 percent from producer surplus, 1.5 percent from reduced damage to produce, 22.3 percent from faster ship turnaround time, and 25.3 percent from road user savings. Two kinds of producer surplus were envisaged: surplus on the present level of production and additional surplus induced by lower transportation costs.

43. The actual production of copra in the catchment areas of the Project declined rather significantly from about 45,000 tons before the Project in 1990 to about 30,000 tons after the Project in 1995. In fact, copra production in the catchment area declined faster than in other areas of Vanuatu. There has also not been appreciable savings in the transportation costs since five of the six wharves and landing stages are either not used or seldom used. The number of vehicles using the roads either for transporting copra or other purposes is small and has not increased as predicted in the SARs (see para. 36).

44. The PPAR follows the Bank's analytical framework for economic analysis of projects. The reestimated EIRR for each of the six systems of wharves and landing stages and road network is negative. This is also true of the Lolopuepue system, which is being used at a lower level than projected at appraisal. The EIRR for the Malo road is also negative. The Santo Port bypass road is considered economically viable when the benefits of increased port

security are considered in addition to more conventional benefits associated with road improvement such as savings in the VOCs and passenger time. See Appendix 3 for the recalculated EIRRs and assumptions for them.

45. The EIRRs at postevaluation are so much lower than the estimates at appraisal not only because Project facilities are underutilized but also because the benefit at appraisal was exaggerated. A careful review of the economic analysis undertaken during subproject appraisal indicates that there were some unreasonable assumptions as well as methodological errors. For example, ship cost savings were overstated by a factor of 3; and road user savings were overstated by a factor of 4 to 14 because of optimistic assumptions with regard to the number of vehicles, VOC savings rate, and vehicle road usage. Shipping cost savings were double counted as transportation cost savings and as producer surplus on the existing level of copra production. There was no basis to assume that a supply elasticity of copra existed. Supply elasticity was not only assumed but also applied wrongly to calculate producer surplus from induced production. This overstated producer surplus from induced production by a factor of six to nine. The EIRRs for these subprojects as presented in the SARs were only marginally above the threshold level of 10 percent at appraisal, but a proper economic analysis reflecting one or more of such errors or unrealistic assumptions would have proven these subprojects not viable. These points are discussed more fully in Appendix 4.

46. The benefits of rebuilding and upgrading the cyclone-damaged schools to better standard school buildings cannot be fully quantified. The most significant quantifiable benefit is the avoided cost of replacing lower cost buildings of traditional standard every time a major cyclone hits the island. An EIRR of 4.2 percent can be achieved if it is assumed that traditional school buildings would be damaged every five years and that the new school buildings would withstand damage for 20 years. However, there are not enough data to substantiate the above assumptions. Furthermore, it appears possible to build school buildings strong enough to withstand cyclones with the use of local materials at lesser costs (see para. 55). The PEM, however, believes that the intended benefits of the school subproject have been realized although there might have been a less costly alternative. Delays lasting between two and four years in total in rebuilding school buildings, mostly in awarding contracts, reduced the educational benefits.

47. The detailed engineering design for Santo Port was used in the expansion of the port, but the quality of the design was questionable as discussed in para. 21. Hence, benefits from this subproject were not fully realized.

E. Socioeconomic and Sociocultural Results

48. Since most transportation facilities are either not being used or seldom used, the socioeconomic impact of the Project is minimal. However, some positive socioeconomic impacts exist. The improved roads in the outer islands have contributed to better communication and access to airports, educational facilities, and other public facilities. The impact of the roads on new land development and pedestrian traffic, whether intended or not, appears to have been minimal, because the Project improved existing roads rather than provided new roads. The schools provided under the Project also include dormitories and teachers' housing. This has reduced the travel costs and time for students and has made it easier to recruit teachers from distant locations.

F. Women in Development

49. As the Project was not designed to promote women in development, it does not have any remarkable impact on women.

G. Environmental Impact and Control

50. The PPAR confirms the assessment of the PCR that the Project's impact on the environment has been minimal, as most of the roads were constructed over existing roads and tracks, and the wharves and landing stages are small structures. The wharves and landing stages were constructed over existing rocky portions of the shore, usually on solidified lava flows, and damage to the ecology is insignificant. There have been buildup and depletion of sand adjacent to the Lamén Bay wharf, but this is believed to be caused by storm action rather than littoral sand drift. The reconstruction, renovation, and upgrading of school facilities were done on existing school sites, with minimal environmental impact.

H. Gestation and Sustainability

51. Most wharves and landing stages are not being used or maintained. Since there is no cost recovery and the facilities have not been taken over by LGC, ownership of the facilities is undetermined. Sustainability of the facilities currently in use is also not assured. The roads are being repaired when there are major damages, but are not being maintained on a regular basis. The school buildings and furniture are generally well maintained.

V. KEY ISSUES FOR THE FUTURE

A. Multiproject Loan and Use of Consulting Services

52. A multiproject loan is a practical loan instrument in a small island country such as Vanuatu. However, it requires Government ability to appraise individual subprojects for financing under the Bank loan. Although consultants are usually engaged for subproject appraisal and project implementation as in this Project, their competence and integrity cannot always be assumed. Therefore, the effective use of consultants requires the capability of the government to supervise them and critically review appraisal results. The Project experience points out that this was not the case. In addition, the Bank did little to augment the Government's limited capability and resources. The Project experience also points to the need to strengthen the consultant selection process although the root cause of the failure experienced in the Project goes beyond the issue of consultants' competence. Subproject appraisal appears to have been overwhelmed by the desire to proceed with the indicative subprojects identified rather than to go through a laborious redesign process. Although a multiproject is supposed to provide flexibility in allowing substitution and addition of subprojects after loan approval, there was no substitution of subprojects in this Project except the addition of one road. In countries with limited appraisal capability, the appraisal of indicative subprojects may need to be more rigorously carried out by Bank staff during the loan processing, and an indicative list longer to make it easier to find substitute subprojects.

B. Regional Development Priority

53. The underlying objective of the Project was the development of the outer islands. The first and second National Development Plans of Vanuatu aimed to "promote balanced regional and rural growth by assisting in the realization of the economic potential of all constituent areas." The attainment of this objective involved "decentralization of economic activity by the creation of regional growth centers throughout the country."¹ While such objective and strategy were popular during the period, they often led to rationalize otherwise questionable or marginal projects in the country. An issue for consideration by the Government and the Bank is the relative priority to be given to growth versus regional dispersal objectives. In theory, both objectives can be met simultaneously, but, in reality, emphasis on decentralization in countries with severe fiscal constraints and in the early stages of economic development may entail trade-offs and compromises. This issue is particularly important in Vanuatu because of the current fiscal constraints and the country's dependence on foreign aid for practically all capital investments.

