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# LABOUR INTENSIVE WORK IN BOTSWANA: A DESCRIPTION AND EVALUATION OF SIX PROGRAMMES.

Mex Mujazemee Muatjetjeja

A research report submitted to the Faculty of Engineering and the Built Environment University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Science in Engineering.

Johannesburg, 2006

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**DECLARATION**

I declare that this research report is my own, unaided work. It is submitted for the Degree of Master Science in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

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## ABSTRACT

The Government of Botswana has, since 1972, implemented several programmes of labour intensive work as a complementary effort to alleviate high levels of unemployment, poverty and rural under-development. This research project describes and evaluates six of the programmes: the Botswana Labour Intensive District Roads Programme (LG 34), the Rural Roads Programme (RRP), the Labour Intensive Public Works Schemes (LG 38), the Labour Intensive Drought Relief Programme (LG 117), the current National Public Works Programme (LG 1107) and the current Labour Intensive Routine Road Maintenance Programme. The programmes have been described and evaluated in relation to their internal objectives as well as against international literature on labour intensive work in order to determine whether or not they were successful. The study reveals that the LG 34 was a highly successful programme as it achieved most of its key objectives and was in conformity with international literature. The programme created jobs for a significant number of poor Batswana through the construction of good quality low cost roads. It developed and established road construction and maintenance units within the District Councils. The success of the LG 34 was, however, later undermined by a depreciated wage rate contributing to the eventual demise of the programme.

The Labour Intensive Road Maintenance Programme, although currently in its early stages of expansion, has been impressive. It has successfully developed and demonstrated through a Pilot Project a model for the use of labour based small contractors, managed by a private sector consultant, for routine road maintenance. This had not been done before in Botswana.

The rest of the programmes were plagued by inefficiencies resulting from poor initial planning, lack of training and technical supervisory personnel, lack of proper organisational systems for the programmes and incorporation into drought relief

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activities. Most of these programmes were wound up, and the on-going National Public Works Programme is struggling to survive.

In sum, the Botswana experience has shown that labour intensive methods could be successful if attention were paid to initial design and planning, training of technical supervisory staff and the establishment of proper organisational systems. In addition, to differentiate proper labour intensive work from drought relief, wages must be paid at or close to the Industrial Class minimum wage.

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**DEDICATION**

To my wife Dolly Muatjetjeja and my daughter Jakendisa Muatjetjeja

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**ACKNOWLEDGEMENTS**

I would like to express my sincere indebtness to Professor Robert McCutcheon for guiding this entire research effort and particularly for making critical but valuable comments on the preparation of the report. It is difficult to figure out how this could have been achieved without his guidance and contribution. I also wish to extend my gratitude to Mr. Harry Quainoo who diligently proof read the report.

Lastly, I take this opportunity to express my recognition of the contribution from my wife Dolly Muatjetjeja, who provided emotional support and typed part of the report.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| AGL | Assistant Gang Leader |
| ARE | Assistant Roads Engineer |
| BDFID | British Department for International Development |
| BIDPA | Botswana Institute for Development Policy Analysis |
| CDC | Central District Council |
| CSO | Central Statistics Office |
| CTO | Chief Technical Officer |
| DBES | Department of Engineering and Building Services |
| DCRU | District Council Road Unit |
| DDC | District Development Committee |
| DRE | District Roads Engineer |
| LIDRP | Labour Intensive Drought Relief Programme |
| DRTO | Drought Relief Technical Officer |
| FSD | Food Studies Group |
| FTU | Field Training Unit |
| GOB | Government of Botswana |
| IBRD | International Bank for Reconstruction and Development |
| ILO | International Labour Organisation |
| KRARP | Kenya Rural Access Roads Programme |
| LG 1107 | Current Labour Intensive Public Works Programme |
| LG 117 | Labour Intensive Drought Relief Programme |
| LG 34 | District Roads Upgrading and Maintenance Programme |
| LG 38 | Labour Intensive Public Works Schemes |
| LIM | Labour Intensive Methods |
| LIRMP | Labour Intensive Roads Maintenance Programme |
| MFDP | Ministry of Finance and Development Planning |
| MLGL | Ministry of Local Government and Lands |

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| | |
|---|---|
| MLHA | Ministry of Labour and Home Affairs |
| MTWC | Ministry of Works Transport and Communications |
| NDP | National Development Plan |
| NORAD | Norwegian Agency for International Development |
| OECD | Organisation for Economic Cooperation and Development |
| RDC | Rural Development Council |
| RRP | Rural Roads Programme |
| RTC | Roads Training Centre |
| SGL | Senior Gang Leader |
| SIDA | Swedish International Development Authority |
| STA | Senior Technical Assistant |
| STO | Senior Technical Officer |
| TA | Technical Assistant |
| TML | Team Leader Maintenance |
| TO | Technical Officer |
| UGLS | Unified Local Government Service |
| UNDP | United Nations Development Programme |

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# 1. INTRODUCTION

## 1.1. Definition

"Labour-intensive" is a phrase in economics to describe an operation in which proportionately more labour is used than other factors of production.[1]

Labour-intensive construction may be defined as the economically efficient employment of as great a proportion of labour as is technically feasible, ideally throughout the construction process including the production of materials, to produce as high a standard of construction as demanded by the specification and allowed by the funding available; labour intensive construction results in the generation of a significant increase in employment opportunities per unit of expenditure by comparison with conventional capital-intensive methods. There are several stages of employment intensity depending on the type of project and the parameters used to define economic efficiencies. The first stage of labour intensity is cost-competitiveness with conventional capital-intensive methods.

Since the 1970s, " labour-intensive" has been the term used in the major research and field studies carried out by the World Bank and the International Labour Organisation. A serious problem with the phrase "labour-intensive" is that decision makers tend to focus upon "labour" and its negative connotations of "picks and shovels" ( and "slave"). This ignores the array of factors which need to be in place long before any labour can be employed productively. These factors include appropriate policy, legislation, institution, suitability of project, contract documentation, sanction, quality and efficiency, organisation and training at site and managerial levels including that required for proper contractor and sub-contractor

[1] Penguin Dictionary of Economics (1972), South African Concise Oxford Dictionary(2002):"needing a large work force or a large amount of work in relation to output".

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development. For these reasons some authors now prefer to use the term employment intensive.[2]

Thus the the phrase "labour-intensive" will be used in this study because of its intellectual pedigree in the 1970s. It was the phrase used during all the path-breaking research. It is the term used in relation to contract in South African legislation.

## 1.2. Two pertinent concepts that underpin the theory of labour-intensive construction

In 1971 the World Bank initiated a research programme called "Study of the Substitution of Labour for Equipment in Road Construction" later broadened to "…Civil Construction". The research was formally completed fifteen years later in 1986, and led to the delineation of several basic concepts including those of technical feasibility and economic efficiency.

The World Bank study was undertaken in three phases. In the Second Phase the conclusion regarding the concept of technical feasibility was extended beyond road construction and qualified labour-intensive methods for a wide range of construction activities without compromising the level of product quality normally achieved through the use of equipment-intensive methods.[3]

While the later phases of the World Bank study did take some account of the lower equipment productivities in the developing countries, it was mainly concerned with

---

[2] There has been further debate as to the terms "labour-intensive" and "labour-based". Some authorities prefer to use the term "labour-based" as opposed to "labour-intensive". They hold that labour-intensive implies that work is done entirely by hand whereas labour-based allows the use of equipment where necessary. For this study the term labour-intensive is preferred for the sense that it conveys the intensive use of labour, while not pre-cluding the use of appropriate machinery. In the opinion of the author the essential difference is not between these two terms but between both of them and the term "labour-extensive" where the emphasis is upon the size of the labour force wih scant concern for either the product or productivity(as occurs during relief projects).

[3] IBRD,1974

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the improvements that could be achieved by advanced labour-intensive methods over the inefficient traditional ones. Placing more emphasis upon the need to improve the productivity of labour than delineating the actual productivity of equipment, one of the major conclusions from Phase Three was that with superior tools, high incentives and good management, labour productivity could be improved to a point that labour-intensive methods could be fully competitive with equipment intensive methods at certain wage rates. Where the wage rates were less than US$2 per day, labour-intensive methods would be distinctly competitive.

> *Wherever the basic wage actually paid…is less than…about US$4 per day in 1982 prices, and labour is available in adequate quantities, the alternative of using labour-intensive techniques should be seriously considered.*[4]

In 2003 the International Labour Organisation stated that US$ 10 had become the "break even" wage.[5]

### 1.3. Context

The Government of Botswana has, since 1972, implemented several programmes of labour intensive work as a complementary effort to alleviate high levels of unemployment, poverty and rural under-development. This research project describes and evaluates six of these programmes. The programmes have been described and evaluated in relation to their internal objectives as well as against international literature on labour intensive work.

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[4] IBRD,1986
[5] Majeres, 2003: 1-3

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### 1.3.1. Work and unemployment

In order to stay alive one needs access to air, water and food. These are the fundamental requirements for human subsistence, and while air and water are readily available food is not. One can obtain food by stealing, begging for, growing, borrowing or buying it. If one cannot grow food and therefore needs to buy, then work is the most moral alternative to gain access to food.[6]

Other important needs that we afford through work are sociological and psychological needs. We meet our sociological needs if we are able to meet important social commitments such as participating in social clubs or are able to live a certain lifestyle. Work enables us to achieve a sense of self-esteem, which derives from the perception that the work we do is important and earns us recognition. Thus we recreate ourselves and the world around us through work.[7]

However, although work is so important, it is not so easy to find work and hence unemployment has become one of the most feared phenomena of our times, especially in the developing world. High unemployment levels represent a waste of human resources and reflect an economic inefficiency while causing a disturbing degree of social distress.[8] It leads to other social ills like poverty and crime.

### 1.3.2. Global Poverty

Poverty is a situation where one cannot afford a minimum standard of living.[9] There is a high incidence of poverty in the developing world. Of the world's six billion

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[6] McCutcheon, 2003 in McCutcheon & Taylor-Parkins: 42
[7] Ibid.,
[8] OECD,1994:7
[9] BIDPA,1997

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people, nearly half live on less than $2 a day and over one billion on less than $1 a day.[10] Widespread poverty results in social tensions and problems due to inequalities between the poor and the rich and/or living a tough life. Poverty results in economic inefficiencies on the part of the affected groups. Hungry children cannot study properly, a malnourished work force is deficient in productivity and an economy where the population is poor has a structure of demand that does not encourage the production and marketing of the needed goods.[11]

### 1.3.3. Lack of basic infrastructure

Many people in the rural and urban areas of developing countries do not have access to such basic infrastructure as housing, access roads, storm water drainage, sewerage, and sanitation services. People need housing because shelter is a basic need. Proper access roads in the rural areas increase the mobility of the rural people. It makes it easier for them to participate in economic activities. The provision of sewerage and sanitary infrastructure ensures that people live in hygienic conditions especially in the urban informal settlements where the population densities are high. Availability of these basic infrastructure uplifts the livelihoods of the people.

While there is a dire need for basic infrastructure, the conventional infrastructure development programmes have not been able to meet the demand for it and there is a critical backlog in the provision and maintenance of infrastructure. This has been alluded to by the Minister of Finance and Development Planning when he presented the national budget for the financial year 2005/2006. 'It is the government's intention to give priority to the completion of on going projects before embarking on new

[10] McCutcheon,2001 in Proceedings of the First International Conference on Employment Creation in Development:3
[11] Mbonini 1996 in Proceedings of a Symposium on the Quality of Life in Botswana

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ones', noted the minister.[12] He also stated that the government is acting to address the backlog of maintenance of public facilities.

### 1.3.4. Individual and community capacities

Communities in the developing world need access to basic infrastructure and employment opportunities, which would contribute to their development process. Set against these needs is the lack of individual and community capacities in technical and institutional terms to implement development projects.[13] Both the job market and the development programmes for communities require a skilled labour force. Furthermore, the planning and implementation of development programmes requires the participation of legitimate democratic institutions in the local communities.

## 1.4. Concepts of Labour-intensive Construction

Development theory has failed to solve the above-mentioned problems. It had suggested that technology transfer through industrialisation and urbanisation would bring about economic growth leading to reduced unemployment and poverty. However, despite the rapid industrialisation and economic growth, unemployment and underemployment continued to rise. It became evident that other means than growth alone were needed to generate employment opportunities. To that effect, the International Labour Organisation and the World Bank initiated research to investigate the technical feasibility and economic efficiency of using labour intensive methods in the construction of infrastructure. The research concluded that labour intensive methods were technically feasible and economically efficient for a wide variety of construction activities and generally produced the same quality of product

[12] MFDP,2005:23
[13] Ibid.

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as machine intensive methods. This has been discussed in more detail in section 2.2 of the report.

Many countries in the developing world welcomed this development and went on to initiate and implement labour intensive public works schemes to help alleviate high unemployment and achieve rural development. Botswana, the focus of this research, is one of the countries which have implemented programmes of labour intensive work and in the following section a brief overview of the country is taken.

## 1.5. The Case of Botswana

### 1.5.1. Country background

Botswana is a landlocked country sitting in the centre of the Southern African plateau, surrounded by Namibia, South Africa, Zambia and Zimbabwe. Botswana has a relatively large geographical size (582 000 $km^2$) and a small population of about 1.7 million.[14]

The country has a semi-arid type of climate and a savannah type of vegetation. It receives an average annual rainfall of about 250-650 mm. Only about 5% of the land is cultivable.[15] The balance of the land is mostly covered with Kalahari sand, which is poor and infertile. The fertile land is situated in the south eastern part of the country, which also receives the highest annual rainfall and is the centre of commercial activity. The combination of the above factors has meant that the population of Botswana is also concentrated in the south eastern region.

[14] World Bank/MFDP,2004:1

[15] Ibid.

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### 1.5.2. Economic overview

Botswana is a success story in terms of economic growth. It stands out in the Southern African Development Community (SADC) region and globally as a country that has experienced remarkable and consistent growth-"the highest level of per capita growth of any country in the world in the last 35 years".[16]

Botswana was a predominantly rural country on being granted independence in 1966 and was ranked one of the poorest in the world. There were less than 5 km of tarred road and only 3 secondary schools. The majority of the population, 85% in 1971, lived in the rural areas, where the main source of income was traditional subsistence agriculture.[17] Botswana's per capita (de facto) GDP was only P68 in 1966 and P305 in 1974.[18] Agriculture was the largest GDP earner throughout the independence decade (1966-1976). It formed 39% and 32% of Botswana's GDP in 1966 and 1974 respectively.

However, diamonds were discovered in 1967 and their exportation has fuelled remarkable economic growth. Per capita growth has since averaged more than 7 % per year allowing the country to move from its position as one of the poorest in the world to a position as a middle-income country with a per capita GDP of about $ 4 278 in 2003[19]. Diamonds have played a key role in fostering growth and the mining industry accounts for 36% of GDP, 75% of export earnings and over 50% of government revenues.

However, Botswana presents a paradox because there are parts of the country where poverty is endemic and for many, livelihoods have suffered to the extent that some

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[16] Clover,2003:1
[17] ILO/MLGL,1976
[18] MFDP,1977
[19] World Bank/MFDP, 2004:1

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are supported by government destitute payments only.[20] It was the only country that recorded a drop in the Human Development Index while it was experiencing a rapid economic growth in 2001.

Life expectancy in Botswana dropped from 68 in 1995 to 39-45 in 2001.[21] Although this drop has been attributed to the high incidence of HIV/AIDS in Botswana it is an indicator for an inequitable distribution of income.

From Table 1.1, the country's Gini coefficient[22] was 63 in 2003.[23] This figure is not reconcilable with the high per capita income of Botswana, $ 4 278 in 2003. It shows that the distribution of income in Botswana is highly uneven. In comparison with some of its regional neighbours, Botswana had the second highest Gini coefficient next to South Africa in 2001. This was despite its second highest per capita income during the same year.

**Table 1.1: Socio and macroeconomic trends: regional comparisons**

| Country | GDP/capita(PPP US$)2001 | HDI rank 2003 | GDP/capita growth rate (1990-2001) | Gini coefficient 2003 |
|---|---|---|---|---|
| South Africa | 11 290 | 111 | 0.2 | 59.3 |
| Namibia | 7 120 | 124 | 2.2 | 70.7 |
| Botswana | 7 820 | 125 | 2.5 | 63.0 |
| Swaziland | 4 330 | 133 | 0.1 | 60.9 |
| Zimbabwe | 2 280 | 145 | -0.2 | 56.8 |

Source (Clover, 2003)

Thus the remarkable economic growth has not translated into a significant degree of socio-economic transformation in Botswana. The benefits of economic growth are

[20] Clover, 2003:1
[21] Ibid
[22] Gini coefficient: a statistical index used in econometrics to measure inter-individual or inter-household disparities in the distribution of income. A high coefficient is indicative of wide income disparities.
[23] Clover, 2003:1

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being enjoyed by a few much more than many. This has been attributed in part to the fact that the engine of economic growth is the mining sector, which is highly capital intensive and its share of the labour force is only about 5%. This has led to a situation of high unemployment and widespread poverty.

### 1.5.3. Unemployment

The problem of high unemployment levels within the Botswana economy dates as far back as the pre-independence period. Out of the 206 000 people of working age who lived in the rural areas only 34 000 were in cash employment in 1976.[24] This situation and high unemployment in the urban centres explained the 'exodus' of Batswana workers to South African mines where the working and living conditions were poor and remuneration was low. This bears testimony to the hardships of living in rural Botswana then.

The remarkable economic growth of post-1967 is yet to bring about a significant degree of socio-economic transformation. The Household Income and Expenditure Survey of 2004 put the unemployment rate at 23.8%.[25] Available data shows that as the GDP continued to grow the gap between the rate of generation of employment opportunities and the rate of growth of the labour force has widened. Unemployment increased from 14% in 1991 to 23.8% in 2004 and the highest rate of unemployment was among the youth.[26] The rate among the youth increased from 31% to 55.9% between 1991 and 2004. The unemployment problem in Botswana has a gender dimension as well, with women experiencing the highest incidence of unemployment. According to Mayer and Gladson (1997), between the years 1991 and 2004 the rate of unemployment among women increased from 17% to 26.3% while the rate for men increased from 12% to 21.4% during the same period.

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[24] ILO/MLGL,1976
[25] CSO,2004
[26] Mayer & Gladson,1997 in Botswana Development Issues No. 1:4

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### 1.5.4. Poverty

Botswana is a country where, ironically, the masses are poor amid plenty. A 1997 study on poverty and poverty alleviation commissioned by the Government of Botswana (GOB) and undertaken by the Botswana Institute for Development Policy Analysis (BIDPA) reported that 47 % of Batswana lived below the Poverty Datum Line in 1994.[27] It also reported an unevenness of development between the rural and urban areas with 55% of the rural population found to be below the poverty datum compared to 46% in urban villages and 29% in urban areas. At the root of the problem of rural poverty is a structural limitation: lack of agricultural diversity renders Botswana resources difficult to convert into more sustainable uses, cattle rearing being the only effective means of attaining wealth above subsistence income.[28]

Abject poverty is found mainly in the smallest settlements, decreasing in the larger rural settlements (villages and towns). The greatest poverty is among ethnic groups such as the Basarwa, who mainly live in Remote Area Dweller (RAD) settlements and cattle posts. RAD households are still highly dependent on the rapidly depleting natural resources of wildlife and veld foods and products.

## 1.6. Problem Statement

A permanent feature of the development policy planning of Botswana has been the creation of employment opportunities and rural development leading to poverty alleviation and a better quality of life. A recent addition to these objectives has been

[27] BIDPA, 1997
[28] Clover, 2003: 4

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the promotion of private sector development.[29] Botswana's rural areas remain inaccessible as the rural roads are in a state of disrepair. Thus there is a need to provide access to the rural areas, which if done labour-intensively could generate a significant number of employment opportunities. It was in line with these objectives that the Government of Botswana came up with a number of programmes of labour intensive construction and maintenance of infrastructure. These programmes were as follows:

- The Rural Roads Programme (RRP) started in 1972
- The Labour Intensive Public Works Schemes (LG 38) started in 1980
- The Botswana District Roads Programme ( LG 34) started in 1980
    - Pilot Project (1980-1982)
    - Expanded Programme: District Roads Upgrading and Maintenance Programme (1982-1992)
- The Labour Intensive Drought Relief Programme ( LG 117) started in 1980
- The current Labour Intensive Public Works Programme ( LG 1107) started in 1997
- The Labour Intensive Routine Road Maintenance Programme started in 1998

Some of the above programmes no longer exist (RRP, LG 38, LG 34 and LG 117) and it is not clear as to the future prospects of the others.

### 1.7. Aims and Objectives of the Research

Against that background it is the aim of this research project to evaluate the above programmes with a view to draw the lessons learned in order to inform decisions on current and future similar programmes in Botswana and elsewhere. In order to achieve this aim the research has the following objectives:

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[29] MFDP,1998

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- To give a detailed description and analysis of each programme
- To identify the major problems affecting or which affected the programmes
- To identify the objectives of these programmes and determine the extent to which they were or were not achieved
- To review the international literature on good practice in labour intensive work
- To evaluate the Botswana programmes against the good practice
- To draw the lessons learned from the Botswana experience and make recommendations for future programmes in Botswana and elsewhere.

## 1.8. Hypothesis

Some of the labour intensive programmes in Botswana have degenerated into drought relief-type projects and progressively ceased to be treated as long term development initiatives. They began to attract an undeserved image of producing poor quality products at a high cost and too slowly. These perceptions had no basis in technology and economics but were powerful enough to undermine some of the programmes as political and bureaucratic support for the programmes also waned. These factors have contributed to the demise of some of the programmes.

## 1.9. Research Methodology

The methodology employed in this research comprises:

i. A literature review of the subject of labour intensive construction in general and previous research on labour intensive work in Botswana
ii. Visits to the relevant participating institutions and libraries to collect data in the form of progress reports, technical review reports, socio-economic impact study reports and any other secondary data.
iii. Selective interviews of current and previous officials of the programmes

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iv. A detailed description of the programmes followed by a critical evaluation of the programmes in relation to their own objectives and in relation to literature on good practice
v. Conclusions and recommendations will be drawn arising from the above analysis and evaluation

### 1.10. Limitations of the research

The research is subject to the following limitations:

- It is confined to only 6 programmes of labour intensive work in Botswana
- It is confined to the time period from 1972 to 2004

### 1.11. Report Outline

Having reviewed all the programmes, the author considers that, apart from the recent Labour Based Roads Maintenance Programme, only the LG 34 has been successful in terms of both internal and external evaluations. Internal evaluations were in relation to the programmes' objectives while external evaluations were by comparison with other programmes such as the Kenya Rural Access Roads Programme (KRARP). Furthermore there was more complete documentation for the LG 34 than for all the other programmes. For the above reasons the author decided to first discuss the LG 34 before passing to the other programmes.

## Chapter 2

Chapter 2 reviews the subject matter of labour intensive construction, discussing the conceptual and theoretical frameworks. This constitutes a summary review of the international literature.

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**Chapter 3**

This chapter contains a detailed description of the Pilot Project to the Botswana District Roads Programme, LG 34. It details the issues that the Pilot Project experimented with, or investigated, and identifies the main findings of the project.

**Chapter 4**

This chapter contains a description of the LG 34, as expanded after the pilot phase. It identifies any deviations or otherwise from the methods, standards, organisation types as established and recommended by the Pilot Project. Any new developments during the expanded phase have also been described here. The chapter closes with an evaluation of the programme and conclusions.

**Chapter 5**

This chapter contains a brief description of the Rural Roads Programme (RRP) followed by detailed descriptions of the Labour Intensive Public Works Scheme (LG 38) and the Labour Intensive Drought Relief Programme (LG 117).The chapter closes with an evaluation of the programmes and conclusions.

**Chapter 6**

This chapter contains a description of the current Labour Intensive Public Works Programme (LG 1107). The description covers such issues as the type work done, organisational frameworks, sources of funding, employment and wages. The chapter ends with an evaluation of the programme and conclusions.

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**Chapter 7**

This chapter contains a detailed description of the recent Labour Intensive Routine Road Maintenance Programme using Small Scale Citizen Contractors by the Roads Department. The description involves a discussion of the institutional framework, the type of organisation for maintenance, source and structure of funding, the type of work done, employment and productivities. It also contains an evaluation of the programme and concluding remarks.

**Chapter 8**

Chapter 8 contains the conclusions drawn by the study and the recommendations for future and current similar programmes. The chapter concludes with recommendations for further research.

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# 2. LITERATURE REVIEW

## 2.1. Introduction

In setting out the theoretical framework for this study, the author has drawn heavily upon the work of McCutcheon who was directly involved in one of the projects and has written extensively about labour-intensive construction in general and Botswana and Kenya in particular.The author has also summarised the key findings of the path-breaking researches and field studies carried out by the World Bank and the International Labour Organisation in the 1970s. These studies have delineated some of the concepts which underpin labour-intensive construction.

## 2.2. Context and Concepts of Labour –intensive Construction

Societies in the developing world have been and continue to be ravaged by high levels of unemployment, poverty, lack of technical skills and community capacities, backlogs in the provision of basic infrastructure rendering the quality of life poor. This is more so for rural communities.

The above problems have defied development theory, which suggested that industrialization by the economies of the developing world would lead to economic growth with the latter resulting in the generation of employment opportunities. Developing nations spent a significant proportion of their scarce foreign resources in a drive to industrialise. Economic growth was achieved but the problems of unemployment and underemployment continued to rise.[30]

[30] Rostow,1963

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Clearly there was a need to generate employment opportunities within the existing economy, through other means than economic growth alone. To that effect two major international organisations, the International Labour Organisation (ILO) and the International Bank for Reconstruction and Development (IBRD) initiated research to investigate the possibilities of creating employment opportunities within the existing economy.

In 1969, the ILO started its World Employment Programme (WEP) under which it carried out part of the above-mentioned research. The ILO started with the exploration of the reverse substitution of labour for equipment. The inquiry identified two types of product: one where the production process was not amenable to the reverse substitution of labour for equipment and another where production process was amenable to reverse substitution. [31]

The ILO concluded that the reverse substitution of labour for equipment was less likely in process-centred industries and more likely in product-centred industries like civil construction where the products are time-honoured, involves the mechanical fitting together of partial products and the machines used are essentially magnified versions of handicraft tools.

The construction industry was also considered worthy of attention from the perspective of a number of socio-economic factors.[32] It constitutes a significant proportion of the economy. In the developed world and the modern sectors of developing nations the construction industry was capital-intensive leaving room for labour-capital substitution, unlike the building industry.[33]

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[31] Lal,1978
[32] McCutcheon, 2003 op.cit:24
[33] Ibid.

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Civil construction plays a major role in the provision of infrastructure, which in turn accounts for 50-60% of the Fixed Capital Formation of most countries. Lastly 60-70% of civil construction in developing countries is carried out through public funding rendering the industry amenable to influence by public policy. Thus civil construction was promising.

The ILO then focused on establishing the economic viability of using labour intensive methods and from a number of studies the following conclusions were drawn:[34]

- The use of labour intensive methods of construction will go a long way to reduce inequalities in the distribution of income and achievement of social justice.
- Labour intensive methods could be competitive with equipment intensive methods at shadow prices and could be cheaper at shadow prices if labour productivity could be improved.
- Labour intensive methods are more economically viable than equipment intensive methods at both market and shadow prices.

In 1971, the World Bank set up a research project called the Study of the Substitution of Labour and Equipment in Road Construction (later changed to civil construction) to investigate the technical feasibility and economic efficiency of labour intensive methods. Initial work started with the reviews of literature on past experiences with labour intensive methods followed by field studies of on-going projects from which

[34] ILO, 1974,1975 & 1978

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initial conclusions were drawn. The World Bank then went on to test the initial findings by embarking upon test activities in India, Honduras, Indonesia and Kenya.[35]

The World Bank work culminated in a project completion report whose major conclusions were as follows:[36]

- It is technically feasible to substitute labour for equipment for a wide variety of construction activities and generally produce the same quality of product as machine intensive methods.
- With superior tools, high incentives and good management labour productivity could be improved to the point that labour intensive methods could be fully competitive with equipment intensive methods at certain wage rates.

- It further stated that where the wage rate actually paid is less than $ 4 per day in 1982 prices and labour is readily available the alternative of using labour intensive methods should be seriously considered. In 2003 the ILO revised the $ 4 to $ 10.

## 2.3. The Principles of Employment Intensive Construction for Successful Site Implementation

Based on an evaluation of the literature and his own experience McCutcheon has proposed the following principles for the successful site implementation of labour intensive methods:[37]

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[35] McCutcheon,op.cit
[36]IBRD,1986.

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- The work must be treated as proper engineering and careful consideration must be given to carefully selected socio-economic objectives including employment generation
- The product must be appropriate to employment intensive methods
- Detailed technical analysis must be carried out
- Designs, specifications and other documentation must be appropriate
- As far as possible work must be based on individual or group tasks
- During preparatory work or the pilot phase work and method studies should be carried out to reveal:
    - The various operations and their optimal sequencing
    - The various activities within each operation
    - The individual and group tasks appropriate to the different activities and operations
    - The balancing of activities and operations within each operation and project respectively
- The conditions of employment must be appropriate since the majority of the work would be carried out by daily or monthly employed labour.
    - "A fair day's wage for a fair day's work"
    - "A fair day's work for a fair day's wage"
- Health and safety issues must be observed: workmen's compensation legislation must be applied
- The labourers must not be transported to work

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[37] McCutcheon,op.cit

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- High quality appropriate tools and equipment must be used and maintained
- The training must be extensive and good at what it sets out to do with attention particularly paid to the training of the "hands-on" site supervisors. In the selection and training of candidates as much attention must be paid to character as to technical competence
- The labourers must accept instructions given by the trained road builders
- There should be close liaison between site work and the local community and this should not be the responsibility of the site supervisor since he/she has to be on site all day every day.
- Sites must be well organised
- Strong organisations are required with good management systems
- Labour intensive work is not drought relief

## 2.4. Reasons for Success of Large Scale Labour Intensive Programmes

Subsequent to the multi site operations carried out on the basis of the findings of the desk and single site research, large scale programmes were implemented including those of Kenya and Botswana from which further principles were derived regarding large scale programme development.

In order for labour intensive methods to be used effectively on a large scale an approach that leads to a programme of work as opposed to a "once off project is required.[38] On a single project the ratio of professional fees to that of expenditure on

[38] McCutcheon,op.cit:33

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skilled, semi-skilled and unskilled workers will be highly distorted. It takes as much high level technical expertise for one project as does for a programme.[39]

Thus large scale programmes, instead of individual projects, were set up and run revealing that a number of issues required attention for the long term success of large scale implementation of programmes. The following were identified as the main reasons for the success of large scale programmes:[40]

- Major policy and decision makers understood the concepts and principles of labour intensive work and the principles of long term programmes
- The programmes were long term and national: not ad hoc projects
- There was a sound intellectual assessment of the technical feasibility and economic efficiency of labour intensive methods: cognizance was taken of the institutional capacities and the principles of labour intensive construction were incorporated into the daily site work
- Technical, institutional, organisational, managerial and socio-economic aspects received attention during preparatory work, continued through pilot projects, initial training programmes and subsequent national programmes. Technical matters included design standards, specifications, tools and equipment and construction methods. Institutional matters included the decentralization necessary for grass roots success and the centralization necessary to plan and coordinate a large scale programme. Organisational and managerial aspects included the type of organisation required, the management structures, systems and training. Socio-economic aspects

[39] Ibid.
[40] Ibid

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included the wage rate, conditions of employment, labour legislation and supply and the role of women.

- Strong organisations were established with good management systems.
- Training was extensive and good at what it set out to do: "hands-on" site supervisors, multi-site supervisors, clerks etc.
- There was long term political support
- Long term financial commitment was provided by governments and donors
- There was good coordination between government departments, local authorities, technical assistance and donors

Apart from the World Bank and ILO research, other developments and economic experiences have unearthed other essential issues to the concept of labour intensive methods.[41]

## 2.5. Other Important Issues to the Concept of Labour Intensive Construction

### 2.5.1. Technology transfer and the level of technology

The transfer of technology from developed to developing countries was not seen to be problematic from the on-set but in the event it proved more complicated than anticipated.[42] An immediate response was the development of an appropriate technology, which again proved difficult to develop contrary to its initial ostensible simplicity. Within the poor societies requiring such technology there was a lack of technical skills and a low level of formal education and training, pre-requisites for any technological transfer or development. Thus for a technology transfer or

[41] Ibid.,34
[42] Ibid.

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development to take place there must be a local capacity to absorb the new technology.

### 2.5.2. Sustainability

This word is open to interpretation in two ways. The first relates to when what is being done is able to continue without external support. For example, if a business is able to continue because its products are demanded by the market.[43]

The second relates to compatibility between what is being done and the factors affecting it, and this is the most important or relevant to labour intensive construction. It is not sustainable to use capital intensive methods in a society where there is a low level of technical skills, foreign resources are scarce and labour is in oversupply. Employment intensive methods could be more sustainable as they would be in accordance with the level of technical skills available and would generate more employment opportunities for the surplus labour.

