

CHAPTER 3

LITERATURE REVIEW II: INTERNATIONAL EXPERIENCE IN DEVELOPMENT OF LABOUR-INTENSIVE WORKS PROGRAMMES.

3.1 Overview of the Chapter

The potential of the labour-intensive approach in employment generation and poverty alleviation was proven in large scale programmes implemented in Kenya, Malawi, Ghana, Botswana and Lesotho. These programmes were implemented in the periods 1974-1976 (Kenya), 1980-1996 (Botswana) and 1986-1990 (Ghana and Lesotho). This chapter reviews these programmes.

In each case, the background of the programme is provided, objectives are stated and the main features of the programme are summarized and discussed. The employment creation and capacity building potential are highlighted.

3.2 The Kenya Rural Access Roads Programme (RARP).

3.2.1 Background

The Kenya Rural Access Roads Programme (RARP) was initiated in 1974 to respond to Kenya's policy of employment creation and rural development embodied in the 1974/78 Development Plan. The latter placed emphasis on access to new farming areas. The objectives of the programme were to provide all weather access between high potential farming areas and market centres; provide meaningful employment opportunities; to encourage the production of cash crops; to improve the quality of rural life and access to services at "growth centres" (De Veen 1983).

The RARP was the first major labour-intensive construction programme in Africa, was the largest and longest running programme and which has been extensively documented (McCutcheon 1990, De Veen 1983).

3.2.2 Institutional Setting

The RARP was initiated within the Ministry of Works as a pilot project in 1974. The Ministry had two distinct programmes at the time: a gravelling, culverting and bridge building programme (equipment based) and the rural access roads programme (labour-intensive (RARP)).

The pilot project consisted of a construction unit assisted by a technology unit (TU). The TU, with the support of the ILO, carried out initial labour-intensive works studies to analyse, monitor and advise on the important aspects of construction work, and investigated problems pertaining to labour-intensive works technology. It was also responsible for developmental work, which entailed the production of technical and training manuals on all aspects of the work e.g. tools, tasks, organization and management. Studies on labour supply showed that labour was generally available in most parts of Kenya in quantities meeting LBW project demands. The results of the pilot project were positive and led to a larger programme with the same objectives but with an extended scope, output and duration (McCutcheon, 1988).

The programme was started in a few selected districts, but subsequently spread to 23 of the 39 districts in Kenya. Field units consisted of 3 construction units, a structures unit and a graveling team. It had long-term financial commitment by the donors and government.

3.2.3 Technical Criteria

The RARP specified road widths of 4,5m for traffic volumes of 10-30 vehicles per day narrowing to 3,5m in deep cuts. Road alignments followed original land contours to minimize earthworks. Roads widened to 5,25m or 6m for embankments on expansive soils and for traffic levels exceeding 30vehicles/day. A 100mm gravel wearing course layer was placed on the roads (De Veen 1983).

Construction activities undertaken using labour-intensive methods and activity task rates used in the KRARP are summarized in the following Table 3.1.

Table 3.1: Kenya Rural Access Roads; Simplified Task Rates

Operation	Activity	Minimum Task
Site Clearance	Bush clearing	20m/day
	Stripping and grubbing	20m/day
	Tree and stump removal	Experience
	Boulder removal	200/day/km
Earth works	Slotting	4m ³ /day
	Excavation to level	5m ³ /day
	Cut < 0,25m	4m ³ /day
	> 0,25m	4m ³ /day
	Borrow to fill	
	Haulage (wheelbarrow)	
	0-20m	13,5m ³ /day
	40-60	8,0m ³ /day
80-100	5,5m ³ /day	
	Spreading	12m ³ /day
Drainage	Ditching	30m/day
	Sloping	30m/day
	Camber formation	20m/day
	Mitre drains	15m/day
	Catchwater drains	30m/day
	Scour checks	25/day
	Culvert installation	Max 20 days/line
Graveling	Excavation	3m ³ /day
	Load	6m ³ (loose)/day
	Spread	12m ³ /day