C. Appropriate Strategy for Increasing Copra Production

54. The Project experience casts doubt on the effectiveness of improving transportation infrastructure to increase copra production. Copra producers prefer to use beach landings. Therefore, improved wharves and landing stages do not automatically lead to reduced transportation costs. Even if transportation costs can be saved by providing better transportation facilities, the impact of such cost savings on copra production is uncertain. The strong supply elasticity of copra has not been proven. Area development, provision of new roads to inaccessible areas, and agricultural support services may prove to be more effective in increasing copra production than the approach taken in the Project.

D. Appropriate School Building Standards

55. Using a cyclone-proof standard in rebuilding schools is *prima facie* justified although more systematic research is needed regarding appropriate school building standards. It may be possible to construct cyclone-proof school buildings by using less expensive indigenous materials. This may require a simple experiment by the Government, such as bolting down posts to concrete foundation.

E. Use of TA Grant for Appraisal, Engineering Design, and Construction Supervision

56. When a feasibility study is combined with engineering design and construction supervision and is awarded to a single consulting firm, as in the case of this Project, there may be inadequate checks and balance. Under such circumstances, subproject appraisal could become a mere formality for rationalizing the initial list of subprojects and moving ahead to engineering design and construction supervision. While some minor changes were made, no radical alternatives or redesigns were considered. This may be particularly true under the Bank's TA grant, which is for a fixed amount. Having been recruited under TA, the consultants were selected and supervised by the Bank. The Bank must share the responsibility in the poor performance of the consultants.

¹ See "First National Development Plan 1982-1986."

VI. CONCLUSIONS

A. Overall Assessment

57. The Project has failed to achieve the objective of reducing transportation costs and increasing copra production, but the objective of reconstructing and improving the schools destroyed by cyclones was met. The cost of school reconstruction comprised 20 percent of the total Project cost. The quality of the engineering design for the Santo Port wharf was not satisfactory. Copra growers continue to use beach landing and traditional anchorages. The roads, whether for transportation of copra or other purposes, are poorly utilized. The investment made in the transport facilities, on the whole, has a disappointing negative EIRRs. Investment in such facilities comprised about 75 percent of the Project cost. On the basis of the above consideration, the Project is rated unsuccessful.

B. Lessons Learned

58. In a small island country with limited institutional capability such as Vanuatu, a more rigorous preparation and appraisal of multiprojects is needed because the Government may not be able to provide appropriate supervision over appraisal of subprojects. In such circumstances, especially when some basic assumptions need to be questioned, necessary fields of expertise should be included in loan administration mission for a comprehensive review of Project design, benefits, and rationale.

59. Construction supervision by the Government should be improved. In situations where construction sites are remote and accommodation facilities are inadequate, relying on international consultants to carry out on-site supervision may be costly and impractical. As-built drawings need to be prepared.

60. Inadequate utilization of public services and infrastructure facilities is a common cause of project failure in a small island country with a low level of population. A more critical analysis of the likely demand is required if the quality of the project is to improve in such island countries. The tendency to exaggerate the real demand in such a situation should be resisted.

61. For the siting of wharves and landing stages, careful consultation with communities is needed.

C. Follow-up Actions

62. Now that most wharves and landing stages created under the Project are not being used, the feasibility of transferring these facilities to either the private sector or the communities in which they are located should be investigated. They may be in the best position to decide whether incremental investment in, for example, clearing coral heads and extending the wharves and landing stages to deeper water is justified. In this connection, an issue to be studied is whether a conducive regulatory environment is in place for the private sector to operate wharves and landing stages.

APPENDIXES

Number	Title	Page	Cited on (page, para.)
1	Appraisal Estimates vs. Actual Project Costs	17	6,23
2	Utilization of Roads	18	10,36
3	Recalculation of the Economic Internal Rates of Return	20	12,44
4	Economic Analysis Methodology and Assumptions	33	12,45

APPRAISAL ESTIMATES VS. ACTUAL PROJECT COSTS
(in current prices: \$'000)

Components	Estimated			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
Wharves and Landing Stages	1,880	400	2,280	1,793	145	1,938
Roads - Equipment	2,120	780	2,900	2,879	405	3,284
Schools	590	140	730	1,117	238	1,355
Santo Port Wharf Design	340	80	420	311	32	343
Service Charge on Loan	70	-	70	89	-	89
Total	5,000	1,400	6,400	6,189	820	7,009

UTILIZATION OF ROADS

1. On the entire island of Vanua Lava, there are only three trucks and traffic count in 1996 by the Public Works Department (PWD) is three vehicles a day. The road has recently been repaired and is in good condition. Since the Sola landing stage is rarely used, the original purpose of upgrading the road, mainly to facilitate the transport of copra, has not been achieved although the improved road obviously serves other purposes (see Table 1 for traffic forecast in the SAR (1995) and actual traffic in 1996).

2. The Kereimbei-Narovorovo road on Maewo Island is not being used for the purpose of transporting copra from farms to Narovorovo Wharf. The road carries an estimated traffic volume of 14 vehicles a day. The PWD report indicates that the road was not maintained for eight years until 1995. The road condition was poor and vehicles were avoiding the road. The main problem was two creeks (Naenvene on the Kerembei side and another one on the Narovorovo side) crossing coastal outlets.

3. The road on Ambae Island (from Devils Rock through Walaha to Nduindui) has an estimated traffic volume of 2 vehicles a day on the stretch between Devils Rock and Walaha and 12 vehicles a day on the Walaha-Nduindui stretch. Vehicles are using the road to transport passengers to the Wahala airport and to transport copra to different anchorages around Nduindui. The road had maintenance work two years ago, and is in an acceptable condition now.

4. The traffic count on the road from Lolowai to Lolopuepue is estimated at less than 12 and a couple of vehicles per day in other places a few kilometers north. The road was, however, seriously damaged by erosion at the Lolowai hill. There is no vehicle on Paama Island on which Liro landing stage is located.

5. The road between Cape Foreland through Ringdove and Lamen Bay wharf on Epi Island is being used for transport to and from the airport, health center, agricultural delivery points, education, and other general purposes. There are 20-30 vehicles including agricultural equipment, and the estimated traffic volume is 12-24 vehicles a day. The road is mostly in good condition except for hill slopes. The road will require maintenance in a few years, particularly on slopes.

