



REVIEW OF THE ROAD USER CHARGING SYSTEM OF THE ROAD FUND ADMINISTRATION



PART B: STUDY ON MACRO-ECONOMIC IMPACTS OF ECONOMIC EFFICIENCY IN THE ROAD SECTOR

PHASE 4: ECONOMIC WARRANTS OF LOANS FOR DEVELOPMENT PROJECTS

FINAL REPORT

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EXECUTIVE SUMMARY

The purpose of this report was to deal with Economic Warrants of Loans which is one separate phase of the broader MIEERS study. In order to investigate the Economic Warrants of Loans, an analysis was done which focused on the effects of additional vehicle operating costs incurred as well as savings in the form of interest payments if the implementation of major capital expenditure projects as depicted in the (Roads Authority) RA 5-year Development Budget are postponed by two, four and six years, respectively. This analysis also aimed to compare the effects on vehicle operating costs where no or minimum improvements are done. This analysis was based on findings from an extension project of the MLTRMP which was completed in August 2002.

In terms of the proposed projects as per RA 5-year Development Budget, it was shown that postponing the implementation of these projects would result in a loss in vehicle operating cost savings (valued at discounted economic costs) of N\$ 197 million, N\$ 408 million and N\$ 647 million if the implementation of the proposed projects is postponed by two, four and six years, respectively. If the vehicle operating cost savings are valued at undiscounted financial prices, the loss in savings amount to N\$ 712.59 million, N\$ 1 476.72 million and N\$ 2 340.70 million for the respective postponement periods. If these undiscounted financial vehicle operating cost savings are compared to savings in interest payments which are incurred should the projects be postponed (i.e. it would not be necessary to resort to loans), the total cost to road users relative to the case where the project implementation is **not** postponed amount to N\$180.67 million, N\$271.61 million and N\$283.56 million, respectively.

If the project implementation should be cancelled, the analysis showed that significant savings would be incurred by the road transport sector as a whole, as it can be assumed that all agency costs are devolved to road users through road user charges. The savings in vehicle operating costs over a 20-year period amount to a real discounted amount of between N\$ 3 424 million and N\$ 2 268 million if the projects are implemented as per the RA 5-year Development Budget relative to the Do-Nothing and Do-Minimum Alternatives, respectively. Road agency costs (which are recovered through road user charges) comprise between 37% and 55% of the vehicle operating cost savings that are incurred, depending on the approach. This indicates value for road users' money.

Other aspects were also considered such as the optimum timing of project implementation and staged construction or implementation which are closely related to the issue of resorting to loans for purposes of project implementation.

It is recommended that the RFA communicate these findings to the road users of Namibia, to place road user charges in perspective.

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1. ECONOMIC WARRANTS OF LOANS

1.1 BACKGROUND

During June 2003 Africon Namibia was appointed to conduct a review study of the current RUC System, with the main purpose of investigating and determining whether current revenue levels are sufficient and adequate and also whether the current RUC System adheres to the principles of equity and efficiency.

This report should be viewed as supplementary to the Draft Version 1.0 of the RUC Policy Document, Revised NAMRUC Model & RUC Strategy which also incorporated most aspects of the MIEERS Report, and which was submitted on 16 March 2004.

The purpose of this report is to deal with the Economic Warrants of Loans which is one separate phase of the broader MIEERS study.

1.2 OUTLINE

In order to achieve the above-mentioned purpose, the remainder of this report is structured as follows:

- Section 1.3 defines development projects to be used in the context of determining the economic warrants of loans for development projects.
- Section 1.4 presents an overview for the rationale for loans, and is divided into the following sub-sections:
 - Sub-section 1.4.1 which presents a more general discussion on loans.
 - Sub-section 1.4.2 deals with issues on loans which are more specific to the RFA.
 - Sub-section 1.4.4 presents an analysis in terms of the impact on both VOCs and interest payment if project implementation is postponed.
 - In sub-section 1.4.3 the impact of not implementing the proposed projects is investigated.
 - Sub-section 1.4.5 deals with other considerations which are closely related to resorting to loans to implement projects such as optimum timing of project implementation and staged construction or implementation.
- Section 1.5 concludes this report.