(Source: De Veen, 1983)

3.2.4 Employment Creation

The programme created 70000 man-years of casual employment and 6000 years of supervisory employment. At its peak, 10000 casual workers, 120 supervisors and 14 Engineers were employed in the programme. The original planned output was 84000 years of casual employment and 6000 years of supervisory

employment. In 1977, a labour-intensive road maintenance programme started to maintain the roads built using LBW methods. At the peak of the maintenance programme, 5000 contractors were employed on the maintenance of the roads. Staff wages accounted for 12% and casual wages 47% of the total expenditure. The wage rate in the Kenya programme was about US\$1.4 per day (Hagen, 1985; McCutcheon 1990; 1994(1)).

Construction workers were recruited near to the road being constructed and were paid on a daily task basis. Tasks were decided after sufficient studies had been conducted, and conditions of employment were explained and agreed upon at the beginning of each project. Recruitment of labour was done with the assistance of the local administration. During recruitment meetings, if the number of job seeking workers exceeded the available positions, workers were selected using a lottery system.

By constructing good quality roads at low costs, the RARP proved that labour-intensive construction methods are economically and technically viable, provided that appropriate organization and management techniques are adapted to their use. Furthermore the programme showed that labour-intensive construction technology is eminently suited to the socio-economic environment of many developing countries.

3.2.5 Programme Output

Up to 1987, the RARP had constructed 8000 km of roads by labour-intensive methods using force account. Out of these, 6000 km were been gravelled. The RARP's original target was 14000 km of access roads, which was later revised to 9000 km. On average 2140 man-days days were required to construct and gravel one kilometre of an access road. In recent years this figure improved to lower than 2000 person days/km (De Veen, 1983, McCutcheon 1990; 1994(1)). The average unit construction cost was about U\$12000/km. The programme increased the public roads in Kenya by 25% of the original network.

The World Bank's review of the programme concluded that, considering the development of the institutions, administration, training, staff and supervision required for the size of the programme, the Kenya RARP may be considered one of the most successful donor financed programmes in Kenya and one of the best organized labour-intensive road construction programme anywhere (World Bank 1986). At the end of 1983, 43 force account construction or graveling units were operative in 25 districts.

The RARP demonstrated on a large scale the technical feasibility and economic efficiency of labour-intensive methods. Sixty nine percent (69%) of the total project expenditure remained within Kenya. The proportion of programme costs devoted to wages was 59% and the programme became an integrated institution within the Ministry of Works. The World Bank completion report (cited in McCutcheon 1990) gives the following reasons for the success of the RARP: the number of kilometres constructed was high; the organizational structure for the head office was efficient and roads were constructed in full compliance with the design standards even with a low supply of skilled technical staff. Further reasons were that production rates were high and an average of 67% of the estimated 45 km per annum per construction unit was consistently achieved.

3.2.6 Development of Small Contractors

The RARP was succeeded by the Minor Roads Programme (MRP) in 1987. Drawing on the experience gained in using contractors for the haulage of gravel in the RARP, the MRP promoted labour-intensive contracting with the following objectives (Twumasi-Boakye, 1996);

- to generate more employment
- to promote growth of small contractors and increase competition for labour-intensive works
- to transfer labour-intensive technology skills to the private sector
- to optimize contract rates by increasing competition.

Invitations to trainees were extended through newspaper advertisements. Criteria for selection of firms included education level of the managing director (preference was given to qualified Engineers), minimum equipment holding and experience in civil works.

Twelve (12) contractors were selected for training in phase 1, nine (9) of which completed the training programme. Supervisors were engaged separately by the project and trained, and thereafter made available for employment by trained contractors. A further 12 contractors were trained in phase 2. Each one of these sponsored two (2) Assistant Foremen for training. The training programme lasted for between 15 and 21 months. Theoretical training was completed in 3 months, and the practical phase lasted for 12-18 months. The practical part included trial and fixed price contracts (ibid).