### 2.5.3. Training

All successful labour intensive programmes have been linked with long term in-house training programmes. All levels of management require training to different degrees of sophistication, orientation and education.[44] Programmes expanded at rates at which the training programmes had been able to produce competent people. Institutional capacity had been built by training people of various orientations and levels of skill and incorporating it into the institution so that, as a whole, it functioned in accordance with its overall objectives.

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[43] Ibid.,35
[44] Ibid.,37

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The “hands-on” site supervisor has been found to be the most critical person as, without daily supervision, he/she ensures that work is done properly both organisationally and technically.

The training programme must pay as much attention to character as to technical competence and a careful selection process must be followed for selecting the candidates.

### 2.5.4. Targeting

During the 1970s and 1980s a major objective was to generate employment opportunities for the poor and no systematic way was put in place to target the programme to the poor. Thus people from higher income groups could be employed at the expense of the poor.

In labour intensive programmes, steps must be taken to target poor people including pitching the wage rate at the appropriate level to enable the programme to be self targeting. The wage must not be too high as it would take labour away from other productive activities. It must still be sufficient to allow site supervisors the moral obligation to insist on strict discipline. Targeting the poor requires attention in both the recruitment of casual labourers and the selection of potential trainees. The latter would have distinct individual benefits and would contribute to long term poverty alleviation for the poor families.[45]

[45] Ibid.,40

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### 2.5.5. Distinction from drought relief/emergency work

Labour intensive construction should not be confused with relief make-work.[46] Labour intensive work entails careful design, planning and documentation. This is not possible with relief work projects because of the need to show immediate short-term results.

Labour intensive programmes employ labour efficiently to produce assets through the setting and achievement of realistic objectives for quality, time and cost. On the other hand, the main objective of relief work is usually to employ a great number of people regardless of their productivity and quality of work.

## 2.6. The need for programmes for success in projects

### 2.6.1. General

For projects of labour intensive work to succeed they must be part of long term programmes. The strategy to establish a programme for large scale replication of innovatory work involves a four phased approach.[47]

**Phase 1: Orientation**

This phase involves the orientation and education of all the parties on the policy objectives, types of projects, methods of construction, conditions of employment and the concepts and principles of labour intensive work.

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[46] Ibid.,43
[47] Ibid.,48

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**Phase 2: Preparatory work**

This entails the detailed analysis, design, planning and documentation. In particular, the aspects determined here include institutional framework (local and national), organisation for work, funding and staff recruitment policy. Specifications and training materials are prepared as well as conducting community briefings and selection of trainees.

**Phase 3: Piloting**

During this phase demonstration projects and embryonic training programmes are implemented and expanded into national programmes. The expansion of programmes is only allowed to proceed at the rate at which:

- The programme can produce trained personnel
- Local and national institutions and the communities have the capacity to absorb the trained personnel and be able to maintain their roles in the programme

The phased approach to a programme ensures the requisite individual development and institution building at all levels. The approach must be located in an appropriate institutional framework identified early in the process.[48] For countries without prior experience a three-year time period is recommended for the lead-in phases (1-3).

[48] Ibid.,49

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During the lead-in phases the overheads are high but they revert to normal ratios once the institution has been built. In the KRARP the ratio of overheads to direct construction cost was 84:16 during the first three years (1974-76) but it reversed to 16:84 in the long-term (1974-85) and training accounted for only 1.5-2% of total expenditure.

Thus through the programme approach, the institution and human resources required to implement the work are established over time.[49]

## 2.7. Small Scale Contractor Development and Employment

### 2.7.1. General

Until the late 1980s not much attention was paid to entrepreneurial development and the feasibility of creating a small contractor capacity to service the labour intensive sector of the construction industry.[50].

During the period after the 1980s, two independent efforts were made in South Africa and in Sub-Saharan Africa. The experience in Sub-Saharan Africa was on rural roads construction while that in South Africa covered a wide range of civil engineering.

### 2.7.2. Need for small scale contractors

Within the thrust towards labour intensive construction there was a need to incorporate small contractor development. This need was given impetus by a number

[49] Ibid.
[50] McCutcheon &Croswell, 2003 in McCutcheon & Taylor- Parkins, 2003:320

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of factors. First the private sector was seen to make a more efficient use of resources and thus had to play a greater role. On the other hand, the public sector was seen to be inefficient in the provision and maintenance of infrastructure.

It was difficult to manage and control the maintenance of large networks of labour-intensively constructed roads in-house. It was thus considered reasonable to explore the potential of using small scale contractors.

Maintenance was normally carried out in-house by government departments through the use of casually employed labourers. This set up has been hindered by employment legislation which requires that casual labourers must be given the status of permanent employees after 6 months of continuous employment. The problem with this is that if they are permanent and pensionable and remuneration is not tied to production then productivity may suffer.

The above scenario makes it handy to organise maintenance using small scale contractors because, then, the labourers would not be on the payroll of government and should the contractors fail to deliver, their contracts could be cancelled.

### 2.7.3. Lessons from experiences with small scale contractor development

Small contractor development in relation to labour intensive construction must incorporate the lessons from labour intensive work as a whole.[51] The programme approach should be adopted coupled with the recognition that there exist a lack of technical skills and institutional capacities. This means the programme must be formally linked with a comprehensive training programme. The training programme

[51] Ibid.,324

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must generate various skills at various levels (technical, management, entrepreneurial and administrative).

Experience in South Africa[52] with the establishment and development of small scale contractors has revealed that attention must be paid to the following details:

- The complexity and uncertainty of civil engineering contracting
- The need for psychometric testing
- The need to modify the existing contract documentation to suit small contractors
- After pre-contract training the contractor must be engaged on a series of consecutive contracts during which they are progressively less mentored until they have acquired skills.

- The programme must be managed by a single private sector consultant, who should also be the champion of the programme, advocating for an enabling environment for it.

The development of small scale contractors using employment intensive methods should ensure the following:

- A programme approach to implementation
- Continuity of contracting opportunities, training and on-going mentoring

[52] Ibid.

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- High level support ("championing")
- Institutional support

Although progress has been made in large scale implementation in such countries as Kenya, Lesotho and Ghana, a number of issues have been identified as the major impediments to the development of small contractors:[53]

- Lack of contract continuity
- Rigid procurement procedures
- Delay of awards and difficulties in mobilization
- Lack of administrative resources
- Wages and funding
- Delayed payment to contractors
- Difficulties in raising funds and professional indemnities

## 2.8. CONCLUSIONS

- High levels of unemployment and under-employment gave rise to the need to generate employment opportunities within the existing economy
- An analysis of the feasibility for the reverse substitution of labour for equipment revealed that civil construction was promising:
    - Major civil construction operations are amenable to reverse substitution

[53] Ibid.

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  - Civil construction plays a major role in the economy and the bulk of its funding comes from the public sector rendering it amenable to influence by public policy

- Subsequent research revealed that labour intensive methods are technically feasible for a wide range of construction activities and can produce the same quality of product as conventional methods
- Under certain circumstances labour intensive methods may be economically efficient and cost competitive with conventional methods
- From research and subsequent iterative implementation, it was revealed that in terms of technical and economic efficiency, successful site implementation depended upon a number of basic principles of labour intensive construction
- Labour intensive methods must be implemented through a programme approach in order to be successful on a large scale. Large scale implementation has delineated a number of success factors for large programmes
- Programme establishment must follow a four-phased implementation strategy: orientation, preparation, piloting and expansion
- Labour intensive programmes must be sustainable, distinguished from drought, properly targeted to the poor and linked to a long term training programme
- Small scale contractor development has become an important aspect of labour intensive work
- Any effort to develop small scale labour intensive contractors must ensure the following:
  - A programme approach to implementation

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- Generation of continuous contracting opportunities, on-going training and mentoring
- High level and institutional support

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# 3. PILOT PROJECT: BOTSWANA DISTRICT ROADS UPGRADING AND MAINTENANCE PROGRAMME (LG 34)

## 3.1. Background

In 1980, Botswana had about 7 500 km of gazetted road network and about 11 500 km of non-gazetted road network. Responsibility for the construction and maintenance of the non-gazetted network lay with the Roads Department of the Ministry of Works and Communications. As for the non-gazetted network responsibility was devolved to the District Councils in line with the Government's strategy to create an effective local government and establish decentralized planning procedures.[54] The planning decentralization would in part serve to enable the District Councils to come up with an overall strategy for development within the district. Thus the District Councils were mandated with the upgrading and maintenance of the non-gazetted road network, which mainly comprised dirt tracks and was the only link between villages, cattle posts and lands areas where about 80% of the people of Botswana lived.

All year round access to these areas was identified by the Government of Botswana (GOB) as essential for rural development and economic growth, the then major themes of economic development planning. The District Development Plans had as one of their top priorities to keep the 11 500 km of track in a usable condition all year round.[55]

The responsibility for district roads by the District Councils was exacerbated by the (fact that there had been) little engineering experience in the District Councils and virtually none in road construction and maintenance. The GOB wanted an effective

[54] McCutcheon,1983:1
[55] Ibid

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District Council capacity to improve and maintain non-gazetted roads and deemed it vital to develop a system that would enable the District Councils to have such capacity.[56]

The upgrading and maintenance of rural roads was considered important from the perspective of rural development and institutional capacity building for the local government to act effectively in respect to one aspect of rural development. The standard of upgrading and maintenance of the non-gezetted roads was to be determined with regard to the national development objectives and budgetary constraints. The standard of upgrading for roads would then help determine the sort of capacity required of the District Council to carry out their mandate for roads.

The national financial status quo and the roads sub-sector construction costs then prevailing called for a minimum standard of upgrading for the tracks. A tarred road cost a minimum of P75000/km while a gravel road cost between P30000-P50 000/km (P1 = $1.27 in 1980).[57] In 1980, the Central District Council (CDC) budget for upgrading their non-gazetted network was only P40, 000 and for the whole of Botswana, the budget was P 184 090.[58] Even if the district budgets were increased substantially it would only be possible to improve a few kilometres of track to gravel standard. From experience in other countries an engineered earth road was technically and economically suitable for rural use. “In 1977 it had been estimated that upgrading a track in Botswana would cost approximately P4000/km to engineered earth standard and today the figure would be close to P9000/km.”[59] In order to stretch the Pula further, the GOB considered the concept of selected betterment or spot improvement, that is, construction to engineered earth standard only where it was essential to allow the passage of a vehicle.

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[56] Ibid., 2
[57] Masalila &Motshidisi,2003:124
[58] Ibid.,47
[59] Ibid.,1

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The decision on the method of construction was guided by the major themes of National Development Plan (NDP) 5 (1976-81), that is, the creation of employment and rural development. The Government of Botswana was interested in exploring the potential of labour intensive methods, as it was committed to the expansion of employment opportunities in rural areas. From research and experience elsewhere the upgrading and maintenance of rural roads was one sector where greater use could be made of labour intensive methods, thereby generating employment opportunities in the rural areas. The use of labour intensive methods would lessen the need for imported machinery and save the scarce foreign currency resources.

There was no prior experience in spot improvement and selected betterment of dirt tracks to engineered earth standard in Botswana, with the exception of the unsuccessful Rural Roads Programme in 1972. The methodology to develop a local authority capacity to handle the above was therefore not obvious. In order to lay the foundation for such a local capacity the GOB, in collaboration with the Norwegian Agency for International Development (NORAD) and the International Labour Organisation (ILO), established a District Roads Upgrading and Maintenance Pilot Project which was based in Serowe in the Central District of Botswana. The project took place along the 120 km of track between Shoshong and Serowe. The ILO provided technical assistance while NORAD and the IBRD funded the construction activities.

### 3.2. The Pilot Project

The Pilot Project began in January 1980 upon the arrival of the Project Manager of the team of experts and consultants, which constituted the Technical Assistance (TA). The TA team consisted of four full time members, stationed in Serowe (the Project Manager, Work Study and Organisation Specialist, Training Specialist and the Associate Expert) and four short term consultants: Tools and Equipment, Labour

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Economist, Rural Development, and Work Organisation. A Rural Sociologist from the MLGL was seconded to the project as a short-term socio-economic consultant.

The Pilot Project was housed within the existing government structure and the above mentioned project team made up a Central Government supernumerary team. The team worked closely with the CDC but was responsible to the Permanent Secretary in the MLGL. An advisory reference group was set up with representatives drawn from the Central District Council, District Commissioner's office in Serowe, Ministry of Finance and Development Planning (MFDP), Ministry of Local Government and Lands (MLGL) and Ministry of Works and Communication (MWC).

The Pilot Project was to experiment with all aspects of selected betterment and maintenance of rural roads, including technology, methods, wage rates, payment in cash and /or kind and employment of women in order to establish a Road Maintenance Unit, and a formula for operation which would be turned over to the CDC and replicated in other Councils upon completion of the project.

While examining the above –mentioned issues the Pilot Project maintained focus on the following facts: (i) experimentation was to be on labour intensive and employment generating technologies, (ii) standard of construction was to be the minimum necessary to keep the improved tracks open and passable all year round by two-wheel drive pick-ups, and (iii) methods developed should be replicable upon completion of the Pilot Project.

In summary the Pilot Project was consistent with the aims of efficiently employing as many people as possible, constructing low cost maintainable roads and the eventual integration into the CDC operations.

The programme of work adopted was in accordance with the Project Memo and also tied-in with the expectations of the CDC which were high regarding the

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improvements of the 120 km of non-gazetted track between Serowe and Shoshong. In the Project Memo commitment had not been made to improve any particular track and the decision on which track to experiment with was to be bilateral, made by the project team and the CDC. After consultation, it was decided that the candidate for experimentation would be the stretch between Shoshong and Serowe. Conditions along that stretch represented those throughout the CDC.

Early on, the project was misunderstood by those who were not closely involved in its design. Councillors perceived the object of experimentation as being whether within the project time frame the stretch between Serowe and Shoshong could be upgraded using labour-intensive methods and not that the experimentation was to develop methods suitable to Botswana as a whole. However this misconception did not change the national perspective in relation to how much of the track between Shoshong and Serowe could be upgraded. The primary concern was that the experiments should come up with ways to carry out such upgrading.

It was however pointed out to the Project Manager that, in the eyes of most people, the success of the Pilot Project would be judged by the extent of the physical results of experimentation. If more tracks were upgraded the methods would be deemed successful otherwise, the methods would not be taken seriously by most influential figures when considering country- wide replication. In the light of the above a programme was devised which was a compromise between the experimental nature of the project and the expectations of other project stakeholders such as the CDC Councillors.

Construction began in July 1980. Between February 1981 and June 1982, 34.8 km of formation was constructed (including 10 m width of bush clearing and de-stumping throughout) of which 23.3 km were surfaced. An additional 111 km of bush was cleared (2.5 m on either side of the track).

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## 3.3. The Major Issues Examined During the Pilot Project

The Pilot Project examined the supply of labour, wage rate, standard of construction, methods of construction, tools and equipment, maintenance, organisation, planning, cost and other socio-economic factors.

### 3.3.1. Labour supply

**Quantity of labour**

In order to test the extent of labour supply[60] a construction programme was planned such that simultaneous work would be in progress near seven villages identified along the route. From August 1981 construction was carried out near at least five villages, while between October 1981 and April 1982 construction was in progress near six villages. At any one time during the latter period at least nine sites were in operation.

Employment reached a peak of 235 workers in January 1982 and between July 1980 and May 1982 a total of 182 people were employed in Mogorosi alone. Thus 33% of the population of Mogorosi (554)[61] participated in the project during the above-mentioned period. Altogether, between July 1980 and May 1982, the project employed 631 different people between Serowe and Shoshong. The project employed 630% more men than the 70-80 men that the feasibility study had estimated would avail themselves for work.

It was concluded that ample labour was available for the development of highly labour intensive methods of construction, about double more than the amount required.

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[60] Vaidya,1980
[61] CSO,1981:8

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Still under the examination of the quantity of labour the project investigated the extent to which conditions along the project route were representative of the conditions in the Central District as a whole. A sample survey was carried out based on conditions along the 1 365 km of the major non-gazetted roads in the Central District.

An analysis of the survey results showed that for 65% of the road sections, labour availability was likely to be more than adequate. For the next 20%, prospects for recruiting within 20 km looked reasonable while for the remaining 15%, local labour supply prospects were poor. For 35% of the non-gazetted roads in the Central District sufficient labour would only be available if workers were willing to travel long distances to site or set up temporary camps at road sites. It was concluded that between 55%-75% of the total 1 365 km of road network would have an adequate labour supply.

Another analysis concluded that the supply of labour in areas initially considered labour scarce would be less problematic because of the better supervision and organisational methods subsequently developed.[62] The revised methods resulted in:

- Smaller gangs than initially envisaged.
- Additional flexibility in reducing gang sizes below the normal, if necessary.

Furthermore road sections where labour supply was difficult could be given a low priority in the betterment process thus offsetting the effects of low supply.

[62] Vaidya,1981

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**Quality of labour**

Quality of labour includes such factors as reliability, honesty, willingness and ability. Preliminary estimates of reliability and ability were necessary in order to determine whether it would be possible to run a highly labour intensive programme smoothly. Reliability was tested by maintaining records of absenteeism over the duration of the Pilot Project. Ability was determined through work studies and the measurement of production.

During the course of the Pilot Project labour was generally reliable. Between July 1980 and May 1982, 47,022 worker-days were recorded out of a possible 52,312, giving 89.9% attendance.[63] Monthly attendance was 85%. The above figures were for all casually paid labourers, including Gang Leaders, Assistants and Trainees, but excluding Cart Drivers as their attendance was dependent upon the availability of carts and donkeys. If they were included the overall attendance was 88.8%.

The agriculture cycle was initially expected to seriously affect the supply of labour prompting a recommendation by the Labour Economist that the labour force be kept at a relatively low level during the first ploughing season. Absenteeism and desertion were monitored during the first ploughing season with a view to make recommendations for the future. In the event absenteeism was high but not significant to cause problems for the project. The effects of the second ploughing season could not be monitored due to drought in the summer of 1881/82.

It was recommended that the expanded programme should be flexible with regard to labour requirements for agriculture and be prepared to stop or reduce work during the ploughing season. People would continue to be given time-off for ploughing and other agricultural activities.

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[63] McCutcheon,1983:6

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As for productivity, it was comparable to that recorded in labour intensive projects elsewhere.

Therefore it was possible to plan a programme of work based on the expectations for a stable and productive workforce.

### 3.3.2. Wage Rate

During the initial stages of the project it was decided that the payment of wages would be in cash in order to distinguish the project from drought relief, facilitate assessment of results in economic terms and reduce logistical problems inherent in payment in kind (e.g. food).

Although the project was at liberty to experiment with the wage rate, it did not vary the wage rate between the different sites in order to assess the response of labour supply and productivity. This would have disrupted the project as wages are a sensitive issue. Wages set too low would negatively affect the willingness of and productivity of workers as well as commitment to the sort of strict discipline required for labour intensive work.

So it was prudent to pitch the wage as close as possible to the right level at the beginning. A sufficient wage rate would ensure a sufficient supply of productive labour under strict discipline.

The problem was studied by the Labour Economist in April 1980 and the study comprised:

- Comparison of prevailing wages in the private and public sectors.
- Discussing with officials and experts at the local level and in the relevant ministries (MFDP, MLGL, MA and MHA).

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- Comparison of bush-clearing productivities on the Drought Relief Programme (DRP) and in the private sector.

Based upon the recommendations of the Labour Economist's study, the wage rate was set at P 2.10/day (equivalent to $2.27 in 1980) in 1980.[64] At P2.10/day, the wage rate was 75% of the Government minimum wage for Industrial Class I workers which was P2.70/day. However, later that year, the Government minimum wage was increased to P4.10/day. The wage for the Pilot project could not be increased to maintain the 75% margin to the public sector wage as it had not been pegged to the public sector wage from the onset. The wage had now fallen to 51% in proportion to the public sector wage.

Attempts by the project management to lobby for an upward revision of the wage were not entertained by senior Government officials who cited the following reasons:

i. There was an adequate supply of labour.
ii. The statutory minimum wage in the public sector was too high and uneconomic and therefore could not be used as a benchmark
iii. Labour intensive methods would not be cost-competitive with equipment intensive methods
iv. With the wage rate at P2-10/day, motivation, productivity, morale and discipline were adequate.
v. Avoiding confusion between labour intensive work and drought relief was not a compelling argument.
vi. It was solely up to the government and not the project to decide on matters of public employment.
vii. It would be preferable to employ more people at a lower age.
viii. It would be difficult to find funds for high wages

[64] Vaidya,1980

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ix. Wages too high would disrupt the rural economy.

x. P2-10/day would be too high a wage during the off-season.

### 3.3.3. Standard of construction

The standard of construction required for the non-gazetted network was that which would keep the roads open and passable all year round, by two-wheel drive pick-ups. The GOB had adopted the concept of selected betterment or spot improvement with the majority of the road to receive little or no maintenance.

The GOB had anticipated a low cost of such upgrading, and the financial budget was slim. According to the MFDP the cost of an engineered earth road was P4000/km. In 1980/81, the total budget for the upgrading and maintenance of the non-gazetted network in the Central District Council was only P40000.

Thus, in order to upgrade as much track as possible it would be necessary to device as low a standard of construction as possible which would also withstand conditions during the rainy season. Achieving the above would also shed light on the concept of selected betterment.

**Standard of constructed sections**

Track upgrading on the Pilot Project involved carrying out the following activities:

- Re-alignment
- Bush-clearing
- Formation construction (ditching, sloping, camber formation)
- Interception ditches and mitre drains
- Spreading/surfacing of formation

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- Hand packing of stones on formation
- Minor water crossings
- Dry stone drifts
- Spreading calcrete in the ruts of heavy sand

According to the Rural Sociologist[65], the people felt that the roads had facilitated their movement between Serowe and other villages. Sections that were once impassable during the rainy season were now passable. There were, however, complaints about the standard of the upgraded roads on the part of the local people, local and national officials and a Minister. The concerns were about design characteristics particularly that the road was narrow and not tarred, side ditches were too close and the minor drifts were too steep. From the Rural Sociologist's perspective, the alleged low standards were blamed on labour intensive technology.

It was recommended that a public relations exercise be carried out to highlight such issues as the cost of a tarred road per kilometre and the cost implications of a wider road. The purpose and standard of upgrading for the roads would also be explained. Another recommendation was for continued experimentation during the expanded programme to improve the design standards while maintaining their simplicity, low cost and ease of maintenance.

**Selected Betterment: Selection criteria**

The Pilot Project undertook, inter alia, to identify and quantify the characteristics of the concepts of selected betterment and spot improvement.[66] Running conditions of tracks in the CDC were difficult because of:

[65] Ibid.
[66] Mould,1981

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- Excessive tracking of loose material surfaces
- Excessive depth of loose material causing slip
- Poor alignment of tracks
- Excessive erosion leading to an uneven surface
- Flooding and water logging

A sample survey of conditions along the 1 365 km of track in the Central District revealed the following:

- 20% of tracks required no upgrading at all
- 38% of the tracks required bush clearing and re-alignment only
- 22% of the tracks required re-alignment and bush clearing. Vehicles would not get stuck but the running surface was not smooth.
- 20% of the tracks required re-alignment and bush clearing. Road construction was required, as vehicles would get stuck.
- On average 10 km of major drift construction was required per km.

Experience along the Pilot Project route combined with results of the survey led to the following policy regarding selected betterment.

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**Table 3.1 Selected betterment stage one**

| Soil type | Operations | Average length per km |
|---|---|---|
| Clay and sandy clay | Realignment, bush clearing and de-stumping ( 10m width):<br>Formation construction ( 5.5 m width) ; surfacing (4 m width);<br>Surfacing ( 4 m width) and minor drainage drifts | 200 m |
| Water courses | Construction of dry stone drifts ( 6 m width) | 10 m |
| The remainder | Realignment where necessary and 2.5 m bush clearing on either side of the track | 600 m |

Source (McCutcheon, 1983)

The above type of selected betterment would make the tracks passable only and would not lead to a continuously smooth ride.

Where it was required that a vehicle may drive in safety under more uniform conditions it was recommended that in addition to Stage One, Stage Two upgrading be carried out, generating 70% more work than Stage One upgrading. Stage Two upgrading provided a continuously smooth ride in addition to vehicles not getting stuck. Stage One upgrading only required that vehicles should not get stuck anywhere along the upgraded track.

The criteria for the determination of the required standard of upgrading would be developed during the expanded programme. Upgrading to Stage Two would create more employment and smoother roads lessening the scepticism about labour intensive methods.

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In western Botswana conditions were different from those in the Central District. They called for a new set of criteria and upgrading operations. In addition to bush clearing and de-stumping, reshaping of loose material on tracks using a metal drag was essential. Thorough extensive experimentation under local conditions was necessary in these Districts. The mode of operation would follow the approach adopted on the Pilot Project: labour intensity, lowest possible cost and the replication of results.

**Route selection criteria**

For the expanded programme there were more tracks than could be upgraded in a five-year period. Thus it was necessary to select the tracks to upgrade. The Pilot Project in consultation with the Central District Council proposed a selection system that not only took account of the status quo but more importantly respected equity and furthered positive development objectives.[67] The system for prioritizing the tracks for upgrading was based on the following:

- Population density within the catchment area
- Remoteness from services
- Productive potential and linkage to Arable Land Development Programme (ALDEP)
- Traffic density
- Condition/cost of upgrading required

The above ranking system was adopted for testing in the Central District. The system would then be turned over to other Districts if the outcome was positive. In the interim, other District Councils were advised to take inventories of the roads

[67] Ibid.

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proposed for upgrading in order to facilitate the development of a five-year programme.

3.3.4. Methods of construction

**Methods**

Given the adequate supply of labour it was feasible to consider introducing and developing highly labour intensive methods of construction. The quality of labour experienced during the Pilot Project was adequate leading to the recommendation that labour intensive methods should be used for all the construction activities.

**Justification for the construction methods adopted by the Pilot Project and recommended for the expanded programme.**

**General**: In order to counter any change of opinion against labour intensive methods, it was necessary to show that the methods not only generated employment but that they were also technically feasible.

During the Pilot Project, the organisation of the construction operations had been sound, the productivities on par with those achieved previously and the wage rate well below $ 4 per day. Thus the operations were technically efficient. The operations were small scale and dispersed and thus labour intensive methods would be more cost effective than alternative methods.

Consideration was given to the use of donkey carts for material haulage. This was given impetus by a number of favourable factors. Donkeys were plentiful and in widespread use for the transportation of people and goods. The use of donkeys was thus, not going to be culturally incompatible with local practices. The Arable Lands

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Development Programme (ALDEP) and National Development Bank (NDB) encouraged the productive use of donkeys.

A system of donkey-drawn haulage was developed on the basis of extensive observation, time studies and analysis. A comparison between the donkey based system and various tractor and trailer alternatives showed that the donkey drawn system cost about P 1 590/km, which compared favourably with the $ 1 285 reported in 1980 on the KRARP, which used tractors and trailers.[68]

**Productivities**

**General:** The project was also given free rein to find out which system of wage payment resulted in the highest productivity: daily, task or piece rates.

Experiments had shown that productivities significantly increase in the following order of wage payments: daily, task and piece work rates. The project concentrated upon developing a system based upon a combination of the daily and task rates workers. This was due to consideration that the resources, training and effort required to achieve the necessary level of supervision to control work were reasonable but those required to administer piecework rates were too great. Two types of productivities were required to control the work.

**Productivities for each activity**: Time studies were conducted on the haulage operation concentrating upon the development of a system to control haulage. Table A1 in the appendix shows the productivities that were determined from the limited amount of activity sampling and the time studies carried out on the haulage operation. See Table A2 in the appendix for the number of cart trips required for different ranges of haulage distance.

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[68] McCutcheon,1985

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The task rates used to control daily activities were derived in part from work studies, observation and certain accurate production data over the period of the project. Table A3 in the appendix shows the detailed productivity data for the operations: bush clearing, ditching sloping and camber formation. It also shows the task rates used during the Pilot Project and recommended for the expanded programme.

**Overall productivities for each operation:** The initial (September 1980) productivity results were disappointing: 2 386 days/km for formation construction. However with improved organisation and control the productivity rates also increased and the following figures formed the basis of the 1981 plan for production.

**Table 3.2 Overall productivity for each operation**

| Operation | Productivity (days/km) | Productivity(cart-days/km) |
|---|---|---|
| Bush clearing and de-stumping | 112.5 (300-1200) | |
| Basic formation construction | 400 (880-1 275) 90 | 23 |
| Dry stone drifts | 1 802.5 (1 180-1 575) | 23 |
| Surfacing | 1 470.0 (840) | 480 |

Except for drift construction there had been significant improvements in productivity during the course of the project. The average figures for animal-drawn haulage proved once more that it was an economically efficient system. The average days per km (283 and 117 cart days) compared more than favourably with those reported on the KRARP (840 worker-days).

A check was carried out on the general level of production since 1981. A comparison was made between the amount of labour recorded in the muster rolls and the amount of labour obtained by multiplying the total amount of construction by the average

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productivities listed above. It showed that the average productivities reflected the overall levels of productivities to be obtained over a long period of time under prevailing conditions of small scale and dispersed operations. These productivities could be used as the basis for future planning. It was, however, emphasized that further field studies had to be carried out to determine productivities for all the operations under various conditions, in order to improve the definition of task rates and to refine the overall planning criteria.

### 3.3.5. Tools and equipment

**General**

Previous experience in labour intensive methods had shown that the correct choice of tools and their adequate standard is essential to achieve the required productivity. The Tools and Equipment Consultant carried out an assessment of the quality and availability of suitable tools in Botswana. He also evaluated the manufacturing capability in respect of tools and light equipment.[69]

**Required tools and Equipment**

The tools and equipment required on the Pilot Project were based on the following considerations:

- Field conditions
- The nature of the upgrading activities
- The need to maximize the use of local resources in the manufacture of tools
- The need to maximize the efficiency of labour intensive methods

[69] Howe,1981

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- The resources likely to become available for improvement of the roads.

**Inventory and control of equipment**

The control of tools and equipment on the Pilot Project was run from the Central Stores of the CDC. Project stocks were not integrated with those of the Central Stores but the same procedure was followed. The recording procedure enabled the cost, number and location of each item to be determined rapidly. Stocks were initially issued to storemen at the main camps along the route of the project from where they were collected and returned by workers each day. The collection and return of tools consumed an unacceptable amount of working time and a more decentralized system was developed. Implements were stocked at each work site in a padlocked toolbox. The box was transported by donkey cart from site to site.

**Maintenance of tools and equipment**

A team technician maintained the tools and equipment. After several months of use on the field each toolbox was returned to the Central Store and the gang issued with a fresh set of tools while the old set was reconditioned or replaced by the technician. The technician also made field trips to maintain the donkey carts. Those that were beyond the technician's capacity were taken to Serowe for repair by one of the local enterprises.

**Assessment of the quality and availability of tools**

There were no local hand tools or simple items of equipment suitable for road construction and maintenance. The market was dominated by South African implements with only a small proportion of poor quality tools originating from elsewhere. Botswana maintained an open economy and the setting up of a new

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competitive tool industry was difficult as foreign companies could set up legal commercial practices to protect their position. There was a government concession which favoured local manufacturers if they produced goods for not more than 12.5% above the tender price of foreign companies.

However, because of proximity to the South African market, the general standard of tools and equipment was higher than in most developing countries. The quality ranged from excellent to poor with many of the tools below the quality acceptable for use on labour intensive work. In order to obtain tools of an acceptable quality the tools consultant developed guidelines for tools selection.

**Local manufacture of tools and equipment**

Some prototype tools and equipment were produced such as, hand tongs, tree hooks, crow bars, hand rammers, donkey drawn rollers, donkey harnesses. It was difficult to find organisations with the capability and willingness to undertake the manufacture of prototype tools especially if the numbers of implements were not encouraging. Liaison was made with the Rural Industries authority for assistance with identifying local sources.

There were six donkey cart manufactures. Amongst them, N.Stoneham Brothers sold for a good price and the workmanship was good. They were reliable in terms of supply and delivery and ready to assist. Various types of two and four-wheeled carts were built and tested under site conditions with the two-wheeled tipping carts receiving particular attention. Final modifications were made and orders were made for the manufacture of three types of the two-wheel tipping carts.

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**Procurement**

During the Pilot Project exploration was made of the various avenues of procurement available: local manufacture, private suppliers and the Department of Supplies (DOS). The Tools Consultant concluded that for the project it was not sensible to source supplies of the most important construction tools through any of the above-mentioned procurement options since it would be against the aim of securing implements of the appropriate quality. Tender regulations specified award to the lowest price but for tools, one has to link lowest price to a clearly defined specification.

Although the tools consultant reckoned that the supply and quality of tools was not satisfactory, he later advised that they be sourced through the DOS. DOS had agreed to consider the use of the technical specifications for the production of the tools.

The consultant recommended that prior to the expanded programme MLGL must take up the issue of technical specifications, acceptance testing and tendering procedures with the DOS in order to improve the quality of tools and equipment.