1.3 DEFINITION OF DEVELOPMENT PROJECTS

The Roads Authority (RA) makes provision for the following categories for purposes of budgeting:

- Maintenance;
- Rehabilitation;
- Labour Based Projects;
- Planning; and

- Development.

It is evident that only one of the above items refers specifically to the term “Development”. However, it is clear that the term “Development” needs to be extended to cover a wider spectrum, and to also include items such as Rehabilitation, Labour Based Projects, Planning and Development.

Section 17(1) of the Road Fund Administration Act, 1999 (Act 18 of 1999) (the RFA Act) stipulates that the RFA shall utilise the Fund *inter alia* to *defray the cost of the management of the national road network*. The national road network is defined in the Roads Authority Act 1999 (Act 17 of 1999) (the RA Act) as “... *consisting of every trunk, main and district road proclaimed in terms of Chapter III of the Roads Ordinance, 1972 (Ordinance 17 of 1972)*”. In terms of the RA Act “Management” includes the following:

- Planning, design, construction and maintenance of roads which form part of the national road network
- Quality control of materials
- Supervision of work
- Operation of road management systems
- Prevention of excessive damage of roads by road users

1.4 RATIONALE FOR LOANS

This sub-section provides a general overview of the rationale for loans as well as a more specific reference to the RFA.

1.4.1 General

Loans are obtainable from the private sector and from other borrowing agencies. Such loans have to be repaid in the form of interest and redemption.

Loans allow roads related expenditure to be undertaken at an earlier stage than would have been the case if financing was dependent on road user charges revenue on a pay-as-you-go principle. Continually resorting to loans for road conservation is however tantamount to transferring costs to future years and to road users in future years and placing future strains on budgets.

The following types of loans can be distinguished:

Table 1-1: Types of Loans

Type of Loan	Purpose
Investment loans	Direct project funding
Preparation Assistance Loans	Pre project investigations, studies and planning
Guarantee	Backup project funding
Public/Private partnerships	Facilitate preparation and funds mobilisation

Loan repayments normally take place over 5 to 20 years, depending on the cash flow of a project and the economic lifespan. Specific criteria exist for making investment decisions, including the requirement that the project must have a developmental impact.

Although loans may provide bridging finance for implementing projects, it should not be used to postpone financial needs and in fact create future liabilities.

1.4.2 RFA Specific

The Road Fund Administration (RFA) was established in terms of the Road Fund Administration Act, 1999 (Act 18 of 1999). In terms of section 15 (1) of the Road Fund Administration Act, 1999 (Act 18 of 1999), one of the functions of the RFA is to *impose road user charges, to determine the rates of those charges and to collect the charges.*

There are however two notable constraints on the imposition and collection of RUCs, namely:

- RUCs may not be raised substantially in any one year, in order to ensure affordability and to limit the distortive effects on the economy¹.
- Long term stability in the level of RUCs must be achieved.

The first constraint is self-explanatory. The second constraint can be illustrated by means of Figure 1-1 depicting the comparison of RUC revenue with expenditure of the preferred MLTRMP Scenario 2: Minimised Total Transport Costs.