6. The Santo Port bypass on Espiritu Santo is a heavily traveled urban road. The estimated number of vehicles is 2,161 a day. The bypass road was built because the pre-Project road, which passes through Santo Port, had to be closed to provide the port with necessary security and to reduce the conflict with port traffic to the stevedore's facility located on the other side of the original road. To an extent, the operation of the port interfered with the flow of traffic as well, but there was no record on road conditions prior to the construction of the bypass. About 50 vehicles use the roads on Malo Island.

Table 1: Daily Traffic Volume

Island	Road	1995 Forecast in SAR ^a	1996 Actual
Vanua Lava	Sola	90	3
Maewo	Kereimbei-Narovorovo	160	14
Ambae (Aoba)	Devils Rock through Walaha to Nduindui	85	12
Ambae	Lolowai to Lolopuepue	93	12
Paama	Liro	75	0
Epi	Cape Foreland-Ringdove and Lamén Bay	159	24
Malo		n.a.	50
Espiritu Santo	Santo Port Bypass	n.a.	2,161

n.a. = not available.

^a Subproject appraisal report.

RECALCULATION OF THE ECONOMIC INTERNAL RATES OF RETURN

A. General

1. To compare appraisal and the Postevaluation Mission (PEM) economic internal rate of return (EIRR) estimates, the stream of costs as well as benefits were converted to 1993¹ prices using the manufacturing unit value (MUV) index of the World Bank for the foreign currency cost component, and the gross domestic product deflator for the local currency component.
2. A standard conversion factor of 0.80 was used to convert financial costs to economic costs, to take into account, among others, taxes, import duties, and shadow prices for labor. This was likewise applied to the financial value of all subproject benefits.
3. The residual value of new construction equipment provided under this loan was assumed at 40 percent of the cost of the equipment.

B. Outer Island Wharf/Road Subprojects

4. Annual maintenance cost was placed at 6 percent of capital cost and road network maintenance at Vt225,400 per kilometer (km). Maintenance costs are identical to those used in the consultant's appraisal reports² (referred to as subproject appraisal reports [SAR]), updated to 1993 prices (see Tables 1-7).
5. Project benefits included in the EIRR recalculation were the same as in the SARs, with the additional benefit from the residual value of new construction equipment provided.
6. Benefits from ship cost savings and produce damage savings have been calculated only for the Lolopuepue wharf subproject, as this is the only subproject currently used by interisland ships. Savings of one day per ship visit and average daily demurrage cost of Vt112,700 a day (in 1993 prices) are assumed. These are similar to the assumptions used in the SARs. As the other wharf/landing stage subprojects are either damaged (Narovorovo and Lamén Bay) or unused by interisland ships, future utilization by ships is not anticipated.
7. Since there is no evidence of increased copra production in the various subproject catchments resulting from the wharves, landing stages, and the roads, no producer surplus benefits have been incorporated in the EIRR recalculation.

¹ The most recent data available are for 1993.

² TA No. 726-VAN: *Appraisal of Subprojects Under Multiproject Loan*, for \$270,000, approved on 5 December 1985.

8. Road user benefits were assumed for all subprojects except for the Liro landing stage subproject as there are no vehicles in this subproject's catchment. Road user benefits were calculated using the SARs' assumptions although they appear optimistic. The highest values for vehicle operating cost (VOC) and time savings were adopted.

9. An economic life of 15 years was adopted for the associated wharves, landing stages, and road network. Road replacement cost was assumed only once, after seven years of operation for each subproject.

C. Santo Wharf Bypass Road

10. Additional operation and maintenance (O&M) costs of the bypass road were assumed to be nil as the bypass road length was broadly similar to the replacement road section. Thus, a similar O&M cost would have been incurred in the with- and without-Project situations.

11. Improvement from a fair to good standard sealed road was assumed, with a resultant VOC savings of Vt1.1 per kilometer (in 1993 prices).

12. Traffic growth was assumed at 3 percent per annum, which is consistent with the assumption used for urban road traffic growth in Vanuatu in a recent appraisal report.¹

13. Road user cost savings resulting from the elimination of delays caused by conflict with port operations vehicles were calculated by assuming that travel along the old port road (in the without-Project situation) would involve delays equal to an average of 10 percent reduction in vehicle speed. Time savings per vehicle were calculated at 0.14 minute. An average of two persons per vehicle was assumed and the time value was computed in relation to the average earnings of Vt300,000 per person per annum.

14. If only the above benefits are considered, the EIRR does not justify the extent of investment made in the bypass. When the benefits of better port security are included, the investment may be justified. However, the ideal level of security needed is difficult to ascertain. Nonetheless, the EIRR is sensitive to this assumption. If it is assumed that, without the bypass, 24 guards are needed to provide 24-hour year-round security, then the EIRR is 20 percent (see Table 8).

D. School Buildings

15. Annual O&M costs were assumed at 1 percent of the total capital costs.

16. School buildings of traditional standard would have been built without the Project at one half the cost of the buildings provided under the Project.

¹ Loan No. 1448-VAN(SF): *Urban Infrastructure Project*, for \$10 million, approved on 27 June 1996.

17. The EIRR is sensitive to the assumption on the average life of a traditional or new school building before damage by a cyclone. However, a reasonable figure is difficult to establish because of insufficient data. Assuming an average useful life of 5 years for a traditional school building and 20 years for a new school building, the school buildings subproject would have an EIRR of 4.2 percent (see Table 9).

19. The EIRR for all subprojects combined is negative (see Table 10).

Year	Costs			Benefits			
	Total Capital Costs	Maintenance Costs	Total Costs	Road User Benefits	Equipment Residual	Total Benefits	Net Benefits
1986							
1987	4.35		4.35				-4.35
1988	20.26		20.26				-20.26
1989	35.90		35.90				-35.90
1990	11.21		11.21				-11.21
1991	0.17	2.86	3.03	0.44	10.53	10.98	7.95
1992	0.01	2.86	2.86	0.44		0.44	-2.42
1993		2.86	2.86	0.44		0.44	-2.41
1994		2.86	2.86	0.44		0.44	-2.41
1995		2.86	2.86	0.44		0.44	-2.41
1996		2.86	2.86	0.44		0.44	-2.41
1997	42.31	2.86	45.17	0.44		0.44	-44.73
1998		2.86	2.86	0.44		0.44	-2.41
1999		2.86	2.86	0.44		0.44	-2.41
2000		2.86	2.86	0.44		0.44	-2.41
2001		2.86	2.86	0.44		0.44	-2.41
2002		2.86	2.86	0.44		0.44	-2.41
2003		2.86	2.86	0.44		0.44	-2.41
2004		2.86	2.86	0.44		0.44	-2.41
2005		2.86	2.86	0.44		0.44	-2.41
						EIRR	Negative