No equipment was provided to trained contractors. Work was available on a competitive basis, and no guarantee for continuity of contracts was given.

3.2.7 Conclusion

The RARP in Kenya dramatically increased the knowledge of labour-intensive construction and valuable lessons were learned (World Bank, 1986). It was proved that the use of labour-intensive methods for rural road construction and maintenance in Africa can be technically feasible and financially cost effective. The programme also showed that labour-intensive methods in rural areas bring significant economic benefits and have a positive impact on income distribution and quality of life. The duration necessary for a programme to have a positive impact is longer than 5 years. It was also shown that initial input of technical assistance and training can have a high payoff in the project, and that adequate tools and equipment are necessary for optimum unit productivity.

Other conclusions for the success of the programme have been made (McCutcheon (1990)). The initial intellectual assessment of the feasibility of using labour was sound. Technical aspects received concentrated attention by the technology unit. Extensive, good, appropriate training was carried out. There was

long term political and financial support from the Government and good inter party communication.

However some deficiency can be pointed out in some areas.

- i. It appears that donor funding and government support sustained the programme for the long period of its existence. This enabled extensive and appropriate training to take place and the technical aspects of the project were given detailed attention.
- ii. Although employment was created in big numbers, the work generated was by nature temporary and minimal long-term empowerment of the people has taken place. Developed skills during the construction phases did not result in sustainable entrepreneurial or small contractor abilities that could result in small business development. It could be concluded that minimal long-term empowerment of the people has taken place. People who live alongside the road carry out maintenance on a contract basis and this is the only sustainable form of small contractor development.

3.3 The Labour-intensive Works Programme in Ghana

3.3.1 Background

The development and application of labour-intensive technology for road rehabilitation and maintenance in Ghana started in 1986 as the Department of Feeder Roads (DFR) component of the World Bank funded 4th Highway Project. UNDP provided funds for the technical support by the ILO (Bental, P (1992); Twumasi-Boakye, 1996).

3.3.2 Programme Objectives

The programme objectives were (Twumasi-Boakye, 1996));

- Improvement of access to rural areas through the large scale application of cost-saving approach to feeder road construction, improvement and maintenance utilizing local resources.
- Creation of capacity within the Department of Feeder Roads and a number of private contracting firms to efficiently apply cost-saving methodologies to road improvement and maintenance.
- Creation of additional employment opportunities by the introduction of cost-effective labour-intensive approaches for feeder road construction improvement and maintenance.

Programme objectives were achieved in three phases:

Phase I: Training of individual supervisors from small-scale contracting firms, foremen and engineers from DFR.

Phase II: Developing capabilities of contractors by giving those 5km each of real life trial sites to run on their own under DFR supervision.

Phase III: Development of contractors through on site training by giving each qualified contractor from the second stage 20km of road to rehabilitate per annum (Ashong, 1996).

3.3.3 Stakeholders Involvement

The Ghanaian road construction industry was characterized by the conventional capital-intensive methods before the introduction of labour-intensive technology. Labour-intensive works technology was a new product in the market, and met a hostile environment. To break this barrier and penetrate the market, serious advertising and education was necessary. The DFR identified target groups, politicians, community leaders, chiefs and other opinion leaders to participate in project seminars and promotional meetings. The latter created a forum for initial marketing of the programme and discussion of project related issues (ibid).

3.3.4 Phases of the Ghana Programme

A three-phase process was adopted in the introduction of LBW technology in Ghana. The programme was considered as a policy experiment and therefore an effective feedback mechanism was created to enable the executing agency to respond timely and adapt to changes at any stage of the project. The three stages were Pilot, Demonstration and Replication (ibid).