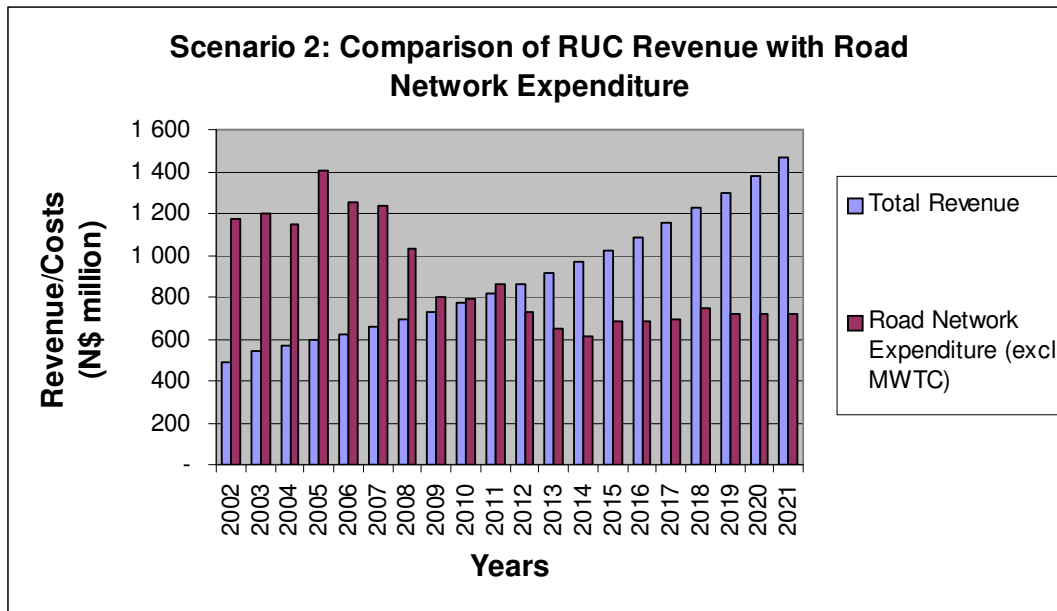


Figure 1-1: Comparison of RUC Revenue with Road Network Expenditure (MLTRMP Scenario 2)

¹ The possible distortive effects of a RUC system on the economy were addressed in the RUC Policy Document, Revised NAMRUC Model & RUC Strategy.

From Figure 1-1, it is evident that there is a significant variation in network expenditure (especially up to the year 2012²) which would be impossible to cover by varying the level of RUCs in any one year, as this would not only be difficult to implement but would possibly also cause significant resistance from road users and consumers in general³.

From the above-mentioned two constraints, it is therefore evident that loans provide the RFA with the opportunity to balance expenditure and revenue over the long term with the understanding that recurrent annual maintenance expenditure is covered by annual RUC revenue and that expenditure required for network development could be financed by loans.

It is evident that loans are useful to ensure the timely implementation of projects. Should loans not be available, this could either mean that projects need to be postponed until sufficient RUC revenue is available or that projects even need to be cancelled. The postponement or cancellation of projects however has negative implications for road users and the consumer in general.

The effects of project postponement or cancellation on vehicle operating costs (VOCs) are investigated in more detail below. This analysis is based on an extension project of the MLTRMP (MODELLING OF SELECTED MAJOR CAPITAL EXPENDITURE PROJECTS) completed in August 2002.

The background to the extension project is briefly as follows:

The RA identified the need to investigate the optimal timing of the implementation of various large roads projects programmed (more specifically rehabilitation projects) for the next five years, given the significant amount of investment that is needed.

A series of major projects that form part of the improvement programme of the RA for next 5 years were identified. The projects account for the major part of the capital expenditure budget over this time period. The projects are the following:

- MR111 : Oshakati-Okahao
- TR1/3: Keetmanshoop-Mariental
- TR1/4: Mariental - Rehoboth
- TR1/5: Rehoboth-Aris
- TR1/6 : Windhoek-Okahandja
- TR1/7 : Okahandja-Otjiwarongo
- TR1/8: Noordoewer-Grunau
- TR1/9: Otavi-Tsumeb

² The high levels of expenditure during the initial years are attributable to the fact that there is currently a significant maintenance backlog which needs to be addressed in order to ensure that the road network remains in a maintainable condition. It should also be noted that the gradual increase in RUC revenue is not only based on a gradual increase in the levels of RUCs but also corresponds to the increase in the amount of travel on the Namibian road network.

³ It should be remembered that the price the consumer pays for products and services includes a transport component.