Table 2: Narovorovo Wharf Subproject
(Vt million, 1993 constant prices)

Year	Costs			Benefits			Net Benefits
	Total Capital Costs	Maintenance Costs	Total Costs	Road User Benefits	Equipment Residual	Total Benefits	
1986							
1987	5.03		5.03				-5.03
1988	39.25		39.25				-39.25
1989	56.34		56.34				-56.34
1990	10.11		10.11	0.54	12.20	12.74	2.63
1991	0.54	5.80	6.34	0.54		0.54	-5.80
1992	0.02	5.80	5.82	0.54		0.54	-5.28
1993		5.80	5.80	0.54		0.54	-5.26
1994		5.80	5.80	0.54		0.54	-5.26
1995		5.80	5.80	0.54		0.54	-5.26
1996		5.80	5.80	0.54		0.54	-5.26
1997	49.01	5.80	54.80	0.54		0.54	-54.27
1998		5.80	5.80	0.54		0.54	-5.26
1999		5.80	5.80	0.54		0.54	-5.26
2000		5.80	5.80	0.54		0.54	-5.26
2001		5.80	5.80	0.54		0.54	-5.26
2002		5.80	5.80	0.54		0.54	-5.26
2003		5.80	5.80	0.54		0.54	-5.26
2004		5.80	5.80	0.54		0.54	-5.26
2005		5.80	5.80	0.54		0.54	-5.26
						EIRR	Negative

Year	Costs			Benefits			Net Benefits
	Total Capital Costs	Maintenance Costs	Total Costs	Road User Benefits	Equipment Residual	Total Benefits	
1986							
1987	3.19		3.19				-3.19
1988	14.89		14.89				-14.89
1989	34.62		34.62				-34.62
1990	23.82		23.82				-23.82
1991	0.68	4.32	5.01	0.77	7.74	8.51	3.50
1992	0.02	4.32	4.34	0.77		0.77	-3.57
1993		2.28	2.28	0.77		0.77	-1.51
1994		2.26	2.26	0.77		0.77	-1.49
1995		2.25	2.25	0.77		0.77	-1.49
1996		2.25	2.25	0.77		0.77	-1.49
1997	31.10	2.25	33.36	0.77		0.77	-32.59
1998		2.25	2.25	0.77		0.77	-1.49
1999		2.25	2.25	0.77		0.77	-1.49
2000		2.25	2.25	0.77		0.77	-1.49
2001		2.25	2.25	0.77		0.77	-1.49
2002		2.25	2.25	0.77		0.77	-1.49
2003		2.25	2.25	0.77		0.77	-1.49
2004		2.25	2.25	0.77		0.77	-1.49
2005		2.25	2.25	0.77		0.77	-1.49
						EIRR	Negative

Table 4: Lolopuepue Wharf Subproject
(Vt million, 1993 constant prices)

Year	Costs			Benefits					Net Benefits
	Total Capital Costs	Maintenance Costs	Total Costs	Shipping Cost Savings	Produce Damage Savings	Road User Benefits	Equipment Residual	Total Benefits	
1986									
1987	3.51		3.51						-3.51
1988	25.64		25.64						-25.64
1989	45.65		45.65						-45.65
1990	2.39		2.39						-2.39
1991	10.34		10.34						-10.34
1992	0.02	3.10	3.12	6.49	0.19	0.67	8.50	15.86	12.74
1993		3.10	3.10	6.49	0.19	0.67		7.36	4.26
1994		3.10	3.10	6.49	0.19	0.67		7.36	4.26
1995		3.10	3.10	6.49	0.19	0.67		7.36	4.26
1996		3.10	3.10	6.49	0.19	0.67		7.36	4.26
1997	34.15	3.10	37.25	6.49	0.19	0.67		7.36	-29.89
1998		3.10	3.10	6.49	0.19	0.67		7.36	4.26
1999		3.10	3.10	6.49	0.19	0.67		7.36	4.26
2000		3.10	3.10	6.49	0.19	0.67		7.36	4.26
2001		3.10	3.10	6.49	0.19	0.67		7.36	4.26
2002		3.10	3.10	6.49	0.19	0.67		7.36	4.26
2003		3.10	3.10	6.49	0.19	0.67		7.36	4.26
2004		3.10	3.10	6.49	0.19	0.67		7.36	4.26
2005		3.10	3.10	6.49	0.19	0.67		7.36	4.26
								EIRR	Negative

Table 5: Liro Landing Stage Subproject
(Vt million, 1993 constant prices)

[illegible]

Table 6: Lamen Bay Wharf Subproject
(Vt million, 1993 constant prices)

Year	Costs			Benefits			Net Benefits
	Total Capital Costs	Maintenance Costs	Total Costs	Road User Benefits	Equipment Residual	Total Benefits	
1986							
1987	4.13		4.13				-4.13
1988	38.19		38.19				-38.19
1989	60.71		60.71				-60.71
1990	3.17		3.17				-3.17
1991	0.71		0.71				-0.71
1992	6.46		6.46				-6.46
1993		5.74	5.74	2.02	10.01	12.03	6.29
1994		5.74	5.74	2.02		2.02	-3.72
1995		5.74	5.74	2.02		2.02	-3.72
1996		5.74	5.74	2.02		2.02	-3.72
1997		5.74	5.74	2.02		2.02	-3.72
1998		5.74	5.74	2.02		2.02	-3.72
1999	40.21	5.74	45.95	2.02		2.02	-43.94
2000		5.74	5.74	2.02		2.02	-3.72
2001		5.74	5.74	2.02		2.02	-3.72
2002		5.74	5.74	2.02		2.02	-3.72
2003		5.74	5.74	2.02		2.02	-3.72
2004		5.74	5.74	2.02		2.02	-3.72
2005		5.74	5.74	2.02		2.02	-3.72
2006		5.74	5.74	2.02		2.02	-3.72
2007		5.74	5.74	2.02		2.02	-3.72
						EIRR	Negative