3.3.4.1 The pilot phase

The Pilot Project was started in the Western region of Ghana in 1987 and was managed by a team headed by a Project Engineer and an ILO Technical Advisor. The latter operated from a Project Office in the project area and reported directly to the Director of DFR. By setting up a separate project office the level of supervision and interaction and feedback was higher than through the normal Departmental set-up.

The pilot phase was used to test the feasibility and acceptability of the innovations upon imported norms from programmes in other countries. New organizational arrangements and management procedures were tested.

Seven (7) contractors were trained during the pilot phase, equipped and taken through the three planned training phases. The initial training lasted eighteen (18 weeks). The following issues were attended to:

- (a) An understanding and respect of diversity of cultural values and the norms in local communities and how to manage them.
- (b) Formal and informal authority relationships within communities taking part in the programme.
- (c) Financial issues and security

- (d) Time for establishment, diffusion of information and acceptance by stakeholders.

Appropriate attention was paid to site selection, labour recruitment and avoidance of conflict with local officials, political leaders and vested interest groups during the planning stage.

3.3.4.2 Demonstration phase

The demonstration phase of the programme was started in 1990 by expansion into two more regions of Ashanti and Brong-Ahafo. The purpose of a demonstration stage was to test how the organizational structures developed during the pilot phase would fare in different environments and away from the strict monitoring of the project team.

Six (6) contractors were trained and equipped from each of the two regions. During this stage some of the advantages and autonomy of the pilot phase were withdrawn. This was so as to determine how the project would fare under the stringent civil service rules. This phase was necessary to build administrative capacity in small incremental, rather than large-scale and complex activities that have a higher probability of failing. Additional resources and manpower needed for full-scale expansion of the programme were also determined during this phase. The transfer of expertise from experts to local counterparts was emphasized at this stage.

3.3.4.3 Replication and dissemination phase

The major aim of this phase was to expand the tested methods and techniques, administrative and productive capacity and sustainability. Nationwide expansion of the programme was undertaken in this phase. Local counterpart staff was adequately trained and equipped to run the projects. At this stage, the sustainability of the programme was no longer hinged on pilot phase structures.

During this phase, the administration of the project was transferred to the normal DFR regional set-up. At head office level, the project was managed by a National Co-ordinator under the deputy head of the Development Branch. Each region had a Project Engineer for labour-intensive projects. In determining the rate of replication, the following factors were considered:

- Degree of Executing Agency participation
- Quality of project staff
- Degree of financial support
- Strength of leadership and human resources within the Executing Agency

Trained contractors were selected from small companies engaged in general trading and civil engineering contracting. Fifty five percent of the trained Managers had basic education, and about 10% each were civil engineers and other graduates, the rest being mainly technicians. Six (6) of the firms trained were owned and managed by women (Twumasi-Bakye, 1996).

With the success of the programme, it was integrated into the DFR regional structures in all the regions. The labour-intensive programme is now nation-wide with contractors operating in all the ten (10) regions.

3.3.5 Programme Output

3.3.5.1 Training

In a period of 10 years since the inception of the project in 1986 up to 1996, 93 contractors were trained. In addition, 542 management and supervisory staff from the 93 contracting firms and DFR were trained in the application of labour-intensive technology (Ashong, 1996). The breakdown of this figure is as follows:

No. of Contractor's Personnel	380
No. of DFR Foremen	98

3.3.5.2 Procurement of equipment for trained contractors

An equipment loan scheme for the trained contractors was negotiated with a construction bank and guaranteed by the Government. In 1991, the first nineteen (19) contracting firms which went through all the three phases of the project training were awarded standard contracts through the normal DFR competitive bidding procedures. DFR was committed to give the new contractors work till they had fully paid for the equipment loan, and competitive bidding was found inappropriate. Subsequently, all DFR contract awards to labour-intensive contractors were based on a negotiated price until the contractors involved had finished paying for their equipment loans.