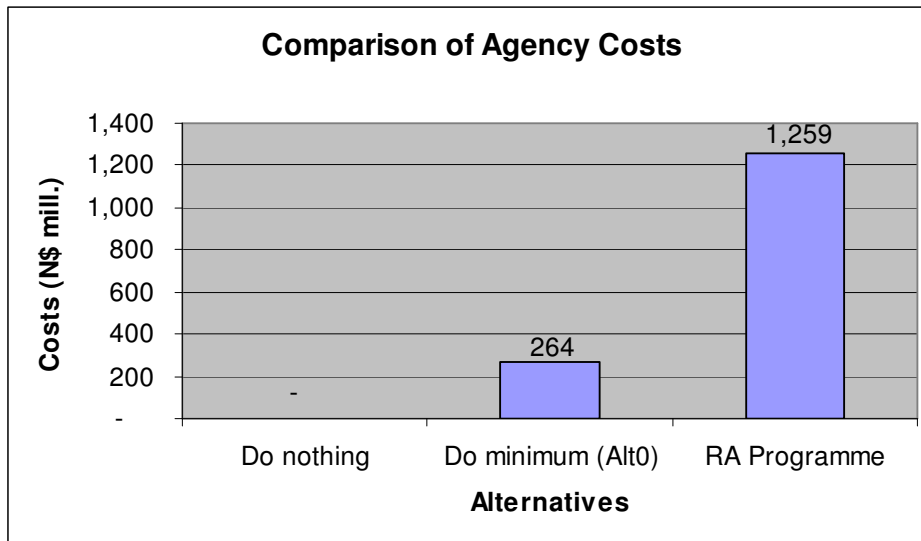
- TR1/11: Ondangwa-Oshikango
- TR2/2: Usakos-Swakopmund
- TR3/1: Ariamsvlei-Grunau
- TR7/1 : Okahandja-Karibib
- TR8/2: Taranaki-Mururani
- TR8/3 : Mururani Gate-Rundu
- TR8/6 : Kongola-Katima Mulilo

Available information was obtained on each of the projects from the RA, in the format of feasibility studies, the RA 5-year Development Budget as well as information on traffic and pavement condition from the RA's Road Management System (RMS).

1.4.3 Impact of not implementing the proposed projects

In this section, the impact on vehicle operating cost savings of not implementing the proposed projects as in the RA 5-year Development Budget is investigated. The agency costs as well as the vehicle operating costs of the RA programme were compared to the agency costs and vehicle operating costs of the Do-nothing and Do-minimum Alternatives⁴.

Figure 1-2 shows the discounted agency costs and vehicle operating costs of the Do-nothing Alternative, Do minimum Alternative and the modelled Alternative (RA



programme) for all the roads analysed.

Figure 1-2: Comparison of Agency Costs for the different Alternatives

From Figure 1-2 it is evident that the modelled Alternative (RA programme) has significantly higher agency costs than the other two alternatives. However, vehicle operating costs of the various alternatives must also be taken into consideration, as total transport costs consist of agency as well as vehicle operating costs, and the objective is to minimise total transport costs. Figure 1-3 depicts the vehicle operating costs of the Do-

⁴ The do-minimum alternative comprises of recurrent maintenance actions such as pothole patching, crack sealing and rejuvenating sprays.

nothing alternative, Do minimum Alternative and the modelled Alternative (RA programme) for all the roads analysed.