Year	Costs			Benefits			Net Benefits
	Total Capital Costs	Maintenance Costs	Total Costs	Road User Benefits	Equipment Residual	Total Benefits	
1986							
1987	4.96		4.96			0.00	-4.96
1988	23.12		23.12			0.00	-23.12
1989	1.83		1.83			0.00	-1.83
1990	0.15		0.15			0.00	-0.15
1991	26.55		26.55			0.00	-26.55
1992	9.72		9.72			0.00	-9.72
1993		6.99	6.99	7.92	12.02	19.94	12.95
1994		6.99	6.99	7.92		7.92	0.93
1995		6.99	6.99	7.92		7.92	0.93
1996		6.99	6.99	7.92		7.92	0.93
1997		6.99	55.28	7.92		7.92	-47.36
1998		6.99	6.99	7.92		7.92	0.93
1999	48.30	6.99	55.28	7.92		7.92	-47.36
2000		6.99	6.99	7.92		7.92	0.93
2001		6.99	6.99	7.92		7.92	0.93
2002		6.99	6.99	7.92		7.92	0.93
2003		6.99	6.99	7.92		7.92	0.93
2004		6.99	6.99	7.92		7.92	0.93
2005		6.99	6.99	7.92		7.92	0.93
2006		6.99	6.99	7.92		7.92	0.93
2007		6.99	6.99	7.92		7.92	0.93
						EIRR	Negative

Table 8: Santo Bypass Road Subproject
(Vt million, 1993 constant prices)

Year	Total Capital Costs	Benefits				Net Benefits
		Vehicle Operating Cost Savings	Passenger Time Savings	Reduced Port Security Costs	Equipment Residual	
1986						0.00
1987	0.95					-0.95
1988	4.66					-4.66
1989	2.95					-2.95
1990	0.13					-0.13
1991	4.00					-4.00
1992		0.19	0.28	3.20	2.30	5.97
1993		0.20	0.29	3.20		3.68
1994		0.20	0.29	3.20		3.70
1995		0.21	0.30	3.20		3.71
1996		0.21	0.31	3.20		3.73
1997		0.22	0.32	3.20		3.74
1998		0.23	0.33	3.20		3.76
1999		0.23	0.34	3.20		3.77
2000		0.24	0.35	3.20		3.79
2001		0.25	0.36	3.20		3.81
2002		0.26	0.37	3.20		3.83
2003		0.26	0.38	3.20		3.85
					EIRR	20.0%

Table 9: Schools Subproject
(Vt million, 1993 constant prices)

Year	Costs			Replacement Local Structures	Net Benefits
	Capital Costs	Maintenance Costs	Total Costs		
1986					
1987					
1988	12.87		12.87		-12.87
1989	60.18		60.18		-60.18
1990	34.33		34.33		-34.33
1991	36.53		36.53		-36.53
1992	1.84		1.84		-1.84
1993		1.46	1.46		-1.46
1994		1.46	1.46		-1.46
1995		1.46	1.46		-1.46
1996		1.46	1.46		-1.46
1997		1.46	1.46	72.87	71.41
1998		1.46	1.46		-1.46
1999		1.46	1.46		-1.46
2000		1.46	1.46		-1.46
2001		1.46	1.46		-1.46
2002		1.46	1.46	72.87	71.41
2003		1.46	1.46		-1.46
2004		1.46	1.46		-1.46
2005		1.46	1.46		-1.46
2006		1.46	1.46		-1.46
2007		1.46	1.46	72.87	71.41
2008		1.46	1.46		-1.46
2009		1.46	1.46		-1.46
2010		1.46	1.46		-1.46
2011		1.46	1.46		-1.46
2012		1.46	1.46	72.87	71.41
EIRR					4.2%

Table 10: All Subprojects
(Vt million, 1993 constant prices)

Year	Total Costs	Total Benefits	Net Benefits
1986	15.51	0.00	-15.51
1987	54.29	0.00	-54.29
1988	197.77	0.00	-197.77
1989	313.47	0.00	-313.47
1990	82.68	12.74	-69.95
1991	103.08	20.03	-83.05
1992	36.03	32.18	-3.85
1993	30.08	44.76	14.67
1994	30.06	22.74	-7.32
1995	30.06	22.75	-7.30
1996	30.06	22.77	-7.29
1997	248.76	95.66	-153.10
1998	30.06	22.80	-7.26
1999	118.57	22.82	-95.75
2000	30.06	22.84	-7.22
2001	30.06	22.85	-7.20
2002	30.06	95.74	65.68
2003	30.06	22.89	-7.17
2004	30.06	19.04	-11.01
2005	30.06	19.04	-11.01
2006	14.19	9.94	-4.25
2007	14.19	82.81	68.62
2008	1.46	0.00	-1.46
2009	1.46	0.00	-1.46
2010	1.46	0.00	-1.46
2011	1.46	0.00	-1.46
2012	1.46	72.87	71.41
		EIRR	Negative

ECONOMIC ANALYSIS METHODOLOGY AND ASSUMPTIONS

1. The most significant benefits estimated in the subproject appraisal report (SAR), accounting for about one half of the total benefits, are related to producer surplus, mostly in the form of increased copra production (accounting for around 98 percent of total producer surplus). In the SAR, this producer surplus to copra producers located in the catchments for each of the wharves and the landing stages was estimated from a low of 33 percent to a high of 78 percent of the total benefits. Two other benefits, ship operating costs savings and road user benefits, each account for approximately one quarter of the total benefits.

2. A number of assumptions are associated with the generation of the producer surplus (mostly related to copra production). Underlying these assumptions was the view of the consultants who prepared the SARs that "there is enormous potential for growth in the cash economy which would be facilitated by construction of the wharf and the road upgradings."¹ The assumptions were related to the

- (i) size of the catchment for each subproject;
- (ii) projected population growth rate within each catchment;
- (iii) normal copra production (in the without-Project situation) increasing at a rate comparable with the catchment population growth rate; and
- (iv) copra supply elasticity.

3. In actual fact, copra production has not experienced the dramatic growth forecast in the Bank's Appraisal Report (AR) or the SARs. Table 1 outlines actual copra production statistics in the catchments defined in the SARs. The production data indicate that the actual level of copra production in Vanuatu declined between 1990 and 1995. In the islands where the wharves, landing stages, and roads were built, copra production has declined faster than in Vanuatu as a whole, except for the Sola subproject's catchment during 1990-1995. This provides prima facie evidence that the Project facilities have not induced additional copra production in both absolute and relative terms.

4. A comparison of actual copra production levels with forecasts in the SARs² gives some indication of the scale difference between actual performance and projections. Table 2 indicates that not only did the level of copra production decline between 1990 and 1995, but the actual production in 1995 was also less than half the projection for 1996.

¹ TA No. 726-VAN: *Appraisal of Subprojects under Multiproject Loan*, for \$270,000, approved on 5 December 1985. (Appraisal Report-Sola Subproject. September 1986. Prepared by Sinclair Knight & Partners, para. 103, page 27.)

² TA No. 726-VAN: *Appraisal of Subprojects under Multiproject Loan*, for \$270,000, approved on 5 December 1985. (Appraisal Reports - Various Subprojects. September 1986. Prepared by Sinclair Knight & Partners, Appendix 4, Table 1 in each report.)

