Investigation of factors affecting rural road maintenance: the case of Sokoto State, Nigeria

This item was submitted to Loughborough University's Institutional Repository by the/an author.

Additional Information:

- A Doctoral Thesis. Submitted in partial fulfillment of the requirements for the award of Doctor of Philosophy of Loughborough University.

Metadata Record: https://dspace.lboro.ac.uk/2134/11704

Publisher: © Shehu Yabo Abubakar

Please cite the published version.
This item was submitted to Loughborough University as a PhD thesis by the author and is made available in the Institutional Repository (https://dspace.lboro.ac.uk/) under the following Creative Commons Licence conditions.

For the full text of this licence, please go to: http://creativecommons.org/licenses/by-nc-nd/2.5/
INVESTIGATION OF FACTORS AFFECTING RURAL ROAD MAINTENANCE - THE CASE OF SOKOTO STATE, NIGERIA

by

ABUBAKAR SHEHU YABO, BSc, MSc.

A Doctoral Thesis submitted in partial fulfilment of the requirements for the award of

Doctor of Philosophy of Loughborough University

August, 1998

©Shehu Yabo Abubakar 1998
Abstract

The study relates to road management in Nigeria, on one (land locked) state out of the 36 that comprise the country. The state (Sokoto) has a population of over four million people, and the acute shortage of road connections to the majority of its rural inhabitants necessitated the research. The practice of road management in Sokoto is broadly representative of other Nigerian States. Sokoto like all the northern states, is distant from the coast, and its main asset is an abundant supply of cheap labour. Roads provide the principal mode of access, and are a key factor to trade, industry and social development.

An intensive literature review was carried out to determine the existing state of knowledge on the problems encountered by practitioners in the field. The review (desk study) occupied the first stage of the research. It rapidly became clear that the topic is seriously under-researched, both internationally and specifically in the study area. The review has also drawn upon a variety of published and unpublished sources, drawing upon the limited amount of quantified and rigorous data that is available, but also assessing the more substantial quantity of partially quantified or impressionistic information to be found in project reports and case studies. For research to be successful, observable indicators must be found for at least some of the abstract concepts used in the theory. In this regard, six months field work (data collection) was carried out in Nigeria as the study’s second stage. This translates the research hypothesis into an operational hypothesis. The third stage of the research covers the analysis and validation of data. This includes an interpretation, which serves as a bridge between the theoretical and practical data.

The thesis describes how the empirical data has been used in analysis, to spell out parameters that affect rural road management in Nigeria as in many Sub-Saharan Africa. The research revealed the inappropriate use of technology to be the major factor hindering performance. The study suggests some workable operating methods as possible alternatives that can simplify the difficulties of road maintenance under different operating conditions.

Keywords: Labour-based methods, Equipment Intensive Techniques, Inappropriate Technology, Contracts, Contractor, Community, Participation, Construction, Materials
Research Motivational Concept

The author's interest in the research topic started at the age of 15. The idea originated two decades ago, during the time of Nigeria's second democratic elections in 1979. The author served in the electoral process as a voter's registration officer in a village that was very difficult to reach due to lack of access roads. It was Friday morning and the registration was scheduled to take place the next morning. Access to the village was imperative, but thoroughly impossible due to lack of access roads and a bridge to cross the river. The author's inability to swim across the river worsened the frustration, as he had to wait for five hours to get a camel for the river crossing. The crossing with the camel still proved difficult after the author fell in the middle of the river, injuring his right leg. The author, with the aid of the Village Head and his entourage, managed to reach the village, but cheerlessly, there was no health centre to provide for emergency treatment, and none of the villagers had any knowledge of first aid treatment. The author then had to wait for 24 hours before returning back home for medical treatment.

After the completion of the exercise, all the returning officers were asked to narrate their experiences of the exercise. Coincidentally, the Chief Returning Officer (CRO) was a civil engineer by profession, and as such was delighted to learn of the author's experience. He expressed his sympathy with the author's experience and the harsh realities of human existence in those areas. The CRO then explained to the audience the importance of infrastructure for the development of the region. He singled out the road as the most fundamental source of communication that can influence the development of many other infrastructures. The author from then onward always recalls the incident, and the scale of suffering by the communities in those areas, and as such developed earnest interest in rural access road development for humane development.

The author appraised other infrastructures and found them to be indispensable for our existence. However, road transport in Sokoto State (a land locked area), is of exceptional importance to the service of the majority poor rural communities. Road transport in these circumstances influences economic development, diversifies production, expands trade, reduces poverty, raises productivity and lowers production costs. Road transport, in this case, is a saving to transporters and passengers; it
improves environmental conditions, enhances welfare and fosters economic growth and as such serves as a life line in the day to day activities of our normal affairs. Improving the services for roads will therefore ensure growth and development of rural areas.

It is sad to see that almost every aspect of development in this area is linked to road. Road failures in these circumstances therefore quickly reduce the communities’ quality of life and productivity. As the road is the only mode of transport, it is the only means that can provide services to meet the demands of businesses, households, and many other areas of economic development. Roads, in this case represent, if not the engine, then the “Wheels” of economic activity. The development of every infrastructure sector requires road transport as an input for its commodity. Users demand road services for raising their productivity by, for example, reducing the time and effort needed to secure safe water, to bring crops to market, or to commute to work.

Deficiency of road transport sector affects:

- **Agriculture**, --- Which will in turn affect farmers input and output.
- **Trade and Commerce**, --- Which will in turn affect market links, e.g. local tools.
- **Industries**, --- Which will in turn affect small enterprise promotion.
- **Social Development**, --- That can affect sports, and other social obligations e.g.;
- **Education**, --- Schools, pupils, quality teachers,
- **Health**, ---- health centres, women in labour,

The developments of these basic necessities of life are likely to remain so in the absence of a maintainable road network. The development of this infrastructure can encourage investors to invest for the growth of these areas. This research, however, has revealed how rural roads can affect the local economy especially when related to the above mentioned infrastructures.

**Agriculture:**
In Nigeria, about 80% (almost 90 million) live in and derive their livelihood from rural areas. They receive less than 30% of development funds from the national treasury. In
particular, Northern Nigeria as a whole, which Sokoto (case study) belongs to, is predominantly agricultural in economy.

Trade and Commerce:
Northern Nigeria especially the case study area (Sokoto), is one of the main sources of varieties of commodities for the country. Commodities such as fruits, vegetables, groundnuts, cotton, hide and skins, tomatoes and onions are produced in high quantities in rural areas. Poor road links to local markets makes the transportation of these commodities (mostly perishable) difficult.

Industries:
Poor road links make it extremely difficult for private enterprises to open industries in rural areas. Majority of farm products end up being wasted due to lack of industries for the modern methods of preservation. In the absence of local industries, and the extremes of weather conditions, utilisation of these commodities would be quite difficult, if not impossible.

Education:
Technical and managerial skill in the public sector is generally of low standard. Lack of access makes it difficult to attract teachers of quality or even the volunteers to help in motivating the community on development programmes. This lack of education result in backwardness in education, and it affects the representation of rural areas in both the Federal and State governments. This makes it difficult to attract authorities’ influence to divert resources to their development.

Health and Sanitation:
As a WEDC trainee, I have to be very regardful of Health and Sanitation. Dr Margaret Ince taught us to regard health and sanitation as essential and priceless in comparison with all other infrastructure. It is therefore worthwhile to give it serious consideration. Rural health centres in Nigeria, particularly in the North are poorly developed. The lack of any sort of rural health centres or dispensaries causes serious concern for the health status of rural communities, especially women in labour among others. Lack of good road connections makes it difficult to provide adequate attention for pregnant women and their vulnerable children.
EXECUTIVE SUMMARY

The study relates to road management in Nigeria, Africa's most populous country, located at the West coast of the continent. The entire continent's population is 615 million, with West African region sharing 192 million (World Factbook 1996), and Nigeria alone having nearly 112 million (NPC, 1992). The interpretation above indicates that, one African in every six is a Nigerian as is one in every two West Africans, highlighting the relevance of this research to the entire continent.