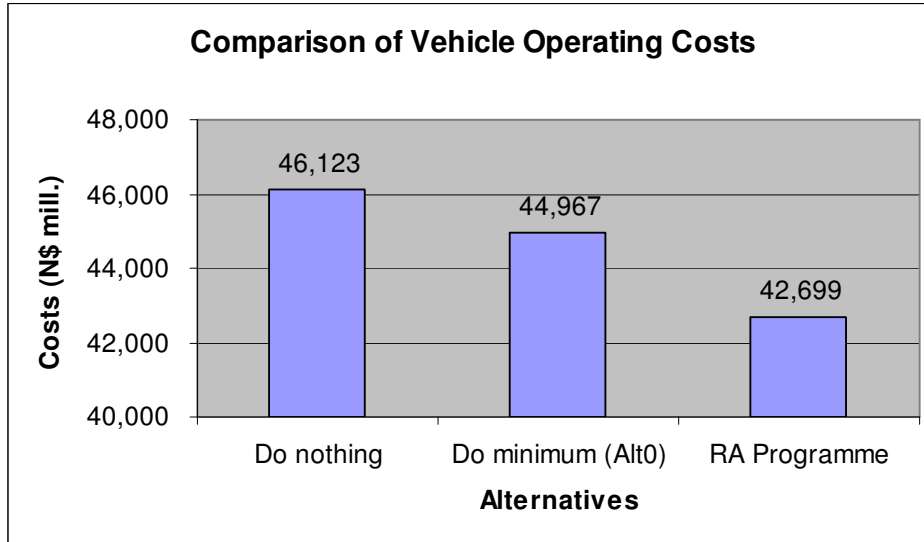
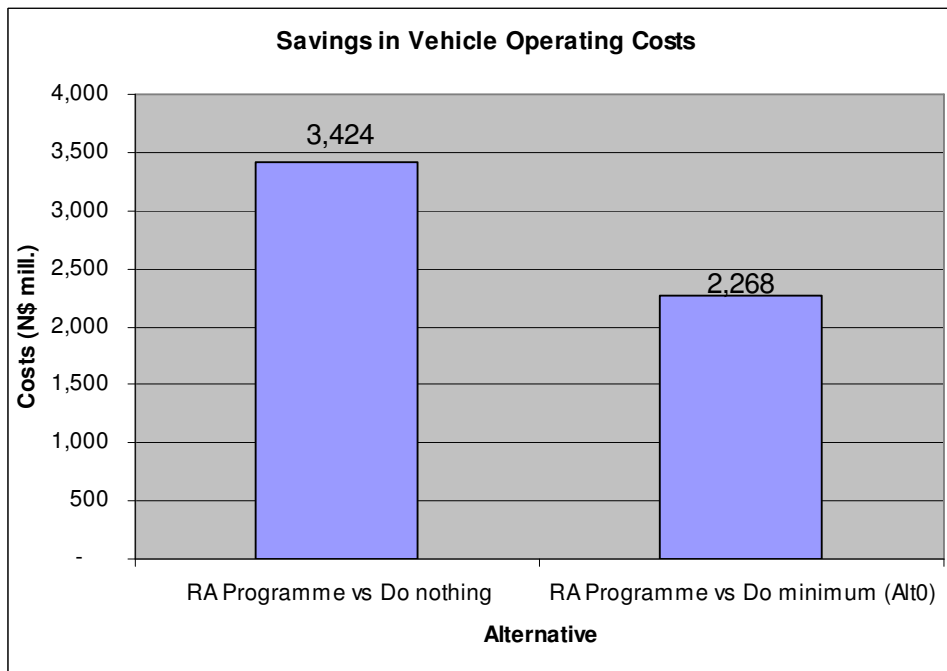


Figure 1-3: Comparison of Vehicle Operating Costs for the different Alternatives

The savings in vehicle operating costs resulting from the RA programme compared to the



Do-nothing and the Do-minimum alternatives are depicted in Figure 1-4.

Figure 1-4: Savings in Vehicle Operating Costs

From Figure 1-4, it is evident that the modelled Alternative (RA programme) result in discounted vehicle operating cost savings of N\$ 3 424 million and N\$ 2 268 million compared to the Do-nothing Alternative and the Do-minimum Alternative, respectively.

A graph can now be drawn, depicting discounted agency costs of the modelled Alternative (RA programme) expressed as a percentage of discounted costs of vehicle operating cost savings relative to the Do-nothing and Do-minimum Alternatives. This is shown in Figure 1-5.