The appropriate light equipment supplied comprised of: 3 tractors heads; 6 trailers; 2 pedestrian vibratory rollers; 1 towed water bowser; 1 water pump; 1 pick-up bakkie; 1 tipper truck and a set of hand-tools. The cost of the set of equipment was about US\$150 000. However equipment supply to trained contractors on loan had not matched the rate of the training of contractors. The time lag between contractor training and equipment provision was up to a few years. The schedule of supply of equipment to contractors involved is given in Table 3.2 below.

Table 3.2: Schedule of supply of equipment to trained contractors

Year	No. of Contractors Equipped	Donor
1988	7	IDA
1989	12	IDA
1991	2	IDA
1991	5	GOG
1994	16	DANIDA

1994	12	USAID
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(Source: Ashong, 1996)

3.3.5.3 Employment creation

At the end of 1995, a total of 4 371 815 man-days of employment had been created, made up of about 3.5 million man-days for the rehabilitation of 1 400km (including culverts) and 0.9 million man-days for culverts only contracts executed by non-equipped contractors. The average daily wage was approximately US\$1.0. On average, 30% of the employment created was for women (Twumasi-Boakye, 1992). A schedule of annual employment creation and the proportion of female workers is shown below.

Table 3.3: Ghana Labour-intensive Programme: Annual employment creation figures.

Year	Man-days	% of Female Workers
1987	49 220	21.9
1988	110 500	23
1989	270 160	24
1990	561 080	22.8
1991	614 870	25.5
1992	794 170	28.1
1993	651 280	30
1994	642 535	30
1995	678 000	28
Total:	4,371,815	

Source: Ashong, 1996.

3.3.5.4 Physical results

By the end of 1995, 1,395km of feeder roads had been rehabilitated to year round accessibility standards and some 3,711-box culverts of various sizes had been constructed (Ashong, 1996). The average cost per kilometre of the

improved roads including culvert works was about US\$14,000 (de Veen, 1996).

The planned average production achieved on the standard contracts was 2km/month per contractor. On average this was achieved. Some contractors dropped to about 1.50km/month per contractor and others achieved 2.30km/month.

3.3.6 Constraints Experienced

The following constraints were experienced in the Ghana programme (Twumasi-Boakye, 1992; Ashong, 1996);

- Seasonal variations in labour supply and competition with other employers for labour available within an area reduced production rates.
- Irregular payment of contractors had a severe effect on the capacity of the contractors to produce constantly.
- Equipment breakdown and repair problems were experienced. Excessive downtime in the performance of the pedestrian vibrating rollers, for example, accounted for the major shortfalls in production on both standard and trial Contracts.
- Some of the roads tackled were complete new developments of timber tracks through hilly terrains. This involved extensive earthwork and thus slowed down progress of works.
- The DFR had problems in matching the supervision capacity required as new contractors were trained.

Regarding the performance of contractors, the main factors influencing their output were (Danso, 1996);

- i. Labour availability

- ii. Frequent breakdown of equipment
- iii. Poor planning of works
- iv. Attrition of supervisors
- v. Delays in payment for work done
- vi. Divided attention by contractors
- vii. Under-tasking
- viii. Roads with excessive earthworks
- ix. Long delays in equipping contractors

3.3.7 Conclusion

The Ghana programme was the first successful programme in Africa to use small-scale contractors in labour-intensive roadworks. Although the efficacy of the technology was already established in Kenya and elsewhere and could not be doubted, the same could not be said about using the private sector.

The Ghana model the necessary prerequisites for successful development of small contractors were taken care of. These can be summarized as training, reduction of barriers to entry, provision of equipment, management training, government support, programme approach, a tailored selection process and integration into the construction industry. Through this programme, labour-intensive construction technology was able to penetrate the Ghanaian construction industry. The programme won the support of the Government because it was in line with its privatization programme and had the added benefits of rural employment generation leading to a reversal of rural-urban migration.