The research concentrates on Sokoto as a case study area. The State is one of the 36 states that comprise Nigeria, and the practice of road management in Sokoto is broadly representative of other Nigerian states. Sokoto as in most Nigerian states, has in recent decades suffered from deteriorating economic conditions, exacerbated by a crippling scarcity of foreign exchange. Its main asset is an abundant supply of cheap labour, and like all the northern states, it is distant from the coast. Roads provide the principal mode of access, and are a key factor to trade, industry and social development.

The report therefore presents an empirical study of Nigeria's rural road industry located in 774 local government areas, and distributed over around 923,770 square kilometres of land area. It reveals that rural roads in Nigeria are inefficiently governed due to split of responsibilities between the tiers of governance that control the sector. The confused responsibility for rural roads has resulted in their inadequacy and shabby status, hindering the development effort of the country. Accessibility is essential for a wide range of interactions, including the functioning of agriculture, labour markets, as well as export and import flows. Rural roads in Nigeria may be thought of as a landscape of interaction possibilities for resource flows, communication, interpersonal and interfirm contacts as well as other kinds of market contacts. Rural roads serve as economic agents providing accessibility to farms, some located mineral resources (as illustrated in table 4A, page 97), and markets for products and services.

Given the above formulation, this study analyses how human, technological, and organisational as well as other factors influence the development of rural roads in Nigeria. In particular, the study investigates how the economic and social development...
of approximately 80% of the population (about 90 million people) is affected by the choice of technology in rural road development. In addition, the study looks at the repercussions to the country's economy with regard to choice of technology. It examines how economic activities react to changed conditions, i.e., how choice of technology in rural road projects can affect activities such as; transport, output from farm production units, market goods, and other daily activities. The analysis also looked at which variables of the choices have the strongest influence. In examining the use of local resources in the improvement of rural transport in Nigeria, the report discusses how employment creation and income generation can be integrated into programmes to improve access by the rural population to economic and social services. The research draws on work successfully carried out by the UNDP/IL0 both in employment-intensive methods for road construction and maintenance and in improved local level rural transport planning. The author suggests that there is considerable potential for expanding such programmes and identifies critical issues in their implementation.

The basic assessment in this study is that maintainable rural road networks generate accessibility empowerment to Nigeria's rural areas. It could be argued that a regional economy can be depicted by a model with intraregional nodes and links, where the latter connect the nodes and make flows between the nodes possible. The same argument can be applied to a multiregional economy. The overall conviction is that improvements of rural road networks within and between regions change the accessibility investments. Hence, transportation and economic interaction are determine to be facilitated and become more efficient. As time goes by the better conditions for interaction are expected to gradually bring about a more efficient resource allocation which will stimulate economic growth. Such a dynamic process (Johansson 1993)¹ is illustrated in the figure below.

Interregional links integrate the economies of regions. Improving the rural road access in Nigeria and Sokoto State in particular promotes interaction links which are theoretically equivalent to the reduction or removal of trade frictions in local trade. This is an important consideration for Sokoto, which is land locked far from sea ports, and lacking satisfactory transport links to other parts of the country. The state has very poor rural road connections, which affect both factor markets and the markets for goods and services. The research suggests that technology choice is one of the major factors affecting the development of rural roads in Nigeria. An assessment of willingness to pay for the road investments has shown that local people in all the three regions of Nigeria are ready to pay for road investment, providing that they are confident that the work will be carried out efficiently and effectively. The UNDP/ILO project in Nigeria has demonstrated that local people are anxious to participate in rural road construction and maintenance projects, and that they are able to make a real contribution providing that appropriate techniques are specified.

An adequate rural road infrastructure is critical to rural development, and fundamentally relies on effective participation between all parties. As the research is investigating the factors that affect rural road development in Sokoto State, Nigeria, the study focuses on the choice of technology, to enable the local people have a say in the development that pertain to their areas. The goal is to establish a workable system for rural road sustenance through the application of appropriate technology, which
would have implications for growth in the road industry. A variety of technologies are discussed, including: equipment-based technology, labour-based technology, and community-based techniques. Although previous studies have shown that application of heavy equipment is the predominant practice in the country, in almost all projects executed, the impact on the target beneficiaries has been disappointing. The advantages of applying local resources to meet local needs as against the disadvantages of equipment system to local needs made the adoption of labour-based technology suitable. The study has found that, there is increasing awareness and acceptance of labour-based technology and its benefits. The comparison between labour-intensive and equipment-intensive techniques shows the former to be both realistic and affordable, while the latter are increasingly unrealistic and unaffordable in the Nigerian context.

No solutions can be entirely problem-free, and the study reveals that problems with labour-based methods include:

* provable delays in project completion;
* site conditions are not always suitable;
* where materials are too hard for hand excavation, compacting by hand is impossible;
* labour is not always motivated;
* Nigeria’s recent political instability (1994-1998), has resulted in abandonment of the organisation responsible for setting, funding, and operating the training of labour-based system in the country;
* the UNDP/ILO were effective promoters of labour-based techniques in the Nigeria, but this assistance is no longer available;
* lastly and the most strange of all, the educational principles of local resource use are still not widely taught in the educational institutes of Nigeria.

Tables A and B below summarise the choices, and the appropriateness for selecting the suitable and fitting technology for various circumstances.
Nonetheless, equipment-based systems have been shown to bring their own set of problems, which are more fundamental and intractable. Thus, it seems likely that labour-based will eventually dominate as:

- private sector participation is now common, and private and community contractors are more likely to opt for labour-based techniques;
- most local tools required in construction are now manufactured at competitive prices;
- assessment of labour (UNDP/IL0 1992) in the country has indicated a high labour surplus at cheaper rate;
- there is abundance of local resources;
- there is abundance of manpower in the country who require little training on the use of labour-based methods;
- and most importantly, the country is on the verge of democratising from military dominated politics.

The role of the Petroleum (special) Trust Fund (PTF):

In 1994, the Nigerian government established an independent road fund, together with other infrastructural sectors, as catalyst for national roads development under the Petroleum (special) Trust Fund (PTF), to safeguard its road networks and related infrastructure from total collapse. The organisation (PTF) was established to invest the proceeds from higher fuel prices more productively, including financing the rehabilitation of the country's road networks.

The organisation has so far provided assistance to the development of a sustainable road maintenance capacity through the construction and operation of toll gates by contractors at appropriate locations, and retaining same the contractors for routine maintenance after the defects liability period using proceeds from the toll gates. The PTF employ Nigerians with experienced domestic as well as foreign contractors to provide competition in the construction works.

In 1997, PTF started rehabilitation work for 12,500 km of Federal Highways at a cost of N33 billion. Having realised the difficulty faced by Nigerian states and the
deteriorating state of their road networks, the PTF project extends their services to cover states and some LGCs. The project has identified rehabilitation and pavement strengthening as crucial for intervention. The class of rehabilitation includes patching of potholes, sealing of moderate cracks, desilting of drains, washout repairs, culvert repairs, and reconstruction of failed sections and overlay, which mostly relates to unskilled labour for local communities. According to the project brief; “The implementation of the PTF project is expected to:

- provide free passage of 12,000 km of the federal highway and more than 650 km of urban roads;
- increase riding comfort, reduced vehicle operating costs, and a reduction in the number, severity and costs of highway accidents;
- provide passage for the timely delivery and evacuation of agricultural inputs and products thus reducing the price of food items in the market;
- contribute to expanding agriculture and export crops and support domestic manufacturing activities;
- improve the pavement management system;
- provide employment opportunities to over 35,000 skilled labour;
- provide about 400 places to students who will receive training;
- facilitate the completion of rehabilitation works on 1,515 km of roads under the Highway Highway Sector Loan Project” (PTF, 1997).

The establishment of the PTF gives real ground for hope that analysis and conclusions of the present study will be accepted and applied, both within the focused study area and elsewhere in Nigeria.