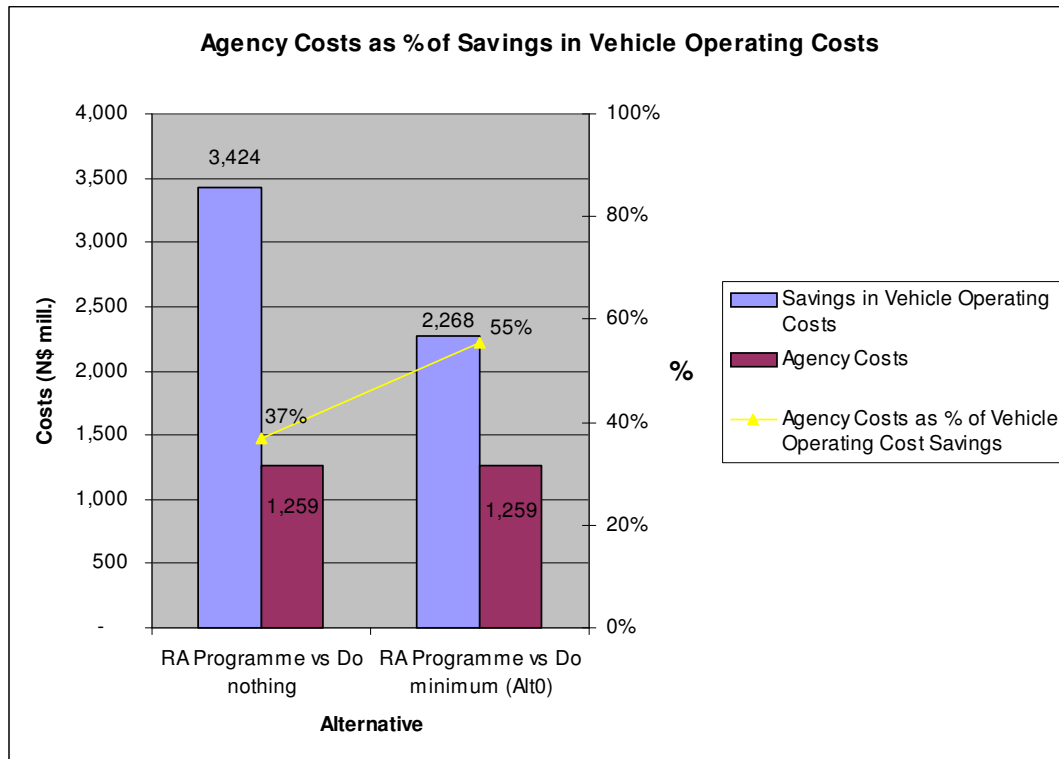


Figure 1-5: Agency Costs as a Percentage of Savings in Vehicle Operating Costs for the different Alternatives

It is evident from Figure 1-5 that the discounted agency costs of the modelled Alternative (RA programme) constitute 37% and 55% relative to discounted vehicle operating cost savings of the modelled Alternative (RA programme) versus the Do-nothing Alternative and the modelled Alternative (RA programme) versus the Do-minimum Alternative, respectively. It can therefore be argued that the money for improvement/rehabilitation is well-spent.

1.4.4 Impact due to postponement of projects

In this section, the implementation of the proposed projects as in the RA 5-year Development Budget were postponed with two, four and six years, respectively, in order to investigate the effect of project postponement on vehicle operating cost savings.

Table 1-2 depicts the **discounted economic** agency costs, vehicle operating costs and subsequent total transport costs of the proposed projects for the different implementation periods.

Table 1-2: Agency Costs, Vehicle Operating Costs and Total Transport Costs for different Project Implementation Periods

Costs (N\$ million)	Postponed Project Implementation (years)			
	0	2	4	6
Agency Costs	1 259	1 037	865	724
Vehicle Operating Costs	42 699	42 896	43 107	43 346
Total Transport Costs	43 958	43 933	43 972	44 070

Note: Agency costs and VOCs refer to **discounted economic** costs (at 10% per annum) which were derived from **actual** or **undiscounted financial** prices.

It will be noted from Table 1-2 that implementation of the proposed projects without postponement (0 years) has the highest agency costs and the lowest vehicle operating costs.

The effect on vehicle operating costs in terms of postponing the implementation of the proposed projects by two, four and six years is shown in Figure 1-6.

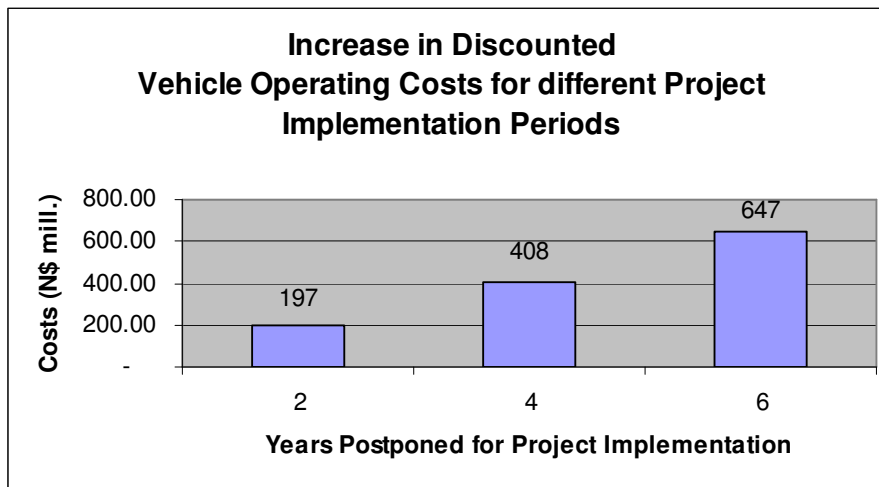


Figure 1-6: Increase in Vehicle Operating Costs for different Project Implementation Periods

It is evident from Figure 1-6 that road users will face an increase in vehicle operating costs of N\$ 197 million, N\$ 408 million and N\$ 647 million if the implementation of the proposed projects is postponed by two, four and six years, respectively.