**Future work**

It was observed during the Pilot Project that the expanded programme would require work in connection with the following:

- Research and development of tools and light equipment
- Stimulation of local manufacturing
- Improvement of procurement and marketing of local tools and equipment

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### 3.3.6. Maintenance

After construction, a road must not be left until it deteriorates to a state where only rehabilitation can restore it to its original and usable condition. Maintenance began as soon as formation construction was completed and opened to traffic. It was carried out by one of the construction workers and consisted of raking to fill the ruts formed by traffic. Formal maintenance by maintenance workers began as soon as the construction team had progressed too far away for the deployment of a construction worker. The allocation of maintenance work per person was about one and half kilometres of completed road.

Maintenance personnel were required to develop the need to maintain each section in good shape and generally carried out the following duties on constructed sections:

- Filling in of potholes and depressions
- Raking of loose surfacing material into the correct camber
- Clearing of ditches and drains
- Grass cutting and bush clearing
- Replacement of missing stones in drifts
- Maintenance of traffic signs
- Improvement of existing and construction of new drains
- Erosion control
- Keeping of bushes and trees at least 2.5 m away from the edge of the road
- Continuous checking and maintenance immediately after heavy rains including rains after hours, during weekends or holidays

To carry out their work on constructed sections maintenance workers were normally equipped with a wheel barrow, spade, mattock, rake, grass slasher, hand rammer, pick eyed axe and a water bag.

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While construction activities went on in the area maintenance workers were recoded as normally in the muster rolls and paid according to days worked, and Gang Leaders were responsible for maintenance. New maintenance personnel were monitored to see if they worked competently and were able to work competently without direct daily supervision.

The road was inspected once every month for quality and labour attendance before payment. Maintenance personnel worked full time and were paid P 2-10 /day for nineteen days a month. Full time employment aided control, as workers were expected to present themselves for work every working day except on the Monday after pay weekend. Payment was withheld if maintenance was unsatisfactory and workers were given one month to get the road to an acceptable standard.

When the construction activities had ceased in the area maintenance personnel operated according to a system whereby their payment was not related to the number of days worked but to whether or not the road had been maintained to an acceptable standard.

Existing labour legislation needed to be changed to accommodate the above aspect. Given the major maintenance emergencies likely to occur from the unpredictable nature of rainfall in Botswana, the Pilot Project observed the need for continued and refined experimentation with maintenance methods during the expanded programme.

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### 3.3.7. Organisation

**Labour**

Labourers were responsible for executing the work under the supervision of trained Gang Leaders.[70] Recruitment of labour was in various ways as shown below:

- Through formal contact with the Headmen and the Kgotlas, at which people were informed of the days on which work would start, followed by random selection amongst the applicants on the appointed day.
- Formal contact between the Headmen and the kgotlas was followed by recruitment of the casual labourers through the offices of the headmen and the kgotlas
- Recruitment by the Technical Assistant from amongst the applicants at the job site
- Recruitment by the Gang Leaders by searching for potential workers from amongst the villagers

Although the above methods led to a sufficient number of people being employed, the Pilot Project recommended the extension of the recruitment methods to include the Village Development Committees (VDCs) and Extension Staff to ensure that more people were reached and women were particularly informed of their full eligibility for employment.

[70] Gang Leader: later termed a “Road Builder” and now (in RSA) “a Construction Processes Site Supervisor” (informally) and “Hands-on Site Supervisor” (formally).

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**Supervision**

**Gang Leaders:** Initially there was a shortage of trained Gang Leaders, Store men, etc. The level of production was lower than that indicated by the level of reliability and effort by workers. While a tighter definition of working procedures improved the situation there were other reasons for low production of which lack of trained Gang Leaders was one.

The operations were of a dispersed nature and organisational based upon gangs of up to twenty five labourers depending upon the nature of the upgrading activity. It proved difficult to achieve higher productivity with larger groups of workers. The rules of operation for the gangs were clearly defined and discipline was strict. Gang Leaders reported to the technical assistant (TA). Gang Leaders were expected to be:

- Technically competent and capable of understanding instructions
- Willing and able to issue instructions to the gang
- Capable of setting out and controlling the work of about up to 25 labourers
- Able to give accurate and oral reports to the TA
- Able to instil discipline

Daily muster rolls and tools records were kept as well as daily progress records. Construction activities were carried out either on a daily or task basis with the task based system preferred for its higher productivity.

Assistant Gang Leaders demonstrated working methods to new workers. Thus Gang Leaders did not have to start with completely inexperienced workers from each village. Assistant Gang Leaders marked the muster roll and daily tool record and oversaw bush clearing. Liaison was made with the Headmen through which free accommodation was obtained for Assistant Gang Leaders in every village.

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**Technical Officers (TO) and Technical Assistants (TA):** A TA reported to a TO for the supervision of five to ten Gang Leaders. The TA was the vehicle for instructions from the TO to the Gang Leaders and information from site to the TO. The duties of the TA were as follows:

- To set out new sections of construction
- To recruit labour
- To prepare the weekly plan for Gang Leaders and to issue the record forms
- To issue tools to new work sites and to collect the old ones when work was completed
- To check and sign the muster rolls
- To collect the completed forms every week
- To ensure that the daily reports were compiled
- To do the daily planning
- To collect the weekly reports
- To ensure that work was done correctly
- To collect broken tools and issue replacements
- To take care of disciplinary issues between the casual labourers and the Gang Leaders and to report disciplinary issues between the Gang Leaders and the TA to the TO
- To prepare the monthly progress reports

The TA spent at least four days of each week out on site doing supervisory work. During the Pilot Project the TA was responsible to the Site Engineer. In the expanded programme the TA would report to the TO, who would have responsibility for a District Council Road Unit. Duties and responsibilities of a Technical Officer have been described in the following chapter.

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### 3.3.8. Planning and cost

**Planning**

The Pilot Project developed planning systems that were adequate for the various levels at which they were used. The Council Engineer (assisted by a Technical Officer) carried out the long-term forward planning in consultation with the Council.

To ensure sufficient time for the TO to carry out liaison and detailed planning for each construction operation, the Engineer would work at least one year ahead of the construction activities of the DCRU. The definition of criteria for route selection would aid long-term planning.

On the basis of the proposed organisation and the average productivities which led to certain planning criteria, a DCRU, consisting of seven Gang Leaders and a casual labour force of about 150 workers would be expected to construct about 22 km of complete road per year. Thus about 110 km and 52 km of track could be upgraded to Stages One and Two respectively of selected betterment.

The TO would come up with a detailed construction programme based upon a survey of the route combined with the use of planning criteria evolved during the Pilot Project. The TO would break the construction programme into weekly plans for each Gang Leader. By monitoring the progress reported, the TA would adjust the weekly plans to adhere to the overall construction programme. The Gang Leader would in turn make detailed plans for each day's work adhering to the weekly plan and record any deviations from the plan.

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**Cost of construction**

Based upon the operational productivities quoted in Table 3.2 in section 3.3.4, the average cost of construction was derived. The average cost for the different formation profiles would be as shown in Table A4 in the appendix.

The figures in the above-mentioned tables took account of tools and supervision by the Gang Leaders but not senior supervision and office overheads. Based upon the proposed organisational structure, normal overheads (office administration, stores, TA, TO, vehicles and drivers) would amount to a further P 1700/km.

Experience between Serowe and Shoshong combined with the results of the sample survey of the major non-gazetted tracks in the Central District led to the formulation of a policy as to where selected betterment should take place along any particular route section. On the basis of the amount of work required to upgrade a track the average site construction cost in upgrading a network of tracks was calculated (See Table A5 in the appendix).

It was considered that the figures in the above-mentioned table were obtainable during the expanded programme as long as the overall organisation was good, training programme was effective, supply of tools and equipment was regular and site and office management was good.

3.3.9. Training

**General**

Training requirements had been developed in relation to 4 distinct levels of personnel:

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- Gang Leader
- Office administration, stores and maintenance of tools
- Technical Officer and Technical Assistant

The small scale and dispersed nature of the operations meant that the Gang Leader would not be amenable to daily supervision by the TA, neither would the TA be amenable to daily supervision by the TO. Thus at all levels the persons responsible for the activities of others had to have the right character. As much attention had to be paid to selecting people with the right character as was paid to technical competence.

**Gang Leaders**

The nature of work in Botswana meant that trained personnel were required at a lower level than on the KRARP. It was thus necessary to put would-be Gang Leaders through a rigorous course of site and class training. The Training Officer prepared modules for use in class and in the field.

Candidates were sourced from the villages where construction took place and were accepted if they met the following criteria:

- There was evidence of work on the project for at least six months
- They possessed basic numeracy and literacy skills
- Evidence of interest, initiative and responsibility

Candidates from outside were accepted if they possessed the following:

- Junior certificate of education or had passed standard seven and had relevant work experience

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- Evidence of interest, initiative and responsibility during a shorter period of time than that required for village candidates

Various courses were run for Gang Leaders. Despite the minimum standard 7 required of the recruits, in relation to measurement and reporting, difficulty was experienced during training. The pass rate amongst the candidates who were recruited from the villages was lower than for those recruited from outside. Village candidates were less educated and less experienced than their foreign counterparts.

While local recruitment continued, it was recommended from the point of view of the need for rapid expansion, that greater emphasis be placed on the recruitment from other sources. Advertising and screening of the candidates were also called for during the expanded programme. Attention would be paid to other suitable sources like retired policemen, veterinary workers and others with extended field experience.

The training of Gang Leaders was mostly carried out using the facilities available in most of the villages. Trainees and instructors were housed in huts provided from the villages. Instruction took place in a school classroom, hut or under a tree. For practical training, tents were set up next to the construction training sites.

During the project, training was integrated into production, requiring more flexibility on the part of the Training Officer. It was considered suitable to separate training from production in the expanded programme. A stretch of track was selected near Serowe for training. Courses were run for three months comprising in aggregate four to six weeks of theoretical training and six to eight weeks of site training. Originally the training took place in the morning and field site work followed in the afternoon. Later it was changed and trainees alternatively spent one day in class and the following day on the field doing practical work. Successful trainees would become Gang Leaders after serving up to six months probation. The Training Officer in consultation with the DCRUs set the length of the probation period.

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Gang Leaders who proved to be competent over a long period of time would be recommended to be employed as Industrial Class workers. They were recommended for further training as Technical Assistants if they displayed particular initiative and if they possessed the necessary academic qualifications they were further recommended for training as Technical Officers.

**Office administrators, Store men and Tools Technicians**

Training in this category was mainly on-the-job. Four Storekeepers were given intensive training in the maintenance of tools by Serowe Brigades. A team technician received training in welding techniques carried out to maintain the carts. It was carried out on the premises of N.Stoneham Brothers, the biggest single source of carts for the project.

Training in these types of skill would continue to be on the job but advertising and screening were used in order to attract a high calibre of candidates. Liaison with appropriate institutions would be required to formalize this form of training.

**Technical Assistant**

The Technical Assistant received the same training as the Gang Leader plus the same standard course run by the Roads Training Centre (RTC).The existing two-year course at the RTC had been modified to include site and class training in labour intensive methods. The Roads Training Centre, part of the official Government training establishment, was already in place when the Pilot Project started.

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**Technical Officer**

As it has already been mentioned, the Pilot Project did not have Technical Officers. The Technical Assistants operated under an expatriate Site Engineer. The production of trained Technical Officers started at the beginning of the expanded programme. In order to develop the first trained Technical Officers three trainees from the RTC's three-year technicians' course were sent to the Pilot Project for site training. They completed an accelerated Gang Leaders' course and were introduced to various aspects of the project. Upon completion of the course at RTC, the suitable ones would be seconded to the DCRU in the CDC for intensive practical and theoretical training.

The trained TOs were responsible to an Engineer and controlled the operations of a DCRU. After some years into the expanded programme, a Technical Officer attended the full three year course at the Roads Training Centre, which had been modified to include site and class training in the supervision of labour intensive construction and maintenance of roads. A trained and competent Technical Officer controlled the activities of two Technical Assistants.

## 3.4. Other Socio-economic Considerations

### 3.4.1. Genera

Besides the socio-economic aspects of labour supply, wage rate, standard of construction, route selection and methods of construction, consideration had also been given to related socio-economic matters and to issues which were liable to become more important in relation to an expanded programme.[71]

[71] Vaidya, 1983

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These issues included:

(i) Liaison

(ii) Employment of women

(iii) Socio-economic benefits:

- A field survey
- An analysis of the economic benefits of an expanded programme
- A cost-benefit analysis of an expanded programme
- Direct benefits and traffic surveys

(iv) Investment in complementary rural infrastructure and linkages with other rural development projects

3.4.2. Liaison

**National:** Upon initiation of the Pilot Project formal contact was made with officials in the Ministry of Finance and Development Planning, Ministry of Local Government and Lands, Ministry of Works and Communications, Ministry of Home Affairs and the Ministry of Agriculture, the Norwegian Agency for International Development, Botswana Trade Union, Botswana Employers Federation, Botswana Enterprise Development Unit and the Swedish International Development Authority. Formal liaison was maintained with most of the above bodies. At various times visits were paid to the project and tours were arranged, inter alia, for the ministers and senior officials of the above-mentioned organisations. At three-monthly intervals the Project Manager briefed the Reference Group.

The visits were meant to address a major problem. The initial understanding of labour intensive work and the Pilot Project was very low and therefore it was necessary to explain the project in detail in order to overcome the misconceptions held prior to visiting the project sites. The Project Manager was once summoned to the House of Chiefs to defend the Pilot Project at a meeting chaired by the Vice President. It was often necessary to top up the discussions and slide shows with exposure to the

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physical reality of the project in order to further the understanding of the project by the visitors. During the tours down the route of the Pilot Project groups of workers were observed actually working hard in the absence of high-level supervision. However, there were still indications that apart from those who had actually had contact with the Pilot Project, there was a basic lack of understanding about labour intensive work. This prompted a recommendation for an extensive public relations exercise for the expanded programme linked to the training programme.

**District:** Upon initiation of the Pilot Project, formal contact was established with the Central District Council, the District Commissioner's office, the Tribal Administration Office and the Land Board. Reciprocal liaison was maintained throughout the project and this benefited the functioning of the project.[72] The District Commissioner, the Council Secretary and the Council Engineer promptly and effectively solved any problems arising. The Project Manager briefed the relevant officials at the regular reporting meetings of the Central District Council, the District Development Committee and the Council Works Committee.

At the local level, initially, there was more resistance in relation to the project on the grounds that the roads built by labour intensive methods were second-class products compared to their machine-built counterparts. More exposure to physical results of the Pilot Project and large groups of hard working labourers reduced the negative attitude of local officials and Councillors. At the end of the Pilot Project, scepticism about the methods employed was far less than at the beginning.

**Village:** Liaison was established and maintained throughout the project with the village Headmen, the Kgotlas, the VDCs and teachers at the village primary schools.

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[72]MLGL, 1980 & McCutcheon,1980-1982

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In terms of project progress there was a high degree of cooperation on the part of the local communities. However, villagers still did not understand the nature of labour intensive construction and the standard of road to be built. They envisaged a road built by machines and topped by a wide layer of tar.

It was recommended that more should be done to inform the villagers of the nature of the work to be done. However, the high degree of cooperation on the part of the communities was good for the future of the expanded programme.

### 3.4.3. Employment of women

Despite a recommendation for the use of male labour by the report on the feasibility study of the project, female labour was employed during the project. Of the first 161 applicants for work at Mogorosi, about 20 were women. Incidentally, the first person chosen by lottery was a woman.

At Moijabana, of the first 30 people, about six women volunteered although only well after the quota had been filled. Where the recruitment was through the Kgotla alone, no women were employed. The number of women volunteering for work was much less than that of men and this led to deliberate recruitment drives aimed at the employment of a greater number of women. This resulted in a significant increase in the number of women employed. Between August and December 1981 the number of women employed rose from 1 to 30. Women were expected to carry out the same work as men although it was found that internal allocations were made which assigned women to lighter tasks. Women were given the opportunity to train as Gang Leaders.

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A study by the Rural Sociologist[73] found that the employment of women in labour intensive road construction was not contrary to local culture. Even men did not mind if women were employed on the project. It was recommended that in the expanded programme women should be given an equal chance of employment, as they needed cash employment much as men.

It was also recommended that voluntary organisations, assisted by extension staff, should also be used to disseminate information adequately. Particular attention had to be paid to women being made aware that they were fully eligible for employment.

### 3.4.4. Socio-economic benefits

**Field study**

The Rural Sociologist also examined the socio-economic effects of the Pilot Project on the impact group or the impact on agricultural activities, expenditure patterns and household incomes.

In relation to agriculture evidence indicated that the Pilot Project did not have a negative effect on crop farming, as the majority of labourers ploughed their fields during the 1980/81 ploughing season.

In relation to expenditure most of the workers' money was spent on food and clothes. 80% of the workers ploughed their fields during the 1980/81 ploughing season indicating that some of the workers spent part of their money on ploughing. A few workers hired or borrowed oxen. Thus earnings from the project were stimulating other income generating activities by the communities.

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[73] Alexander,1982

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**Economic benefits of the expanded programme**

The Labour Economist[74] examined the economic benefits resulting from the upgrading of the 1 365 km of the major non-gazetted tracks in the Central District. The examination was in relation to the two types of selected betterment described (i.e. Stage One, and Stage One and Stage Two combined) and it culminated in a number of conclusions of which the major ones will follow.

The proposed programme would provide additional employment opportunities in the rural areas. During construction, Stage One improvement would result in about 2100 man-years of unskilled labour and 100 man-years each of Assistant Gang Leaders and Gang Leaders. In addition, the programme would require Technical Assistants, office staff, Storekeepers and equipment maintenance personnel. The labour required for maintenance after betterment would be about 0.2 man-years per year per average running kilometre. On completion of the programme at least 270 maintenance personnel would be employed. Stage One and Stage Two upgrading would result in 65% more employment created.

Unskilled labour cost would be about 70% and the total labour cost would be 78% of the betterment cost (including tools and equipment but not office overheads and senior supervision). The labour component of maintenance would be about 85%. Therefore a substantial component of programme costs would remain in the rural communities.

The programme would impart skills to members of the communities through training. The improved roads would improve the availability of essential facilities to the rural population and their access to larger villages and towns.

[74] Vaidya, op.cit

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For a typical kilometre, if the average daily traffic (ADT) was 10 before track upgrading, the total road-use benefits in the year after the upgrading were estimated to be P236 for Stage One upgrading and P318 for Stage One and Stage Two upgrading. Benefits had been assumed to grow at 5% per year in line with the forecast growth in traffic of 5% per year.

Benefits of improved access to facilities were not estimated separately and were instead captured in the estimated users' cost savings. The benefits and distribution effects of the programme were considered in the cost-benefit analysis.

**Economic cost-benefit analysis**

A cost-benefit analysis[75] was carried out for the proposed upgrading of the 1 365 kilometres of non-gazetted tracks in the Central District. The evaluation was carried out in relation to the two types of upgrading i.e. Stage One upgrading only and Stage One and Stage Two upgrading. The evaluation was based on three assumptions about policy objectives:

i) In the financial costs evaluation the estimated benefits were compared with the actual financial costs of construction and maintenance
ii) In the economic costs evaluation, unskilled labour was shadow-priced at P1-50 per day
iii) In the economic costs and weighted benefits evaluation unskilled labour was shadow-priced as in ii) above and road-user benefits to the rural poor were weighted 2.5 times the nominal value.

At ADT = 10, Stage One improvement showed an adequate financial return (IRR = 8%), healthy economic return and a high return (IRR = 22%) with weighted benefits.

[75] Ibid., 20

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With weighted benefits, an adequate return was obtained at ADT below 5% (i.e. IRR = 9% at ADT = 4.9% and IRR = 6% at ADT = 4.4%).

At ADT = 10, Stage One and Two upgrading had a poor financial return (IRR = 1%) and a barely adequate economic return (IRR = 6.4%) but a healthy return (IRR = 17%) with weighted benefits. With weighted benefits, an adequate return is obtained at an ADT of 6 or less. The above evaluation showed a high sensitivity of benefits to average daily traffic.

A further analysis was carried out for the proposed expanded programme and although the returns were lower due to the larger geographical spread of the programme the economic return and the distributional benefits made the programme highly attractive for Botswana.

The high sensitivity of benefits to the average daily traffic was once again noticed for weighted benefits and economic costs. A 5% higher ADT accounted for a 50% increase in economic return.

**Direct Benefits and Traffic Surveys**

**Direct benefits:** The Pilot Project employed 631 different casual labourers between July 1980 and May 1982. The average number of days worked was 79 translating to an average wage of P 166 for casual labourers. Excluding those who worked less than a month, 519 labourers remained, at an average of 94 days each and an average wage of P197. Both wages were greater than the annual average rural income in Botswana then.

**Traffic Surveys:** Traffic surveys were carried out near Mogorosi village before the start of formation construction and again well after the completion of construction on that section of the road.

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While the increase in the number of vehicles was significant the increase in the number of trucks was dramatic (over 250%). Prior to construction only one truck operated three times a week between Serowe and Moijabana. After construction the same truck operated six times a week while at least three other trucks had begun to ferry goods and people along the same route.

### 3.4.5. Investment in complementary rural infrastructure and linkages with other rural development projects

For the benefits from investment in rural roads to be fully realised, there must be adequate levels of investment in rural infrastructure as well as productive activities. The Rural Development Consultant[76] considered adequacy in terms of:

- The extent to which facilities existed
- The extent to which the then National Development Plan (NDP) would address the shortfalls in infrastructure
- The extent to which rural infrastructure was prioritized in the current development plans

The policy for rural development in Botswana had been in existence since its second Development Plan (1970-75) and had since strengthened with the subsequent editions of the Development Plan. Rural development and employment creation were major themes of the then National Development Plan (NDP 5) between the period 1979 and 1985. NDP 5 had a number of continuing programmes for rural development including the following:

- Rural Social Infrastructure (schools, health posts, water supplies, roads etc)

[76] Mould, 1981

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- Tribal Grazing Land Programme
- Arable Lands Development Programme
- Communal Area Development Programme
- Remote Areas Development Programme
- District Levels Planning
- Drought Relief Programme

The National Development Plan 5 made adequate provision for rural infrastructure and strengthening of the operational and implementation capabilities of the District Councils through training and enhanced manpower allocations. 75-80% of the rural population was within 15 km of a health post indicating improved access to primary health care facilities despite the existence of room for improvement in the quality of service. Under NDP 5, primary school facilities and teaching staff were provided at a reasonable rate to overcome the backlog in both resources. Rural access to piped water had risen to 35-40% from 5% in 1974. The rate at which new supplies were installed was to be maintained under NDP 5 and the capacity of District Councils to operate and maintain village supplies was to be improved.

Generally there had been adequate investment in rural infrastructure and future plans for both infrastructure and stimulation of productive activities was reasonable and in harmony with the objectives of national development planning.

The upgrading and maintenance of rural roads using labour intensive methods would go a long way to achieve the objectives of employment creation and rural development as stated in national development planning. However the Rural Development Consultant identified a number of problems in relation to the integration of roads and other development projects.

There was the problem of District Councils lacking a simplified procedure for selecting and ranking tracks for betterment. The feasibility study method was

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considered to be inappropriate and too costly for rural roads construction. It was recommended that a long-term programme for track betterment should be prepared in each District. The programmes would then be submitted to the Works Department Committee and District Development Committees well ahead of construction for use in drafting five-year rolling plans and annual plans in a way that would maximize integration with other development programmes.

The suitability of the District Councils for the expanded use of labour intensive methods to upgrade the non-gazetted tracks provoked some scepticism. After an assessment of their performance in general and in relation to non-gazetted roads it was concluded that they were the appropriate agencies to exercise responsibility for the non-gazetted network. It was observed that the nature and scale of the proposed undertaking would have serious organisational implications for the Ministry of Local Government and Lands.

### 3.5. REPLICATION

One of the major objectives of the Pilot Project was to develop methods that would later be turned over to all the districts for replication when the District Council Roads Units had been formed.

After the project, it was considered that the proposed methods and organisational structures were suitable for replication by the Central District Council on condition that caution was exercised during execution. A basic template had been established for the Central District, which might require modification for other districts because of different conditions.

While there were many positive indicators for the potential of labour intensive methods the following issues required attention before and during the expanded programme:

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- The wage rate
- The labour legislation governing the wage rate, conditions of service and payment method on both construction and maintenance
- Continued improvement of design standards, methods of work, organisation and management procedures
- The maintenance of strict control and discipline throughout
- Adequate forward planning of work including budget, labour supply, route selection and liaison
- Regular supply of adequate tools and equipment
- Regular provision of well trained, adequate quality personnel at all levels in the management structure
- A public relations exercise at national, district and village levels to inform people about the nature of the programme, the standard of upgrading required, the methods of construction to be adopted and the eligibility of women for employment
- The rate of expansion of the programme

It was observed that concentrated attention to the above issues would be required for the successful creation of the District Council Road Units and the Technical Assistance should assist in resolving the issues. A slow build-up of the programme would allow the managerial and administrative infrastructure to grow with the programme leading to a more self-sustaining programme. Less technical assistance would be required for the programme in the long run. The creation of the DCRUs was optimistic given the positive indicators identified during the Pilot Project and the positive attitude of key officials towards the project and provided the recommendations made would be heeded.

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## 3.6. CONCLUSIONS

- The Pilot Project demonstrated that labour intensive methods could be successfully carried out in Botswana despite its sparsely distributed population.
- At a wage rate significantly lower than the minimum wage in the public sector, there was an adequate supply of a reliable and productive labour for the development of a highly labour intensive programme of work.
- It was possible to develop a standard of work which was low cost, technically sound, maintainable and strong enough to allow all-weather passage of two-wheel drive vehicles.
- The project had demonstrated that the most suitable site organisation was based upon gangs of up to twenty-five labourers under the strict control of a trained Gang Leader.
- The haulage of road construction materials could be economically carried through a system based on the use of donkey-carts.
- It was possible to develop a site-based training system for Gang Leaders. Initial training for these staff took place on the Pilot Project site.
- For small scale and isolated operations as much attention had to be paid to character as to technical competence in the training of supervisors.
- The best supply and control of tools was based on a toolbox kept at each site under the care of the Gang Leader and transported from one site to another by donkey-cart.
- If the various recommendations were implemented then the methods and organisational structures developed during the Pilot Project would be replicable by the Central District Council.

In sum, after experimentation with the various key issues as outlined by the Terms of Reference, the Pilot Project revealed that labour intensive methods

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could be applied in Botswana provided adequate attention was paid to certain crucial issues which could otherwise jeopardize the application of these methods.

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# 4. THE EXPANDED PHASE (LG 34)

## 4.1. General

In 1982, following the evaluation of the Pilot Project, the Ministry of Local Government and Lands decided that over the next 5 years the methods developed during the project should be replicated throughout the country.[77]

The expanded programme started in earnest in March 1983 upon the arrival of the ILO Training Advisor who was based at the RTC in Gaborone.[78] While attempts were made to expand the programme as rapidly as possible it was ensured that expansion was a function of the build up of fully trained personnel. By 1987 DCRUs had been established and operational in all the nine Districts of Botswana.

## 4.2. Objectives of the programme

The objectives of the LG 34 were in line with the major themes of Botswana's 5th and 6th National Development Plans (1976-1985): employment creation and rural development. The objectives included the following:

- Employment creation for the rural poor
- Use of labour intensive methods to build good quality low cost roads
- To create employment opportunities for women
- To establish District Council Road Units

[77] McCutcheon,1985:3
[78] Ibid.,5

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## 4.3. Construction

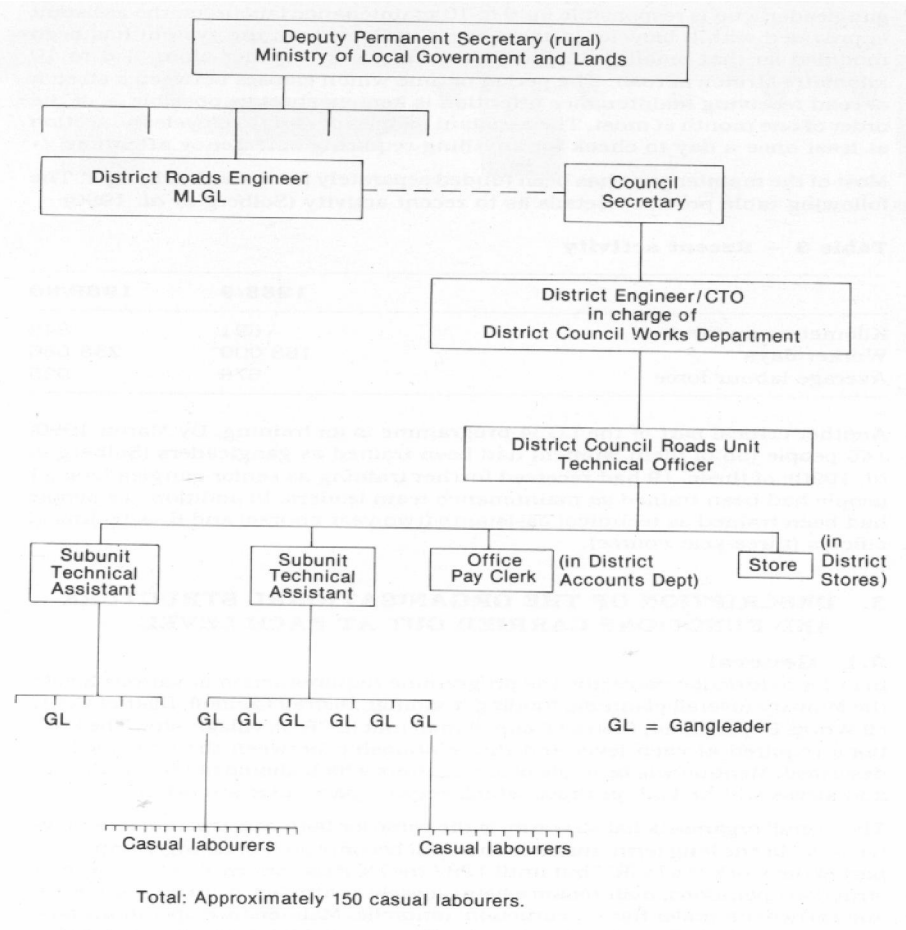
### 4.3.1. Overall Organisational Structure

The organisational structure adopted for the expanded programme was such as required to control activities which were small scale and dispersed yet fully integrated into the existing local and national government structures.

The programme was institutionally located within the Ministry of Local Government and Lands at national level. The Permanent Secretary for Rural Affairs was responsible for the overall monitoring of the programme and reporting to the Minister. He reported on progress, impact and sustainability of the programme. The District Roads Engineer carried out planning and coordination of the programme at national level. At the local level, the Council Secretary was in charge of the programme and was the contact point between the programme and the District Roads Engineer and other external officials. He managed the programme through the District Engineer and Technical Officers. The District Engineer and Technical Officers planned and technically administered the programme at the local level.

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**Figure 4.1: Organogramme of the LG 34**




4.3.2. Gang: labourers, Gang Leader and Senior Gang Leader

The work of a gang of 25 labourers was strictly controlled by a trained Gang Leader. The labourers were recruited locally and employed on a casual basis. Before work started in an area liaison was established between the programme and the village Kgotlas and Village Development Committees. Emphasis was made on the eligibility of women for employment.

The starting time for work varied from 5.30 AM in mid-summer to 8.00 AM in mid-winter. Work was either on a task or daily rate basis, with the latter applied to

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activities for which it was difficult to set a task and the length of the working day was 8 hours. For task based activities workers could go home on completion of a task and the length of a working day for task based activities was about 6 hours. Preference was given to task based work because of its significantly higher productivity. Workers were required to complete a full day's work in order to be eligible for payment. Absence without leave for three consecutive days was taken as resignation. Workers were free to take as much time off as they needed to attend to their own affairs (particularly agriculture) provided they informed the Gang Leaders.

It was not found necessary to provide transport for casual labourers who were prepared to walk up to 10 km from their homes and still be on time for work. Where workers occasionally formed spontaneous camps around the work sites arrangements were made to provide water to these camps.

A Gang Leader performed the following duties:

- Choice of final alignment
- Setting out of work
- Recording the daily muster roll
- Daily issue and receipt of tools
- Control of the work
- Reporting on the work carried out every day

The Gang Leaders did not have the authority to recruit or dismiss workers. In relation to these matters the Gang Leaders could only make a recommendation to the TA.

Gang Leaders were assisted by Assistant Gang Leaders who were selected from amongst workers who had demonstrated reliability and ability to work. They demonstrated working methods to new workers. Gang Leaders did not have to start with completely inexperienced workers at each village. In the absence of a Gang

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Leader, Assistant Gang Leaders marked the muster roll, daily tool record and oversaw bush clearing. Liaison was made with the Headmen through, which free accommodation was obtained for Assistant Gang Leaders at every village.

In 1984, a scheme of service and career structure was submitted to the Department of Unified Local Government Service (UGLS) for approval. Two grades of Gang Leader were proposed for the Industrial Class categories Group II and Group I. Ordinary Gang Leaders would be in Group II while Senior Gang Leaders would be in Group I.

Part of the reason for the introduction of Senior Gang Leaders was the increase in the amount of construction along those routes where complete construction took place. It was considered that ordinary Gang Leaders would be replaced by casual Assistant Gang Leaders along routes where many gangs would be working close to one another. Up to four Assistant Gang Leaders would be controlled by a Senior Gang Leader living on site.