Table 1: Vanuatu Copra Production by Subproject Catchment 1990-1995

Subproject Catchment	Copra Production (tons)		Average Annual Growth Rate (% per annum)
	1990	1995	
Sola Landing Stage	800	718	-2.1
Narovorovo Wharf	1,198	460	-17.4
Nduindui Wharf	2,011	1,300	-8.4
Lolopuepue Wharf	2,128	1,357	-8.6
Liro Landing Stage	220	82	-17.9
Lamen Bay Wharf	<u>719</u>	<u>238</u>	<u>-19.8</u>
	7,076	4,156	-10.1
Vanuatu	45,071	30,363	-7.6

Source: Vanuatu Statistics Office.

5. An examination of the copra production assumptions outlined in the SARs provides an indication of why the copra production forecasts and the associated level of producer surplus benefits had not been achieved by 1995. This is separate from the reason that five out of six subproject wharves or landing stages are not being used.

Table 2: Comparison of Actual Copra Production and Consultant Subproject Appraisal Report Forecasts (tons)

Subproject Catchment	Subproject Appraisal Report			Actual Production ^c	
	1986 ^a	1996 ^b		1986	1995
		Normal	Induced		
Sola Landing Stage	760	1,012	1,316	996	719
Narovorovo Wharf	860	1,158	1,390	817	460
Nduindui Wharf	1,760	2,071	2,174	1,631	1,300
Lolopuepue Wharf	2,200	2,844	2,986	1,399	1,357
Liro Landing Stage	380	420	504	405	82
Lamen Bay Wharf	<u>912</u>	<u>1,211</u>	<u>1,453</u>	<u>1,320</u>	<u>238</u>
	6,872	8,716	9,823	5,169	4,156

^a Estimate.

^b Forecast.

^c Vanuatu Statistics Office.

6. A review of the amount of copra shipped through the wharves and landing stages indicates that SARs were too optimistic in their expectation of regional influence. The traditional copra shipping habit of using a beach landing near the respective villages continues. The road transport costs for bagged copra from the copra producer's village to the subproject

wharf, being cash expenditure, are perceived as an avoidable cost when using a beach landing near the producer's village. This situation is unlikely to change quickly, as interisland shipping collections are competitive and individual ships are happy to continue this beach landing service. A recent interisland shipping study found that "The cost of using speedboats to ferry freight and passengers between ship and shore is about Vt1,000/ton, compared with Vt3,210/ton with the use of jetties."¹ The projection for the catchment area of Sola landing stage is one that appears particularly excessive. The SAR projected that not only all the copra produced on Vanua Lava but also on several nearby islands (Ureparapara, Mota Lava, and Mota) would be shipped through Sola Landing Stage. This was a highly unlikely scenario even without hindsight wisdom.

7. The induced producer surplus benefits were significantly influenced by the assumption in the SARs that copra production in Vanuatu is responsive to price changes, with supply elasticity assumed to be 1 for all but the Sola landing stage (where a higher 1.5 value was used). No reason was given for selecting the supply elasticity and assuming a higher supply elasticity for copra handled through the Sola landing stage. The consultant's supply elasticity was based on a previous report in Solomon Islands,² although such source is not documented, and the Postevaluation Mission (PEM) was unable to obtain any details about the work/report in Vanuatu. The notion is that higher prices of copra reduce the consumption of green coconut and more export of coconut in the form of copra.

8. If this assumption of supply elasticity of copra is incorrect, the producer surplus benefits outlined in the consultant's appraisals would not arise. No supporting data have been discovered during the PEM's visit to Vanuatu and anecdotal evidence and comments suggest that there is no solid body of evidence or opinion supporting a case for supply elasticity of any value.

9. Opinions suggest that a number of factors are likely to affect the level of copra production in any year, including

- (i) reduced coconut yields because of cyclone damage or weather conditions (e.g., drought);
- (ii) age of coconut trees and extent of replanting;
- (iii) copra growers target total annual income level (copra is the main source of income for the great majority of households in rural areas). The production peak months are July and December, which coincides with a time of cash need for national and end-of-year holidays, as well as payment of school fees;
- (iv) relative price and earnings from other income-generating activity available to the copra grower; and

¹ TA No. 1525-VAN: *Interisland Shipping Study*, for \$525,000, approved on 21 June 1991. (Vanuatu Interisland Shipping Study Final Report, 1992. Prepared by PPK Consultants, Section 6.7.3, page 56.)

² TA No. 726-VAN: *Appraisal of Subprojects under Multiproject Loan*, for \$270,000, approved on 5 December 1985. (Appraisal Report - Sola Subproject. September 1986. Prepared by Sinclair Knight & Partners, para.104, page 27 [repeated in similar sections of all subproject appraisal reports].)

- (v) copra prices paid by the Vanuatu Commodities Marketing Board (VCMB) and international price trends.

10. When considering the issue of copra supply elasticity in the Vanuatu context, it is important to recognize the role of copra growing in both the national economy and the contribution to village subsistence and culture. The normal commercial and economic rules of supply, demand, and price operate imperfectly in this environment.

11. The PEM undertook an analysis of available copra production and price statistics, but was unable to find any quantitative analytical support for the existence of price elasticity of copra. Indeed, the evidence tends to point to a negative correlation between copra production and prices. Data for production and prices at the national level were collated for the period 1981 to 1995. Five different price series were examined (obtained from VCMB and the Statistics Office), which reflected the VCMB "beach prices" (returns directly to the grower), export earnings related to the price obtained for Vanuatu copra, and world copra prices.

12. Both correlation and regression analyses were undertaken. The correlation coefficients ranged from 0.013 to 0.19. The regression coefficient (R^2) ranged from 0.00002 to 0.038. A value close to 1 indicates a significant degree of correlation between time series. Additional analysis was conducted using two-year moving average price series to identify a lagged response, and the R^2 values were generally even lower. The chart pattern of price and supply suggests that a lag of several years may not make any difference either. Accordingly, this analysis does not support the existence of copra supply elasticity.

13. While the evidence appears to suggest that there is no supply elasticity of copra, the application of this concept in the SARs was in error on two counts. First there was double counting of benefits associated with without-Project copra production. Second, the use of the supply elasticity methodology was incorrect.