Keywords: Labour-based methods, Equipment Intensive Techniques, Inappropriate Technology, Contracts, Contractor, Community, Participation, Construction, Materials

---

Figure 12B: Pathway Analysis Illustrating Decision Making Process Regarding Technology Choice

Design Suitable for Labour-Based approach?
Yes → Site conditions suitable for labour?
Yes → Is labour available?
Yes → Is labour motivated?
Yes → Can targets be met by labour-based methods?
Yes → PILOT PROJECT

- Performance regarding: -Quality -Training -Management

- Productivity?
-Labour availability?
-Forecast production for long-term programme?

Use labour-based approach
Positive
Use equipment-intensive approach
Negative

Can changes be made?
No → Can changes be made?
No

Determine appropriate mix of labour and machines
Partly
Assess wage rates and incentive schemes
No change possible
Positive change possible

Assess wage rates and incentive schemes

No (*):

-ve Use equipment-intensive approach

Use labour-based approach
Positive
Make financial and economic analysis
Negative

(*) Based on actual performance/comparison between labour-based and equipment-intensive alternatives

Source: The figure is adopted from Edmonds and de Veen 1992.
Are Appropriate Designs Prepared for Labour Intensive Construction?

- Yes → Research Requirement → Alternative Designs Created
- No

Separate into Activities

Research Requirement

Is it Physically Possible to Use Labour Intensive Techniques for the Activity

- Yes → Possible Reasons:
  - Material Too Hard for Hand Excavation
  - Impossible to Compact by Hand
- No

Would Labour Intensive Methods Meet the Standard?

- No
- Yes → Rectifiable before the Project Begins?
  - Yes → Quality
  - Time
  - *Develop Improve Labour Intensive Methods
  - *Improve Admin. Supervision, Management Capacity
  - *Training
  - *Increase Amount and Productivity of Labour
  - *Modify Specifications, Institutions
  - Labour Intensive → Machine Intensive
- No

Can Completion be Delayed?

Cost Calculations

Passes Socio-economic
- Passes Financial → Does the Machine-Labour Combination Pass the Decision rule?
- No → Replace Relatively Expensive Activities
- Yes

Fails Socio-economic
- Passes Financial
  - Conventional Construction
  - Specify Degree of Labour-Intensity in Tender → Award of Tender; Project Implementation
  - Evaluation and Monitoring
- Fails Financial

Source: From Phillips et al. 1994
CERTIFICATE OF AUTHORITY

This is to certify that:

a) I am responsible for the work submitted in this thesis,

b) The original work is my own except as specified in footnotes and the references;

c) Neither the thesis nor the original work contained therein has been submitted to this or any other institution for a higher degree.

(Signed)

2nd Nov, 1998 (Date)

The research was carried out by S.Y. Abubakar, Bsc, Msc, and supervised by Dr Derek William James Miles, Bsc, PhD, CEng, FICE, FIMgt, EurIng, Director, Institute of Development Engineering, Loughborough University, UK.
Acknowledgements

The author (I) would like to express my sincere appreciation and thanks to my supervisor, Dr Derek William James MILES (Director of the Institute of Development engineering), for his guidance, support and encouragement throughout my research work. His ideas, suggestions and comments form a valuable part of this thesis.

I am thankful to the WEDC members of staff, particularly Kathy Brown, Patricia Jackson, my Msc course tutor Dr Andrew Cotton, my Pre Msc course tutor Dr Margaret Ince, Paul and Dr Jeremy Parr, for their excellent services.

Appreciation is also due to my research colleagues and all the members of staff of Civil and Building Engineering Department for their kindness, and patience as well as their valuable contributions in academic discussions. My thanks and love are once again due to my father and mother who had provided me the foundation of my education. My wife and our son for their patience and understanding throughout the period of this research. Appreciation is also due to all my relatives and friends (in Nigeria and overseas) for their support, understanding and encouragement.

Last but not the leasts, my special thanks to Sokoto State Government who provided the finance, General B.S. Magashi who approved and continue to support me, and the root founder of the whole process, Honourable Alhaji Alfa Wali the present Minister of Agriculture in the Federal Republic of Nigeria.
Dedicated to:

My dear parents;

My father Alhaji Daudu Yabo and my mother Hajiya Aishat Aliyu Yabo,

My dear wife Hajiya Amina Abubakar Yabo and our children Bashir and Nabil, whose love, patience and interest in my research work proved to be a great source of encouragement.
**Contents**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>I</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>iii</td>
</tr>
<tr>
<td>List of Contents</td>
<td>v</td>
</tr>
<tr>
<td>List of Figures</td>
<td>xvi</td>
</tr>
<tr>
<td>List of Tables</td>
<td>xviii</td>
</tr>
<tr>
<td>List of Terms (Glossary)</td>
<td>xxi</td>
</tr>
</tbody>
</table>

**CHAPTER ONE ---- GENERAL INTRODUCTION**

1.0 INTRODUCTION

1.0.1 Rural Roads and Agriculture in Nigeria
1.0.2 Rural Roads and Industry in Nigeria

1.1 BACKGROUND INFORMATION

1.2 RESEARCH OBJECTIVES

1.3 JUSTIFICATION OF RURAL ROAD INFRASTRUCTURE

1.4 SIGNIFICANCE OF LABOUR BASED METHODS

1.5 RESEARCH HYPOTHESIS

1.6 RESEARCH METHODOLOGY

1.7 ORGANISATION OF STUDY
CHAPTER TWO -- DISTINCTIVE NATURE OF THE NIGERIAN ENVIRONMENT

2.0 INTRODUCTION 26

2.1 DESCRIPTION OF THE STUDY AREA 28
2.1.1 Case study area 32
   2.1.1.1 Climate 32
   2.1.1.2 Population of case study area 32
2.1.2 Country's Population 34
2.1.3 Local Skills 36

2.2 GENERAL ENVIRONMENT 38
2.2.1 Political Aspects 39
2.2.2 Economic Aspects 40
2.2.3 Socio Cultural Aspects 42

2.3 GENERAL STATE OF RURAL ROADS IN NIGERIA 43
2.3.1 Present Situation of Rural Roads 44
2.3.2 Inadequate Funding 44
2.3.3 Low Priority for Maintenance 45
2.3.4 Inappropriate Method of Road Maintenance 45

2.4 POLICY AND PLANS 46
2.4.1 Government Concerns 47
2.4.2 Community's concern 48

2.5 ORGANIZATIONAL AUTONOMY 49
2.5.1 Government Structure 50
2.5.2 Community's structure 51
2.6 LEADERSHIP
2.6.1 Governmental Leadership
2.6.2 Community’s Leadership
2.6.3 Special Features - Nigeria
2.6.4 Special Features - Sokoto State
2.6.5 Special Features - Village level
2.6.6 Scope for improved Co-ordination

CHAPTER THREE --- METHODOLOGY

3.0 INTRODUCTION
3.1 RESEARCH PROCEDURE
3.1.1 Research Design
3.2 DATA COLLECTION METHODS
3.2.1 Field Work Survey Procedure
3.2.1.1 Case study area
3.2.1.2 Other areas
3.2.2 Project Value
3.3 QUESTIONNAIRES AND MEASUREMENT
3.3.1 Survey Responses
3.3.2 Analysis of Results
3.3.3 Some Selected Road Networks
3.3.4 Regional disparities on rural roads service coverage
3.4 LABOUR AVAILABILITY
3.5 EQUIPMENT AND TECHNOLOGY
3.6 CONTRACT AND CONTRACTORS
CHAPTER FOUR -- INFRASTRUCTURE DEFICIENCIES IN NIGERIA

4.0 INTRODUCTION 93

4.1 CAUSES OF INFRASTRUCTURE DEFICIENCIES 95
  4.1.1 Inappropriate technology 95
  4.1.2 Need for training 96

4.2 EXTENT OF INFRASTRUCTURE DEFICIENCIES IN NIGERIA 97

4.3 SITUATION IN THE CASE STUDY AREA 98

4.4 APPROPRIATE TECHNOLOGY 103

4.5 APPROPRIATE ROAD TECHNOLOGY 105

4.6 APPROPRIATE TOOLS AND CONSTRUCTION MATERIALS 106
  4.6.1 Maintenance and Scope for Local Production 108
    4.6.1.1 Scope for Local Production 109
  4.6.2 Light Equipment for Construction of Rural Feeder Roads 110
    4.6.2.1 Availability and Purchase 111
### CHAPTER FIVE ---WHY LABOUR BASED METHODS FOR NIGERIA?