Along those routes where selected betterment was predominant and gangs were relatively isolated the grade of Gang Leader would depend upon the competence of the Gang Leader and the nature of the work.

The above trend led to a greater number of casual labourers being employed for each Permanent and Pensionable or Industrial Class post and a reduction in overhead costs. These internal developments along long lengths of construction resulted in ratios that were similar to those in the KRARP (labourers: Senior Gang Leaders: TA = 300:4:1).

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### 4.3.3. Sub-unit

The TA was formally responsible for the work of four to six Gang Leaders. Where Senior Gang Leaders were concerned the TA was responsible for the control of two to six of them. Thus the TA was formally responsible for the work of 100-50 labourers. The minimum academic qualifications for a TA were a Junior Certificate and the successful completion of the two-year supervisor's course at the RTC. The duties of a TA were as follows:

- To prepare detailed annual plans for the routes for which he/she had been given responsibility.
- To liaise with community structures concerning the LG 34 programme, in particular stressing the labour intensive nature of the work, the alignment, the standard of construction and the eligibility of women for employment
- Recruitment of labour
- To prepare the weekly plan for each Gang Leader and issue the record forms
- To issue tools to new work sites and collect them when work had been completed
- To control the muster roll and ensure that the daily reports were compiled
- To ensure that the plans for the next day were ready and collect the completed weekly reports
- To check if work was being done correctly
- To uphold safety standards
- To collect broken tools and issue replacements
- To solve disciplinary issues between the casual labourers and Gang Leaders and report (to the TO) those between himself/herself and the Gang Leaders.
- To prepare the monthly progress reports
- To supervise preparation and payment of wages during the absence of the TO
- To supervise the maintenance personnel

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The prime responsibility of TA was the construction of technically sound roads. He/she was expected to spend at least three days of each week on site actively engaged in detailed technical and organisational support and supervisory work.

### 4.3.4. District Council Road Unit (DCRU)

The TA of a sub-unit was directly responsible to a Technical Officer (TO) (Roads) who was in-charge of a DCRU. In addition to the construction sub-units and maintenance operations the DCRU housed a section devoted to the payment of casual labour wages and running a central store for the District. The STO was responsible for the work of at least two TAs and thus for the work of at least 300 casual labourers. The Senior Technical Officer (STO) had the following duties:

- Preparation, in each January, of the detailed annual plan for the DCRU. The plans contained information regarding the routes to be constructed, the amount of construction required along each route, the required number of labourers and industrial class employees, tools, equipment and vehicle requirements.
- Initial surveying of new routes with respect to alignment and selected betterment: centrelines of routes were marked out at least six months ahead of construction to allow time for any objections to be voiced
- Close supervision of the activities of the TAs and the monitoring of production
- Liaison between the DCRU and other sections of the Works Department particularly the Accounts and Vehicle Maintenance Departments
- Supervision of the activities of the Store keeper, in particular the procurement of new tools and equipment
- Supervision of the office administration for the DCRU- in particular the preparation for and payment of casual labourers

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- Liaison with the head of the Works Department (District Engineer/ CTO), in particular:
    a) Assisting in the preparation of the rolling year programme
    b) Preparation of regular (monthly) reports on progress and other reports requested by the head of the Works Department
- Settling disciplinary disputes between Gang Leaders and supervisors and reporting other disciplinary issues to the head of the Works Department
- Close supervision of the maintenance supervisors in the district
- Checking the monthly sub-unit reports and compilation of the DCRU report for submission to the CTO.
- Monitoring the progress of the unit by plotting the progress of the work days, production and expenditure against the annual plan

4.3.5. Head of the Council Works Department (District Engineer/ CTO)

The head of the Works Department reported to the Council Secretary for the operations of a DCRU. The CTOs were the main points of formal contact between the LG 34 programme and other Council officials and informal contact between the programme and officials from various Ministries and donor agencies. They were the source of information regarding the labour intensive nature of the work and the standard of construction required by the programme. Thus CTOs were expected to be fully conversant with the aims and objectives of the programme in order to perform their official duties.

The CTOs prepared the monthly progress reports and presented them to the Council Secretary for the attention of the District Roads Engineer (DRE). They also monitored the flow of funds as shown on the monthly progress reports. The flow of funds from the Ministry was supposed to be regular amounts at regular intervals. By knowing the budget and monitoring expenditure the CTO would be able to judge whether or not additional funds would be requested before the due date.

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Each year in February, the CTO prepared Project Memos based on the annual plan completed in January by the STO (Roads). The project Memos were sent to the MLGL. In September each year, the CTO prepared an estimate of recurrent expenditure for the following financial year.

The CTO was also engaged on the preparation of the rolling five-year plans. Council members proposed motions of the roads to be constructed and if the motions were approved at a full Council meeting they were forwarded to the Works Committee. The CTO, assisted by the STO (Roads), prepared a priority list of the roads, using established selection criteria.

The priority list was then submitted to the DRE, who in consultation with the CTO (works) and the STO (Roads) and using information from traffic surveys made the final decision on the list. These three senior officers then came up with District roads inventories and the five-year rolling plans including indicative forward plans for the following financial year. The STO (Roads) then carried out the detailed plans required for each route and presented them for discussion at the annual DRE/DCRU/RTC programme meeting.

At regular intervals the rolling five-year plan was submitted to full Council for approval. Any significant variations to the plan were subject to approval by a full Council.

### 4.3.6. The District Roads Engineer (DRE)

The DRE was located within the MLGL and responsible to the Under Secretary (Rural) for the LG 34 programme. As the District Councils were largely autonomous from the Ministry, there was no direct link between the DRE and any of the Council officers. Thus the DRE could instruct neither the CTO nor the STO (Roads). The DRE could only advise the Council Secretaries through a savingram from the

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Permanent Secretary (MLGL). However within the Ministry, the DRE had some direct influence on events and thus influenced that portion of funding which the Councils received from the MLGL.

However, in practice, through good personal relations the DRE related more directly to the DCRUs and impacted on their activities. The duties of the DRE in relation to the LG 34 programme were as follows:

- To compile project memoranda from the Districts into a national project memorandum and steer it through the correct channels to ensure that sufficient funding was available for the following year's work
- To arrange for the regular disbursement of funds to the districts: in principle a quarter of the budget was dispatched to the districts every three months
- To monitor progress on the programme through the monthly reports received from the Council Secretaries
- To compile a monthly summary of progress and a quarterly report
- To advise (through the Permanent Secretary, MLGL) the Council Secretaries regarding the LG 34 programme
- To ensure that the six-monthly expenditure report was sent through the correct channels to the MFDP
- To provide a rolling five-year forward plan for the LG 34 programme
- Field visits to check progress on the ground
- Liaison with the training programme and the UGLS regarding establishment of posts, promotions etc.
- Liaison with other relevant ministries, MFDP, MWC and MHA.

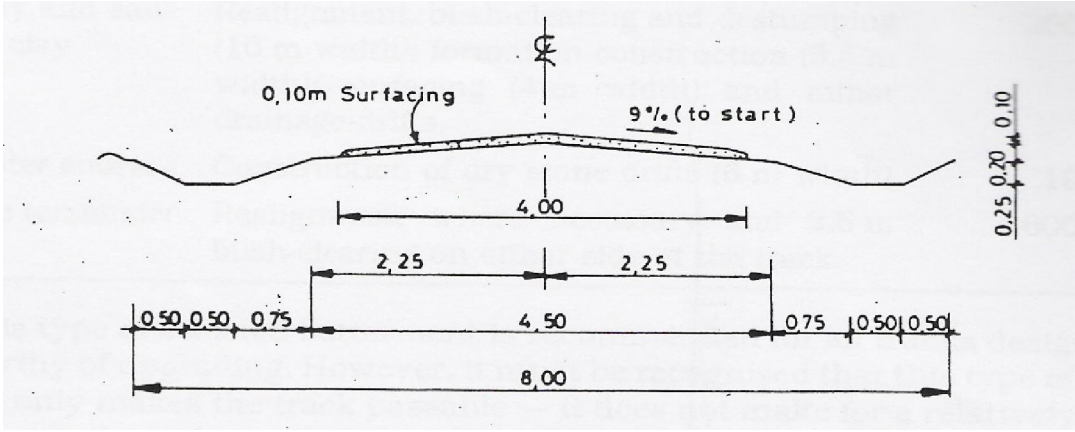
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4.3.7. Types and standards of roads constructed

**Earth roads**

An important part of the mandate of the Pilot Project was to explore low-cost, good quality road construction and selected betterment to keep costs as low as possible. The Pilot Project thus developed a low-cost and good quality road which was economically justifiable in view of the expected traffic volumes. The width and cross section of the road adopted were almost similar to those used in the highly successful KRARP. See the figure below. The project estimated that 20% of the route would require Stage One upgrading using a 4.5m carriageway. If the traffic volumes warranted, then a further 20% of the route would require Stage Two upgrading using a 4.5 m carriageway.

**Figure 4.2: Road Section (Pilot Project)**




However there were complaints regarding the standard of construction particularly concerning the width of the road and steepness of the side drains. They stemmed from the fundamental misunderstanding of the low cost minimum standard required by the Government and the fact that the low traffic volumes could not justify greater expenditure. The low standard was instead attributed to the use of “backward” labour

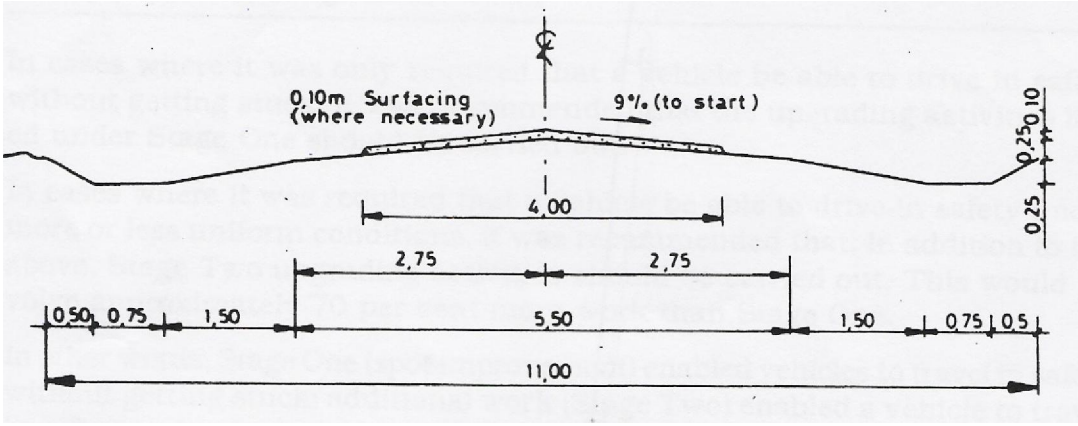
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intensive methods and led to frequent requests for graders. In discussions it was argued that graders were modern, quicker and cheaper and produced a better quality product than labour intensive methods.

It began to appear that the future of labour intensive work in Botswana would be jeopardized by the false allegations against the use of labour intensive methods. Again the routes were of a more secondary nature than the “access to farm” type in the KRARP. In addition, the status of those using the roads was higher than those using the KRARP roads and sufficient for their complaints to influence those in such decision making bodies as the parliament.

It was thus decided that the width of the carriageway should be 5.5 m throughout and the slope of the side drains was reduced. See the figure below. The introduction of the new cross section increased by nearly 10%, the cost of selected betterment Stages One and Two. It was considered that the additional cost of constructing 5.5 m as opposed to 4.5 m carriageway should be borne in the interest of continuing a labour intensive programme in Botswana. The new cross section was introduced at the beginning of 1983.

**Figure 4.3: Road section (expanded LG 34)**



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Technical standards were also improved and back sloping was introduced throughout. A new method of setting out was introduced, which used profile boards in such a way that the longitudinal profile had been improved as had the side and off-road drainage.

As a result of these changes there was a subsequent reduction in publicly expressed dissatisfaction as well an improvement in morale amongst the Gang Leaders and labourers. The use of profile boards for setting out gave the programme a more professional appeal and silenced the critics to a large extent.

Neither the increase in width nor the increase in technical standards decreased the proportion of expenditure devoted to the employment of casual labourer.

**Western Botswana**

As the programme expanded into some parts of western Botswana it was evident that not all the methods and standards developed during the Pilot Project and applied in most parts of eastern Botswana could be applied in this part of the country. Western Botswana is characterised by such conditions as the presence of heavy Kalahari sand, shortage of water and construction material and sparsely populated settlements, which are far apart.

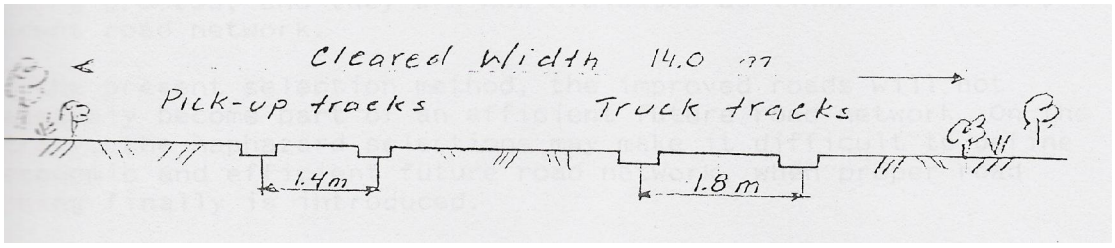
In the light of these difficult conditions a system of bush clearing and track upgrading was developed, which was still highly labour intensive. On the other hand further exploratory work was continued and other types of upgrading were introduced.

**Spoor graded tracks:** As mentioned above, large parts of Botswana are sparsely populated with vast distances between small settlements. Normal earth roads would be too costly and slow to construct. Spoor graded tracks were constructed to provide access to such areas. These were cheap and fast to construct and could sustain a few vehicles a day while providing an acceptable ride quality.

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Spoor graded tracks are two graded wheel tracks along a bush-cleared corridor. A Spoor Grader consists of a number of short blades mounted on a heavy steel frame.

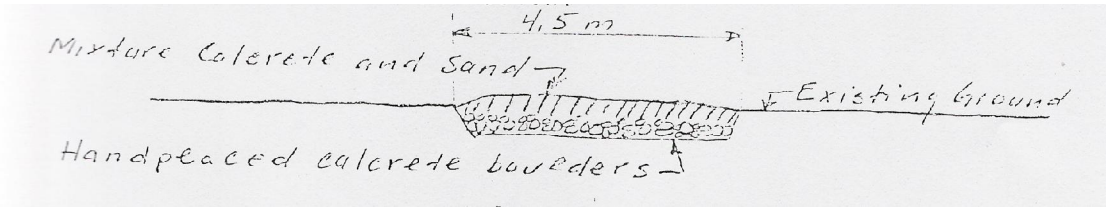
**Figure 4.4:Section through a spoor graded track**




**Gravel surfacing:** Gravel surfacing was applied where the road was constructed on soils of a poor quality. Calcrete was used as the surfacing material and applied over the whole width of the carriage way in layers of 10-15 cm

**Calcrete McAdam roads**: This type of road was constructed in areas covered with heavy Kalahari sand. The top layer of loose sand was removed and a road foundation was constructed from hand-packed calcrete boulders. The foundation was then topped with a mixture of sand and calcrete as surfacing. The road was strong and provided a good riding quality but was expensive to build.

**Figure 4.5: Section through a calctete McAdam road**



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### 4.3.8. Construction output and productivity

**Construction output**

As the programme progressed the length of road constructed per annum increased every year until the fiscal year 1994/95 when it dropped to 150 km of earth road. The highest annual output was 207 km in 1991/92.

**Table 4.1 Length of road constructed per year**

| Year | 80/83 | 83/84 | 84/85 | 85/86 | 86/87 | 87/88 | 88/89 | 89/90 | 90/91 | 91/92 | 92/93 | 93/94 | 94/95 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Km | 39 | 55 | 89 | 76 | 142 | 140 | 176 | 159 | 177 | 207 | 206 | 205 | 150 | 1821 |

According to Table 4.1 above, the length of earth road construction per year increased every year until 1992. Then it started to drop due to difficulties for the programme to attract and retain labour as a result of the low wage paid.[79] During the fiscal year 1994/95 there were indications that the labour turnover was higher, again pointing to an inability to retain labour. At sites visited by a Technical Review Mission team in 1995 there were no full construction teams.

However, by July 1995 the programme had constructed about 1 819 km of earth road. As for the Districts of Ghanzi and Kgalagadi 1000 km of track improvement and spoor grading had been done by the fiscal year 1992/93.

[79] Brudefors et.al,1995

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**Productivity**

An important indicator of productivity is the work input in worker days per km or the cost per km.

**Table 4.2 Work input per year (worker days)**

| Year | 80/83 | 83/84 | 84/85 | 85/86 | 86/87 | 87/88 | 88/89 | 89/90 | 90/91 | 91/92 | 92/93 | 93/94 | 94/95 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Worker-Days | 1900 | 1200 | 1700 | 3200 | 2550 | 2200 | 2000 | 2250 | 2000 | 1750 | 1900 | 2000 | 2150 |

According to Table 4.2 above, the work input per kilometer in terms of worker days was an average of 2000 wd/km during the period from 1980 to 1995. This was accepted to be an efficient utilization of labour.

**Table 4.3 Cost/km per year (P/km)**

| Year | 84/85 | 88/89 | 89/90 | 90/91 | 91/92 | 92/93 | 94/95 |
|---|---|---|---|---|---|---|---|
| Cost/km/yr | 9 260 | 12 831 | 16 172 | 15 442 | 15 187.5 | 18 382.4 | 20 000 |

As shown in Table 4.3 above, the cost of constructing a kilometre of earth road was within P 20 000 from 1984 to 1995. This was a bargain from the perspective of the Botswana Institute for Development Policy Analysis (1997).

4.3.9. Source and structure of programme finance and expenditure

During the expanded programme, NORAD funded the construction activities, purchase of equipment, training and technical assistance. Maintenance of the roads constructed under the programme was funded through domestic recurrent expenditure under vote D-36. This vote also covered the cost of replacement of tools and equipment purchased by the LG 34 funds.

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**Table 4.4 Budget and expenditure for construction**

| Year | Budget (Pmillion) | Expenditure(Pmillion) |
|---|---|---|
| 80-82 ( Pilot phase) | - | 2.5 |
| 82-85 | - | 1.7 |
| 88/89 | 3.2 | 2.8 |
| 89/90 | 3.4 | 3.3 |
| 90/91 | 4.1 | 3.3 |
| 91/92 | 5.1 | - |
| 92/93 | 5.6 | 4.9 |
| 93/94 | 5.6 | 5.4 |
| 94/95 | 5.8 | 3.7 |

Source (MLGL, 1980-1995)

**Table 4.5 Budget and expenditure for maintenance**

| Year | Budget (Pmillion) | Expenditure(Pmillion) |
|---|---|---|
| 86/87 | - | - |
| 87/88 | 0.4 | - |
| 88/89 | 1.0 | 0.9 |
| 89/90 | 1.2 | 1.2 |
| 90/91 | 1.5 | 1.7 |
| 91/92 | 1.8 | 1.8 |
| 92/93 | 2.0 | 2.1 |
| 93/94 | 2.4 | - |
| 94/95 | 2.8 | 1.5 |

Source (MLGL, 1980-1995)

From the two tables above, it is evident that for both construction and maintenance, expenditure increased every year until 1995 when the programme began to experience problems with the recruitment and retention of labourers.

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## 4.4. Maintenance

### 4.4.1. General

Maintenance was the responsibility of the DCRU within the District Council Works Department. Explorations were made to identify the most effective maintenance system and organisation.

### 4.4.2. Background

The World Bank (1981) reported that the estimated economic returns for a proposed road maintenance project are higher than the estimated cost for a proposed road construction project.[80] It reported again that a maintenance programme requires a considerable amount of time to establish. All the maintenance development projects that the bank was involved in took more than 10 years to establish and none of them was foreseen that it would take more than 10 years. Thus maintenance is an important part of an infrastructure development programme and must be treated as such.

For the LG 34 the maintenance methods employed by the KRARP were considered. On the Kenyan programme maintenance workers were contracted to keep a particular stretch of road in order, about 1.7 km per worker in 1980. Workers were paid the equivalent of twelve working days if the maintenance work was adequate. Given the close proximity of construction and maintenance works in the LG 34, maintenance workers were hired just like construction workers; hired by the day and paid by the month.

Upon the arrival of the first rainy season it was evident that emergency maintenance needed to be incorporated into the maintenance system. It was decided to employ 1

[80] IBRD, 1986

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person per kilometre full time. This was in excess of the maintenance work requirement on the Kenya programme but it just had to be done that way in the light of recent public outcry about the quality of the roads.

It was certain from the beginning that maintenance would require a different organisation from construction. Thus there was a need to define a maintenance organisation and as the programme went on and the physical gap between the construction and maintenance activities widened, this need became even more compelling.

The following is a summary of the maintenance systems explored. The exploration to define maintenance methods overlapped both the pilot and the expanded phases of the programme and the first method, length men system, was entirely tried during the Pilot Project.

### 4.4.3. The length men system

Under this method maintenance operations commenced immediately upon the completion of formation construction and prior to surfacing. A length of road was allocated to maintenance workers chosen from amongst workers who had proven to be reliable, technically competent and hard working. The length of road allocated to workers depended upon such conditions as terrain, soil type, traffic density, number of drifts and thickness of bush. At one end of the scale 1 person was responsible for 1 km of completely constructed road while at the other end 1 person was responsible for 10 km of track along which only bush clearing was required.

Maintenance personnel were required to develop an awareness of the need to maintain each section in good shape and develop pride in their work. The following comprised the maintenance activities for completely constructed roads:

- Filling in potholes and depressions

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- Maintenance of camber by reshaping the carriageway
- Drainage maintenance: removal of debris from drains and replacement of stones washed away from the drainage drifts
- Grass cutting and bush clearing
- Erosion prevention
- Road sign maintenance
- Emergency maintenance works: repairs after heavy rains whether or not the rains occurred after hours or during weekends or holidays.

Along sections where formation had not been constructed maintenance activities involved the following:

- Bush clearing
- Maintenance of a smooth running surface
- Works to avoid water logging in the roadway

Maintenance workers were equipped with the necessary tools. For constructed sections a set of maintenance tools comprised a wheel barrow, a spade, a mattock, a grass slasher, a hand rammer, a pick-eyed axe and a water bag.

During the expanded programme it was acknowledged that the level of routine maintenance was not adequate due to a number of factors:

- Maintenance had not been given adequate attention on the Pilot Project
- Lack of supervisory personnel for maintenance
- Maintenance workers lacked an understanding of what was required of them and did not work hard
- Botswana's climate meant that for at least six months of the year there was very little to do except replace the material pushed away from the centre of

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the road. On the other hand, for the remainder of the year, there were frequent occasions where there was too much work to be adequately carried out by one person

### 4.4.4. Roving Gang Leaders

A section of road was divided into three maintenance zones, each under the responsibility of a Maintenance Gang Leader, who was in turn responsible to a TA. The Maintenance Gang Leaders were stationed at a village along their respective maintenance routes. Two huts were secured for each Gang Leader, one at each end of the maintenance route.

The Gang Leader took daily site visits to oversee the work of maintenance labourers who were distributed such that each was assigned 1 km of constructed road. This system collapsed in 1984 due to lack of senior supervisors to control the Maintenance Gang Leaders.

### 4.4.5. Complementary organisation of routine maintenance

This system was based upon small teams of maintenance personnel working under the daily supervision of a Gang Leader. The Gang Leader was required to have a good understanding of construction and maintenance and the ability to work unsupervised. The Gang Leader recruited workers from each village along the route. The workers were recruited from among previous construction labourers. Each village was allocated a section of road.

The Gang Leader carried out routine and periodic maintenance work along the road. Improvement work was carried out according to annual plans and the instructions of senior personnel. Emergency maintenance was also carried out. The Gang Leader could order work, but senior personnel were available for advice on the scope of emergency work.

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### 4.4.6. Tools and equipment

These were issued to the Gang Leader for each road and were stored in a secure hut in each village under the care of a village Headman. Maintenance tools included wheelbarrows, spades, picks shovels, mattocks, axes, slashers and rakes.

### 4.4.7. Frequency of maintenance

The frequency of maintenance was typically determined as follows:

- 1 labourer was required to maintain 3 km of road per year
- Mandays = 1/3 x 200 per km ≈ 67 m-d/ km/yr
- For a 15 km section: 15 x 67m-d/yr ≈ 1000 (1005) man-days
- For a team of 10 labourers = 1000/10 = 100 days work on each section

Short periods of work were more frequent and provided more frequent pay packets for the work force. Longer periods saved the time lost in moving site but provided less frequent pay packets. Thus a balance had to be struck between the two extremes of length of working time in determining the frequency of maintenance works.

### 4.4.8. Amount and cost of maintenance required

The amount of maintenance work required was estimated at one person per 3 km. The maintenance system comprised routine maintenance incorporating a periodic maintenance component (resurfacing), keeping the road at a high standard. It was assumed that maintenance would take about 4% of the number of days required for construction. The number of days required for the construction of earth roads was 2250 per km. Then 4% would amount to 90 days/km/yr. Assuming half of this for periodic maintenance (33 days), then routine and periodic work would total 100

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days/km/yr. Including tools (P75) and overheads (P125), 100 days/km/yr would result in a maintenance cost of P 5000/km/yr.

From the above review it can be seen that maintenance operations during the expanded programme were not carried out on the basis of entirely one method. It was either the length men system or the system of labour gangs under a Gang Leader or a combination of the two.

### 4.5. Employment

One objective of the programme was to generate employment opportunities for the rural poor. Three categories of staff were employed during the programme. These comprised the Permanent and pensionable staff recruited and employed by the UGLS of the MLGL. The UGLS was responsible for the establishment of posts, promotions and transfers concerning this category of staff.

There was the category of industrial class employees, who were managed by the District Councils. These staff included Gang Leaders, Drivers, Pay clerks and Store keepers.

The last category was casual labourers, who were employed on a short term basis and were paid daily. Casual labourers constituted the bulk of the work force and the following analysis of employment mainly focuses on the casual labour content.

As the programme expanded country-wide the labour force increased progressively and so did the percentage of women casual labourers. This can be seen in Tables (4.6 and 4.7) below.

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**Table 4.6 Employment for casual labour**

| Year | 81/82 | 83/84 | 84/85 | 85/86 | 86/87 | 87/88 | 88/89 | 89/90 | 90/91 | 92/93 | 94/95 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Labourers | 235 | 250 | 750 | 1445 | 1818 | 2118 | 2980 | 2810 | 3200 | 3646 | 2730 |

**Table 4.7 Proportion of women labourers**

| Year | 81-82 | 85/86 | 86/87 | 87/88 | 88/89 | 89/90 | 90/91 | 92/93 | 94/95 |
|---|---|---|---|---|---|---|---|---|---|
| % Women | 8 | 22 | 22 | 27 | 28 | 37 | 40 | 43.3 | 40 |

**Table 4.8 Employment in July 1994/95**

| | Construction | Maintenance | Total | % LG 34 |
|---|---|---|---|---|
| Worker days | 380 000 | 340 000 | 720 000 | |
| Labourers | 1440 | 1290 | 2 730 | 1.3 |
| Rural employment | | | 83 400 | 3.3 |
| Local Government employment | | | 15 221 | 18 |
| Rural Local Government employment | | | 10045 | 27 |

**Table 4.9 Comparison of LG 34 with national economy(1995)**

| | | | | |
|---|---|---|---|---|
| National economy | Employment: 234 500 | GDP (Pm): 11 444.5 | GDP/EMP: 48 803.8 | 100 % |
| LG 34 | Employment: 2 730 | LG 34 Exp (Pm): 3.4 | (LG 34 exp)/EMP: 1245 | (1245/48 803) 2.6 % |

According to Tables (4.8 and 4.9) above, the LG 34 contributed a significant proportion (27%) to rural local government employment in July 1995. A comparison with the national economy for the same period reveals that a unit of expenditure on

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the LG 34 generated more employment opportunities than a unit of expenditure on the national economy.

**Table 4.10 Employment for Industrial Class workers (1990/91)**

| | Number | |
|---|---|---|
| Staff | Construction | Maintenance |
| Senior Gang Leader | 16 | - |
| Gang Leader | 81 | - |
| Maintenance Team Leader | - | 23 |

**Table 4.11 UGLS employees**

| | 1990/91 | | 1995 | |
|---|---|---|---|---|
| Staff | Posts | Vacancies | Posts | Vacancies |
| RE | 1 | 0 | 3 | - |
| CTO (Roads) | 0 | - | 5 | - |
| STO( Roads) | 7 | 4 | 10 | - |
| TO(Roads) | 13 | 7 | 21 | - |
| STA(Roads) | 12 | 6 | 19 | - |
| TA(Roads) | 15 | 0 | 20 | - |

Table 4.10 above shows that a Senior Gang Leader was in charge of at least three Gang Leaders. According to Table 4.11, the number of permanent staff positions on the programme increased as the programme progressed.

## 4.6. Wages

As the programme progressed and expanded country-wide the wage rate for casual labourers waned in proportion to the Industrial Class minimum wage in the public sector. The context within which this came about will be briefly discussed below.

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After a thorough analysis of prevailing wages in the public and private sectors and due consideration of the nature of labour intensive work, the wage rate was, with the approval of Government, pitched at P2.10 in May 1980.[81] It amounted to 75% of the Public Sector minimum wage.

However, the project 'architects' had made a big mistake. They forgot to have the wage pegged to the minimum wage in the public sector from the onset. When they later tried to save the situation, it was too late. The government did not entertain any notion of the wage being raised. They preferred to keep it as stable as possible while other wages progressively went up. Government only allowed slight increases to the wage, which were only made after they were long overdue. This situation made the wage level so stagnant that at times it was barely on par with wages paid to workers on the Drought Relief Programme.

Thus, while wages in the public and private sectors continued to rise, the LG 34 wage was almost stationary and dropped, in proportion to the Public Sector minimum, from 75% in 1980 to about 40% in 1995.The programme began to lose workers to the Drought Relief Programme and recorded a decline in the annual road construction outputs and expenditure.

**Table 4.12 Wage rate history**

| Wage/Year | 1980a | 1980b | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 93 | 94 | 95 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LG 34 Wage(P) | 2.10 | 2.1 | 2.1 | 2.1 | 2.5 | 3.00 | 3.6 | 3.96 | 4.24 | 4.66 | 5.17 | 5.79 | 5.79 | 5.79 | 6.30 |
| Min A3 (P) | 2.80 | 4.1 | 4.42 | 4.77 | 5.25 | 5.57 | 6.68 | 7.35 | 7.86 | 8.65 | 9.6 | 10.76 | 14.61 | 15.78 | 16.57 |
| LG34/A3 (%) | 75.0 | 51.2 | 47.5 | 44.0 | 47.6 | 53.9 | 53.9 | 53.9 | 53.9 | 53.9 | 53.8 | 53.8 | 39.6 | 36.7 | 38.0 |

A3: Public sector minimum wage

[81] Vaidya, 1983

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The above Table shows that, over time, the wage rate for the LG 34 fell in proportion to the public sector minimum wage as the two had not been pegged from the onset.

## 4.7. Management Reporting Systems

The LG 34 established a proper monitoring and reporting system to provide reliable information for planning and cost control. The system was functional in all the DCRUs.

The Gang Leaders compiled daily and weekly reports for their respective sites and submitted them to the Technical Assistants, who compiled the reports for all the sites. The Technical Officer (DCRU head) then compiled the monthly reports for submission to the MLGL, where they were compiled and filed on computer.

The above reports were used in the compilation of monthly reports on construction and maintenance expenditures, construction and maintenance output in terms of lengths of road constructed and maintained. Labour input and cost were also reported on.

The reporting was part of a monitoring and control system whereby actual performance could be compared with the plan and the necessary adjustments and corrections made. It also aided future programme planning through the production of a reliable database.