Several lessons can be drawn from the Ghana programme. The most important of these are:

- i. The minimum level of education of participants in the training course should be GCE Ordinary level or its equivalent. This level of education adapts to the training better and participants are eager to advance.

- ii. Construction sites should be spaced sufficiently apart to avoid competition in recruiting labour.
- iii. Roads selected must not involve extensive earthworks.
- iv. For cost-effective and efficient labour-intensive road programmes, a high premium needs to be placed on training and supervision. As the number of contractors trained increases, a corresponding number of supervisory staff of the executing agency should be trained. In the worst case there should be one supervisor to two (2) contractors. Private consultants should be trained to help in the design and supervision of projects where in-house capacity is found to be inadequate.
- v. Sufficient and prompt feedback mechanisms must be put in place to enable the training division to respond to the needs of already trained foremen and supervisors. This will lead to the institution of corrective measures at the very early stages.
- vi. Geographical expansion should be gradual and should be matched with the available manpower and logistical support. Politically motivated expansion should be avoided. This often results when the programme is accepted as a panacea for the solution of employment problems in the country.
- vii. The quality of the outputs should not be sacrificed by considering the programme as just an employment generation exercise.

3.4 The Lesotho Labour-intensive Works Programme

3.4.1 Background

The inception of the labour-intensive works programme in Lesotho was attributed to two main events. First, the main objectives articulated in the 2nd and 3rd National Development Plans (1975-1985) were rural development and creation of employment. One way adopted to implement the policy was the promotion of the

use of economically efficient labour-intensive methods in all aspects of public works in Lesotho. The Labour Construction Unit (LCU), a labour-intensive programme, was initiated in 1977 for this purpose (Pama, 1992). Secondly, the retrenchment of more than 130,000 Basotho mine workers from South African mines in mid-1970s gave rise to the Lesotho government facing severe social and economic problems. Therefore, a parallel objective was to create an organization which was able to absorb large numbers of returning mine workers repatriated from South Africa (ibid). LCU was started as a section within the Roads Department of the Ministry of Works and became a full department in 1987.

A brief description of the programme and the key features of the programme are summarized in the following paragraphs.

3.4.2 Pilot Phase

The founding principles of the Lesotho programme were basically the same as the Kenyan programme but were adapted for the mountainous environment. The pilot project was implemented from 1977 to 1980, with three main objectives (ibid);

- i. To build an organization with a maximum labour strength of 500 to carry out civil works using labour-intensive methods.
- ii. To provide training of supervisory personnel and develop administrative procedures for handling large labour forces.
- iii. Compare the results with similar works produced by capital intensive methods.

The analysis of the physical results of the pilot project and financial costs showed that labour-intensive works could be carried out competitively in Lesotho even at the relatively high wages prevailing then. The same conclusions were reached by Edmonds, Goppers and Soderback (1986), quoted in Pama, 1992.

3.4.3 Institutional Arrangements

The institution responsible for labour-intensive works was a department within public works. At national level the programme had three (3) major departments:

Planning and Control, Operations and Training (Pama, 1992). Operations were structured regionally in 3 regions (East, North, and South) and were responsible for all road improvement and maintenance. The structure in the regions included an administrative section, a maintenance unit and 3 construction units. Each construction unit employed approximately 220 people.

3.4.4 Technical Criteria

The aims of the Lesotho programme were to construct gravel roads to a specified standard; create employment and improve the rural economy. The programme criteria were mostly social and economic and not necessarily technical. Road specifications were similar to those used in Kenya, and similar construction activities were executed by labour.

3.4.5 Development of Small Contractors

In order to ensure sustainability, reduce government establishment, achieve greater efficiency and be more cost effective, the Lesotho government decided in early 1990s that labour-intensive road-works must be privatised (Twumasi-Boakye, 1996). However, the domestic contracting industry had no capacity to take over LBW roadworks. Consequently a small contractor training programme was started in 1993 (ibid).