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0</td>
<td>INTRODUCTION</td>
<td>113</td>
</tr>
<tr>
<td>5.1</td>
<td>CONCEPT OF LABOUR BASED CONSTRUCTION</td>
<td>114</td>
</tr>
<tr>
<td>5.1.1</td>
<td>Labour Availability</td>
<td>116</td>
</tr>
<tr>
<td>5.1.2</td>
<td>Labour Motivation</td>
<td>117</td>
</tr>
<tr>
<td>5.1.3</td>
<td>Labour Management</td>
<td>117</td>
</tr>
<tr>
<td>5.2</td>
<td>EMPLOYMENT GENERATION</td>
<td>118</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Comparison of Employment Generation</td>
<td>120</td>
</tr>
<tr>
<td>5.3</td>
<td>SCOPE FOR INTRODUCTION OF LABOUR-BASED METHOD</td>
<td>121</td>
</tr>
<tr>
<td>5.4</td>
<td>SCOPE FOR PRODUCTIVE EMPLOYMENT IN RURAL ROAD MAINTENANCE</td>
<td>122</td>
</tr>
<tr>
<td>5.5</td>
<td>ECONOMIC AND SOCIAL JUSTIFICATION OF LABOUR BASED CONSTRUCTION TECHNIQUES IN NIGERIA</td>
<td>123</td>
</tr>
<tr>
<td>5.6</td>
<td>INSTITUTIONAL ASPECT OF LABOUR BASED METHODS</td>
<td>124</td>
</tr>
<tr>
<td>5.7</td>
<td>SUSTAINABLE MAINTENANCE ON RURAL ROADS</td>
<td>125</td>
</tr>
</tbody>
</table>

### CHAPTER SIX ---NIGERIAN ROAD SYSTEM AND THE SPLIT OF RESPONSIBILITIES

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0</td>
<td>INTRODUCTION</td>
<td>127</td>
</tr>
<tr>
<td>6.1</td>
<td>INSTITUTIONAL FRAMEWORK</td>
<td>129</td>
</tr>
<tr>
<td>6.1.1</td>
<td>Agencies Involved In road Operation</td>
<td>131</td>
</tr>
<tr>
<td>6.1.1.1</td>
<td>Directorate of Food, Roads and Rural Infrastructure (DFRRRI)</td>
<td>132</td>
</tr>
<tr>
<td>6.1.1.2</td>
<td>Agricultural Development Projects (ADPs)</td>
<td>132</td>
</tr>
</tbody>
</table>
6.1.1.3 National Directorate of Employment (NDE) 134
6.1.1.4 State Ministry of Works and Transports (MOWT) 134
6.1.1.5 Local Government Councils (LGCs) 134

6.2 FEDERAL ROAD SYSTEM 137

6.3 STATES ROAD SYSTEM 138

6.4 LOCAL GOVERNMENT ROADS (rural roads) 138

6.5 ROAD SYSTEM IN SOKOTO STATE 140

6.6 RURAL ROADS IN SOKOTO STATE 141

CHAPTER SEVEN --- EMPLOYMENT OF LOCAL CONTRACTORS

7.0 INTRODUCTION 144

7.1 DEVELOPMENT OF INDIGENOUS CONTRACTORS 147

7.1.1 Technical Aspects of Road Maintenance and Managerial Implications 149

7.1.2 Potential Benefits from the Use of Local Firms 150

7.1.2.1 The Efficiency Factor 150

7.1.2.2 The National Development Factor 151

7.1.2.3 Employment and Economic Growth 152

7.1.3 Problems and Impediments to Implementations 152

7.1.3.1 Creation of the Market 153

7.1.3.1(a) Political philosophy and structure 153

7.1.3.1(b) Aid donor policies 153

7.1.3.1(c) Clients’ requirements 153

7.1.3.1(d) Form of Contract and Contract Documents 154

7.1.3.1(e) Uncertain Payments 154

7.1.3.1(f) Fluctuating Workload 154
7.1.3.2 Control 154
7.1.3.3 Effects of Organisational Change 155
7.1.4 Action Plans 156
7.1.4.1 Market Development 156
7.1.4.2 Measures to Effective Control 157
7.1.4.3 Facilitating Organisational Change 157
7.1.4.4 Institution Building 157

7.2 CATEGORIES OF CONTRACTORS IN NIGERIA 158
7.2.1 Multinational Foreign firms 158
7.2.2 Indiginised firms 159
7.2.3 Direct Labour Operations (DLO) 159

7.3 SMALL SCALE CONTRACTORS 161

7.4 SURVIVAL OF SMALL SCALE CONTRACTORS 162

CHAPTER EIGHT--EDUCATION AND TRAINING FOR LOCAL RESOURCE UTILISATION

8.0 INTRODUCTION 163

8.1 RESPONSIBILITY FOR THE PROVISION OF TRAINING 166

8.2 CIVIL ENGINEERING CURRICULA IN NIGERIA 169

8.3 TRAINING FOR CAPACITY BUILDING 166

8.2.1 Academic Curricula of Universities 171
8.2.2 Academic Curricula of Polytechnics 173
8.2.3 Prerequisite Conditions for effective introduction of labour based technology 174
8.2.3.1 Strengthening the capacity of Civil Engineering Departments 174
8.2.3.2 Strengthening the Civil Engineering Curricula to Utilise Local Resources 175
8.2.3.3 Supply of Educational Materials for Local Resource Utilisation 176
8.3 TRAINING FOR CAPACITY BUILDING

8.4 TRAINING AND DEMONSTRATIONS
  8.4.1 The Demonstration Effect

8.5 TRAINING OF LABOUR BASED TRAINERS
  8.5.1 Project Results over the Period of Time

8.6 TRAINING FOR GREATER PARTICIPATION

CHAPTER NINE --- ROAD DETERIORATION AND FAILURES

9.0 INTRODUCTION
  9.0.1 Benefits from road maintenance
  9.0.2 Consequences of neglecting or delaying road maintenance

9.1 FACTORS RESPONSIBLE FOR ROAD DETERIORATION AND FAILURES
  9.1.1 Institutional Failure

9.2 TYPES OF ROAD DETERIORATION AND FAILURES
  9.2.1 Factors Responsible for Road Deterioration and Failures

9.3 TYPES AND CHARACTERISTICS OF ROAD MAINTENANCE
  9.3.1 Routine Maintenance
  9.3.2 Periodic Maintenance
  9.3.3 Emergency Maintenance

9.4 FACTORS INHIBITING BESIDES PRIORITISING MAINTENANCE
  9.4.1 Factors Inhibiting Road maintenance
  9.4.2 Factors influencing Prioritising Maintenance Operations
9.4.3 Priority for Emergency Maintenance 195
9.4.4 Priority for Periodic Maintenance 196

9.5 RESOURCES FOR ROAD MAINTENANCE 196
9.5.1 Labour 197
9.5.2 Materials 197
9.5.3 Equipment or Tools 198
9.5.4 Funding 198
9.5.5 Resource Utilisation 198

CHAPTER TEN --- CONCEPT OF POPULAR PARTICIPATION FOR RURAL ROADS

10.0 INTRODUCTION 199
10.0.1 Decision making 199
10.0.2 Project Planning 199
10.0.4 Implementation phase 200

10.1 EMPOWERMENT 201

10.2 COMMUNITIES ROLES IN ROAD MAINTENANCE 202

10.3 ROAD MAINTENANCE AND SCOPE FOR COMMUNITY PARTICIPATION 203
10.3.1 Direct Labour 203
10.3.2 Community Contract 203

10.4 INSTITUTIONAL SETTING FOR POPULAR PARTICIPATION 204
10.4.1 Federal Government Institutions 204
10.4.2 State Government Institutions 205
10.4.3 Local Government Institutions 205
10.4.4 Local Community Level Institutions 205
10.5 A TYPICAL COMMUNITY SET UP IN NIGERIA