## 4.8. Training

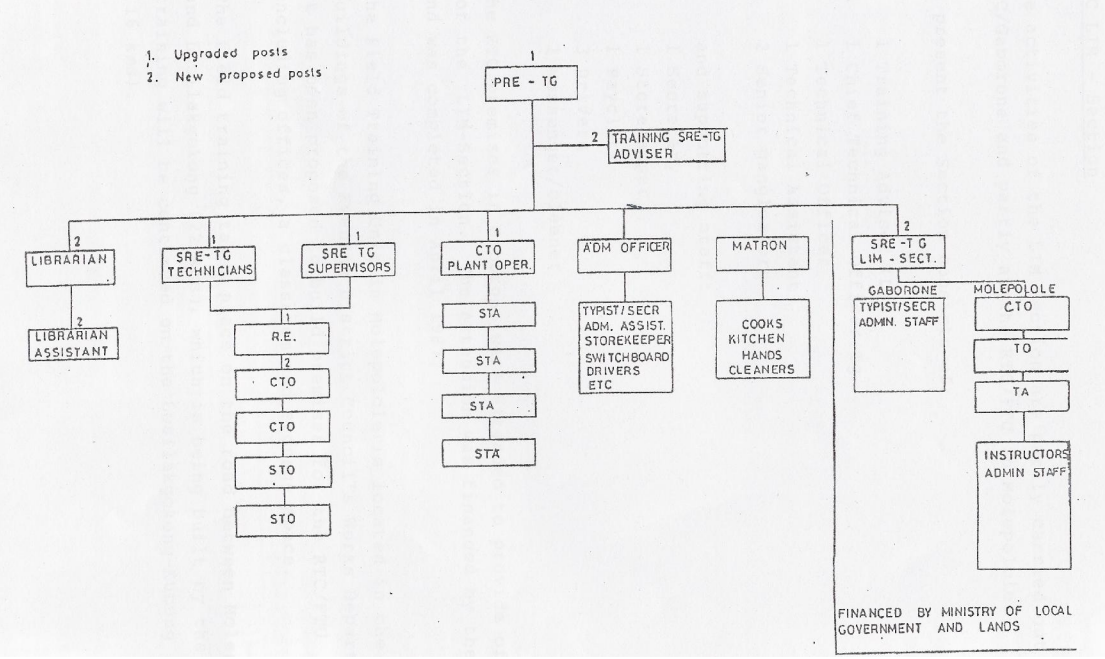
### 4.8.1. General

Formal training was an integral part of the LG 34 and was carried at three levels: supervision of a sub-unit and a DCRU (Technical assistant and Technical Officer) and site supervision (Gang Leader). Informal on-the-job training was also given to

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Storekeepers, Pay clerks and Welders. All formal training was the direct responsibility of the Roads Department's Roads Training Centre in Gaborone. A new section called Labour Intensive Methods was created at RTC in 1985 and was responsible for all the formal training in labour intensive methods. In 1985, field training was moved from Serowe to a new organisation called the Field Training Unit (FTU), in Molepolole. The FTU was under the Labour Intensive Methods section of the RTC and was responsible for the training of Gang Leaders and the practical training of Technical Assistants and Technical Officers. The Labour Intensive Methods section was initially coordinated by the ILO Training Advisor and later by a Chief Technical Officer.

**Figure 4.6 : Organogramme of the RTC**



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### 4.8.2. Technical Officers

The minimum entrance requirement for the RTC technician's course was the General Certificate of Secondary Education. The TOs would also attend further short courses devoted to technical and organisational matters specific to running a labour intensive programme.

### 4.8.3. Technical Assistants

The DCRUs were entitled to 25% of the places in the site supervisors' course. The minimum entrance qualification was the Junior Certificate and passing an entrance examination. Students were reviewed at the end of the first term and were discontinued if they were not up to standard. The course included a general introduction to labour intensive methods and field work with a DCRU. Upon completion they attended further short courses on technical and organisational matters specific to running a labour intensive DCRU.

### 4.8.4. Gang Leader training

Candidates were required to possess a minimum of standard 7 certificates and pass an entrance examination. The course was run entirely on site and comprised both class and practical work. The course lasted three months followed by three months of close supervision on site before the Gang Leaders returned to their DCRU's for six months probation.

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**Table 4.13 Training modules for Gang Leaders**

| Subject | No. of Modules |
|---|---|
| English ( Practical and Communication) | 3 |
| Calculation | 5 |
| Drafting & Plan Reading | 2 |
| Surveying | 4 |
| Road Building Materials | 7 |
| Road Construction | 5 |
| Road Maintenance | 2 |
| Construction Management | 3 |
| Total | 40 |

### 4.8.5. Pay Clerks and Store Keepers

These staff were trained on-the-job and their training was not formalised. This was one aspect of training that was not satisfactory and calls were made for it to be formalised and be included in the activities of those authorities normally responsible for the training of Council Pay clerks and Store keepers. It was recommended that on-the-job training should only follow from the formal training.

### 4.8.6. Welders

Through the cooperation of certain local enterprises, a number of former labourers received on-the-job training as welders and repairers. The companies paid visits to the construction sites where they welded and repaired the donkey-carts. Liaison with these companies was sustained to ensure continued cooperation.

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### 4.8.7. Training output

**Table 4.14 Training output (Industrial Class)**

| Period / Course | Intake | | Graduated | |
|---|---|---|---|---|
| | Total | % Women | Total | % Women |
| GL | | | | |
| 81-85(Serowe) | 109 | 21 | 73 | 21 |
| 85-87(FTU) | 40 | 40 | 31 | 35 |
| 1988 | 13 | 62 | 13 | 62 |
| 1989 | 25 | 80 | 22 | 86 |
| 1990 | 11 | 45 | 8 | 50 |
| 1991 | | | | |
| SGL | | | | |
| 1985-87(FTU) | 14 | 2 | 14 | 14 |
| 1988 | 6 | 3 | 5 | 60 |
| 1989 | | | | |
| 1990 | | | | |
| 1991 | 11 | 45 | | |
| TML | | | | |
| 1989 | 15 | 53 | 11 | 64 |
| 1990 | 27 | 59 | 21 | 71 |
| 1991 | | | | |
| | | | | |

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**Table 4.15 Training output (UGLS employees)**

| Course | Intake | | | Graduated | | | |
|---|---|---|---|---|---|---|---|
| | Total | RD | DCRU | Total | RD | DCRU | % Women |
| TOs | | | | | | | |
| 81-83 | | | | 16 | 14 | 2 | - |
| 84-86 | 26 | | 3 | 14 | 11 | 3 | 0 |
| 87-89 | 23 | | 3 | 12 | 11 | 1 | 17 |
| 89-91 | 25 | | 2 | | | | |
| 90-92 | | | | | | | |
| 93 | | | | | | | |
| TAs | | | | | | | |
| 1983 | 16 | | | 16 | | | |
| 84-85 | 17 | | | 16 | | | |
| 85-86 | 20 | | | 12 | | | |
| 86-87 | 27 | | | 17 | 13 | 4 | 12 |
| 87-88 | 28 | 23 | 5 | 16 | 12 | 4 | 19 |
| 88-89 | 22 | 17 | 5 | 14 | 11 | 3 | 21 |
| 90-91 | 26 | 20 | 6 | 26 | 20 | 6 | |
| | | | | | | | |

According to Tables 4.14 and 4.15 above, the training of technical staff at the RTC and its FTU produced a large number of technical personnel for the LG 34. By 1990, 166 Gang Leaders, 32 Maintenance Team Leaders, 6 Technical Officers and 18 Technical Assistants had graduated and joined the LG 34. The above Tables also show that the proportion of female trainees also increased and over time the number of female trainees was higher than the number of male trainees.

Although the training output did not meet the actual demand by the programme, this did not cause the programme to suffer from a shortage of technical staff. The shortfall in training output was insignificant and did not hamper the programme.

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## 4.9. Other Issues

### 4.9.1. Selected betterment

As the programme expanded there was a trend towards selected betterment of longer stretches of route, and this constituted at least 42% of the route previously estimated for Stages One and Two upgrading. Part of the reason was the acknowledgement that the network was of a secondary nature.

Selected betterment was a difficult concept to tie down.[82] Once a section of road had been upgraded its old condition was forgotten and the remaining road appeared worse than the constructed section.

Another factor that led to longer sections being upgraded during the expanded programme was the high sensitivity of weighted benefits to the level of traffic (ADT) for Stages One and Two upgrading. From a cost-benefit analysis, the Labour Economist determined that for weighted benefits and economic costs, a 5% increase in ADT resulted in a 50% higher Internal Rate of Return (IRR).[83]

Traffic surveys carried out in 1983 showed that ADT levels had increased. Of the 17 roads surveyed in the Central District only four had an ADT less that six. Seven of the roads had ADT greater than 10 while it was expected that traffic along other routes would blossom once the roads had been constructed. At ADT 10 Stages One and Two combined had a high Internal Rate of Return (IRR=17) with weighted benefits. Adequate return was obtained at an ADT of only six.

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[82] McCutcheon,op.cit
[83] Vaidya,op.cit.

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Thus the Labour Economist's cost-benefit analysis and the traffic survey results of 1983 showed that along 75% of the routes the traffic levels warranted 50% of the routes to be upgraded to Stages One and Two. For routes where the ADT exceeded 10 almost complete upgrading was warranted. The above analysis justified the tendency for the increased proportion of completely constructed routes during the expanded programme.

The combined effect of the increased standard and length of route constructed would increase the cost from the P 2 065/km, estimated during the Pilot Project, to figures shown in Table 4.16.

**Table 4.16 Cost per kilometre of constructed road (P/km)**

| **Length constructed** | Pilot Project estimates | | Effect of new cross section | |
|---|---|---|---|---|
| | Not gravelled | gravelled | Not gravelled | gravelled |
| 20 | 916 | 1234 | 1125 | 1443 |
| 42 | 1398 | 2065 | 2137 | 2804 |
| 100 | 3100 | 4860 | 4346 | 5934 |
| GraveL | | | 318 | |
| Total | | | 4764 | |

The new section throughout to engineered earth standard plus 20% of the route gravelled would cost P 4 764/km (1982 prices).

4.9.2. Selection criteria

**Background**

There were more non-gazetted tracks in the Districts than could be upgraded during a five-year period. Therefore there was a need to develop a selection criterion for the roads in order to come up with a priority list of roads for upgrading.

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**Procedure for obtaining priority lists**

During the expanded programme a simplified selection criterion was developed and the procedure was as follows:

- Councillors tabled motions at full Council meetings requesting for certain roads to be constructed
- Approved motions were forwarded to the Works Department for implementation
- After assessing the priorities for construction a rolling five-year plan was prepared
- The priorities were assessed by screening to see which roads would be reasonably considered and by ranking the roads according to the following criteria:

    - Population density in the catchment area
    - Average Daily Traffic
    - Estimated cost of the route

This simple assessment coupled with the democratic processes of the Councils provided an accurate list of priorities.

4.9.3. Forward planning

**Planning values**

**Selected betterment:** A lower standard of construction was required for selected betterment than complete construction. The Pilot Project found that selected betterment required 1600 worker days per kilometre (without back sloping). With back-sloping, 1 km of earth road required 2000 worker days.

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The average amount of construction was 3 km per gang in eastern Botswana. This was calculated from the 5000 days per gang and the 1600 day/km. A six-gang DCRU sub-unit was expected to complete 18 km of construction including back sloping.

**Complete construction:** For a DCRU sub-unit of about 150 labourers, the estimate per year (excluding drifts) was (30 000/ 2250) 13.5 km.

4.9.4. Preparation of the five-year rolling plans

**Complete construction**

The following example on how to prepare the rolling five-year plan is based on a case where one route at a time was dealt with. If only one sub-unit existed in a District the rolling plan was prepared by taking the priority list and dividing by 13.5 km. In this case one route would be completed before moving to the next.

A surfacing unit comprised 15 labourers. They did spot surfacing along constructed sections. The amount of surfacing was estimated as follows:

- Working days available: 21x200 = 4200 days
- Working days per km : 420 ( + 120 cart days)
- Surfacing per year: 4200/420 = 10 km

**Selected betterment**

In working out the amount of work for selected betterment allowance was made for movement between sections. In addition the following considerations were made:

- Formation construction: four days/week, one week between sections
- Surfacing : three days/week, one week between sections, 50% cart availability

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The preliminary inventory of work required along each route was prepared. The time for construction was then estimated using the basic work rates quoted above for selected betterment and allowing for hiatus. The rolling five-year plan was prepared by working down the priority list. Surfacing was assumed to follow a year after construction.

## 4.10. Haulage

### 4.10.1. General

As it has already been mentioned in the description of the Pilot Project, circumstances in Botswana warranted a serious investigation of the potential of using donkey-drawn haulage. In particular the investigation concentrated upon defining the type of cart and the system of organisation within which the donkey-cart teams would operate. A comparison was made between the financial costs of the donkey-cart based system and the alternative of the tractor and trailer system.[84]

### 4.10.2. Technical

The investigation revealed that the most appropriate cart was the two-wheel tipping cart of 0.5 $m^3$/ load drawn by a team of four donkeys. The carts were manufactured in Botswana.

[84] McCutcheon,1985

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4.10.3. Organisation

Work studies were carried out on the carts in order to develop an efficient system of haulage. The system was based upon the number of tasks to be completed for the carts. For each haulage distance each cart would carry out a number of trips each day. Disruptions were minimised by balancing the operations in order to keep the number of people employed more or less constant. For example, where few carts were required for surfacing, work was balanced to ensure that stones for drifts, sand for topping etc were hauled to keep the fleet busy.

4.10.4. Financial analysis

Financial comparison was made between the donkey-cart system and the tractor-trailer system at low gross utilisation. A low gross utilisation was assumed for the tractor system since the operations were of a dispersed nature and small scale. The donkey-cart system was financially competitive up to at least 2.5 km. Haulage distance was often shorter than 1 km, offsetting the effects of the occasional haulage distance of over 2.5 km on the normal programme. The cart system was therefore also more efficient in economic terms.

Thus donkey carts played an important role in the expanded programme. They were used to transport construction materials, tools and water.

## 4.11. Tools and equipment

4.11.1. General

During the expanded programme the tools and equipment were the same as those which were used on the Pilot Project. They were still stored in a tool box kept at each site and transported by donkey cart.

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In the western Districts of Ghanzi and Kgalagadi a trailer-drawn spoor grader was introduced.

4.11.2. Control of tools and equipment

Tools and equipment were purchased through the Stores Department of Council. A toolbox completely stocked with a set of tools and equipment (for 25 construction labourers, or 15 surfacing labourers and 6 cart drivers) was issued to each site.

An inventory of the tools was kept in each toolbox and a copy was kept in the Council stores. Broken tools were repaired or replaced with new ones. The DRCU Store keeper carried out inventories of the tools at regular intervals

4.11.3. Manufacture of tools and equipment

The tools and equipment were manufactured in Botswana by both private and parastatal enterprises. These included the Botswana Enterprise Development Unit (BEDU), Madiba Brigade, N.Stoneham (Ltd), J.T. Industries and DEK (Ltd).Typical tools and equipment were jembes, gabions, spoor graders, carts, animal-drawn rollers and water bowsers.

## 4.12. Evaluation

4.12.1. Internal

**Employment**

One of the objectives of the LG 34 was to generate employment opportunities for the rural poor. This objective was achieved to a large extent. As the programme

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expanded, the number of casual labourers employed progressively increased (See Table 4.6 in section 4.5 of this chapter).

From 235 casual labourers employed during the Pilot Project, the casual labour force increased to at least 3000 labourers in 1990. With this, the LG 34 had achieved the NDP 6 objective to create 3000 jobs by 1990.

In July 1995 the LG 34, under LG 117, constituted a significant proportion of rural employment. It employed about 2 730 casual labourers, accounting for 3.3% of total rural employment and 27% of rural local government employment (See Table 4.8 in section 4.5).

A comparison with national employment in July 1995 reveals that the LG 34 generated more employment opportunities per unit of expenditure than the national economy (See Table 4.9 in section 4.5).

The LG 34 had a specific objective to generate employment opportunities for women. The programme implemented effective recruitment strategies to target women, getting more of them into the programme both as casual labourers and supervisors. The proportion of women casual labourers increased from 8% in 1980 to about 40% in 1995 (See Table 4.7 in section 4.5).

The proportion of women trained as site supervisors also increased as the programme went on. In fact women dominated men in the Gang Leader cadre of staff. Their proportion increased from 21 % in 1985 to about 86 % in 1990.

**Good quality low cost roads**

The primary purpose of the LG 34 was to upgrade and maintain the non-gazetted District roads labour intensively. The programme opened up, all year round, access to

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these areas by constructing and maintaining good quality roads. The main activity was the construction of earth roads. The length of earth road constructed each year progressively increased until 1995 (See Table 4.1 in section 4.3.8). By 1995 the programme had constructed a total of about 1 821 km of earth road at an average cost of P 20 000/km/yr. On average, the labour input was about 2000 worker days only per year.

The construction of good quality low cost roads was a cornerstone for the success of the LG 34. This earned the programme international recognition and the government of Botswana declared the programme a national asset. This prompted statements such as the following by BIDPA. The construction and maintenance of nearly 2000 km of relatively high standard road at an average cost of under P 25 000/km was a bargain from an economic point of view.[85]

Therefore the LG 34 succeeded in relation to achieving the objective to produce good quality roads at a low cost.

**Building institutional capacity for the District Councils**

The LG 34 also aimed to create institutional capacity for the District Councils to enable them to construct and maintain their non-gazetted network of roads. The Councils did not have this capacity prior to the programme.

The LG 34 developed and established this capacity within the Councils. By 1987 Road Units were established in all the nine District Councils and were constructing and maintaining good quality roads. The programme had thus met the objective to create Road Maintenance Units within the District Councils.

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[85] BIDPA, 1997:331

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4.12.2. External evaluation

Although it had a few shortcomings, the LG 34 complied, to a large extent, with good practice in labour intensive work.

**Piloting**

The LG 34 had adopted the four-phased approach to programme implementation and implemented a Pilot Project to investigate the technical feasibility and economic efficiency of labour intensive methods in Botswana, prior to expansion. The project experimented with all aspects of selected betterment and maintenance of rural roads, including technology, methods of construction, wage rates, payment in cash or in kind and employment of women. The project came up with a number of findings on the above issues and recommended that the methods be replicated. The replication of the methods during the expanded programme was supported by the firm foundation laid by the preceding Pilot Project.

**Centralisation and decentralisation**

There was a balance between the centralisation essential for the success of lower level operations and the centralisation required for the overall planning and coordination of the programme at national level.

Implementation was decentralised to local authorities (District Councils) and the beneficiary communities (through their VDCs) while the overall programme policy planning and coordination was centralised in the MLGL.

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**Institutionalisation and training**

The LG 34 had a strong and fully incorporated formal training component. Training was carried out at three levels: Technical Officer (TO) responsible for the supervision of a District Council Road Unit, Technical Assistant (TA) responsible for the supervision of four to six Gang Leaders, and Gang Leaders responsible for site supervision. Informal on-the-job training was also given to Store Keepers, Pay-clerks and Welders.

Institutional adjustments were made to existing institutions and new institutions created in order to create training infrastructure for the programme. Internal adjustments were made to the Roads Training Centre resulting in the creation of a Labour Intensive Methods section and the establishment of a Field training Unit in Molepolole. The above institutions produced trained technical staff for the programme, Gang Leaders, Technical Assistants and Technical Officers. These staff were crucial (especially the Gang Leader) to the success of the programme.

A careful screening process was followed in the selection of candidates for training. The screening process involved a requirement for certain minimum qualifications and sometimes pre-qualification examinations. As much attention was paid to character as to technical competence in the selection of trainees. This thorough process ensured that only the suitable candidates were trained as site supervisors and other technical staff.

The training of site supervisors was crucial due to the nature of conditions in Botswana. They were such that the operations were of a small scale nature and dispersed. This meant that site supervisors would work for longer times without supervision by their superiors.

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The success of the LG 34 derived much from the robust training programme incorporated.

**Financial commitment and political support**

The Programme enjoyed sustained financial support from the initial donor, NORAD, until 1997 when the donor's commitment ended.

The programme also received strong political support from its early stages until the latter stages when it began to be implemented with drought relief.

The long term financial commitment and political support were crucial to the success of the LG 34. At times, in the early stages, the odds were against labour intensive methods but the enthusiasm by the political leadership prevailed and the programme forged ahead.

4.12.3. Problems and shortcomings

Despite the good performance of the LG 34 in relation to most of its objectives and international good practice, the programme had a few shortcomings, especially in its latter stages.

**Wage rate**

As it has already been mentioned, the wage rate was pitched at P 2.10/day at the start of the piloting phase of the LG 34. That was after a thorough assessment of the then prevailing economic situation and due consideration of the nature of labour intensive work. Thus in terms of conditions in 1980, the wage rate was appropriately set at P 2.10 per day.

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However, over time, the wage rate was outstripped by the upward movements by of both the cost of living index and the minimum industrial class wage in the public sector. The wage had not been pegged to the public sector minimum. The LG 34 wage dropped from 75% in 1980 to 40% in 1994, in proportion to the public sector minimum. It dropped to a level where it was on par with wages on the Drought Relief Programme. In 1995 labourers on the LG 34 worked 7.75 hours a day for P 6.30 (P0.82 / hr) while their counterparts on the Drought Programme worked 6 hours a day for P 6.00 (P 1.00/hr). Drought workers were better off.

Thus workers in a programme that was generating productive employment opportunities while producing good quality assets were paid not differently from drought relief workers. This situation seriously undermined the performance of the LG 34. Workers left the LG 34 en masse to join the Drought Relief Programme where they would be paid the same wage under much less supervision. The LG 34 started to record lower performance in terms of road construction output and the quality of workmanship.

In 1992, the LG 34 was combined with the inefficient LG 38, an essentially drought Relief programme. This further dampened the performance of the LG 34 and strengthened its new drought relief image, further diluting its efficiency. The strict discipline enforced, high productivity maintained and constant technical supervision on the LG 34 progressively went down and the programme degenerated into drought relief.

Government support for the programme also went down. The programme was eventually wound up upon the withdrawal of its foreign donors. It had now ceased to be a productive development programme and apparently the government did not see the need to continue it.

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**Localisation**

The LG 34 failed to localise senior positions in the programme, preventing the crucial handing over of the programme to local engineers. This was due to a critical shortage of qualified local persons coupled with the reluctance to train local personnel for the programme, on the part of the Government.

As at March 1993 (after 13 years) the two most senior engineering positions on the programme were still in expatriate hands (The District Roads Engineer and Assistant Roads Engineer). The most qualified locals on the programme were those of Technician Certificate level, who were crowded in lower middle programme management.

In comparison with the KRARP, the number of Kenyan engineers employed in the KRARP increased from zero in 1974 through to 2 in 1978 to 23 in 1985 ( out of a total 29). In respect of localisation the LG 34 faired poorly against the successful Kenya programme.

**Donor withdrawal**

NORAD withdrew financial and technical support to the programme in 1996 on the pretext that Botswana's economy had reached a level where it could sustain itself. Botswana experienced remarkable and consistent economic growth recording the highest per capita growth of any country, over 7 % on average. The GDP per capita stood at $ 4 278 in 2003.[86]

But the good economic performance has not been accompanied by a matching degree of socio-economic transformation. There are parts of the country where poverty is so

[86] World Bank/MFDP, 2004

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endemic that some households survive on state destitute grants. Botswana recorded a drop in its Human Development Index while it was experiencing a rapid economic growth in 2001.

**Table 4.17 Human Development Index trend for Botswana**

| Year | 1975 | 1980 | 1985 | 1990 | 1995 | 2001 |
|---|---|---|---|---|---|---|
| HDI | 0.509 | 0.573 | 0.626 | 0.674 | 0.666 | 0.614 |

In the light of this wide gap between economic performance in terms of per capita growth and socio-economic development one is compelled to question NORAD's withdrawal on grounds of economic independence for Botswana. If that was a genuine reason for withdrawal then NORAD's analysis of the economic situation in Botswana was superficial and needs to be reconsidered..

This is more so in light of the fact that the withdrawal of NORAD support marked the demise of the LG 34.

## 4.13. Conclusions

### 4.13.1. Achievements

**Internal achievements**

**Employment:** This objective was achieved to a large extent. As the programme expanded, the number of casual labourers employed progressively increased. From 235 casual labourers employed during the Pilot Project the casual labour force increased to over 3000 labourers in 1990. With this, the LG 34 had achieved an NDP 6 objective to create 3000 jobs by 1990.

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In July 1995 the LG 34, then under LG 117, employed about 2 730 casual labourers. This accounted for 3.3% of total rural employment and 27% of rural local government employment.

A comparison with the national economy for July 1995 reveals that the LG 34 generated more employment opportunities per unit of expenditure than the national economy.

The LG 34 had a specific objective to generate employment opportunities for women. The proportion of women casual labourers increased from 8% in 1980 to about 40% in 1995.

The proportion of women trained as site supervisors also increased as the programme went on. In fact, women dominated men in the Gang Leader cadre of staff. Their proportion increased from 21% in 1985 to about 86% in 1990.

Thus the District roads programme succeeded in achieving the employment creation objective.

**Good quality roads:** The primary purpose of the LG 34 was to upgrade and maintain the non-gazetted District roads labour intensively. The length of earth road constructed each year progressively increased until 1995. By 1995 the programme had constructed a total of about 1 821 km of earth road at an average cost of P 20 000/km/yr.

The construction of good quality low cost roads was a cornerstone for the success of the LG 34. This earned the programme international recognition and the Government of Botswana declared the programme a national asset. Therefore the LG 34 succeeded in relation to achieving the objective to produce good quality roads at a low cost.

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**Institutional capacity building:** The LG 34 also aimed to create institutional capacity for the District Councils to enable them to construct and maintain District roads. By 1987, Road Units had been established in all the nine District Councils and were constructing and maintaining good quality roads.

**External achievements**

The LG 34 complied, to a large extent, with good practice in labour intensive work.

**Piloting:** The LG 34 adopted the four-phased approach to programme implementation and implemented a Pilot Project to investigate the technical feasibility and economic efficiency of labour intensive methods in Botswana prior to expansion. The subsequent replication of the methods was supported by the firm foundation laid by the preceding Pilot Project.

**Centralisation and decentralisation:** There was a balance between the centralisation essential for the success of lower level operations and the centralisation required for the overall planning and coordination of the programme at national level.

**Institutionalisation and training:** The LG 34 had a strong and fully incorporated training component carried out at three levels: a TO responsible for the supervision of a DCRU, a TA responsible for the supervision of four to six Gang Leaders, and a Gang Leader responsible for site supervision of a gang of up to 25 labourers.

Institutional adjustments were made to existing institutions (RTC) and new institutions (FTU) were created in order to create training infrastructure for the programme. A careful screening process was followed in the selection of candidates for training. As much attention was paid to character as to technical competence in the selection of trainees.

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In sum, the success of the LG 34 owed much to the robust training programme incorporated.

**Financial and political support:** The Programme enjoyed sustained financial and political support for the better part of its existence and this contributed to its success.

4.13.2. Problems and shortcomings

**Wage rate:** The wage rate on the District Roads programme was not pegged to the minimum wage in the public sector. Over time it was outstripped by the public sector minimum and the cost of living. It dropped to levels where it was on par with drought relief wages. This situation seriously undermined the performance of the programme in terms of productivity and quality of work. Workers left the LG 34 en masse to join the Drought Relief Programme, where they would be paid the same wage under much less supervision. The programme began to be treated much as drought relief.

In 1992, the LG 34 was combined with the inefficient LG 117, further dampening its performance and strengthening its false drought relief image. Government support for the programme also weakened.

The above developments contributed to the demise of the LG 34.

**Localisation**

In respect of localisation the LG 34 faired poorly against the successful Kenya programme. The LG 34 failed to localise senior positions in the programme, preventing the crucial handing over of the programme to local engineers. As at March 1993 (after 13 years) the two most senior engineering positions on the programme were still in expatriate hands (The District Roads Engineer and Assistant Roads Engineer).

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In the KRARP, the number of local engineers increased from zero in 1974 through to two in 1978 to twenty three in 1985, out of a total of twenty nine.

**Donor withdrawal**

NORAD withdrew financial and technical support to the LG 34 (1996) on the pretext that Botswana's economy had reached a level where it could sustain itself. However, the withdrawal of NORAD support marked the collapse of the LG 34.

The good economic performance was not accompanied by a matching degree of socio-economic transformation. Botswana recorded a drop in its Human Development Index (HDI) while it was experiencing a rapid economic growth in 2001.

Against that background one is therefore compelled to question NORAD's withdrawal on grounds of economic independence for Botswana. If their withdrawal was indeed based on a genuine conviction about the economic status quo in Botswana then NORAD's analysis of the economic situation in Botswana was superficial and should be reconsidered.

However, the achievements of the LG 34 outweighed its shortfalls and the programme was successful. Other programmes in Botswana and elsewhere should emulate it while taking note of its few shortfalls.

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# 5. RURAL ROADS PROGRAMME (RRP), LABOUR INTENSIVE PUBLIC WORKS SCHEMES (LG 38) AND THE LABOUR INTENSIVE DROUGHT RELIEF PROGRAMME ( LG 117)

## 5.1. Rural Roads Programme (RRP)

### 5.1.1. Introduction

The Rural Roads Programme was initiated in 1972 by the Government of Botswana through the Ministry of Works and Communications. It was funded by NORAD. Its aim was to improve rural roads through the use of labour intensive methods. The programme began with a Pilot Project which investigated the following:

- The type of equipment and methods to be used
- The extent of labour intensive methods
- The size of construction units
- The maintenance methods and their organisation

Pilot activities were carried in the eastern and western parts of the country to establish methods which were suitable for the different physical conditions in the two regions.

### 5.1.2. Implementation

**Planning and construction**

District Councils were requested to submit their lists of roads to be constructed to the Ministry of Works and Communication (MWC). The MWC drew up the construction plans and constituted two construction teams which started work in 1972. By 1975, four construction teams were operational.

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**Table 5.1 Roads constructed**

| Road | Length (km) | Year |
|---|---|---|
| Molepolole-Lethlakeng | 62 | Completed in 1975 |
| Kanye-Ramatlabama | 85 | Completed in 1976 |
| Sebina-Maitengwe | 75 | Started in 1975 |
| Sebina-Ramokgwebana | 90 | Started in 19/75 |
| Sehitwa-Shakawe | 270 | Started in 1975 |
| Sefophe-Bobonong | 55 | - |
| Malolwane-Gaborone | 55 | - |
| Mahalapye-Kalamare | 45 | - |
| Kalkfontein-Karakubis | 30 | - |

**Unit Organisation**

Construction operations were organised in units composed of labourers, Site Supervisors and Works Inspectors. Each unit employed various items of machinery as shown below.

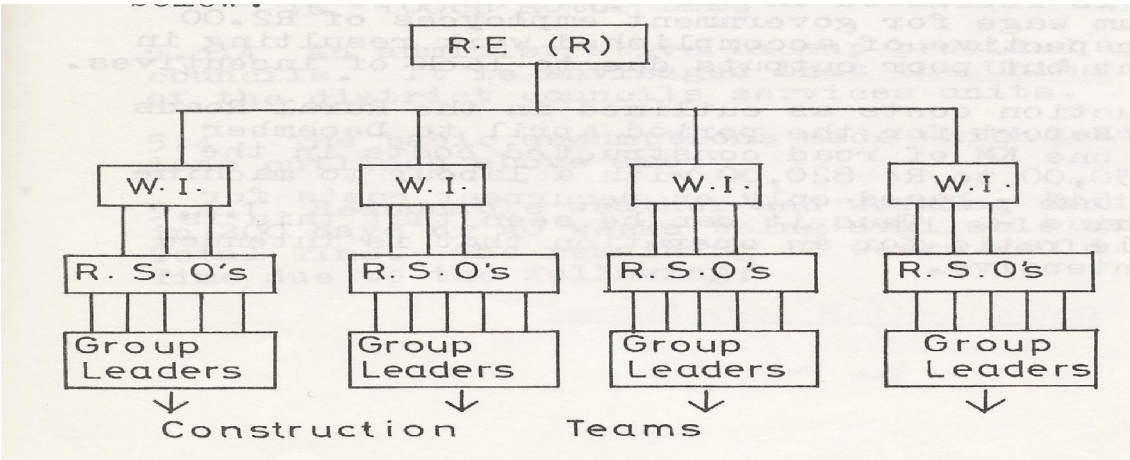
Labour gang: 200 men

Machinery: 1Bulldozer
1 Motor grader
15 Tractors
14 Tipper Trucks
6 Water Tankers
1 Towed Roller
2 Cement Mixers
1 Motor Bike
20 Group Leaders
5 R.S.Os
1 Works Inspector

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The construction units operated under the overall responsibility of the Roads Engineer who was based in Gaborone. The Roads Engineer was in charge of the overall programme design and planning. He controlled the construction units through the Works Inspectors who were resident on site and directly reported to him.

**Figure 5.1: Organogramme of the RRP**




5.1.3. Problems and Shortcomings (RRP)

There was a lack of administrative back-up for the Roads Engineer who was based at Head Office in Gaborone. In addition to technical matters, he was also responsible for financial administration to ensure that the projects were allocated funds on time and hence he did not maintain sufficient contact with District authorities and construction teams on site. This negatively affected the programme's efficiency as it lacked sufficient technical support.

The programme experienced difficulties and delays in obtaining materials and machine spares for plant maintenance. This increased the manpower and machine idle times leading to inefficiency and high unit costs of production.

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The programme did not have performance incentives (i.e. task or piece work wages) leading to low productivity by the workforce.

The programme was not adequately designed and piloted from the onset. Construction work was started before any prior embryonic training of technical supervisory staff and the development of sound organisational and construction methods. No training was later introduced to the programme as it continued and, it suffered from a critical shortage of supervisory staff.

### 5.1.4. Conclusions (RRP)

The RRP was intended to be a labour intensive programme but was not planned as such from the on-set. The implementing institution did not have the capacity to handle a labour intensive programme. There was thus a need for institutional capacity building in the form of training and organisational restructuring. There was a need for proper design and planning for the programme. All these needs were not provided for prior to implementation. As a result the programme became inefficient and problematic. The resultant perception within the Roads Department was that labour intensive methods were inefficient and too expensive and hence they should not be used again.