Selected trainees profiles varied from primary education to engineering degree. The training programme was made up of theoretical and field sessions, and lasted for about ten (10) months. Initially 12 contractors were trained with the support of the ILO (ibid).

3.4.6 Programme Outputs

The major component of LCU's work was gravelling, maintenance and reconstruction of roads. Between 1000km and 1400 km of roads were gravelled and 404km reconstructed. The average unit construction cost achieved in Lesotho was about US\$55 000/km. The building of high standard gravel roads even in

mountainous terrain was achieved and a sense of ownership of the roads was generated in the communities.

The programme created 2 000 jobs with 46% of the cost going to local labour. Site and office overheads were 23% with materials and tools 10% and plant 21%. Wage rates in Lesotho were about US\$4.5 per day. Employment targets were however not reached due to a lack of a sound institutional base and lack of assurance of long term funding (Pama, 1992).

3.4.7 Conclusion

The programme in Lesotho achieved its objectives and showed that the Kenya programme principles are not unique to a particular context but may be replicated elsewhere if appropriately customized. The main criticism however (Edmonds, Goppers and Soderback, 1986, quoted in Pama, 1992) is that the LCU had failed to transform the successful pilot phase into a full scale implementation phase.

3.5 A Botswana Labour-Intensive Works Programme

3.5.1 Background

The Botswana government initiated a rural roads programme within the Ministry of Works and Communications in 1974. However the whole road planning process of design, specification and construction was not re-engineered for execution by labour and the programme remained in effect capital-intensive for a long time (Mc Cutcheon, 1991(1), 1992).

Two major objectives of the Botswana's 5th and 6th National Development Plans (1976-1991) were the creation of employment and rural development. As one of the means of fulfilling the objectives of the NDP, the Botswana Government decided that labour-intensive methods should be used by District Councils, under the Ministry of Local Government and Lands, to improve and maintain the 13,000km of non-gazetted roads for which they were responsible. During 1980-1982, a pilot project was implemented in the Central District for labour-intensive "district road"

construction and maintenance. Initial resistance to the programme was experienced due to design standards, mismatched expectations and ignorance. Once these had been overcome the pilot project was expanded into a national programme (ibid).

3.5.2 Institutional Arrangements

The programme was driven by the national government. It had the required institutional backing and a detailed 3 year training programme was initiated for district co-ordinators. In a period of ten (10) years, from 1980 to 1989, one hundred and forty five (145) people were trained for 1 year as single site supervisors (road builders). Seventeen (17) of these were trained further to multi-site supervisory levels (ibid)

3.5.3 Technical Criteria

Initially the standards applicable in Kenya were specified. The design for hilly Kenya was not appropriate and difficulties were experienced with speed. With road user's expectations related to the South African gravel network, the width of roads and vertical alignment were adjusted and revised for the particular context.

The standard of construction was higher than in Kenya, was comparable with equipment and had an animal drawn haulage system. The overall system was in effect more labour-intensive than in Kenya, with 65% of the costs going to labour. The same construction activities as used in Lesotho and Kenya were carried out by labour-intensive methods. The major difference was the use of donkey carts for the haulage of surfacing materials in Botswana.

3.5.4 Programme Output

By 1990, over 2 000 km of roads had been upgraded and 3 000 people per year were employed (Solberg, Nteta and Tensen (1990) quoted in McCutcheon 1992). During the same period 213 road builders were trained, and regular refresher courses were held. A construction team consisted of 100 - 150 labourers under 4-6

road builders. Once the road had been constructed an assistant road builder and 6-10 maintenance workers maintained it. The team was made responsible for a 6-10 km stretch of road.

3.5.5 Conclusion

Independent evaluations have concluded that the Botswana programme was a success in relation to most of its objectives (Solberg et al, 1991). A good training programme was developed, emerging contractors as road builders were trained and then they maintained the built roads.

The following chapter discusses the planning and preparation for the labour-intensive works pilot projects in Namibia.