10.5.1 Selection and Role of Leadership in Community Development

10.5.2 Rural Community self-help projects (road) in Sokoto State

CHAPTER ELEVEN ------- GAP ANALYSIS BETWEEN ALTERNATIVE TECHNOLOGIES, AND OBLIGATING ESTABLISHMENTS

11.0 INTRODUCTION

11.1 TOP DOWN VERSUS BOTTOM UP APPROACHES

11.2 PUBLIC VERSUS PRIVATE SECTOR ENTERPRISES

11.3 LABOUR-BASED VERSUS EQUIPMENT-BASED METHODS

11.3.1 Systems Costs Variations Under a Km of Road Construction

11.3.2 Outcome of the Comparisons

11.4 SYSTEMS IMPACTS ON ECONOMY AND THE COMMUNITY

11.4.1 Impacts from the Road Projects

11.4.2 Impacts from Projects and Technology

11.4.5 Gap or Vacuum interpretation

11.5 PERFORMANCE EFFICIENCY

CHAPTER TWELVE --- CONCLUSIONS AND RECOMMENDATIONS

12.0 CONCLUSIONS

12.1 CHALLENGES IN RURAL ROAD SUPPLY

12.1.1 Community Participation

12.1.2 Labour availability

12.1.3 Use of local Contractors
12.1.4 Use of local Resources 232
12.1.7 Manpower and Development 234
12.1.8 Educational Curriculum 234

12.2 PRACTICE OF ROAD MANAGEMENT IN SOKOTO STATE (case study area) 235
12.3 INSTITUTIONAL DEVELOPMENT 237
12.4 CHOICE OF TECHNOLOGY AND AFFORDABILITY 238

12.5 RECOMMENDATIONS 242
12.5.1 Institutional Reforms 243
12.5.2 Local Government Level Reforms 243
  12.5.2.1 The Advisory Committees 244
  12.5.2.2 Application in Sokoto State 244
  12.5.2.3 Local Govt. Implementation Committee 245

List of References 246

Appendices
## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>The general organisation of the study</td>
<td>22</td>
</tr>
<tr>
<td>Figure 2.1</td>
<td>Map of the Federal Republic of Nigeria (36 States)</td>
<td>30</td>
</tr>
<tr>
<td>Figure 2.1A</td>
<td>Map of the Federal Republic of Nigeria (major routes connections)</td>
<td>31</td>
</tr>
<tr>
<td>Figure 2.1.1</td>
<td>Representation of LGCs and their Populations in Sokoto State</td>
<td>34</td>
</tr>
<tr>
<td>Figure 2.1.2</td>
<td>Representation of Nigerian States by Population</td>
<td>36</td>
</tr>
<tr>
<td>Figure 2.1.3</td>
<td>An illustration of Typical Blacksmith/Carpenters in rural areas</td>
<td>37</td>
</tr>
<tr>
<td>Figure 2.2.2A</td>
<td>Graphical comparison of Nigeria and its immediate neighbours based on their GNP and construction output</td>
<td>41</td>
</tr>
<tr>
<td>Figure 2.2.2B</td>
<td>Graphical representation of comparison between Nigeria and its other Oil producing nations based on GNP, Value added as % of GDP and Value added in Construction/capita</td>
<td>42</td>
</tr>
<tr>
<td>Figure 2.6.2A</td>
<td>An illustration of village meeting in rural areas of Northern Nigeria</td>
<td>58</td>
</tr>
<tr>
<td>Figure 2.6.2B</td>
<td>Illustration of a village meeting in rural areas of South East Nigeria</td>
<td>58</td>
</tr>
<tr>
<td>Figure 3B</td>
<td>Distributed Questionnaires as a proportion of responses by region</td>
<td>66</td>
</tr>
<tr>
<td>Figure 3B1</td>
<td>Percentages of total survey responses by regions</td>
<td>66</td>
</tr>
<tr>
<td>Figure 3C</td>
<td>Analysis of average survey responses by group</td>
<td>67</td>
</tr>
<tr>
<td>Figure 3D</td>
<td>Respondents groups by region</td>
<td>68</td>
</tr>
<tr>
<td>Figure 3D1</td>
<td>Groups respondents from the North</td>
<td>68</td>
</tr>
<tr>
<td>Figure 3D2</td>
<td>Group respondents from the South West</td>
<td>69</td>
</tr>
<tr>
<td>Figure 3D3</td>
<td>Group respondents from the South East</td>
<td>69</td>
</tr>
<tr>
<td>Figure 3K</td>
<td>Regional disparities in rural road densities and average distances from production centres</td>
<td>72</td>
</tr>
<tr>
<td>Figure 3M</td>
<td>Rural road performances in two selected states of the North</td>
<td>74</td>
</tr>
<tr>
<td>Figure 3N</td>
<td>Rural road performances in two selected states from South-East</td>
<td>75</td>
</tr>
<tr>
<td>Figure 3P</td>
<td>Rural road performance in two selected states from South-West</td>
<td>75</td>
</tr>
<tr>
<td>Figure 3Q</td>
<td>Regional computation of labour availability in sampled LGAs</td>
<td>77</td>
</tr>
<tr>
<td>Figure 3R</td>
<td>Sokoto State rural road construction and maintenance equipment holding situation</td>
<td>79</td>
</tr>
<tr>
<td>Figure 3S</td>
<td>Imo State rural road construction/maintenance equipment holding</td>
<td>80</td>
</tr>
<tr>
<td>Figure 3T</td>
<td>Domestic contractors response to survey questionnaire</td>
<td>83</td>
</tr>
</tbody>
</table>
Figure 3U Responses from selected Academic institutions in Nigeria 85
Figure 3V Number and distribution of participants trained under labour-based programme (1988 -1992) 87
Figure 3W Group responses on potential for rural road improvement 89
Figure 4A Some light equipment suitable for both Agriculture and roadworks 111
Figure 4B Some basic equipment used in roadworks operations in Nigeria 112
Figure 6A Annual rural road construction and rehabilitation undertaken by ADPs, 1978 - 87 (kms) 133
Figure 6B Comparing Nigeria’s rural road distribution with other African countries based on service coverage and km/1000 km² arable land 136
Figure 6C A prototypal structure of a road sector in Sokoto State 143
Figure 8.3 The Ladder of Competence 177
Figure 9C Sokoto State Trend in road allocated funding 193
Figure 9D The Four tiers involved in rural road development in Nigeria 194
Figure 10A Number and value of self-help (roads) projects in Yabo Local Government Council of Sokoto State (1992 - 1996) 209
Figure 10B Number and value of Community development projects and Local Government Contributions in Sokoto State (1994 - 1995) 210
Figure 10C Number and values of Self-help projects in Kwara State (1975-79) 211
Figure 11A Labour-based versus equipment-based under 6 components 222
Figure 11D Graphical Representation of Construction Method 224
Figure 11E Gap representation in a spider diagram 227
Figure 11F Gap representation in a bar chart and line diagram 227
Figure 11G Gap representation in a line graph 228
Figure 12A Pathway analysis to illustrating the decision making regarding technology choice 240
Figure 12B Pathway analysis illustrating decision making regarding appropriate design for technology choice 241
List of Tables