The above analysis focussed on **discounted economic costs**. In order to compare the benefits of road users (vehicle operating cost savings) and the “premium” road users have

to pay for long-term stable RUC levels in the form of interest payments on loans, it is necessary to analyse the **undiscounted financial prices**⁵.

Table 1-3 gives a comparison between the additional VOCs incurred by postponing the project implementation and the savings in interest on loan payments by not postponing the project implementation over the analysis period of 20 years.

Table 1-3: Comparison of Financial VOC Savings with “premiums” in the form of interest payments on loans

Costs (N\$ million)*	Postponed Project Implementation (years)			
	0	2	4	6
Undiscounted VOCs (A)	154 532	155 245	156 009	156 873
Additional Undiscounted VOCs** (B=A _j - A ₀)	-	713	1 477	2 341
Savings in Interest Payments (C)**	-	(532)	(1 205)	(2 057)
Total (D=B+C)**	-	181	272	284

Note: * Negative costs (shown in brackets) represent benefits.

** Relative to 0 years postponement. A_j = Project postponement alternative where j=0, 2, 4 or 6.

Regarding Table 1-3, the following should be noted:

- The first row represents the undiscounted financial VOCs for each project implementation option.
- The second row depicts the additional VOCs incurred by postponing the project implementation with 2, 4 or 6 years.
- The third row represents the savings in payments on interest on loans if the project implementation is postponed with 2, 4 or 6 years. The interest payment was calculated by applying an interest rate of 12.50% per annum which represents the interest rate applicable to RFA 10 loan stocks⁶ to the undiscounted financial agency costs of N\$ 2 003 million over the 20 year analysis period. Furthermore, it was assumed that the loan stocks will be repaid over the respective postponement periods (i.e. 2, 4 or 6 years).
- The fourth row is a sum of the second and the third row and represents the total net-costs road users face for each project postponement option relative to the option where the project is not postponed (i.e. 0 years postponement).

It is therefore evident that it is more beneficial for road users as well as the Namibian consumer in general that projects are not postponed. This analysis is graphically depicted in Figure 1-7.

⁵ To measure the economic costs and benefits of a project, it is essential that the prices of inputs and outputs indicate their scarcity or economic value. Provided certain conditions are met, prices obtained in the market (so called market or financial prices) are the best criterion upon which the allocation of resources can be based. When market prices do not reflect economic scarcity values, the use of shadow prices becomes necessary. Adjustments to arrive at shadow prices include for instance that subsidies and taxes should be excluded in economic analyses, as these are mere government transfers.

⁶ It should be noted that the RFA also receives soft loans from institutions such as the Arab Development Bank (BADEA), the German Credit Institution (KfW), the African Development Bank (AfDB) etc. where the interest rates are significantly lower than the RFA 10 loan stocks.