The programme was stirred towards the capitalization route and more machinery was put into the construction operations. However the high capital content brought with it another problem. The institution did not have the capacity to cope with the high systems demand from the more capitalized operations. Machines broke down and spares were expensive and arrived late from South Africa. This resulted in low plant availability and utilization and drove up the unit costs of production. Thus the ‘superior technology’ was again becoming a problem for Roads Department rendering the programme unsustainable. The programme was eventually wound up.

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The Rural Roads Programme, was therefore inefficient and unsustainable. The programme eventually failed and as result the Ministry of Finance and Development Planning and NORAD decided to try again to fund a labour intensive roads programme which led to the formation of LG 34.

## 5.2. Labour Intensive Public Works Schemes: LG 38

Against the background of socio-economic problems already mentioned in the introduction to Chapter 1, in 1979, the Government of Botswana initiated and then implemented a labour intensive public works scheme (LG 38) to complement other initiatives to further the aims of rural development.

### 5.2.1. Objectives:

- To create realistic employment opportunities for the rural poor
- To drought-proof the economy
- To stimulate productive development activities

**Institutional framework and activities undertaken**

The LG 38 was established in 1979 by the Government of Botswana in collaboration with the Swedish International Development Authority (SIDA), the programme donor. The programme was institutionally located within the Ministry of Local Government and Lands and implemented by the District Councils. The District Councils were supported with technical assistance by the technical departments of relevant Ministries. The Department of Architecture and Building Services and the Roads Department were some of these departments. Infrastructure constructed included rural feeder roads, rural water supply works and small dams.

The projects were identified at local level by the Village Development Committees which then submitted their priority lists of projects to the Councils. After assessment

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of the proposed projects, the Councils incorporated them into their development plans. Based on the plans councils then prepared their budgets and submitted them to the MLGL for approval. When the budgets had been approved the Councils submitted Project Memoranda to the MLGL requesting for funds to implement the projects.

The selected projects were such that:

- They did not conflict with arable agriculture and in particular not divert labour from agricultural activities
- They did not conflict with self help projects

Labour was recruited from the villages where the projects took place and recruitment was through Kgotla meetings organised through liaison with the village Headmen and VDCs. The wage rate was initially fixed at P1.00 per day and the labourers also qualified for food rations if the project sites were far from their villages. The wage was set at a low rate in order to prevent competition with existing rural productive activities. It was however recognized later that the rate might need to be raised in order to make the projects more attractive to the workers.

### 5.2.2. Implementation problems

Although some projects were implemented, employment created and some works constructed, the LG 38 experienced a number of problems:

- Both Central Government and the District Councils had no capacity and experience in planning , designing and implementing labour intensive projects
- The projects placed heavy demand for administrative and supervisory manpower upon the District Councils which they could not meet. This put a limitation to the performance and expansion of the programme.

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Due to these technical and institutional limitations on the part of the Councils many of them were unable to submit detailed project proposals for approval and funding. As at June 1981 only four projects had been approved:

- Mochudi bush clearing
- Mabule airstrip de-bushing
- Ramatea firebreak and road improvements
- Selokolela well digging

Other project proposals had been rejected on the grounds of:

- Lack of supervisory capacity by the Districts Councils
- Vagueness in terms of performance targets and project responsibility

This programme was thus inefficient in the delivery of infrastructure due to the above implementation problems. An evaluation of the programme had recommended that the programme be wound up as it was neither cost effective nor able to produce assets.[87] It was eventually merged with the Labour Intensive Drought Relief Programme(LG 117) in 1982.[88]

## 5.3. Drought Relief Labour Intensive Public Works Programme (LG 117)

### 5.3.1. General

The Drought Relief Labour Intensive Public Works Programme( LG 117) was a cash-for-work programme, which aimed to provide temporary employment on local development projects: road maintenance, construction of small dams, erosion control, fencing and the construction of rural staff housing. The programme was initiated in

[87] Gooch & McDonald, 1981

[88] Food Studies Group, 1990: 11

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1980.[89] As it has already been mentioned in the foregoing section, this programme was merged with the LG 38 in 1982. It is not clear as to why the two programmes were merged and the opinion of the author is that they were merged so that the weak LG 38 could pick up momentum from the then powerful and fast track LG 117. Although records are not available to substantiate this opinion, the fore-going remains highly probable as the reason for the merger.

### 5.3.2. Implementation

The basic principles of projects were as follows:

- Projects were identified by the Village Development Committees
- The target labour cost component was set at a minimum of 70% of total cost
- Projects were intended to benefit the wider community and not individuals

Projects were identified by the Village Development Committees and implemented and administered by the District Councils through Drought Relief Technical Officers (DRTO) who were volunteers from the United States and the Netherlands. The programme was funded by the Food Resources Department of the Ministry of Finance and Development Planning.

Workers were initially paid a wage of P 2 per day. The wage was progressively increased and by the financial year 1988/89 it was P3 per day. During the same period a total of 14 810 projects were delivered and 295 856 temporary jobs created. Employment was rotational so that the job opportunities could be more widely distributed among the needy.

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[89] "Personal communication, McCutcheon to author: 02 March 2006

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The programme was considered a success, in terms of relief delivery, as it became an important source of income support for the many drought victims especially women who took 80% of the jobs created.

**Table 5.2 Expenditure on LG 117 by category (1986-1989) P (000)**

| | Total | Average | Percentage |
|---|---|---|---|
| LG 117 Wages | 24 956 | 8 319 | 63.4 |
| Project Materials | 6 491 | 2 164 | 16.5 |
| Wages and Salaries | 1 940 | 647 | 4.9 |
| Transport | 5 311 | 1 710 | 13.0 |
| Other | 833 | 278 | 2.1 |
| | 39 351 | 13 118 | 99.9 |

According to Table 5.2 above, the bulk of expenditure on the LG 117 went towards the payment of wages.

**Table 5.3 Number of LG 117 jobs created and cost per job (1984-1989)**

| FY | Total Cost P(000) | Employment Opportunities | Cost per job P |
|---|---|---|---|
| 1984 | 7 130 | 41 040 | 174 |
| 19845/86 | 8 356 | 42 099 | 199 |
| 1986/87 | 8 791 | 45 207 | 195 |
| 1987/88 | 15 746 | 61 309 | 258 |
| 1988/89 | 14 814 | 46 401 | 322 |

Table 5.3 shows that the number of employment opportunities created increased with the rise in expenditure on the programme over the years. The cost per job created also increased partly as a result revised wages.

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**Table 5.4 Expenditure for LG 38 and LG 117 (1980-90) P (000)**

| | 80/81 | 81/82 | 82/83 | 83/84 | 84/85 | 85/86 | 86/87 | 87/88 | 88/89 | 89/90 |
|---|---|---|---|---|---|---|---|---|---|---|
| LG 38 | 5 | 138 | 3 121 | 40 | 187 | 1 144 | 521 | 1 141 | 706 | 256 |
| LG 117 | | | 5 793 | 8 000 | 10 577 | 9 460 | 16 123 | 14 862 | 13 028 | 49 953 |

The data in Table 5.4 above indicates that the combination of LG 38 and the LG 117 gave momentum to the former as the bill for the LG 38 increased dramatically from P138 000 in 1982 to about P 3 million after the merger with the LG 117.

5.3.3. Problems and short-comings: LG 117

- Lack of technically qualified supervisors led to the construction of low quality infrastructure
- Lack of basic equipment led to the construction of low quality infrastructure e.g. in the construction of Kanye dam: fill material for the dam wall was not mechanically compacted resulting in excessive seepage through the dam wall and subsequent structural failure
- Lack of formal training for technical supervisory personnel
- Lack of an incorporated maintenance programme
- Lack of technical assistance support

The LG 117 was torn between getting relief money to the people quickly and the need to carry out thorough preparatory work to enable the programme to produce good quality infrastructure.The balance tipped towards the delivery of relief and consequently proper planning, design and documentation were skipped resulting in the production of poor quality products.The productivity of labour was low compared to that experienced on the successful LG 34 roads programme. As at July 1987, workers on the LG 34 were paid P 3.60 per eight-hour working day and their

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productivity for excavation was 4-5 $m^3$ /day. On the relief programme workers were paid P 2.25/day and worked only six hours per day but their productivity (0.25-0.75 $m^3$ /day for excavation ) was insignificant compared to that of workers on the LG 34.

**Table 5.5 Comparison of wages and productivity for excavation between the LG 38 and the LG 117 (1987)**

| | Wage Rate P | Productivity for excavation $m^3$/day |
|---|---|---|
| LG 34 | 3.60 | 4-5 |
| LG 117 | 2.25 | 0.25-0.75 |
| % Difference | 60 | 500 |

Table 5.5 above shows that the percentage difference in productivity for excavation was disproportionately higher than the percentage difference between wages for the two programmes.

5.3.4. Need for a proper public works programme

In addition to the above-mentioned problems there was a growing recognition that the rural unemployment problem in Botswana was not solely drought-induced. It was rather structural with a number of variables. This gave rise to the need for an on-going national public works programme that would deliver relief while creating productive employment through the construction of good quality infrastructure.[90]

In 1985 the Government of Botswana commissioned the ILO to investigate the possibility of implementing labour intensive pilot activities and make proposals for suitable test projects. The terms of reference for the consultancy included the following:

[90] ILO/UNDP, 1985:71-75

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- Rehabilitation of Kanye dam
- Labour intensive test activities down stream of Kanye dam
- Labour intensive test activities for pan improvement in the Sesung area
- Identifying possibilities for a long term special public works programme in Botswana

The ILO mission carried out the consultancy and concluded that there was scope for creating an on-going nation-wide public woks programme. The mission team recommended that, as part of the initial steps to develop the programme, the LG 117 be used as a pilot project (with technical assistance support) to run over three years.
The mission recommended that the rehabilitation of Kanye dam be part of the pilot activities. The dam was leaking after the height of its wall had been increased by a project under the LG 117. Other proposed activities included control works for soil erosion downstream, resulting from the dam leakage, water resources development, horticulture, sanitation and afforestation.

The test activities were to be implemented as part of the pilot project to convert the LG 117 into a proper labour intensive public works programme. They were implemented and as at July 1986, the Kanye dam rehabilitation project had been completed and the others were in progress. The author could not locate documents containing the details of completion of the other activities but it is clear that the pilot activities did not lead to an expanded public works programme. The LG 117 was later merged with the LG 34.

### 5.3.5. Merger with LG 34

As part of further attempts to operationalise a labour intensive public works programme, in 1992, the LG 117 was merged with the successful District Roads Programme (LG 34) giving rise to a new public works programme under the funding vote LG 117. However, drought hit Botswana again and for the entire duration of the

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NDP 7 (1991/92-1996/97) the LG 117 was essentially implemented as a drought relief programme again frustrating the "public works proper" spirit.

For the entire NDP 7 period, the LG 34 component of LG 117 was starved of funds as most of the funds went to the drought relief component ( the first LG 117).[91] The new LG 117 went on until 1996 when NORAD terminated its support for the LG 34 component (road component). This marked the end of the LG 117 and the dawn of the LG 1107, the Current Nation-wide Public Works Programme. The LG 1107 was introduced "on board" the National Development Plan 8 (1997/98-2002/02).

The NDP 8 also introduced the Urban and District Roads Programme (LG 1115). This programme was supposed to be implemented as a continuation of the LG 34 component of the LG 117. NORAD, the ILO and other interested parties had made urgent calls for continuation of the LG 34 and further demanded that the programme be separated from drought relief work.

However these calls were not fully heeded, as the LG 1115 is not a labour intensive programme. It is rather an essentially capital intensive programme. Thus, currently, there is no official programme of labour intensive road construction and maintenance (as the LG 34) in Botswana. The LG 34 component of the LG 117 was wound up upon the withdrawal of NORAD in 1996. This was confirmed by a senior official of the Ministry of Local Government.[92]

In conclusion, the LG 117 was significantly implemented as a drought relief programme and its district roads component (LG 34) was starved of funds. After the combination with drought relief work, the LG 34 started to record drops in annual road construction output and expenditure which resulted from the inefficiencies of the

[91] MFDP,1998:72
[92] Theko Fako: Director: Department of Local Government and Development of the Ministry of Local Government, Botswana: Personal Communication to author, February 2005

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drought relief activities.At the end of the drought period (in 1996) the LG 117 was dissolved giving rise to the LG 1107, the current public works programme. A detailed discussion of the LG 1107 is presented in chapter 6 of this report.

### 5.3.6. Evaluation (LG 38)

**Internal evaluation**

The implementation of the LG 38 was inefficient, rendering the programme a failure. Some District Councils could not even submit sound project proposals as they lacked technical personnel to design, plan, document and implement projects. Thus most projects could not be started because proposals were rejected.

It is therefore inconceivable to think of the LG 38 as having achieved its objectives. It might have created some jobs from the few projects that managed to get off the ground but these were too few to enable any programme to achieve employment objectives. Furthermore, the few products created were of a poor quality.

The LG 38 had failed to meet its objectives. This was, in the author's opinion, the reason why the programme was merged with the Drought Relief Programme (LG 117) and later with the LG 34.

### 5.3.7. Problems and shortcomings for the LG 38

- There was no specific organisation of technical and administrative staff for implementing the LG 38, as it cut across all sections of the District Councils. This lack of direct responsibility for the programme rendered it inefficient in terms of implementation.

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- The LG 38 was also not linked to any training programme and experienced a critical shortage of trained technical staff. District Councils often failed to get their Project Memoranda approved because they did not have appropriate technical personnel to design and implement projects.

- The programme had not been preceded by a pilot project to create the necessary infrastructure for its expansion. It lacked sound organisational and construction methods.

- The LG 38 was supposed to be a labour intensive programme but in the event it was implemented as a drought relief programme. It delivered relief to drought victims but it did not produce any valuable infrastructure.

- The LG 38 was not given proper and full time technical support. It relied on unreliable and unsuitable technical input from other Government departments which were not directly involved in the programme. It did not even have expatriate ILO staff based in Botswana.

- The programme was not treated as proper engineering: no project design, planning and documentation.

5.3.8. Problems and shortcomings ( LG 117)

- This programme was initially intended to be drought relief and thus had no emphasis on generating productive employment, leading to poor quality infrastructure
- Efforts to convert the LG 117 into a proper labour intensive public works programme ( eg. merger with LG 34) failed as the programme continued to be marred by recurrent drought relief activities

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- The programme was not linked to a dedicated training programme and hence experienced a critical shortage of technical skills
- It did not have continuing technical assistance
- The LG 117 failed to capitalise on the good practice established by the LG 34 even after the merger between the two programmes.

## 5.4. Overall Conclusions

### 5.4.1. The Rural Roads Programme (RRP)

This programme was inefficient and was eventually wound up. It had been intended to be a labour intensive programme but in the event it became rather capital intensive and more problematic.

### 5.4.2. The LG 38

- The LG 38 failed due to its high inefficiency
- The inefficiency stemmed from the lack of a linked training programme, lack of proper technical support, lack of a proper organisation and qualified technical personnel
- The programme was also limited by the lack of piloting to develop the necessary embryonic training of supervisory staff as well as establishing the appropriate construction and organisational methods
- The LG 38 was not differentiated from drought and this contributed to its demise
- The programme was inefficient and yielded poor quality assets

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### 5.4.3. The LG 117

The LG 117 lacked a training component and a supply of trained technical staff, leading to the production of poor quality assets. It failed to tap on the experience of its District roads component (LG 34). The LG 34 was a meticulously designed and efficiently implemented programme. It had accumulated trained technical staff and developed good organisational methods. These resources were not made use of when the LG 34 was brought under the LG 117 because the LG 34 component was starved of funds and became dormant. The trained technical staff of the LG 34 component started to leave the LG 117, leading to a lack of continuity of technical personnel. The foreign technical assistance personnel of the LG 34 component were also underutilized during the LG 117. This rendered the programme highly inefficient since these staff were expensive.

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# 6. THE CURRENT LABOUR INTENSIVE PUBLIC WORKS PROGRAMME (LG 1107)

## 6.1. Introduction

The Botswana Government implemented a Drought Relief Labour Intensive Programme (LG 117) from the early eighties until the mid ninenties. The Government then commissioned a consultancy to evaluate the drought programme with a view to draw lessons from the programme for the purpose of drought-proofing the rural economy and developing more efficient future responses to drought.[93] The consultancy team produced a report recommending the introduction of an on-going national public works programme as a measure to integrate drought preparedness into the government's long term economic development planning.

For many years, in Botswana, poverty had been thought to be the sole result of drought. Botswana initiated and implemented the Drought Relief Programme (LG 117) in order to provide temporary relief from what was perceived to be drought-induced hardship.[94] However, by 1990 there was widespread consensus that poverty in Botswana was structural and not caused by drought alone.

A Presidential Commission constituted in 1990[95] to review the national incomes policy substantiated this. "A certain amount of poverty is here to stay," noted the commission, which made a recommendation for a nation-wide labour intensive public works programme at high levels in the poverty stricken rural areas.

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[93] Food Studies Group,1990:viii
[94] BIDPA,1997:182
[95] Presidential Commission on the Review of Incomes Policy,1990:1-30

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In its White Paper on the Commission's report the Government generally accepted the recommendation, adding that the programme must be cost competitive, efficient, free from pure transfer elements and distinct from drought relief.[96]

Indeed a Cabinet Memorandum was prepared in late 1991 to implement the recommendation for an on-going labour intensive public works programme based on a study by Andrews and Manamela (1991) which had estimated that between 20 000-28 000 additional jobs could be created depending on the wage rate paid.[97]

Thus the Government had recognized the need for and undertook to implement a nation-wide labour intensive public works programme totally different from drought.

However drought was declared again and the Labour Intensive Drought Relief Programme (LG 117) was implemented until 1996, just before the start of implementation of the National Development Plan 8 (1997/98-2002/03).

Against the foregoing background the current LG 1107 was initiated and implemented in 1998. The objective of the programme is to generate employment opportunities by using labour intensive methods and simple tools to construct and maintain public facilities. The programme has two components: a permanent component and a drought relief component. The LG 1107 is essentially a drought relief programme. It almost stopped during non-drought years. Its permanent component which is supposed to be on going is too weak. It suffers from a critical shortage of resources; technical personnel, funds and capital. The programme is only accelerated during drought years by the more powerful drought component. Thus the LG 1107 is in effect not entirely a labour intensive public works programme. Most of the activity is related to the drought relief component and this section will deal

[96] Ibid.,194
[97] Andrews & Manamela,1991:vi

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mainly with the relief component. But before concentrating on the relief component, the permanent component will be first summarized.

### 6.1.1. Permanent component

The institutional framework for the permanent component of the LG 1107 comprises the MLGL, at national level, which is responsible for the overall management and coordination of the programme. The MLGL approves the annual District budgets, requests for funds from the MFDP and manages the disbursement of funds to the Districts. The MLGL is also responsible for the implementation of national policy regarding the LG 1107. The division of MLGL responsible for the LG 1107 is the Department of Local Government and Development.

At the District level, the District Councils in collaboration with the Village Development Committees and Headmen implement the programme. All the District Council departments participate in the programme as long as they have identified projects that can be implemented labour intensively. Thus there are no specific units within the District Councils, which are responsible for the LG 1107; it cuts across all the departments. It shares the same human, capital and institutional resources with the so-called ‘normal capital projects’ of the District Councils.

The permanent component of the labour intensive public works programme operates the same way as the drought relief component except that it is implemented during non-drought years and operates at a low key.

### 6.1.2. Relief component

A large part of funds provided under this programme goes to the drought relief component which has become the main hub of activity within the LG 1107. It is supported with more resources (funds, personnel and vehicles) than the permanent component. The government’s rationale for building the drought relief component

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into the LG 1107 was to make the programme an economic barrier to the effects of recurrent drought.

**Institutional framework**

The overall responsibility for the drought programme, at national level, lies with the Rural Development Council (RDC) assisted by the Inter-Ministerial Drought Relief Committee (IMDC). The RDC is an institution of the Ministry of Finance and Development Planning. It is accountable to the Cabinet for the performance and implementation status of the Drought Relief Programme. It reports to Cabinet on a quarterly basis.

The MLGL is responsible for managing the drought programme's actitvities within the scope of its portfolio responsibilities, including the coordination of such activities at the local level. The Ministry has the responsibility to report on a regular basis to the RDC through the IMDC and the secretary to the RDC.

At the district level, District Drought Committees, under the chairmanship of District Commissioners, coordinate drought relief activities at the local level. The day-to-day implementation and management of drought relief projects is done through the Drought Technical Committees comprising all heads of departments/units/sections.

The drought relief component is intended to provide short-term employment during drought years and the wages are set at a supplementary level, for a six-hour working day. The wage level has been set such that the programme is self-targeting. The programme is designed to maximize the use of simple tools, unskilled and semi-skilled labour to construct and maintain public facilities.

The relief component constructs such facilities as health posts, teachers' quarters, extension staff housing, school buildings, firebreaks, drift fences and bush clearing.

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The relief component is used to accelerate the normal public works programme during drought years. In the absence of any Presidential Directive on the type of work to be done, this component involves projects which have been identified and prioritized through the normal development planning process, and according to policy these projects should be implemented in a manner that satisfies both relief and development requirements.

**Monitoring and reporting**

All local authorities and government departments directly involved must ensure close monitoring of their projects, and monitoring should include regular and timely reporting. The reports should at least contain details on the physical and financial status of projects, number of beneficiaries by gender and any problems or issues arising from implementation. In the author's opinion reporting has been erratic and not detailed. Corrective action has been lacking as old implementation inefficiencies and shortcomings seem to be carried over to new projects.

**Drought personnel**

The key drought personnel comprise the Drought Coordinator, Accountant, Technical Officers, Accounts Clerks, Supplies Officers, Drivers and Lorry Attendants. These officers are appointed by the District Councils.The key staff are preferably seconded from other Council departments to implement drought relief projects. This ensures accountability and continuity after the drought period.

Staff may also be sourced from the open market to complement in-house staff if the workload so dictates. These staff are hired on contract and depending on their performance and remaining workload their contracts may be revised.

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**Beneficiaries**

In the LG 1107 a beneficiary is classified as any able bodied person who has been adversely affected by the effects of drought and is willing to render his/her services to the programme in accordance with all the working conditions as stipulated by the programme.

Workers are identified at Kgotla meetings through the assistance of Social and Community Development Workers, Village Development Committees (VDC), Village Extension Teams (VETS) and the village Headmen.

**Wage rate and hours of work**

The wage rate for casual labourers and supervisors on the labour based drought relief component are determined from time to time and as at 2003/2004 these were P10 and P16 respectively.

Casual labourers work six hours from Monday to Friday. Workers may work on the programme for as long as it continues provided they continue to be eligible for relief. Employment is on a monthly basis and each month's term is considered as a new appointment.

**Rotation of workers**

In cases where more workers are available than could be employed at a time they are employed mainly on a rotational basis through half-day shifts. This is meant to evenly distribute the benefits to the drought victims. Rotational employment also ensures that labour legislation is not contravened.

If workers have casual employees' status there is flexibility on the part of the programme in terms of labour management. In cases where for some reason work

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cannot proceed, workers may be laid off temporarily until a resolution has been made. Thus wages would not be paid for work not done.

**Project identification and selection**

In the absence of specific instructions from the Office of the President the projects implemented under the drought relief component are drawn from the District Development Plans (DDPs). This is meant to ensure that the projects implemented are those from the normal development planning process. The selection of projects is carried out through the District Development Committees in collaboration with local community structures such as the VDCs and Community Development officers.

For non-gazetted settlements where permanent structures are not sanctioned selection is biased towards agricultural related activities, maintenance of public facilities, bush clearing for forthcoming projects or the production of materials such as bricks to supply projects elsewhere within the same District. Due to budgetary constraints priority is given to projects carried over from the previous year.

When the projects have been identified and the communities have been informed and mobilized the local authorities and other stakeholders have to acquire plots and the building plans from the Land Board. Soon as these are ready the District Councils are then informed and handed over the sites for implementation of the projects.

**Procurement and storage of materials**

Building materials are sourced from the open market through the invitation of quotations and selection of suitable suppliers. An upper limit is imposed above which the quotations would not be considered. This narrows down the spectrum of quotations and makes the selection process faster and projects can be started

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expeditiously. This is more critical for drought projects since they are planned on the basis of one year.

The responsibility for the storage and safe keeping of materials for projects in each village lies with the VDCs which are also the project overseers at village level. They keep proper records of the materials delivered and issued.

**Use of contractors**

Building projects are a common feature of the programme, requiring the services of qualified builders, preferably individual contractors. These individuals are hired on proper building contracts or agreements.

Depending on the magnitude and complexity of the projects the VDCs and the Kgosis identify and recommend to Council suitable local builders to execute the contracts. The builders are required to express their interest through communication to the VDCs. Once the contracts have been awarded and the works started the VDCs monitor the builders and the casual labourers.

The evaluation of tenders and award, works inspections and payment for the works are the sole responsibility of Councils. Builders from outside the local villages are also eligible for work as long as they are citizen.

**Employment of skilled and semi-skilled contractors**

One way to ensure the construction of good quality assets is the employment of semi skilled and skilled individual contractors to execute the construction works. The good construction materials must be used and contractors must satisfy project specifications.

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**Project supervision**

To ensure that projects are built according to design and specifications Drought Relief Technical Officers carry out regular inspections of the works. These inspections are also carried out to measure and quantify the works in order to prepare valuations for payment.

If projects for the Central Government are implemented then expertise is also drawn from the Department of Building and Engineering Services (DBES) of the Ministry of Works. This is the in-house technical department of Central Government, which is responsible for the technical and otherwise management of most Government building and engineering development projects.

**Daily labour supervision**

Each project site has a site supervisor who accounts for and monitors the materials delivered and issued. In addition, the supervisor maintains the labour attendance register. The register is the document for the record of the number of days worked by each individual worker and forms the basis for the payment of wages.

**Income generating projects**

The construction of such facilities as VDC Guesthouses, Day Care Centres and Community Halls also forms part of the projects. These are income generating facilities for the communities and where they are viable they are prioritized. They are sustainable if they generate sufficient income for their operation and maintenance.

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**Transport**

The drought programme is complemented with a fleet of vehicles to be used for site inspection trips, haulage of materials and other business of the programme. If additional vehicles are required they are sourced from other Council and Government departments or hired from the private sector.

## 6.2. Problems and shortcomings

### 6.2.1. Employment

The LG 1107 succeeds in delivering relief to the drought victims but failed to generate productive employment in an efficient way. Its labour force is unproductive and the quality of workmanship is poor leading to poor quality products.

### 6.2.2. Piloting

There have been many pilot projects in Botswana (and programmes) but the formulation of LG 1107 did not take into account any lessons learned from the previous programmes and Pilot Projects. There has been lack of continuity of local and international personnel between the LG 1107 and the previous programmes in Botswana.

### 6.2.3. Training

The LG1107 is not linked to any training programme for site supervisors and other technical staff. As a result, it suffers from a shortage of trained site supervisors and senior technical personnel.

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### 6.2.4. Government support

The LG 1107 ranks low on the Government's list of priority programmes. It is only remembered during drought years and this is the only time that it is allocated adequate funding.

### 6.2.5. Institutionalisation

In addition to the fact that the programme is not linked to any formal training programme, the LG 1107 does not have a specific organisation of staff within the Councils which is responsible for its management and implementation. It cuts across all departments of Council and if such departments do not have projects they wish to implement labour intensively, the programme becomes inactive. The LG 1107 is a fringe activity and not part of the main business of the District Councils.

### 6.2.6. Delays in land acquisition

Projects are sometimes delayed or not implemented at all because land could not be secured or is available but not serviced. This is more common in the urban areas where there is an acute shortage of serviced land.

### 6.2.7. Wage rate

The wage rate on the LG 1107 is too low to attract and retain labour. People prefer to remain unemployed or opt for other temporary activities with a higher income. This has led to a situation where women and the very poor dominate the programme, sometimes resulting in sluggish project implementation.

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6.2.8. Lack of coordination between the two components

During drought years the few projects under the permanent component are abandoned or progress slowed down as the labourers move to the more resource-endowed drought relief component. The two components are thus not coordinated and compete against one another for labour.

6.2.9. Lack of implementation guidelines

The LG 1107 has been run without any guidelines. It is difficult for the implementing agencies to adopt a common systematic approach for programme implementation.

6.2.10. Delays in delivery of materials

Projects are delayed due to the late delivery of materials. This is more common in the remote areas of the country where suppliers are not keen to deliver and buyers have to organise their own transport. Councils experience problems from the shortage of heavy-duty vehicles to deliver small packages of materials to individual settlements and villages.

## 6.3. Conclusions

The LG 1107 is not linked to a training programme and hence its projects suffer from a shortage of trained senior and supervisory staff. This has led to inefficiencies and the production of poor quality infrastructure.

The programme is practically implemented as a response to drought. This compromises proper project design and planning which also leads to the production of low quality assets.

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Its wage is also too low to attract and retain labour. The programme has a high labour turnover and the majority of its labour force is women and elderly people. Young and able-bodied men leave the programme to seek alternative employment.

District Councils do not have specific and permanent organisations of staff charged with the implementation and management of the programme. This lack of clear responsibility for the programme leads to poor implementation.

The LG 1107 has been a waste of Government money and other resources which have been invested in the programme to make it an on going nation-wide public works programme. It has fallen short of generating productive employment opportunities and good quality assets and has become unsustainable. It is essentially a drought relief effort.

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# 7. THE LABOUR INTENSIVE ROAD MAINTENANCE PROGRAMME ( LIRMP)

## 7.1. Introduction

The use of labour-intensive methods in public works programmes during drought periods has been an important aspect of the rural poverty alleviation strategy in Botswana. Although the broad economic and social benefits of labour-intensive methods are generally appreciated growing unemployment (which was 21% in 1998) necessitated renewed efforts by Government to maximise the use of labour-intensive methods in all projects where it is technically feasible and economically efficient. Government policy stipulated that each Ministry should identify budgeted and planned maintenance and other recurrent activities as well as development projects that should be implemented using labour-intensive approaches.[98] The policy further stipulated that labour-intensive components of the social safety net should take the form of permanent programmes to be specifically targeted to the poor.

The importance of and need for the participation of an expanded citizen private sector in the economy was also recognised and several schemes for assisting citizen entrepreneurs, including citizen contractors, were incorporated into national policy. However, despite the importance attached to the development of emerging citizen contractors and the assistance schemes that have been available to them, the citizen contracting industry remained largely embryonic. Thus, there continued to be a need for additional support to enable particularly the smaller citizen contractors to take full advantage of the opportunities provided by the National Development Plan 8.

Within the NDP 8 a large road construction programme was planned which would result in an increase in the paved road network from 5500 km to over 7500 km. Most

[98] Government of Botswana,1998:10

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of these roads were to be secondary and access roads, and suitable for labour-intensive methods. The large road construction programme offered a unique opportunity to combine the development of small citizen contractors with the alleviation of poverty through employment in labour-intensive methods. This required appropriate policies, planning, design, and contract packaging and implementation mechanisms.

In the decade preceding the 1990's, the construction industry in Botswana had been a major contributor to the growth of the country's GDP contributing approximately 20% to the economy.[99] Some 87% of the expenditure on infrastructure was provided by the public sector, co-ordinated largely by the Ministries of Works, Transport and Communications and Local Government, Lands and Housing.[100] However, the construction industry had failed to generate a reasonable impact on the rural population in terms of job creation and rural development. Therefore, the building of citizen capacity and the generation of job opportunities through an enhanced labour-intensive programme was considered to be of paramount importance.[101]

It was against this background that the Botswana Roads Department embarked on a programme which is aimed at enhancing the use of labour-intensive methods in road works.

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[99] Roads Department,2002:2
[100] Ibid.
[101] Ibid

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The programme had three main components comprising:

i. The review of procurement policies and the incorporation and monitoring of labour-intensive components in all road works. This includes a weighting in the technical evaluations in favour of labour-intensive methods in consultancy proposals and the mandatory specification of certain construction activities which are considered suitable for labour-intensive methods such as bush clearing and grubbing, culvert construction, drainage excavation and other activities.

ii. The training and development of awareness of key stakeholders, including small contractors, in labour-intensive methods and the reservation of certain labour-intensive components of projects for small contractors. For example the sealed access roads leading to all major settlements within 10 km of all new road developments are reserved for small contractors.

iii. Use of Labour-intensive methods for three full-scale road construction demonstration projects and three maintenance demonstration projects using emerging and small contractors.

The exploration of alternative ways of organising maintenance using small-scale contractors and consultants for the management and supervision of the works was a radical departure from the practises that were familiar in Botswana. Thus a Pilot Project was implemented in order to investigate the potential of using small scale citizen contractors for labour-intensive routine maintenance.

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## 7.2. Pilot Project

### 7.2.1. General

In June 1999, the Roads Department appointed Roughton International to undertake, as a demonstration project, the training and establishment of citizen contractors in routine road maintenance using labour-intensive Methods. The company did not have any previous experience in labour intensive work. The company however employed, as one of its technical managers, a former technical officer on the LG 34.[102] It is however ironic that this person was not involved in the Pilot Project. The maintenance engineer, who was also responsible for training was an expatriate with a civil engineering discipline.

The project was aimed at establishing systems and procedures for the increased out souring of routine maintenance using citizen labour-intensive contractors with the aim of eventually widening the programme to cover a larger extent of the national road network.