14. The producer surplus benefits were derived from savings in transportation costs. Transport cost savings were assumed at 20 percent for all, but the Ambae wharves at Lolopuepue and Nduindui, where a lower 5 percent savings were assumed. The consultants gave no reasons for these variations in cost savings rates. These savings were applied directly, so that agricultural production entering the marketplace (mainly copra and small quantities of cocoa) would increase by 20 percent and 5 percent, respectively (using the supply elasticity value of 1). In the case of the Sola landing stage, where a supply elasticity of 1.5 was assumed, the 20 percent reduction in transport costs led to a 30 percent production increase.

15. The value of this production increase was applied to both without-Project production and induced production (derived through the price elasticity assumption). That part of the producer surplus associated with existing production was also taken into account through the ship cost savings benefit, so this element of the producer surplus represents double counting of benefits. Adjusting the consultant's subproject benefits to correct this double counting error would eliminate 26 percent of Project benefits. The magnitude of this double counting error varies by subproject, ranging from 17 percent to 33 percent of individual total benefits.

16. Directly relating the percentage of transport cost savings to the percentage increase in production is incorrect. Shipping transport costs for copra are paid directly by VCMB at designated prices, which represent 11 percent of the total copra price ("beach price" plus transport allowance) for all of the subprojects except Sola, where a higher 16 percent applies. If these percentages are applied, the assumed transport cost reductions only represent 0.6 percent of total copra prices for Nduindui and Lolopuepue, 4.5 percent for Sola, and 3.2 percent for the other subprojects. The net effect of this incorrect calculation methodology is overstatement of the producer surplus benefits derived from induced production annually by Vt13.8 million, representing 17.6 percent of the total Project benefits.

17. Based on the above review of producer surplus assumptions and treatment, at best (accepting the supply elasticity assumption applies) 43.6 percent of total Project benefits should be eliminated (26 percent for double counting and 17.6 percent for incorrect calculations). At worst, discounting the supply elasticity assumption, 50.9 percent of benefits would be eliminated. The impact varies by subproject as outlined in Table 3.

**Table 3: Annual Loss of Subproject Producer Surplus Benefits - Medium Forecast 1995
(1986 prices)**

Subproject	On Existing Production	On Induced Production		Benefits Lost	
		No Elasticity	With Elasticity	No Elasticity	With Elasticity
Sola Landing Stage					
- Value (Vt mn)	2.12	2.87	2.44	4.99	4.56
- Percent	33.10	44.80	44.10	77.90	77.20
Narovorovo Wharf					
- Value (Vt mn)	4.51	4.07	3.42	8.58	8.13
- Percent	31.30	28.30	27.80	59.60	55.10
Nduindui Wharf					
- Value (Vt mn)	1.93	1.74	1.55	3.67	3.48
- Percent	17.50	15.80	14.10	33.30	31.60
Lolopuepue Wharf					
- Value (Vt mn)	2.24	2.01	1.79	4.25	4.03
- Percent	19.00	17.00	15.10	36.00	34.10
Liro Landing Stage					
- Value (Vt mn)	1.59	1.44	1.21	3.03	2.80
- Percent	25.20	22.90	19.30	48.10	44.50
Lamen Bay Wharf					
- Value (Vt mn)	4.56	4.11	3.44	8.67	8.00
- Percent	29.90	26.90	26.50	56.80	56.40
All Above Subprojects					
- Value (Vatu mn)	16.95	16.24	13.85	33.19	30.80
- Percent	26.00	24.90	17.60	50.90	43.60

18. The net effect of the loss of these producer surplus benefits, in full or adjusted, would result in negative economic internal rates of return (EIRRs) for all subprojects in the SARs except the two on Ambae. The EIRR for the Nduindui and Lolopuepue wharf subprojects should have been reduced from 13-14 percent to 3-4 percent.

19. Production damage savings benefits as a consequence of a shift from lighterage operations to handling cargo and passengers directly across a wharf or landing stage were assumed. The avoided damage of cargo dropped in the sea or spoiled during lighterage operations was assessed at between 0.4 percent and 1 percent for wharves and 0.2 percent and 0.5 percent for landing stages.¹ These percentages were adopted for the high and low appraisal cases, with the midpoint percentage used in the medium case. This benefit appears reasonable, although in percentage terms accounts for only a small proportion of Project benefits.

20. Ship cost savings accounted for 22 percent of overall Project benefits. The basis for these benefits was associated with faster ship turnaround at the subproject wharf or landing stage, compared with the without-Project situation where lighterage operations occurred. This is a legitimate benefit and its value is calculated on the basis of ship time saved and the ship demurrage costs.

21. A review of the assumptions associated with this benefit reveals a tendency for optimism. The annual ship calls at Sola and Narovorovo were 15 and 25, respectively, and 40 for the remaining four subprojects. This compares with actual current usage of zero for all but Lolopuepue, which reported 6 ships per month (72 annually).

22. To estimate the time savings, it was assumed that the interisland ships would consolidate their cargo through the subproject facilities and there would be a reduction in the number of beach landing or anchorage locations visited on the respective islands. Interisland ships continue to call at all anchorages, if requested, and villagers retain a preference to use the nearest anchorage, despite the inconvenience of lighterage operations.

23. Ship time savings as a consequence of reduced anchorage calls and faster cargo handling at wharf/landing stage locations were assumed to be one day per ship call at all wharf subprojects. Reduced time savings were assumed for landing stages (Sola - 6 hours and Liro - 4 hours). While the landing stage times seem reasonable, the one-day wharf savings seem optimistic. With 40 annual calls assumed at Lolopuepue and consultants' forecast of a total cargo handled at 3,015 tons, some 75 tons would be loaded each call. This tonnage was assumed to be loaded in 8 hours across the wharf and 21 hours by lighterage (using cargo handling rates used in the appraisal reports²), representing a net savings of 13 hours. The virtual doubling of this to a day savings was justified by the consultants through the reduction of anchorage calls and elimination of overnight stays. It is possible, then, that the ship time savings assumption could be overstated by up to 50 percent.

¹ TA No. 726-VAN: *Appraisal of Subprojects under Multiproject Loan*, for \$270,000, approved on 5 December 1985. (Appraisal Report - Sola Subproject. September 1986. Prepared by Sinclair Knight & Partners, para. 88, page 24 [repeated in similar sections of all subproject appraisal reports].)

² TA No. 726-VAN: *Appraisal of Subprojects under Multiproject Loan*, for \$270,000, approved on 5 December 1985. (Appraisal Report - Lolopuepue Subproject. September 1986. Prepared by Sinclair Knight & Partners, Appendix 6, page 52.)

24. Ship demurrage costs were assumed to be in the range from Vt50,000 to Vt100,000 per day, based on the consultant's discussions with ship operators at that time.¹ This rate appears high, at least on the basis of ships currently providing interisland shipping services. As stated in the Staff Consultants PCR Report,² "timber boats which trade in this area have costs in the order of Vt25,000 to Vt30,000 per day."³ Ship cost savings benefits may then be overstated by a factor of three.