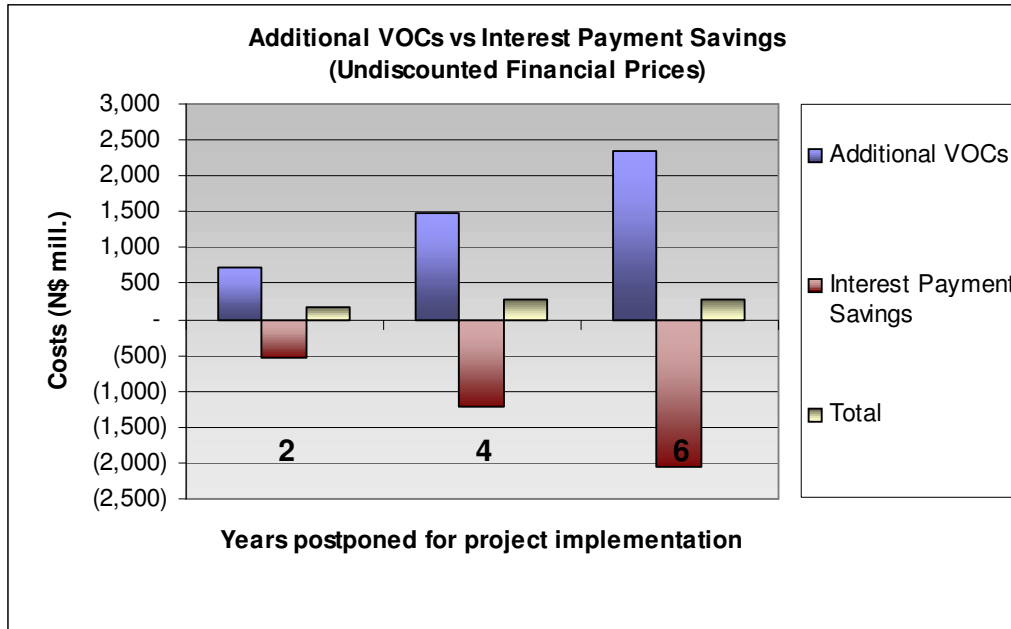


Figure 1-7: Comparison of additional VOCs and Interest Payment Savings

1.4.5 Other considerations

Other considerations which should be kept in mind when implementing projects and before resorting to loans include the following:

- Optimum timing of projects; and
- Staged construction (or implementation).

These are discussed in more detail below.

1.4.5.1 Optimum Timing of Projects

The Rules and Principles in terms of Section 19(2) of the RFA Act refer to economic evaluation criteria, i.e. Net Present Value (NPV), NPV/Cost Ratio, Internal Rate of Return (IRR), Benefit Cost Ratio (BCR), position on the efficiency frontier and optimised timing.

Project or programme⁷ viability as expressed in terms of the NPV, NPV/Cost Ratio, IRR, BCR, position on the efficiency frontier does not reveal the optimum timing of project implementation.

In terms of **project** viability, the First Year Rate of Return (FYRR) is a tool to determine the optimum timing of projects.

⁷ The difference between a project and a programme is that a programme usually consists of more than one project.

The FYRR is calculated by dividing the present worth of the benefits accruing in the first year of operation (i.e. the year subsequent to project completion) by the present worth of the capital cost involved, and expressed as a percentage. If the FYRR is higher than the prescribed discount rate (10% in the case of Namibia), then the project is timely and should be implemented immediately. If the FYRR is lower than the prescribed discount rate, commencement with the project implementation should be postponed.

In the case of budget constraints, or due to political considerations where projects should show benefits as soon as possible, the FYRR can be used as an aid to prioritise projects showing similar degrees of economic viability.

In terms of **programme** viability, optimal life-cycle costing needs to be applied in order to determine the optimal timing of various projects forming part of a programme. Projects cannot be analysed in isolation, as they all impact on the overall viability of a specific programme.

1.4.5.2 Staged Construction

Construction or implementation of a project can be planned to take place in stages. This approach must however be sound from a construction or implementation point of view, and must be fully supported by traffic and economic considerations.

With staged implementation, construction or implementation costs of certain project components may eventually be higher, as full account needs to be taken of the setting up (mobilisation), overhead costs and duplication of certain activities which can and often do represent a substantial part of total project cost. However, the postponement of the construction of those project components which are not necessarily required by the users in the initial years of project operation can reduce the opportunity costs of the project.

Staged construction implies that construction costs will be incurred at different points in time during the life of the project and the analysis period.

1.5 CONCLUSIONS

The purpose of this report was to deal with Economic Warrants of Loans which is one separate phase of the broader MIEERS study.

In order to investigate the Economic Warrants of Loans, an analysis was done which focused on the effects of additional vehicle operating costs incurred as well as savings in the form of interest payments if the implementation of major capital expenditure projects as depicted in the RA 5-year Development Budget are postponed by two, four and six years, respectively. The analysis also aimed to compare the effects on vehicle operating costs where no or minimum improvements are done. This analysis was based on findings from an extension project of the MLTRMP which was completed in August 2002.

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Other aspects were also considered such as the optimum timing of project implementation and staged construction or implementation which are closely related to the issue of resorting to loans for purposes of project implementation.

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