Table 1  Annual exchange rates (Naira per US$) from 1977 to 1997 12
Table 2.1.1  LGCs and their Populations in Sokoto State 33
Table 2.1.2  Tabulation of Nigerian States by Population 35
Table 2.2.2A  Comparison of Nigeria and its immediate neighbours based on GNP and construction output 40
Table 2.2.2B  Comparing Nigeria with its other Oil producing nations based on GNP, Value added as % of GDP and Value added in constrn/capita 41
Table 2.5  Tabulation of the three tier structures and the independent Community structure with their various executing agencies 51
Table 3A  Regional Selection of States, LGCs and Sampled Districts 63
Table 3B  Total number of survey responses by region 65
Table 3C  Total survey responses by group 67
Table 3D  Group Responses by regions 67
Table 3E  Categories of Respondents 70
Table 3F  Road in lengths and densities Alkaleri LGA of Bauchi State 70
Table 3G  Road lengths and densities in Rafi LGC, of Niger State 71
Table 3H  Road lengths and densities in Okpebho LGC, of Bendel State 71
Table 3J  Road lengths and densities in Uyo LGC of Akwa-Ibom State 71
Table 3K  Regional disparities of selected States rural roads based on service coverage and average distances from production centres 72
Table 3L  Length of rural roads around selected markets (km) of the regions 73
Table 3M  Regional comparison of performances in rural road Constrn., /Rehabilitation and Maintenance (km) 73
Table 3Q  Estimates of the labour availability between the three regions 76
Table 3R  Equipment holding situation for road construction in Sokoto Agricultural and Rural Development Authority (SARDA, 1995) 78
Table 3S  Equipment holding situation for road construction in Imo State Agricultural Development Project (IMOSADP, 1995) 79
<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3T</td>
<td>Tabulation of Contractors responses to survey questionnaires</td>
<td>83</td>
</tr>
<tr>
<td>3U</td>
<td>Analysis of responses to questionnaire by Academic Institutions in Nigeria</td>
<td>85</td>
</tr>
<tr>
<td>3V</td>
<td>Number and distribution of participants trained under labour-based programme (1988-1992)</td>
<td>87</td>
</tr>
<tr>
<td>3W</td>
<td>Comparison of construction costs by alternative technologies</td>
<td>91</td>
</tr>
<tr>
<td>4A</td>
<td>Design Standards and Cost Estimates of Proposed Roads (95/96)</td>
<td>100</td>
</tr>
<tr>
<td>4B</td>
<td>Itemised Costs per Km (million Naira) for the categories of roads</td>
<td>101</td>
</tr>
<tr>
<td>4C</td>
<td>Costs Estimates for roads categories</td>
<td>101</td>
</tr>
<tr>
<td>5A</td>
<td>Monthly expenditure on wages and level of employment generation at the Farm access road site, Epe, Lagos State (1989-1991)</td>
<td>119</td>
</tr>
<tr>
<td>5B</td>
<td>Employment generation in the construction of a km of a Farm access road under alternative technologies, in Lagos State</td>
<td>120</td>
</tr>
<tr>
<td>6A</td>
<td>Annual rural road construction and rehabilitation undertaken by ADPs, 1978-87 (kms)</td>
<td>133</td>
</tr>
<tr>
<td>6B</td>
<td>Comparing Nigeria's rural road distribution with other African countries based on service coverage and km/1000 km² arable land</td>
<td>136</td>
</tr>
<tr>
<td>6C</td>
<td>Illustration of recent five years of road funding in Sokoto State</td>
<td>140</td>
</tr>
<tr>
<td>8A</td>
<td>Training needs of activities and their resulting effects</td>
<td>164</td>
</tr>
<tr>
<td>8B</td>
<td>Typical Curriculum of Nigerian Institutions' Civil Engng. Dept.</td>
<td>171</td>
</tr>
<tr>
<td>8C</td>
<td>Typical Curriculum of Sampled Universities in Nigeria</td>
<td>172</td>
</tr>
<tr>
<td>9A</td>
<td>Comparing paved networks with Nigeria's immediate neighbours</td>
<td>187</td>
</tr>
<tr>
<td>9B</td>
<td>Comparing Unpaved networks with Nigeria's neighbours</td>
<td>188</td>
</tr>
<tr>
<td>9C</td>
<td>Sokoto State's financial allocation to road (1991-1997)</td>
<td>193</td>
</tr>
<tr>
<td>9E</td>
<td>Typical priority ratings for some routine maintenance activities based on seasonal variations</td>
<td>195</td>
</tr>
<tr>
<td>9F</td>
<td>Typical priority ratings for periodic maintenance</td>
<td>196</td>
</tr>
<tr>
<td>10B</td>
<td>Number and value of Community development projects and Local Government Contributions in Sokoto State (1994-1995)</td>
<td>210</td>
</tr>
<tr>
<td>10C</td>
<td>Number and values of Self-help projects in Kwara State (1975-79)</td>
<td>211</td>
</tr>
<tr>
<td>Table</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>11A</td>
<td>Costs Comparison of a Km of road by alternative methods of construction</td>
<td>220</td>
</tr>
<tr>
<td>11B</td>
<td>Costs variations and percentage in savings under 6 components</td>
<td>221</td>
</tr>
<tr>
<td>11C</td>
<td>Costs Comparison of the two alternatives approaches</td>
<td>221</td>
</tr>
<tr>
<td>11D</td>
<td>Employment based on method of Construction</td>
<td>224</td>
</tr>
<tr>
<td>11E</td>
<td>Gap (vacuum) Disclosure from the alternative methods</td>
<td>226</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>ABU</td>
<td>Ahmadu Bello University</td>
<td></td>
</tr>
<tr>
<td>ADP</td>
<td>Agricultural Development Project</td>
<td></td>
</tr>
<tr>
<td>BUK</td>
<td>Bayero University Kano</td>
<td></td>
</tr>
<tr>
<td>CDA</td>
<td>Community Development Association</td>
<td></td>
</tr>
<tr>
<td>CDC</td>
<td>Community Development Committee</td>
<td></td>
</tr>
<tr>
<td>CDU</td>
<td>Community Development Unit</td>
<td></td>
</tr>
<tr>
<td>COREN</td>
<td>Council of Registered Engineers in Nigeria</td>
<td></td>
</tr>
<tr>
<td>CTA</td>
<td>Chief Technical Assistant</td>
<td></td>
</tr>
<tr>
<td>DFRRI</td>
<td>Department of Foods Roads and Rural Infrastructure</td>
<td></td>
</tr>
<tr>
<td>DLO</td>
<td>Direct Labour Operation</td>
<td></td>
</tr>
<tr>
<td>DRA</td>
<td>Demand Responsive Approach</td>
<td></td>
</tr>
<tr>
<td>ESUST</td>
<td>Enugu State University of Science and Technology</td>
<td></td>
</tr>
<tr>
<td>FACU</td>
<td>Federal Agricultural Coordinating Unit</td>
<td></td>
</tr>
<tr>
<td>FAO/CP</td>
<td>Food and Agriculture Organisation / World Bank Cooperative Programme</td>
<td></td>
</tr>
<tr>
<td>FDRD</td>
<td>Federal Department of Rural Development</td>
<td></td>
</tr>
<tr>
<td>FGN</td>
<td>Federal Government of Nigeria</td>
<td></td>
</tr>
<tr>
<td>FMW&amp;H</td>
<td>Federal Ministry of Works and Housing</td>
<td></td>
</tr>
<tr>
<td>FOS</td>
<td>Federal Office of Statistics</td>
<td></td>
</tr>
<tr>
<td>FRN</td>
<td>Federal Republic of Nigeria</td>
<td></td>
</tr>
<tr>
<td>FRSC</td>
<td>Federal Road Safety Commission</td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Development Product</td>
<td></td>
</tr>
<tr>
<td>GNP</td>
<td>Gross National Product</td>
<td></td>
</tr>
<tr>
<td>HND</td>
<td>Higher National Diploma</td>
<td></td>
</tr>
<tr>
<td>ILO</td>
<td>International Labour Organisations</td>
<td></td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>Institute of Management and Training</td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>Intermediate Means of Transport</td>
<td></td>
</tr>
<tr>
<td>IYCB</td>
<td>Improve your Construction Business</td>
<td></td>
</tr>
<tr>
<td>KadPoly</td>
<td>Kaduna Polytechnic</td>
<td></td>
</tr>
<tr>
<td>KM</td>
<td>Kilometre</td>
<td></td>
</tr>
<tr>
<td>LB</td>
<td>Labour Based</td>
<td></td>
</tr>
<tr>
<td>LGAs</td>
<td>Local Government Authorities</td>
<td></td>
</tr>
<tr>
<td>LGCs</td>
<td>Local Government Councils</td>
<td></td>
</tr>
<tr>
<td>LPA</td>
<td>Local Planning Authority</td>
<td></td>
</tr>
<tr>
<td>MART</td>
<td>Management of Appropriate Road Technology</td>
<td></td>
</tr>
<tr>
<td>MASDP</td>
<td>Multi-State Agricultural Development Project</td>
<td></td>
</tr>
<tr>
<td>Ms</td>
<td>Millions</td>
<td></td>
</tr>
<tr>
<td>MOF</td>
<td>Ministry Of Finance</td>
<td></td>
</tr>
<tr>
<td>MOW&amp;T</td>
<td>Ministry of Works and Transport</td>
<td></td>
</tr>
<tr>
<td>NBTE</td>
<td>National Board for Technical Education</td>
<td></td>
</tr>
<tr>
<td>NDE</td>
<td>National Directorate of Employment</td>
<td></td>
</tr>
<tr>
<td>NDE</td>
<td>National Directorate of Employment</td>
<td></td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organisation</td>
<td></td>
</tr>
<tr>
<td>NPC</td>
<td>Nigerian Population Commission</td>
<td></td>
</tr>
<tr>
<td>ODA</td>
<td>Overseas development Administration (now Department for International Development)</td>
<td></td>
</tr>
<tr>
<td>OND</td>
<td>Ordinary National Diploma</td>
<td></td>
</tr>
<tr>
<td>PCC</td>
<td>Project Coordinating Committee</td>
<td></td>
</tr>
<tr>
<td>PIAARC</td>
<td>World Road Association (previously: Permanent International Association of Road Congresses)</td>
<td></td>
</tr>
<tr>
<td>PTF</td>
<td>Petroleum Trust Fund</td>
<td></td>
</tr>
<tr>
<td>PTU</td>
<td>Production Training Unit</td>
<td></td>
</tr>
<tr>
<td>RDA</td>
<td>Rural Development Agency</td>
<td></td>
</tr>
<tr>
<td>RMI</td>
<td>Road Maintenance Initiatives</td>
<td></td>
</tr>
<tr>
<td>SAP</td>
<td>Structural Adjustment Programme</td>
<td></td>
</tr>
<tr>
<td>SARDA</td>
<td>Sokoto Agricultural and Rural Development Authority</td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>Small Contractor</td>
<td></td>
</tr>
</tbody>
</table>
Supply Dominated Approach
Sokoto River Rima Basin Development Authority
Sub-Saharan Africa Transport Programme
Small Scale Contractor
Small Scale Enterprise
Transport Road Research Laboratory
United Kingdom
United Nations Development Programme
University of Nigeria Nsukka
World Bank