Three routine maintenance demonstration projects were identified by Roads Department as follows:

- Section 1: Dibete-Mahalapye 85 km
- Section 2: Nokaneng-Sepupa 117 km
- Section 3: Lobatse – Ramatlabama 50 km

[102] Personal Communication:Joseph Raphalane(Former Technical Officer on the LG34) to Author, February 2006

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The project comprised the following:

- Pre-contract services including, project design, the selection and pre-training of potential, emerging and small contractors and tender documentation
- Provision of supervision and on-the-job training.
- Provision of post-contract services.

The maintenance works stage of the project commenced in July 2000 and was scheduled for completion in June 2001. However there was a delay in the start of the Nokaneng project which resulted in the extension of the projects to December 2001.

### 7.2.2. Project objectives

- To come up with ways to increase the use of labour-intensive methods in the maintenance of the national road network using the private sector.
- To increase efficiency by developing citizen capacity to maintain the road network while creating meaningful employment
- To establish methodologies, effectiveness and cost-efficiency for organising routine maintenance employing consultants in maintenance management and supervision.

### 7.2.3. Maintenance environment in which the project was undertaken

Routine maintenance of the road network by Roads Department was undertaken in-house in three maintenance regions located in the northern, western and southern parts of the country. Regions north and south are headed by Works Superintendents while region west is headed by a Senior Roads Engineer assisted by a Chief Technical Officer and a Roads Engineer. Work was undertaken by force account with

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a provision for hiring additional casual labour as required. The wage rate for casual labour was the public sector minimum wage for casual labourers. Plant and major machinery used for maintenance works were provided by the Government's Central Transport Organisation (CTO) on a non-commercial basis.

Overall maintenance planning and budget control was the responsibility of the Principal Roads Engineer I, who reports, directly, to the Chief Roads Engineer and indirectly to the Director of Roads. The regions administered the regional routine maintenance budget for force account. The regional maintenance head could engage small contractors to undertake routine maintenance work. Periodic maintenance contracts were administered by the headquarters in Gaborone with the exception of re-gravelling works, which were undertaken by the regions.

Partly due to the demonstration nature of the Pilot Project it was administered from the Roads Department's headquarters through the Co-ordinator for labour-intensive methods.

The Roads Department maintains a progressive Road Management System (BRMS) which includes a Pavement Management System (PMS) used for network periodic maintenance planning and a Routine Maintenance Management and Planning System, (ROMAPS), used for routine maintenance planning and budgeting. The latter was used during the planning stages of this project.

In line with Government policy, the Department aims to increase private sector participation in road maintenance activities whilst strengthening its project management capabilities. Thus the Pilot Project formed a core part of the Department's intended future.

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### 7.2.4. Contractor development policies in Botswana

The employment of small scale citizen contractors in the construction of public works would go a long way to develop citizen entrepreneurial capacity and employment creation. However this has been a challenging task and most of the small citizen companies remain on the periphery of the industry. In recent years the Government has developed a number of schemes to encourage the participation of small citizen contractors. These include:

- Reservation of certain categories of work
- Relaxation of tendering procedures and reduced performance bonds
- Simplified contract documents and specifications
- Price preference on certain domestically funded projects including contract advance ranging from 5 to 10%
- Assistance with professional services for tendering

The availability of these schemes has generally not led to significant improvement in the capacity of the citizen contracting industry and there is increasing realization that more concerted and co-ordinated efforts are required, including training.

**Problems faced by citizen contractors**

**Fragility:** Small contractors represent an emerging class of entrepreneurs with little previous experience of the highly competitive construction industry. They lack a sustained pool of resources required to acquire and undertake work.

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**Training:** Small contractors lack skills in contractual matters and thus need to be assisted to acquire these skills. The training should entail all the aspects of construction management including estimating and tendering, project planning, cash-flow analysis and site operations.

**Performance bonds and bank guarantees:** Small contractors have difficulties meeting this requirement.

**Capacity:** Small contractors lack the necessary capacity to handle big projects because of the financial ceilings placed for the various sizes of contractors in terms of their resources and experience. Thus in order to accommodate small contractors, large projects must be broken down in to smaller packages.

**Cash flow and access to materials:** Poor financial management is a common feature and often results in cash flow problems for small contractors. Suppliers tend to quote higher prices for basic materials for small contractors than for big contractors and this creates financial problems for small contractors.

**Continuity of work and commitment to the industry:** Because of the inability to undertake larger projects with longer periods of engagement small contractors frequently suffer from lack of continuity of work leading to an inability to build a track record and accumulate sufficient construction fleet.

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**Status of small contractors**

At the beginning of the project it was estimated that there were about 60 registered small and emerging contractors in Botswana ranging from a few contractors able to undertake medium sized road construction work to what has been termed 'Opportunity Category' (OC) contractors. Table 7.1 below shows the government tender board categorisation of contractors depending on size and ability to undertake work.

**Table 7.1: Registered contractors (2002)**

| Category | Work Value | Total Number of Registered Contractors | Number of Citizen Contractors |
|---|---|---|---|
| Opportunity (OC) | <P600,000 | 150 | 150 |
| Grade A | <P2,000,000 | 24 | 24 |
| Grade B | <P10,000,000 | 19 | 6 |
| Grade C and above | P10,000,000 | 18 | 3 |

A large proportion of the small contractors tend to undertake building construction work and those engaged in road works are predominantly in the area of gravel road maintenance with little involvement in paved road maintenance or capital construction works.

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### 7.2.5. Contractor development strategy adopted

**Target group of contractors, registration and eligibility**

Government regulations dictated that only the small contractors who were already registered with the government procurement authority would be eligible for participation in the project.

**Contract packaging**

In order to allow the A and OC-grade contractors to participate taking into account the financial ceilings, the Dibete - Mahalapye road was split into three sections of 25.2, 28.4 and 33.8 km lengths intended for OC-grade contractors. The Nokaneng – Sepupa road was awarded to a B grade contractor who was required to split the work into three sections (36.2 km, 43.2 km and 34.8 km lengths) and sub-contract two sub-sections of the road to OC-grade contractors.

The Lobatse - Ramatlabama road was retained as a single project suitable for an A-grade contractor. The road had been recently resealed and the quantity of routine maintenance work would not exceed the financial limits of an A-grade contractor.

**Training needs**

An assessment was made of the training needs of contractors and this formed the basis for the pre-contract training programme. Training focused more on financial and construction management than technical aspects.

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There was a need to start the projects expeditiously in order to capitalise on the opportunities presented by the NDP 8 programme and hence the training was not as extensive as it should have been to impart the appropriate skills to the contractors.

### 7.2.6. Project implementation

**Community consultations**

High importance was attached to community consultation and this was started early in the project and was carried out by Roughton International's Resident Sociologist.

**Preliminary consultations in the villages**: Meetings were held at each village and the project was explained to the people stating that it was a Pilot Project meant to train and establish small citizen contractors for routine road maintenance using labour intensive methods. The institutions involved in the project were also spelt out.

**Observations on social conditions in the villages:** Fieldwork was conducted in all the villages along the alignment of the thre trial sections, in conjunction with the consultation exercise. After Kgotla meetings had been addressed, the people who were interested in becoming either contractors or employees of the contractors were invited to register their interest.

It became apparent at this stage that there was a large reservoir of available labour in the villages, and that there were more women than men seeking work. At Palla Road, a village with an estimated population of 765 people and a further 609 at lands and cattle posts, 70 work seekers were registered an hour before starting the Kgotla meeting. At Gumare, 105 people were registered in two hours on the day after the

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Kgotla meeting out of a population of 7 293, despite the fact that a large scale Drought Relief Programme was on-going in the village. A high proportion of single mothers registered for work. This group constituted the largest disadvantaged group in rural Botswana.

**Sample survey of work seekers:** In order to have an impression of the socio-economic circumstances of the job-seekers, a sample survey was conducted of the people who turned up for recruitment. 33 individuals of whom 17 were men and 16 were women were surveyed. While this was a small sample and men were over represented, it was believed that in general it gave a valid picture of the circumstances of work seekers. Out of the sample, eight (24%) had no education, five (15%) had not completed primary school, seven (21%) had completed standard 7 and thirteen (39%) had done Form 2.

The mean age of the sample was 36 years, with a maximum of 62 and a minimum of 19. Only four (12%) of the sample had no dependants, the mean number of dependants of the work seekers was 3.75, with a maximum of 12. The work seeker was the head of the household in 23 cases (70%). Most applicants stated that they were fit for heavy work. Only five (15%) had a health problem. Every applicant stated that they could work away from home for a full week.

Wealth and income levels among the sample were low. While 15 applicants (45%) declined to estimate their monthly income, none claimed a monthly income in excess of P600. Of the 18 individuals who estimated their income, half earned under P200 a month, while five (28%) earned between P200 and P400 and 4 (22%) earned between P400 and P600 a month. Most people did piece jobs and a few sold veld products or other goods for a livelihood. 11 people (33%) said they got remittances from relatives who were working. Other activities such as shoemaking, traditional beer brewing and

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livestock rearing were sources of income for 15 individuals (45%). Only six work-seekers (18%) owned cattle and 15 (45%) owned small stock.

However, a high proportion of the sample, 28 people (85%) had some work experience. Most had worked for a civil engineering or building contractor while others had worked for a District Council (mostly on the LG 34) or a Government department).

**Availability of labour:** It was concluded that there was an adequate supply of labour along the Pilot Project routes. The communities were informed that the project was not going create employment for every unemployed person and that the jobs created were going to be temporary and not permanent. The recruitment dates were announced at the meetings and the people were informed that women were also eligible for employment. Contractors were furnished with copies of the workers' register for each village and were required to recruit all labour except skilled specialists in the villages along the project roads. Contractors were required to manage their tasks so that women with young children or other dependants could be employed, e.g. by employing such women on tasks which were within walking distance of their homes or by transporting them to and from their village each day.

**Information to the communities:** The communities were informed that the project was to be implemented on three demonstration sections of road. Each section would be divided into lengths of between 25 and 40 kilometres and one small-scale citizen contractor would be selected, given appropriate training and awarded a maintenance contract for each length through bidding.

Contractors were required to have the ability to execute the work on time and to a satisfactory standard and also to manage their business so that they could pay their

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workers and make profit for themselves. It was stated that those with a previous business experience had an advantage.

It was emphasized that there was going to be competitive bidding and not all those who submitted tenders were going to get work. After contracts had been awarded, the successful tenderers would receive further training in accordance with their needs to enable them to do the work properly and manage their business successfully.

The communities were also told that at the end of the initial contract period, the maintenance contract for each length would be re-tendered. Both winners and losers in the first round of tenders would be allowed to tender again as well as other potential contractors who would show interest.

**Final contract packaging:** In order to enable the A and OC-grade contractors to participate the roads were split into shorter sections. This packaging ensured that the projects were brought within the stipulated financial ceilings for contractors bidding for public jobs.

### 7.2.7. Procurement and pre-contract activities

**Pre-selection of contractors**

All potential and registered OC-grade contractors were invited to attend pre-qualification meetings in the location where the work was to be done. The response resulted in 79 un-registered and 28 registered OC-grade contractors attending the meetings.

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Candidates were individually interviewed and a questionnaire was completed to record the interviewers' impressions as well as information about the candidate's level of education, experience, availability of transport etc. Written tests were given to check on the candidates' entrepreneurial skills and ability to perform simple arithmetic calculations relevant to running a simple contract. The results of these exercises were marked giving a score to each candidate.

It was found that 12 of the 123 candidates from the potential contractors were suitable to be trained as contractors and that 18 of the registered OC-grade contractors were suitable.

The contractors were assessed and allocated grades which designated their capability. The ownership of heavy plant such as graders, dozers and loaders was not taken into account, since the work was to be labour-intensive. It was considered that only five A-grade contractors were required to tender for the single project designated for A-grade contractors. This allowed a realistic chance of winning a project while providing reasonable competition to ensure value for money. It also gave four A-grade contractors a chance to participate in classroom training and pre-tender workshops. These could then participate in other future projects.

**Tendering, evaluation and award**

A detailed analysis was carried out on all the A and OC-grade tenders. The results of this evaluation showed that the bids received from Gops and Sons, Shumba Projects, I&S Building Construction and Civil Engineering, and DHB presented the most viable option for the completion of the project to the Client's best interests. The tenders submitted by the OC-grade contractors were generally of a higher quality than those submitted by the A-grade contractors. One explanation for this was that OC-

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grade contractors paid more attention and followed the procedures and techniques acquired during the pre-tender training and the A-grade contractors tended to rely more on prior knowledge relating mainly to machine based methods.

### 7.2.8. Contract documentation

It was deemed necessary to adopt a form of contract that would be easily understood and applied by the small contractors who lacked a detailed understanding of contractual issues. It was also essential that the form of contract was not over simplified so that Government resources and interests would not be exposed to contractual abuse. The projects adopted a short and modified version of the FIDIC form of contract. The documents comprised the following:

- Information to tenderers
- Instructions to tenderers
- Conditions of contract
- Conditions of particular application
- Technical specifications and bills of quantities
- Form of tender
- Form of performance bond
- Form of agreement

### 7.2.9. Conditions of the road projects

The road projects were:

- Dibete to Mahalapye
- Lobatse to Ramatlabama
- Nokaneng to Sepupa

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The link from Dibete to Mahalapye was constructed in the 1970s and had been subjected to heavy traffic, about 1700 ADT. The pavement was failing seriously with a high prevalence of potholes. It required strengthening or reconstruction. The road reserve is the standard of 61 m total width and is fenced on both sides for the major part of its length. The fence was broken in various places giving rise to intrusions by domestic animals.

During the preparation of this project the North South pipeline was constructed which caused the north-bound side of the road reserve to be substantially cleared of vegetation. This made the maintenance task easier in places where the vegetation had not regenerated. This road had a bad record of animal-vehicle collisions.

The Lobatse - Ramatlabama link forms the major link between Lobatse and South Africa. The pavement was in fair condition having been resealed just before the project. The population density along this road was slightly less than that on the Dibete to Mahalapye road and traffic was of the order of 1500ADT.

The Nokaneng-Sepupa road is 112km long and was built over ten years ago. It traverses a dry area of sparse population and sparse vegetation. The area is in the migration track of many animals so the road is not fenced for long sections. The average daily traffic was of the order of 400 vehicles per day. The road provides access to Namibia through the Caprivi region.

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7.2.10. Contractor Performance

From a visual inspection of the roads it was clear that in all cases the maintenance was effective, with the reserves well cleared of vegetation and a limited amount of repairs to the pavement done.

7.2.11. Contract management and administration

**Technical management**

The contracts were managed by the Engineer (Roughton International) on behalf of the Roads Department, the Client for the project. The technical management comprised the consultant's team of site supervisors supported by a Maintenance Engineer, Team Leader and additional senior technical input from head office.

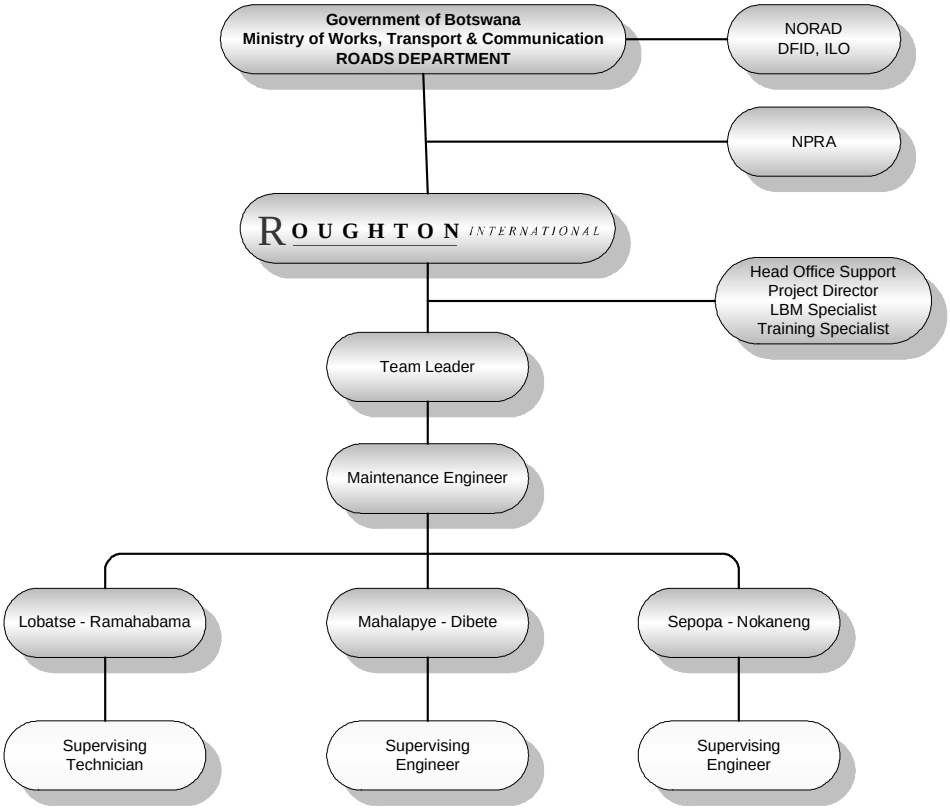
**Site level management:** Technical management on site was provided by supervisors of technician grade allocated to each project site. These individuals were responsible for the daily supervision of the contract, ensuring that the works were measured and undertaken in accordance with the specifications. On a weekly basis the consultant's site supervisor checked the weekly programme of works with the contractor. The contractor had ultimate responsibility for undertaking the work but was regularly assisted by the supervisor in formulating plans and strategies.

The following is the organisational framework for the Pilot Project. Roads Department were the parent institution and housed the project. The Norwegian Public Roads Authority (NPRA) was involved in the project as party to the Institutional Cooperation agreement with Roads Department, which gave rise to the road maintenance programme. NORAD, ILO and the British Department for International Development (DFID) were involved as members of the Task Force for the wider

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programme. Representatives of these foreign organisations attended regular meetings of the Task Force and provided assistance for impact studies, tender documentation and technical audits.

**Figure 7.1: Project Organisation**




**Headquarters level technical management:** The consultant's team allocated to the supervision of the project comprised a full time Maintenance Engineer and a part time Team Leader. The Team Leader was scheduled to provide support in the initial stages of the contract until such a time when the systems and procedures were established.

The demands of the supervisory work and the training were such that it was not practical for the Maintenance Engineer to undertake this function without fulltime support given the additional administration associated with the contractor's bank

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accounts. Sites were visited regularly during the supervision phase by the Maintenance Engineer to undertake training and inspection, as well as to conduct regular monthly meetings with the supervisor and the contractors' agents. The Maintenance Engineer was side-tracked from this supervisory role by the absence of the Team Leader and the requirement to undertake the financial management function of the contracts.

**Financial management**

The five contracts were managed on behalf of Roads Department by the Consultant. The management task entailed the scrutiny of interim certificates, and administration of the contract dedicated bank account. Having a company bank account was a requirement of the contract. It was imposed by the client due to fear of misappropriation of funds by the contractors.

All payments to the contractor were made into this account. Any withdrawals from the account required the authorisation and signature of the Maintenance Engineer. The contractors were required to provide a cash flow forecast showing forward cash needs allowing for the operation of a petty cash account for each contract. All contractors, except one, failed to do this. As a result, contractors had to seek approval from the engineer each time they needed to make a financial transaction.

The Maintenance Engineer was required to receive and then deposit into the bank accounts, cheques for all interim payments by the client. This was a time-consuming process and necessitated the employment of a dedicated clerk.

The other principal financial management task on the contract was the scrutiny and approval of interim payment certificates. Contractors failed to adapt the standard

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format for preparing their claims and this made it difficult for the Engineer to check their figures.

7.2.12. Data collection and reporting

**Requirements of the Terms of Reference**

The terms of reference specified the reporting from the sites to comprise the following:

- Contract brief, contract value, commencement and completion dates
- Consultant's agreement brief
- Description of activities
- Progress charts
- Expenditure records

This information was to be summarised in quarterly reports and further supplemented with new findings and recommendations relevant to the objectives of the project. In addition to the routine reporting, a series of special reports were required as the project progressed.

**Actual reporting**

The monthly reports prepared under the project covered all the items required in the Terms of Reference together with details from Site Monitoring forms, which recorded statistics relating to actual and planned productivities for the tasks (See Tables A( 6-8) in the appendix for site monitoring forms).

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7.2.13. Management and organisation

**General**

The project was part of a wider labour-intensive methods programme initiated by the Roads department. A key aspect to the success or otherwise of a project of this nature is the institutional and management framework within which the project is undertaken. In recognition of its institutional constraints, the Roads Department engaged the assistance of the British Department for International Development (DFID) through an adviser to provide the initial impetus. The department also incorporated the programme within its Institutional Co-operation Agreement with the Norwegian Public Roads Administration (NPRA) funded by NORAD and the Government of Botswana. The ILO was also involved in the Pilot Project through ASIST. It conducted feasibility studies for the project and prepared the tender documents. It also carried socio-economic impact studies of the project. The ILO representative was based in Harare, Zimbabwe and visited the project regularly. He was a civil engineer specialising in labour-intensive technology. The ILO representative was a member of the programme management Task Force.

The Task Force met quarterly to review progress and provide general direction to the programme. In addition NORAD, through NPRA, provided a co-ordinator and an adviser to work closely with the Roads Department's coordinator for labour-intensive methods on a more regular but intermittent basis. The overall programme strategy and project specific strategy including the Terms of Reference were developed by the Task Force.

The Roads Department, through its co-ordinator, undertook day to day management of the project in direct liaison with Roughton International. The project was thus essentially a partnership between the public and private sector with the aims of enhancing job creation and the devolution of routine road maintenance operations

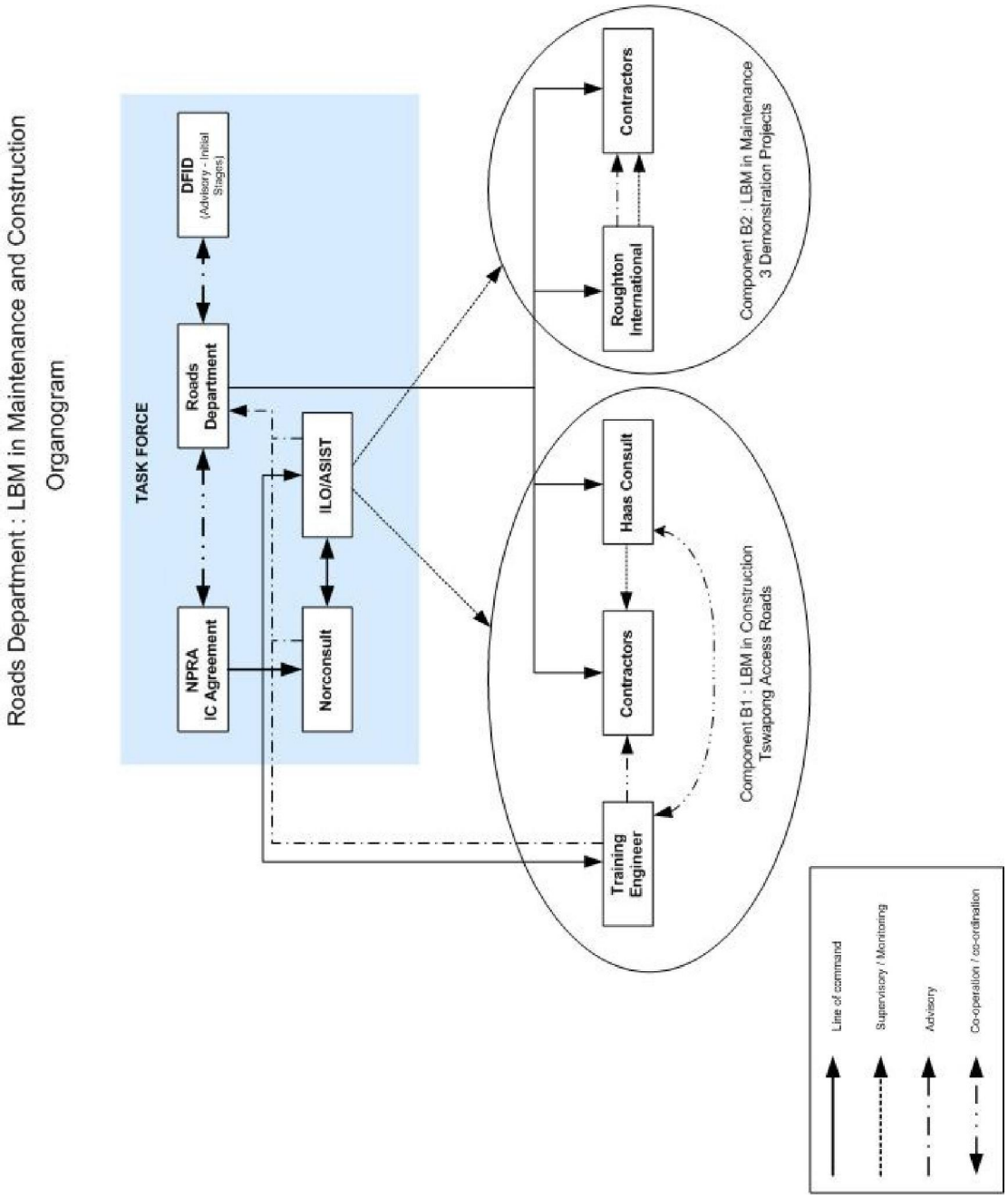
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from the public sector to the private sector as well as to develop the citizen contractor base in Botswana.

The figure on the following page shows the institutional framework for the wider labour-intensive routine road maintenance programme.

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**Figure 7.2:Organogramme of the programme**



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7.2.14. Training

The project was undertaken within the framework of NDP 8, which necessitated a rapid mobilisation of the contractors to participate in the roads programme. Therefore it was not possible to undertake extensive pre-contract training as would have been desirable in order to achieve the benefits accruing from a well trained group of contractors.

As a result it opted to undertake a limited amount of pre-bid training in which the business managers of the contractors were introduced to business management and contract management issues. This was followed by on-the-job training where the senior site staff were trained on the management of site works.

**Pre-bid training for the first bidding**

Following the needs assessment, a pre-bid training programme was organised in December 1999 in Gaborone. This was attended by pre-qualified contractors for the initial round of bidding. A total of six A-grade contractors and thirteen OC-grade contractors attended the pre-bid training. The programme ran for three days covering technical and business management issues.

Further training courses were scheduled in the regional centres (Mahalapye, Francistown and Maun) for eligible contractors who could not travel to Gaborone for the first training session.

The pre-bid training course consisted of modules on costing and bid preparation. Under the costing umbrella issues covered were the cost of labour, small plant, tools,

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equipment, overheads and profit. Bid preparation dealt with contract documentation, site inspection, bid pricing, bid submission, contract award, work planning and productivity. The course was presented by the consultant's Team Leader using pre-prepared workbooks. The contractors generally concurred that the training was useful though insufficient.

**Pre-bid training for the second bidding**

Following the first round of bidding no contract was awarded for the works on the road between Nokaneng and Sepopa and the contract was re-tendered in February 2001. Prior to this, two more training sessions were organised, each for A-grade and OC-grade contractors.

The session for A-grade contractors focused on interpretation of tender invitation documents, bid preparation, site works and business management. The course was however not well attended due to initial time misunderstandings on the part of contractors.

The session for OC-grade contractors was attended by 20 contractors who fully participated. Their educational qualifications ranged from Secondary School certificates to Bachelors Degrees in civil engineering. Some of them were barely literate and numerate. This wide range of abilities made the delivery of the course very difficult. The less qualified candidates experienced most difficulties in learning and often slowed the programme. However strategies were devised to overcome this and, at the end the contractors had generally grasped the basic principles of the subjects.

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The candidates viewed the content presented as of high value and useful for running their businesses and preparing bids. They felt that the training could have been more effective had it been made longer.

**On-the-job training**

**Site supervisor level:** On the job training started in July 2000 and was provided by the consultant's supervisory staff in liaison with the senior staff of the contractors. This training was directed at issues concerning the running of the sites and the keeping of records. It did not yield satisfactory results due to a number of problems.

The contractors' senior site staff did not have prior exposure to labour-intensive methods. Few of them had attended the pre-bid training sessions. They were thus trying to learn new skills in an operational environment where they had responsibility for performance.

The consultant's site staff comprised technicians and engineers. Technicians were generally not successful in transferring skills to the contractor's staff. The consultant's role as a trainer was complicated by the fact that do not generally cope well with the skills transfer required, unless he was also the project engineer and manager. He did not have executive authority on site over the Contractor. The Contractor did not work under the Engineer in a direct supervisory relationship enabling the contractor to learn good practise under authority. This would have enabled the Contractor's foreman to benefit from on-the-job training under a trainer/supervisor in an operational environment.

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7.2.15. Labour content

**Employment created**

Table A9 shows that the project generated 66 211 worker-days of employment. More men were employed than women, although more women (742) had been registered than men (661) for employment during the initial community consultation. The reason for this is not clear but it could have been due to socio-cultural aspects. Possible contributory factors include bias by the contractors or the Kgosi's (through whom labour was recruited) to male labour. A large proportion of the female population who had registered for work were unmarried women with children. They could have been precluded due to maternal duties.

Table A10 in the appendix lists all the various project tasks undertaken by each contractor together with the breakdown of labour per task. The amount of labour used per km showed a considerable variation, with a difference of 601% between the greatest ((I&S) and the least (Sedudu). The author could not directly deduce (from the available data) the reasons for the high disparities in terms of labour input and productivity. What is clear is that Sedudu was of a higher grade (Grage B) than I&S (Grade OC). It is likely that, by virtue of their higher grade, Sedudu were more efficient in terms of labour utilisation and hence more productive than I&S.

Furthermore, the two road sections were different in terms of maintenance requirement. The section awarded to I&S (Pallaroad – Mahalapye) is heavily trafficked and seriously deteriorated in comparison to the section for Sedudu (Nokaneng – Sepopa). Thus, I&S had more difficult work to do than Sedudu.

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For the purpose of the following analysis it has been assumed that the population of Botswana is approximately 1.2 million of which 21% are unemployed (252 000). Half the population has been assumed to be available for work (excluding those over 60 years and under 15 years of age).

As it has already been mentioned, 66211 worker days of labour had been employed at the end of the project. Assuming 22 working days per month, full year's employment is equal to 253 (22 x 11.5) days. The worker days translate to 262 worker years of employment for the 18 months project, which maintained 252 km of road for about P5.6 million. This was equivalent to 174 people working full time for each year (12/18x262). The total labour input represents 0.03% of the population available for work or 0.07% of the unemployed population.

Expanding the project to cover the paved network of 9500 km would give employment (full time equivalent) to 7 446 people, being 1.2% of the working population or 2.95% of the unemployed. A further expansion to cover the whole network of 23 000 km, which includes District roads would provide employment to 3% of the working population or 7.15% of the unemployed. This would provide 18 000 worker years of employment per year. Table A11 in the appendix gives projected figures for the expanded programme.

The socio-economic impact of this would be substantial on the local communities. The inward investment on salaries would amount to P109 million circulating in the citizen economy and giving rise to significant sustainable improvement in livelihoods.

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**The labour content of the investment**

The proportion of labour cost was calculated as a ratio of the total labour cost to the total value of the Pilot Project. The total labour cost was calculated as the product of total man- days and the average task rate. A task rate of P23 was used.

% Labour = (16211*23*100)/5 634840 = 27 %

This was not a good score for the project given the nature of the work involved. Road maintenance is an infrastructure sector with a low capacity building and skills requirement and a high labour intensity. It results in a situation where labour takes a significant proportion of the investment.

The LBRM Pilot Project faired poorly in comparison with the KRARP, for which the proportion of labour cost was 56 %.

However, it must be noted that although the work belongs to a traditionally labour intensive infrastructure sector, it was a Pilot Project, which involved, for the first time in Botswana, the training and development of small-scale citizen contractors. Although the actual figures were not available the author is of the opinion that a significant proportion of the investment went to overheads in training and development.

7.2.16. Labour productivity

**Actual labour productivity**

The average labour productivity for the various tasks on the project showed a significant variation across the sites (See Table A12 in the appendix). Physical

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conditions and site management accounted for the variation in productivity. A comparison for grass cutting across the sites showed the highest productivity (by Shumba) to be three times the lowest productivity (I&S). Site conditions and the wages paid were the same for the two contractors and the difference in productivities could be attributed to site management.

The rate of grass cutting by Gops, at 887 $m^2$ /man-day, was within the norm while that of contractor I&S was low at 380 $m^2$ /man-day. For this task the target standard productivity was 500-1000 $m^2$ /man-day. Productivity standards were designed through consultation with experts (ILO & NORAD) in the field of labour intensive construction and reference to both local and international literature on works of this nature.

The productivity rates for grass cutting were within the norm if cognisance is taken of the fact that they were averages over a site with varying conditions. All contractors in the south paid wages on the same scale and variations in productivities could not have been due to remuneration.

### 7.3. The expanded phase

The Pilot Project was completed in late 2001 and declared successful by the Roads Department as it had just presented a working model for organising labour-intensive routine road maintenance using small scale contractors managed by a consultant. The project had maintained about 252 km of gazetted road to a satisfactory standard. This was confirmed by the following comment by the director of the department. “My

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department has experienced that labour-intensive methods used in road maintenance work are cost effective and the end result is good."[103].