25. Taking into account the possible optimistic assumptions as to ship time savings and the value of such time savings, ship cost savings may be one sixth the level incorporated in the respective EIRR calculations. This would reduce their overall Project benefit contribution from 22 percent to around 4 percent. For the Nduindui and Lolopuepue wharf subprojects, where such benefits represented 31 percent of total benefits, this contribution would be reduced to 5 percent.

26. Road user savings benefits were assumed to accrue in terms of vehicle operating cost savings and passenger time savings (except for Nduindui and Lolopuepue subprojects). A review of the assumptions used in this benefit calculation indicated possible benefit overstatement. It was not possible to verify the average trip length assumptions. The vehicle operating cost (VOC) saving assumptions appear to be overstated by as much as 40 percent based on details provided in a 1992 World Bank report,⁴ as indicated in Table 4. The consultant's VOC assumptions were based on previous work in Papua New Guinea (1979)⁵ and may not have been directly applicable to Vanuatu.

¹ TA No. 726-VAN: *Appraisal of Subprojects under Multiproject Loan*, for \$270,000, approved on 5 December 1985. (Appraisal Report - Sola Subproject. September 1986. Prepared by Sinclair Knight & Partners, para. 110, page 28 [repeated in similar sections of all subproject Appraisal Reports].)

² Vanuatu Multiproject PCR Mission: Report on Wharves and Landing Stages. 24 November 1993. Prepared by PPK Consultants, page 4.

³ TA 1525-VAN: *Interisland Shipping Study*, for \$525,000, approved on 21 June 1991. (Vanuatu Interisland Shipping Study Final Report. 1992. Prepared by PPK Consultants, Annex B, Section 3.1, page B-5.)

⁴ World Bank Report No 10543-EAP: Pacific Islands Transport Sector Study: Vanuatu Transport Sector Survey. May 1992. Annex 1, Box 2.1, page 22.

⁵ "Vehicle Operating Costs", August 1979, prepared by Rendels Economic Study Group for PNG Department of Transport.

Table 4: Vehicle Operating Cost Estimates
(Vt per kilometer, 1991 prices)

Gravel Road Condition	Subproject Appraisal ^a	World Bank ^b
Good (improved)	32.8	30.1
Poor	<u>48.2</u>	<u>39.0</u>
Difference	15.4	8.9

^a TA No. 726-VAN: Appraisal Report - Subproject Reports. September 1986. Prepared by Sinclair Knight & Partners, Appendix 5, page 3.

^b World Bank Report No. 10543-EAP. 1992. "Pacific Islands Transport Sector Study: Vanuatu Transport Sector Survey," Annex 1, Box 2.1, page 22.

27. Passenger time cost savings were calculated using a travel time value of Vt31 per hour. Given the subsistence nature of economic activity on the outer islands and cultural time choices by subproject catchment villagers, the validity of this value is difficult to establish.

28. Vehicle growth estimates for the subproject catchments appear optimistic, particularly in view of the reduced population growth and the lack of increase in motor vehicle ownership experienced in the subproject catchments since these subprojects were completed. Vehicle registration data are not available for the outer islands, but based on discussions in Vanuatu and reference to transport survey reports,¹ it appears that the number of vehicles in the various subproject catchments has not changed significantly since the time of the subproject appraisals. The number of vehicles provides an indication of the likely validity of the subproject appraisal assumptions on vehicle traffic. Relevant details are summarized in Appendix 2. The daily traffic count numbers indicate that possibly the consultant's 1986 base estimates may have significantly overstated the current road pattern. The SARs gave no indication as to how these road usage base numbers were derived, as only total vehicle numbers in the island catchments are mentioned in their report text.² The Public Works Department daily traffic volume numbers for 1996 indicate that the appraisal report assumptions may overstate road usage by a factor of up to nine.

29. Overall, it may be argued that the subproject benefits related to road user savings have been overstated by a factor of 4 to 14, as a result of optimistic assumptions regarding the number of vehicles, VOC savings rate, and vehicle road usage.

30. The combination of optimistic assumptions regarding most project benefits may substantially reduce the level of Project benefits for all subprojects to a level that they will all

¹ TA No. 965 -VAN: *Preparation of a National Transport Development Plan*, \$350,000, approved on 28 March 1988. (National Transport Development Plan Final Report, July 1989. Prepared by Wilbur Smith Associates, Appendix D, Table D.1, page D-6.)

² TA No. 726-VAN: *Appraisal of Subprojects under Multiproject Loan*, for \$270,000, approved on 5 December 1985. (Appraisal Report - Sola Subproject, September 1986. Prepared by Sinclair Knight & Partners, para. 112, page 28 [repeated in similar sections of all subproject appraisal reports].)

have a negative EIRR. A summary of the benefit reductions outlined above as a result of more realistic assumptions and correct application of the elasticity principle is shown in Table 5.

**Table 5: Annual Overstatement of Subproject Benefits - Medium Forecast 1995
(1986 prices)**

Subproject	<u>Producer Surplus Benefit</u>		Ship Cost Savings	Road User Savings	Total Overstatement
	No Elasticity	With Elasticity			
Sola Landing Stage					
- Value (Vt mn)	4.99	4.56	0.31	0.87	5.74-6.17
- Percent	77.90	77.20	4.80	13.5 0	95.50-96.20
Narovorovo Wharf					
- Value (Vt mn)	8.58	8.13	2.10	2.74	12.97-13.42
- Percent	59.6	55.1	14.6	19.0	88.7-93.2
Nduindui Wharf					
- Value (Vt mn)	3.67	3.48	2.80	3.25	9.53-9.72
- Percent	33.3	31.6	25.4	29.5	86.5-88.2
Lolopuepue Wharf					
- Value (Vt mn)	4.25	4.03	3.07	3.12	10.22-10.44
- Percent	36.0	34.1	26.0	26.4	86.5-88.4
Liro Landing Stage					
- Value (Vt mn)	3.03	2.80	0.48	2.33	11.92-12.5
- Percent	48.1	44.5	7.7	36.9	89.1-92.7
Lamen Bay Wharf					
- Value (Vt mn)	8.67	8.00	3.32	2.13	13.45-14.12
- Percent	56.8	56.4	21.7	13.9	92.0-92.4
All Above Subprojects					
- Value (Vt mn)	33.19	30.80	12.08	14.42	57.3-59.69
- Percent	50.9	43.6	7.3	22.1	73.0-80.3