Currency Equivalents

Nigeria's currency is in Naira (N), but the equivalent of exchange rate is in United State Dollar (US$ to Nigerian Naira (N)) as reported in chapter Two page 12.
CHAPTER ONE

1.0 INTRODUCTION

Road is one of the very important infrastructures necessary for our day to day activities and as such is required in all sectors for development. The road transport network of any country plays a vital role in its economy, and the physical condition of its infrastructure is critical. The development of rural networks in most parts of the World in historical sense took place over several centuries. As the riding horse and the cart evolved into more sophisticated means of transport, the path and dirt tracks were gradually improved to meet the new requirements and to satisfy the ever growing movement of inputs and produce and the mobility of the rural population. In Nigeria, as in other countries of tropical Africa, the above long historical roads developing process did not take place. According to a senior rural infrastructure co-ordinator in Ibadan -Nigeria:

- Neither the horse or the animal drawn cart evolved as universal means of transport ever. The rural population had no means of transport besides trekking and hence did not feel any need of roads;
- There was not wide spread rail and water transport development to open up long range trade in bulk commodities to stimulate the development of radial feeding road networks to ports and railway stations;
- The economical, social and administrative needs of the rural population for year round vehicular access developed only recently, and unfortunately in the conditions created by the oil boom - when the provision of roads was undertaken entirely by the government administrative system, with almost no community involvement and contribution to construction and maintenance (Minchev A.T 1984) pp 69.

As a result of the above unfavourable conditions, the main issue of concern was the provision of usable and maintainable rural roads. Due to increased demand for access to support Agriculture, Industries and Social development in rural areas, maintainable roads are required to enable the development of these basic necessities, which are considered as

1 Minchev A.T: Senior rural infrastructure co-ordinator; in a proceedings of Engineering conference of 27th-30th March 1984 in Ibadan, Nigeria Edited by P. O. Nwoso.
among the most important aspects of life. The development of these basic necessities of life are likely to remain so in the absence of maintainable rural roads. Agriculture as the main dominant sector of life in rural areas of Nigeria, requires transportation of both agricultural inputs as well as outputs, to solve the demand of a considerable increased volume of marketable surplus. The provision of road services is therefore of vital importance for the accelerated development of marketing channels, education, health services and other small enterprises. In most development proposals and feasibility studies of the past, little detailed information about these shortages was available. In particular, it was not known whether they are a real limitation to development efforts. Recognising the important role, rural roads play in Agriculture, Rural industry and Social development (health, education, etc.) makes it of paramount importance, often taking precedence over any new investment for economic development.

1.0.1 Rural roads and Agriculture in Nigeria

Nigeria is a country where vast majority of its' population lives in rural areas. According to a presentation made to Federal Department of Rural Development (FDRD) in 1984; “It was estimated that about 80% of the country’s population (then over 80 million) live and derive their livelihood from rural areas”(A.M. KANO 1984). Similarly, KANO revealed that, in spite of the dominant role which the rural areas play in the economic life of the country, it is a fact that rural dwellers received less than 30% of development funds of Federal and State Governments. Equally, the World Bank estimate of 1988 shows that, “there was a total of 85,000 km of rural roads in Nigeria which implies a road density of about 166 km per 1,000 km² of arable land and about 1.0 km per 1,000 population” (FAO / WBCP-March 1992) pp17. The government of Nigeria recognises the importance of rural roads to agricultural development, and considers the “poor” condition of rural roads as one of the major bottlenecks hindering increased agricultural production. As a consequence of “poor” road conditions, transportation costs are extremely high (up to 5 times higher than on good roads) FAO/WBCP 1992. This has resulted to produce evacuation and on-farm

2 Alhaji M. Kano; Welcome address to Federal Department of Rural Development; in Proceedings of Engineering conference of 27th-30th March 1984 in Ibadan, Edited by P. O. Nwoso.

delivery of inputs being insecure and produce losses, especially of perishable commodities, are substantial. There are signs that produce marketing, as a consequence of poor rural road network, tends to shift away from the areas of production to concentrate near major highways, this leading to a sub-optimal market pattern. As a result, subsistence farmers working on margin are especially discouraged from producing a surplus for the market.

1.0.2 Rural roads and Industry in Nigeria

Nigeria’s increase in population from 80 million (1984) to 111.7 million (W. A March 1997) people, is still yet to make much (positive) difference in rural areas. A vast majority of people remained rural and rural road facilities in Nigeria are still extremely poorly developed. In spite of an increment of some 23,700 km of rural roads (Banjo, 1994), which put Nigeria’s rural roads at 108,700 km over the 1988 World Bank estimate of 85,000 km of rural roads, the rating of rural roads in Nigeria is still at nearly 70% of existing in “poor” or “very poor” condition, mainly because of severely neglected maintenance. Banjo’s evaluation puts the State roads rating to an average of 50% poor to very poor conditions. Sokoto (case study area) in particular requires rural roads for its’ economic sustenance, since it produces great varieties of commodities; vegetables, fruits, groundnuts, cotton, Hide and skins in abundance. Some of these commodities are excellent sources of carbohydrates, vitamins and minerals and others provide another source of foreign exchange to the economy. But these being perishable in nature, can not be preserved for a long time without the modern methods of preservation. The establishment of good road networks to link local industries for preserving these items will ensure better and optimum utilisation of such products. The study area (Sokoto) is predominantly agricultural in economy and falls within the Northern region of the country. The 1991 census puts Sokoto State’s population at 4,392,391 people. The author is from the state, and having conducted six months field work studies in this area, realises that nearly 90% of the population in this state live in rural areas. The state is at the extreme North western edge of the region and in the past has suffered by virtue of its location. The unique characteristics of rural environment in this state, have direct bearing on the choice of development programme. Some of these characteristics are:
a) Access to rural communities is difficult, as communities are in scattered structure, often in remote parts of the state, and roads are either very poor or completely non-existent.