The project had created 66 211 worker-days of employment of which 40% went towards the employment of women. About 27% of the total cost of the project was labour wages. A socio-economic study carried out in one of the project areas revealed that the project had improved the quality of life of the participants and the community at large. The wage incomes from the project had increased the demand for goods by the participants, stimulating investment in both informal and formal commercial activities to meet the boosted demand and creating more employment opportunities.

Most notable was the sharp drop in the rate of fatal road accidents resulting from vehicle-animal collisions. This type of accident was reduced by at least 50% and motorists were safer and freer.

Against the background of these positive results from the Pilot Project, the Government decided that it must be expanded to cover more of the road network.

As it has already been mentioned, for gazetted road maintenance purposes, Botswana is divided into three maintenance regions: north, south and west. Each one of these regions has a regional maintenance office responsible for road maintenance there. For the expanded programme the responsibility for maintenance was relinquished to the regional offices as opposed to the Pilot Project, which was implemented, by the head office.

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[103] Roads Department, 2003:1

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The expanded programme is being implemented in stages and was started in November 2002 in the south region. The initial length to be maintained in this region was from the Dibete cordon fence gate to the Ramatlabama border gate and from Gaborone to Molepolole. The expanded programme maintains some 511 km of primary paved road through the use of citizen contractors using labour intensive methods.

The roads were split into 16 shorter sections to suit the various categories of contractors and their financial ceilings. Each one of the sections constitutes a contract assigned to a contractor for maintenance.

The management consultant is Lesedi Consulting in association with Norconsult AS. The consultant is charged with pre-contract activities, contract administration and the provision of training and advisory support services to the contractors.

## 7.4. Evaluation

### 7.4.1. Internal evaluation

**Pilot Project**

The Labour-intensive Routine Road Maintenance Programme is still in its early stages of expansion and has not yet generated any reliable results sufficient for an evaluation. However the impressions from the Pilot Project have been positive. The Project succeeded in working out a model for the use of small scale citizen contractors for labour-intensive routine road maintenance. Amongst the project's achievements were the following:

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- It generated about 66 211 worker days of employment
- Maintained about 252 km of gazetted road network reducing road accidents and increasing driver confidence and safety
- Developed and demonstrated a methodology for the increased use of private sector expertise by using private consultants to manage and train the small contractors
- Trained a number of small scale contractors, some of who are now able to confidently bid for work

**The expanded phase**

The expanded phase has achieved the following:

- As at November 2003, 42 contractors had been trained and developed enabling them to bid for future work. The same type of training has been provided during the expanded programme as was provided during the Pilot Project.
- As at February 2005 the project employed a total of 11 571 labourers (28% women) and had created 262 230 worker-days of employment. Wages accounted for 23% of payment.

7.4.2. External evaluation

- The programme has been preceded by a Pilot Project during which contractors were trained and mentored
- The programme is located in a proper institutional framework; housed within the Roads Department, professionally managed by private sector consultants and technically supported by foreign agencies (Norconsult and the British

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Department for International Development)

- Decentralisation of implementation to the Roads Department's regional offices and the centralisation of overall planning and coordination in the Roads Department head office
- Workers are covered by the national employment regulations and are paid the equivalent of the statutory minimum wage in the public sector
- The programme enjoys a strong political backing and has been prioritised in the current National Development Plan (NDP 9).

### 7.4.3. Problems and shortcomings

- The programme is not yet linked to a formalised training programme. Site supervisors are trained on-the-job. On the job training should only be used as top up to a prior thorough training consisting of alternate class and field work for at least a year.
- The lead-in phase was not allowed sufficient time. There was a hurry to implement quickly to take advantage of the opportunities presented by the NDP 8. This breached the necessity to invest sufficient time in design, planning and documentation.
- The appointed management and training consultant, Roughton International did not have prior experience (as a company) in labour intensive work. The company however employed a former technical officer on the LG 34 but he was ironically not involved in the Pilot Project. The maintenance and training engineer was an expatriate with a civil engineering discipline. In the author's opinion the project should have not been headed by an expatriate engineer while there was somebody with unquestionable local experience in labour intensive work. Furthermore, Roughton International did not have experience in labour intensive work at company level and they should not have been appointed to lead the Pilot Project.

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- No attempts were made to recruit and employ the technical staff (Technical Assistants and Technical Officers) who had been trained and worked on the LG 34. These people were a ready-made resource and their involvement would have improved the programme in terms of organisational and technical matters.
- No lessons were drawn from the experience of LG 34 prior to implementing this programme. The programme was trying to re-invent the wheel when some good practice had been established during the LG 34. Thus, there was a lack of continuity in terms of both personnel and practice between this programme and the LG 34.

## 7.5. Conclusions

The LIRMP is still in its early stages of expansion but it has created a positive impression. The Pilot Project to the programme has developed and demonstrated a model for organising routine road maintenance through the use of small scale contractors using labour-intensive methods. The project maintained about 252 km of gazetted road network generating about 66 211 worker days of employment within 18 months

For the first time in Botswana it was demonstrated that private sector consultants could be effectively used to manage small-scale contractors carrying out maintenance work labour-intensively. Roads Department promptly authorised the replication of the pilot activities over the country. Replication is still ongoing and maintenance has been extended to about a further 500 km of gazetted road network in the southern maintenance region.

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Finally, it is important to note that with a wage bill of 23 % of total cost, this programme is not labour intensive. It is rather conventional road maintenance. The programme is, however, promising in terms of developing small scale contractors and increasing the involvement of the private sector in infrastructure development.

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# 8. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 8.1. Introductory Summary

High unemployment, poverty and rural under-development have led some developing nations to implement programmes of labour intensive work. The programmes provide the opportunity to simultaneously alleviate these socio-economic problems while creating infrastructure. The theoretical basis for the programmes has been the large-scale research by the ILO and the World Bank, which had proven the technical feasibility and economic efficiency of labour intensive methods for a wide range of construction activities under certain socio-economic conditions.

Botswana has experienced and continues to experience high unemployment and poverty, especially among its rural population. The country's recent impressive economic performance has not been able to provide all the answers to these problems. Recognizing the need to generate employment opportunities outside economic growth as well, the Government of Botswana (GOB) has since 1972 implemented programmes of labour intensive work. The programmes have had varying degrees of performance as will be seen in the following sections.

## 8.2. Conclusions

### 8.2.1. The Labour Intensive District Roads Programme (LG 34)

The LG 34 began with a Pilot Project in 1980 to investigate a number of aspects and establish appropriate construction and organisational methods as well as developing and implementing the embryonic training programme for supervisory personnel. On completion, the project was evaluated and declared successful. It recommended that the methods it had developed could be replicated over the country, opening the door to the start of large-scale implementation of the LG 34 in 1982.

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**Internal achievements**

**Employment:** The programme achieved its objective to generate employment opportunities for the rural poor. As the programme expanded, the number of casual labourers employed progressively increased. From 235 casual labourers employed during the Pilot Project the casual labour force increased to over 3000 labourers in 1990. With this, the LG 34 had achieved the National Development Plan 6 objective to create 3000 jobs by 1990.

In July 1995 the LG 34, then under LG 117, accounted for a significant proportion of rural employment. It was employing 2 730 casual labourers, 3.3% of total rural employment and 27% of rural local government employment.

A comparison with the national economy for July 1995 reveals that the LG 34 generated more employment opportunities per unit of expenditure than the national economy.

The LG 34 had a specific objective to generate employment opportunities for women. The proportion of women casual labourers increased from 8% in 1980 to about 40% in 1995. The proportion of women trained as site supervisors also increased as the programme went on. In fact, women eventually dominated men in the Gang Leader cadre of staff. Their proportion increased from 21% in 1985 to about 86% in 1990.

Thus the District Roads programme succeeded in achieving its objective to create employment.

**Good quality low cost roads:** The primary purpose of the LG 34 was to upgrade and maintain the non-gazetted District roads labour-intensively. The length of earth road constructed each year progressively increased until 1995. At maximum performance,

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the programme constructed about 200 km of earth road per year. By 1995 (after 15 years), the programme had constructed a total of about 1 821 km of earth road (against an initial target of 200km/year) at an average cost of P 20 000/km/yr. However, the LG 34 was not confined to earth roads only. It also constructed about 1000 km of spoor graded track.

The construction of good quality low cost roads was a cornerstone for the success of the LG 34. This earned the programme international recognition and the Government of Botswana declared the programme a national asset. Therefore the LG 34 succeeded in relation to achieving the objective to produce good quality roads at a low cost.

**Institutional capacity building:** The LG 34 also aimed to create institutional capacity for the District Councils to enable them to construct and maintain District roads. By 1987, Road Units had been established in all the nine District Councils and were constructing and maintaining good quality roads.

In sum the LG 34 succeeded in achieving most of its key objectives.

**External achievements (Conformity to good practice)**

The LG 34 complied, to a large extent with good practice in labour intensive work.

**Piloting:** The LG 34 adopted the four-phased approach to programme implementation and implemented a Pilot Project to investigate the technical feasibility and economic efficiency of labour intensive methods in Botswana prior to expansion. The subsequent replication of the methods was based on the firm foundation laid by the preceding Pilot Project.

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**Centralization and decentralization:** There was a balance between the centralization essential for the success of lower level operations and the centralization required for the overall planning and coordination of the programme at national level.

**Institutionalization and training:** The LG 34 had a strong and fully incorporated training component carried out at three levels: a Technical Officer responsible for the supervision of a DCRU, a Technical Assistant responsible for the supervision of four to six Gang Leaders, and a Gang Leader responsible for the site supervision of a gang of up to 25 labourers.

Institutional adjustments were made to existing institutions (RTC) and new institutions (FTU) were created in order to create training infrastructure for the programme.A careful screening process was followed in the selection of candidates for training. As much attention was paid to character as to technical competence in the selection of trainees.

The success of the LG 34 owed much to the robust training programme it incorporated.

**Financial and political support:** The Programme enjoyed sustained financial and political support for the better part of its existence and this contributed to its success.

**Problems and shortcomings**

**Wage rate:** The wage rate on the District roads programme was not pegged to the minimum wage in the public sector. Over time, it was outstripped by the public sector minimum wage and the cost of living. It dropped to levels where it was on par with drought relief wages. This situation seriously undermined the performance of the programme in terms of productivity and quality of work. Workers left the LG 34 en masse to join the Drought Relief Programme, where they were paid the same wage

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under much less supervision. The programme began to be treated much as drought relief.

In 1992, the LG 34 was combined with the inefficient LG 38, further dampening its performance and strengthening its false drought relief image. Government support levels for the programme also went down.

**Localisation**

In respect of localisation the LG 34 faired poorly against the successful Kenya programme. The LG 34 failed to localise senior positions in the programme, preventing the crucial handing over of the programme to local engineers. As at March 1993 (after 13 years) the two most senior engineering positions on the programme were still in expatriate hands (The District Roads Engineer and Assistant Roads Engineer).

In the KRARP, the number of local engineers increased from zero in 1974 through to two in 1978 and to twenty three in 1985, out of a total of twenty nine.

**Donor withdrawal**

NORAD withdrew financial and technical support to the LG 34 (in 1996) on the pretext that Botswana's economy had reached a level where it could sustain itself. But the good economic performance has not been accompanied by a matching degree of socio-economic transformation. Botswana recorded a drop in its Human Development Index (HDI) while it was experiencing a rapid economic growth in 2001.

Against that background one is therefore compelled to question NORAD's withdrawal on grounds of economic independence for Botswana. If their withdrawal was indeed based on a genuine conviction about the economic status quo in Botswana

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then NORAD's analysis of the economic situation in Botswana was superficial and should be reconsidered. This is more so in light of the fact that the withdrawal of NORAD support was followed by the demise of the LG 34.

However, the achievements by the LG 34 outweighed its short falls and the programme was generally successful. Other programmes in Botswana and elsewhere should emulate it while taking note of its few short falls.

### 8.2.2. The RRP and the LG 38

**The Rural Roads Programme (RRP)**

The RRP had been intended to be a labour intensive programme but in the event it became rather capital intensive and problematic. It was not properly planned in the beginning and important aspects like training were ignored. The programme did not have adequate technical supervisory staff to supervise projects leading to high inefficiencies. Its poor performance was blamed on labour intensive methods but later attempts to capitalize the programme did not help either. It became more problematic, expensive and was later wound up.

**The LG 38**

The LG 38 was highly inefficient due to its low productivity and poor workmanship. The programme did not have an incorporated training programme and suffered from a serious shortage of trained technical personnel to design, plan and supervise projects. The LG 38 did not have a specific organisation within the District Councils. It was thus not a direct responsibility of any unit or department of the District Councils, and this contributed to its poor performance. The programme was later incorporated into the then powerful but essentially drought relief LG 117.

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**The LG 117**

The LG 117 was intended to be and was implemented as a drought relief intervention.The programme lacked a training component and hence a sufficient supply of trained technical staff and these led to the production of poor quality assets. It failed to tap on the experience of its District roads component (LG 34) after the latter was incorporated into the former. The LG 34 was a meticulously designed and efficiently implemented programme. It had accumulated trained technical staff and developed good organisational methods. Under the LG 117 the LG 34 component was starved of funds and became dormant. The trained technical staff of the LG 34 component started to leave the LG 117, leading to a lack of continuity of technical personnel. The foreign technical assistance personnel of the LG 34 component were underutilized during the LG 117. This rendered the programme highly inefficient since these staff were expensive.

8.2.3. LG 1107

The LG 1107 is essentially a drought relief programme. The programme is inefficient in its use of labour and yields poor quality products. It suffers from a critical shortage of technical supervisory staff because it is not linked to any training programme. Its permanent component is critically under-resourced and weak. The programme does not have, within the Councils, permanent organisations of staff specifically charged with implementing it. It has also generally become unpopular with the Council staff and this is likely to spell doom for the programme.

8.2.4. The Labour-Intensive Road Maintenance Programme (LIRMP)

The LIRMP is still in its early stages of expansion but it has created a positive impression. The Pilot Project to the programme developed and demonstrated a model for organizing routine road maintenance through the use of small scale contractors

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using labour-intensive methods. The project maintained about 252 km of gazetted road network (the initial target) generating about 66 211 worker days of employment over 18 months.

It also demonstrated that private sector consultants could be effectively used to manage small-scale contractors carrying out maintenance work labour intensively. Following this first successful trial in Botswana, the Roads Department promptly authorized the replication of the pilot activities over the country. Replication is still on-going and maintenance has been extended to 500 km of more gazetted road network.

However, it is important to note that with a wage bill of 23 % of total cost, the expansion of programme is not labour intensive. This is rather conventional road maintenance. The programme is, however, promising in terms of developing small scale contractors and increasing the participation of the private sector in the sphere of infrastructure development.

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**Table 8.1 Comparison and evaluation of the programmes against the LG 34**

| Factor/Programme | LG 34 | RRP | LG 38 | LG 117 | LG 1107 | LIRMP |
|---|---|---|---|---|---|---|
| Objectives | Clearly defined and realistic. Mostly achieved | Not clearly defined. Not achieved | Not realistic Not achieved | No defined objectives | Realistic but not achieved | Clearly defined Achieved in the short-term |
| Planning | Long term and short term planning | No time taken to plan | No technical personnel to plan | Planning was ad hoc | Constrained by lack of technical personnel | Constrained by lack of time |
| Quality of work | Good quality roads Improved rural access | Poor quality roads. Deteriorated quickly | Poor quality products (leakage at Kanye dam). No technical personnel | Standard of construction was low as programme was essentiallly drought relief | Poor quality assets. Lacks technical supervision | Roads well maintained and road accidents reduced |
| Training | Long-term training programme ( GLs,TAs and TOs produced) | No training programme | No training programme | No training programme | No training programme | Insufficient. On-the-job training only |
| Technical Assistance | Long term technical assistance by NORAD and ILO | None | None | None | None | No technical assistance based in Botswana. Occasional visits by ILO representatives |
| Labour cost proportion of total cost (%) | 75 | - | 80 | 70 | 51 | 27 |
| Reporting | Detailed regular reporting (production, financial, expenditure etc) | No records | No records | Sketchy financial and physical progress reporting | Sketchy financial and physical progress reporting | Reports on expenditure, physical progress and impact studies |
| Piloting | Preceded by a meticulously designed Pilot Project | Piloting was insufficient | No Pilot Project | -- | Not piloted and was hastily implemented | Preceded by a Pilot Project |

The above comparison matrix shows that most of the programmes deviated from the good practice of the LG 34 in terms of the evaluation criteria shown above. In the

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opinion of the author, no lessons were drawn from the experience of the LG 34 or international good practice prior to implementing most the other programmes and this resulted in the failure of most of them.

### 8.2.5. Failure to learn lessons

Programmes that were implemented subsequent to the District Roads Programme LG 34 did not draw from the experience and good practice established by this programme. They were trying to re-invent the wheel and that is essentially why some of them have failed and the current ones are bound to fail.

### 8.2.6. Recommendations and lessons

i. A labour intensive work programme must be linked to a proper training programme. The candidates selected for training need not only be technically competent, they must also have the right character to enable them to influence, motivate and control others. It has been observed that the skill of site supervisors or Gang Leaders is crucial for the success of a programme and thus their training programme must be effective. It must equip the trainees with requisite numeracy and literacy skills as well as strong technical grounding to enable supervisors to compute, measure, set out works and interpret data. Measures should be put in place to monitor and evaluate the training for quality and efficiency in terms of meeting its own objectives. Monitoring and evaluation helps to answer such questions as: is the training producing enough graduates? Are they competent? Is the training content still relevant to the work?

ii. On-the-job training only is not sufficient. It must be preceded by alternate (weekly basis) class and site training run for one year.

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iii. A programme of labour intensive work should be located within a well-defined institutional framework and the organisational responsibility for the programme must be clearly defined.

iv. Organisations wishing to carry out labour intensive work must be wary of the must-implement-quickly syndrome. Careful preparatory work and institution building must precede project implementation. (This ensures that programmes do not end up like most of those that have been described in this report).

v. Programmes of labour intensive work should have an objective to progressively localise senior technical positions on the programme. This would help to secure the programme when foreign technical assistance is withdrawn.

vi. Technical assistance personnel must be present on a continuous basis in order to provide constant technical support to the programme until the local technical capacity has matured.

vii. Sustained political support and financial commitment are crucial for the long term survival of a labour intensive programme.

viii. In a programme of labour intensive work, the wage rate for unskilled workers or labourers must be near or equal to the minimum wage for Industrial Class workers in the public sector. The wage must also be pegged to the public sector minimum wage. This helps to ensure fair compensation for the hardships endured by workers on labour intensive projects. It also serves to distinguish labour intensive work from drought relief work which does not produce any valuable infrastructure.

ix. Workers must be afforded some minimum protection by special conditions of employment to address such issues as hours of work, leave, payment procedures and worker participation in trade union activities. Hours of work should conform to provisions of the national employment legislation. Worker should be entitled to paid sick and annual leave where their contracts of employment last for over a specific period of time( e.g. one year)

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x. The regulations of conditions of employment in labour intensive work should eventually be incorporated into the national employment legislation. In this case it gains more recognition and wider application in areas where labour intensive work features.

xi. Any attempt to develop small-scale contractors must adopt the programme approach to implementation. The effort must take cognizance of the problems facing small contractors in the industry and try to tackle them in order to create an enabling environment for the development of small contractors.

### 8.2.7. Recommendations for further research

The wider labour-intensive routine road maintenance programme was kick-started with the implementation of two Pilot Projects of labour-intensive work: Pilot Project for routine road maintenance using small scale contractors and Pilot Project for road construction using small scale contractors. Both projects were implemented to completion and only the maintenance Pilot Project has been replicated over the country. From the scope of this study it could not be determined whether the construction Pilot Project is also replicable or not. It is therefore recommended that further investigation be carried out on the construction project to find out if it can be replicated over Botswana.

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## APPENDIX A:

### Table A1 : Productivities from activity sampling

| Activity | Productivities from work studies | Average productivities from production data |
|---|---|---|
| | | |
| Bush clearing only | | 306.0 $m^2$ /day |
| Bush clearing and de-stumping | | 134 $m^2$ /day |
| Ditching | 2.2 $Fm^3$ /day | 1.7 $Fm^3$ /day |
| Sloping | 3.5 $Fm^3$ /day | 2.13 $Fm^3$ /day |
| Camber | | 44.6 $m^2$ /day |
| Quarry excavation | 5.3 $Lm^3$ /day | |
| Loading | 7.7-16.9 $Lm^3$ /day | 2.6 $Lm^3$ /day |
| spreading | 14.1 $Lm^3$ /day | 8 $Lm^3$ /day |
| Mogorosi 1981 | | |

### Table A2: Surfacing: Number of trips per loading station for different haulage distances

| Haulage Distance (Metres) | Trips/Cart | Carts | Trips/Day |
|---|---|---|---|
| <200 | 24 | 2 | 48 |
| 200-300 | 20 | 2 | 40 |
| 300-400 | 10 | 2 | 36 |
| 400-500 | 16 | 3 | 48 |
| 500-650 | 14 | 3 | 42 |
| 650-800 | 12 | 4 | 48 |
| 800-900 | 11 | 4 | 44 |
| 900-1050 | 10 | 5 | 50 |
| 1050-1150 | 9 | 5 | 45 |
| 1150-1400 | 8 | 6 | 48 |
| 1400-1600 | 7 | 6 | 42 |
| 1600-2000 | 6 | 6 | 36 |
| Volume of cart = 0.5 $m^3$ | | | |

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## Table A3: Task rates used and recommended

| Activity | Task rates used | Task rates recommended |
|---|---|---|
| Bush clearing only | 750 $m^2$/day | Medium – light bush = 750 $m^2$/day |
| | | No task set for dense bush |
| Bush clearing and de-stumping | | Medium – light bush = 150 $m^2$/day<br>No task set for dense bush |
| Ditching | 3.75 $Fm^3$/day | Hard: 1.875 $Fm^3$/day ( 15m)<br>Firm: 2.5 $Fm^3$/day ( 20m)<br>Loose: 3.13 $Fm^3$/day ( 25m)<br>Very loose: 3.75 $Fm^3$/day ( 30m) |
| Sloping | 3.75 $Fm^3$/day | Hard: 2.35 $Fm^3$/day ( 25m)<br>Firm: 3.28 $Fm^3$/day ( 35m)<br>Loose: 3.75 $Fm^3$/day ( 40m)<br>Very loose: 4.29$Fm^3$/day ( 345m) |
| camber | | 100 $m^2$/day ( 25) |
| Quarry excavation | 4.0 $Lm^3$/day (hard)<br>6.0 $Lm^3$/day (soft) | Hard: 4.0 $Lm^3$/day (hard gravel)<br>Firm-loose: 6.0 $Lm^3$/day (calcrete and soft gravel) |
| Loading | 12.0 $Lm^3$/day | 12 $Lm^3$/day |
| Spreading | 18 $Lm^3$/day | 18.0 $Lm^3$/day |
| Mitre drains | | As for ditching |
| Interception ditches | 5.0 $Fm^3$/day | 5.0 $Fm^3$/day by a team of four |

## Table A4: Summary of cost planning data

| | Cost/km ( Pula) | |
|---|---|---|
| | Stage One Formation | Stage Two Formation |
| | | |
| | 2 696 | 1 797 |
| Drifts | 347 | 347 |
| Surfacing | 1 588 | 1 588 |
| Total | 4 631 | 3 732 |

## Table A5: Summary of costs

| Item | Amount | Cumulative total | Cost/km |
|---|---|---|---|
| LOCAL EXPENDITURE | | | |
| Excluding houses and offices | 270 213 | 270 213 | |
| Estimate for surfacing remaining 11.5km | 26 818 | 297 031 | 8 535 |
| Houses and offices | 65 987 | 363 018 | 10 432 |
| Orders placed but not yet delivered | 17 275 | 380 293 | 10 928 |
| TECHNICAL ASSISTANCE (Labour, tools, equipment & equipment included + 10 % contingency) | 420 000 | 800 293 | 22 997 |

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## Table A6: Site Monitoring Form (a)

# PROJECT MONITORING FORM

### Contract Data

| CTB no: | Project: | Contract length km: |
|---|---|---|
| 9/5/67/98-99 | DIBETE TO MMAMABULA | 16 |

| Start date: | Duration (mths): | Completion date: | Contract sum: |
|---|---|---|---|
| 07/01/2000 | 12 | 30/6/2001 | 597,410.69 |

| Contractor: | Engineer's Representative: |
|---|---|
| GOPS&SONS (PTY)LTD | CHARLES KAFURUKI |

### Project Summary

| Reporting period | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fin. Year | A | M | J | J | A | S | O | N | D | J | F | M |
| 2000/2001 | | | | | | | | | | | x | |

| Authorised Payments | This mth | To date |
|---|---|---|
| Pula | | 384,402.27 |
| % of Contract Sum | | 64.3 |

**Report based on:** Records [x] Estimates [x]

*For official use only*

**Road Class / Surface**

**P**rimary
**S**econdary
**T**ertiary & Access
**B**ituminised
**G**ravel
**E**arth & Sand Track

| | B | G | E |
|---|---|---|---|
| P | | | |
| S | | | |
| T | | | |

B

**Project Category**

| Construction | Rehabilitation | Shoulder widening | Reseal/Regravel | Routine Mtce |
|---|---|---|---|---|
| | | | | X |

**Employment Data**

| | Workerdays | | Wages | |
|---|---|---|---|---|
| | This mth | To date | This mth | To date |
| | 157 | 3792 | 5,000.00 | 143,987.96 |
| | Gender distribution % | | Wages in % of Total Payments | |
| | This mth | To date | This mth | To date |
| Male | 65 | 61 | | 20.8 |
| Female | 35 | 39 | | 15 |
| Total | 100 | 100 | | 35.8 |

| Weather conditions on site and Working Days during reporting period: | Rainfall mm | No of days worked | No of days work stopped | Total no of working days [1] |
|---|---|---|---|---|
| | | 28 | 0 | 28 |

[1] Excluding Weekends (normally Sundays) and Public Holidays

**Notes:**

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## Table A7: Site monitoring form (b)

| Employment and Productivity | Workerdays | | Wages | | Productivity Units/wd | | |
|---|---|---|---|---|---|---|---|
| **Activity** | This mth | To date | This mth | To date | This mth | To date | Target |
| | | | | | | | |
| Grass cutting | nil | 1007 | nil | 38,658.13 | nil | 700 | 900 |
| | | | | | | | |
| Bush clearing | 0 | 1070 | 0.00 | 17,275.23 | 0 | 50 | 100 |
| | | | | | | | |
| De-littering | 64 | 272 | 1,280 | 11,163.00 | 2.5 | 2.5 | 5 |
| | | | | | | | |
| Drain cleaning | 0 | 174 | 0.00 | 19,891.60 | 0 | 18 | 20 |
| | | | | | | | |
| Cattle chasing | 93 | 691 | 3720 | 36,120 | 8 | 8 | 10 |
| | | | | | | | |
| Destumping | 0 | 192 | 0 | 6,800 | 0 | 80 | 83 |
| | | | | | | | |
| Culvert Cleaning | 0 | 56 | 0 | 2,180 | 0 | 5 | 10 |
| | | | | | | | |
| Surface repairs | 0 | 120 | 0 | 6800 | 0 | 2 | 4 |
| | | | | | | | |
| Shoulder Repairs | 0 | 210 | 0 | 4200 | 0 | 10 | 20 |
| | | | | | | | |
| | | | | | | | |
| **Total** | 157 | 3792 | 5,000.00 | 143,987.96 | | | |

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## Table A8: Site monitoring form (c)

| Works Progress | 1) Quantities in | 2) Approved | 3) Adjusted | Output | | | Compl. in % of 1) | |
|---|---|---|---|---|---|---|---|---|
| Activity | Original BoQ | Variations | Total 1+2 | This mth | To date | Unit | This mth | To date |
| | | | | | | | | |
| GRASS CUTTING | 944,909 | | | 0 | 832000 | sqm | 0 | 88 |
| | | | | | | | | |
| BUSH CLEARING | 83 | | 16000 | 0 | 16000 | Lin-m | 0 | 100 |
| | | | | | | | | |
| DE-LITTERING | 420,000 | | | 35000 | 245000 | sqm | 8.3 | 66.3 |
| | | | | | | | | |
| DRAIN CLEANING | 29,870 | | | 0 | 5430 | m | 0 | 18.2 |
| | | | | | | | | |
| CULVERT CLEANING | 149 | | | 0 | 141.6 | m | 0 | 95 |
| | | | | | | | | |
| DESTUMPING | 58 | | 16000 | 0 | 16000 | LN-M | 0 | 100 |
| | | | | | | | | |
| CATTLE CHASING | 16 | | | 16 | 128 | KM | 8.3 | 66.3 |
| | | | | | | | | |
| SURFACE REPAIR | 37 | | | 0 | 35 | SQM | 0 | 94.6 |
| | | | | | | | | |
| SHOULDER REPAIRS | 4800 | | | 0 | 2784 | SQM | 0 | 58 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## Table A9: Worker days

| Contractor | Total wd | % Male | % Female |
|---|---|---|---|
| Gops | 8191 | 62 | 38 |
| Shumba | 11104 | 64 | 36 |
| I & S | 14207 | 62 | 38 |
| DHB | 16446 | 57 | 43 |
| Sedudu | 16263 | 62 | 38 |
| Total | 66211 | 61 | 39 |

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## Table A10: Labour employed on site

| | Gops and Sons | Shumba projects | I & S | DHB | Sedudu |
|---|---|---|---|---|---|
| Labourers/km | 512 | 505 | 836 | 329 | 139 |
| Length contract road | 16 | 22 | 17 | 50 | 117 |
| Total Worker days | 8191 | 11104 | 14207 | 16446 | 16263 |
| Male Worker Days | 5088 | 7108 | 8835 | 9353 | 10096 |
| Female Worker Days | 3103 | 3996 | 5372 | 7093 | 6167 |
| Grass cutting | 1875 | 1943 | 4531 | 7740 | 5630 |
| Bush clearing | 1336 | 1977 | 3036 | 846 | 7536 |
| De-stumping | 264 | 780 | 108 | 84 | 1258 |
| De-littering | 658 | 1673 | 1813 | 2417 | 726 |
| Culvert cleaning | 56 | 74 | 240 | 375 | 240 |
| Drain cleaning | 174 | 783 | 380 | 250 | 336 |
| Shoulder repairs | 234 | 560 | 216 | 0 | 28 |
| Surface repairs | 1538 | 530 | 353 | 0 | 1-3 |
| Pavement repairs | 0 | 240 | 0 | 0 | 56 |
| Crack repairs(fine) | 0 | 48 | 0 | 0 | 12 |
| Crack repairs(wide) | 0 | 25 | 0 | 0 | 0- |
| Edge repairs | 256 | 68 | 0 | 0 | 0 |
| Cattle chasing | 1800 | 2397 | 3530 | 4334 | 0 |
| fencing | 0 | 0 | 0 | 310 | 0 |
| Sign repairs | 0 | | 0 | 90 | 334 |

## Table A11: Labour projections for the expanded programme (LIRMP)

| Project scenario | Km | Worker days and (male female | worker years and (male female) for (18 project months) | Worker years per year | Female years of employment (40%) | % of working pop * | % of unemployed pop** |
|---|---|---|---|---|---|---|---|
| Pilot Project | 222 | 66211 | 261 | 174 | 68 | 0.03 | 0.090.07 |
| Paved Road Network | 9500 | 2,565,219 | 9717 | 7445 | 2903 | 1.2 | 2.95 |
| National Road Network | 23000 | 6,210,530 | 23525 | 18027 | 7030 | 3. | 7.15 |

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## Table A12: Labour productivity

| contractor | Blockwork replacement | Blockwork plastering | Remove boulders | Grass cutting | Bush clearing | Destumping | Delittering | Culvert cleaning | Drain clearing | Shoulder repairs | Surface repairs | Pavement repairs | Crack repairs(fine) | Crack repairs(wide) | Edge repairs | Cattle chasing | fencing | Sign repairs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | $m^2$ | $m^2$ | l/sum | $m^2$ | lm | lm | wd | m | m | $m^2$ | $m^2$ | $m^3$ | $m^2$ | lm | $m^3$ | wd | lm | no |
| Gops & sons | | | | 887 | 12 | 61 | 37 | 3 | 31 | 40 | 0.19 | n/a | n/a | n/a | n/a | 100 | n/a | n/a |
| Shumba | | | | 1178 | 11 | 28 | 93 | 3 | 1290 | 3 | 0.53 | 0.13 | n/a | 1.8 | 0.23 | 133 | n/a | n/a |
| I&S | | | | 380 | 6 | 157 | 101 | 1 | 10 | 52 | n/a | n/a | n/a | n/a | n/a | 196 | n/a | n/a |
| DHB | | | | 672 | 48 | 60 | 134 | 1 | 20 | n/a | n/a | n/a | n/a | n/a | n/a | 255 | 12 | 0 |
| Sedudu | 071 | 413 | 002 | 1081 | 16 | 93 | 121 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 1.5 |

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