b) Technical and managerial skills are usually of a low level standard, due to mainly lack of access for any volunteers to help motivate or make the community aware of these development programmes.

c) Rural communities usually do not possess the financial resources needed to help themselves, and except in rare cases, rural societies lack the political clout needed to influence authorities to divert resources for their development.

d) There is to date no such thing as water transport, railway track or line that passes through any part of this state. The only good road connections are the federal trunk road passing through the state. Although it has an Airport connection to neighbouring nations, which also serves as a domestic route within the country, the true situation is that, there are less flight than there was in any state with similar population size, or Airport infrastructure, mainly because of economic reasons. The majority of people in this state lives in rural settlements, and therefore require rural roads to benefit them, not an Airport without passengers which eventually turns to be a resource waste than development.

To this extent building as well as maintaining adequate rural road network, can provide service to majority of rural populace, create opportunities including employment in the rural areas, and promote the use of labour-based/light equipment-supported methods of infrastructure programmes, in addition to sustaining the resources provided. It is thus necessary to have a well established institution with sound organisation and management, that has a definite responsibility for the conscientious development of rural roads towards achieving reasonable coverage of set target.

Although priority in approach may vary from country to country, state to state as well as government to government. In Nigeria, where the responsibility of rural roads lies between the three tiers of government, the implementation of labour based approach has been neglected for quite some time. Prior to realising the importance of the programme, which came about during colonial era, roads, especially rural, remained a community responsibility. This process is still very common with rural communities where there is little influence of government projects. Men and women would gather
all materials necessary for access to link them with their neighbouring communities. The access construction or maintenance of which normally takes few months because of collective agreement, willingness and commitment, would sometime be difficult to achieve in government setting despite the available resource and manpower. However, little literature is available on the form of community's productivity achievable in this conditions. There is also little documentation of access provision during the colonial periods, in-spite of some major achievements such as railway lines, roads, and some colonial air strips. Rural roads in the economy of post colonial Nigerian State have had no significant efficiency improvements in-spite of efforts at National level to provide both inter-state and inter-community links. Rural roads link in Nigeria are still not adequate nor are there clearly set development objectives. One of the reasons for the inadequacy is that, rural road construction or maintenance in Nigeria are mostly equipment-intensive instead of labour-based techniques which uses local tools and basic equipment. The equipment-intensive techniques requires importation of parts, and is of high wages. While labour-based methods is characterised by basic hand tools, and of low wages, creating a disparity and gaps between the two methods' approaches. In Nigeria, the current construction practices are geared towards the use of heavy equipment, with rural development projects such as rural roads, and other related infrastructures all being implemented by the same techniques. However, there is no manufacturing capacity for construction equipment in the country and all the equipment is imported. Now, due to the shortage of foreign exchange in the country, it is becoming increasingly difficult to either replace the old worn out equipment or import enough spares for their repair and rehabilitation. As a result, the use of those equipment units which are already available in the country is over-stretched. This has resulted in delays in the execution of many projects, particularly those under the rural development programme. The existing equipment-intensive approach to rural development projects has not only reduced the employment opportunities during the construction phase, it has also reduced the scope for the beneficiaries to carry out regular maintenance and minor repair works, as they lack access to the use of heavy equipment. Therefore, the emphasis on the use of locally available resources means that the methods introduced will have a more realistic chance of being sustainable with respect to programmes focusing on employment creation and rural infrastructure works.
Presently the current economic situation in the country, coupled with labour surplus and shortage of capital, is in fact highly appropriate to the application of labour-based methods. The application of these methods implies the use of surplus labour and minimum light compatible equipment. Therefore the use of labour-based methods in rural development projects would have positive impact on the economy. According to mission’s report; “the employment opportunities during the construction phase will increase, it will be possible to minimise delays and benefit from early implementation of projects and in addition considerable foreign exchange can be saved” (UNDP/ILO 1987).

In recent times the National Directorate of Employment (NDE) has identified rural infrastructure works as a potential source of productive employment opportunities in Nigeria. In that regards the NDE secured assistance from the UNDP and ILO towards the introduction and promotion of labour-based/light equipment-supported approach to the construction, rehabilitation and maintenance of rural infrastructure works within the framework of the Government’s strategy to increase employment opportunities.

This research focuses on factors inhibiting rural road construction and maintenance with suggestion of possible ways of enhancing its’ progress for improvement. To achieve the purpose, the study was devised (planned) to find out the alternative ways of solving rural road deficiency, its consequent upon development programmes, its serious constraints on variations between seasons within Nigeria’s regional areas. The application of indigenous resources through labour based techniques has been chosen as one means of improvement.

1.1 BACKGROUND INFORMATION

Nigeria gained independence from British Colonial Rule in October, 1960 and became a Federal Republic in 1963, with the three regions - North, East and West, inherited at Independence. The country has from then undergone immense administrative reforms culminating in the present 36-state structure and an autonomous Federal Capital Territory at Abuja. These 36 states and Abuja by the latest administrative changes in the late 1996, are subdivided into 774 Local Government areas (LGA’s). After nearly

30 years under military rule, the present administration has promised to return the country to party politics. The parties are expected to be formed before the end of August 1998, and the handing over date to democratically elected leaders is May 1999 (FGN 1998)⁵.

Nigeria is and has always been the most populous country in Africa. “According to the Federal Government and UN population fund’s evaluation, Nigeria’s population was 111.7 million in 1995”⁶(W. A March 1997). Based on the document prepared by the FGN and UN Population Fund, a breakdown shows that people above the age of 60 accounts for 4.5 percent of the population, while those between 25-59 account for 31.7 per cent, and the 15-24 age group form 18.7 per cent. Nigerians aged 14 and below make up 45.5 per cent. Official Government statistics put the rural population at about 70%. The size of the country is approximately 925,000 kilometre square in area BANJO G, 1994 (p6)⁷ evaluated this record. It is a country of immense variety, with geographical zones ranging from tropical rain forest in the south to arid zones in the north, which border the Sahara. Banjo further emphasised on the variation in climate which according to him varies from semi-arid in the north (with about 500 mm of rainfall per year) to wet and humid in the south with over 2,000 mm of rainfall annually. He then went on to explain the well defined wet season; which according to him in summer, extends from as little as four months in the north to as long as seven months in the south. The north of the country has a terrain that is flat with sparse natural vegetation, across the centre are hills and granite outcrops with savannah type vegetation, whilst the south contains a terrain that is generally flat with high rainfall and lush vegetation.

The Federal, State and Local Governments are the three tiers (arms) or levels in control of the country and each has a role in the provision and maintenance of roads. Although there is still tight central control, the structure of the governing bodies is such that at each level there is a measure of local autonomy. The structure of the 36

---


⁶ West Africa; The Pan-Africa magazine, issue of 24-30th March 1997.

state governments is broadly similar to that of the Federal government, while that of the local government is modelled on that of the State.

"Nigeria's total road network is about 167,800 km, comprising about 28,600 km of Federal highways (17%), about 30,500 km of State highways (18%) and the rest 108,700 km of rural roads (65%). Of this network 34,300 km are paved, leaving 133,000 km of earth and gravel roads. As might be expected, the share of paved roads presents a different picture. The Federal Highways Authority is responsible for 67% of the paved roads, the State highways 30%, while only 3% of paved roads are designated as rural roads. The global road density at 1.2 km/1000 population is slightly above the average of 1.17 km/100 population for Sub-Saharan Africa (SSA). The latest available road condition field survey (1988) indicates that, of the Federal road network, 36% are in very good condition, 29% good, 20% fair and 15% poor or very poor condition. The situation of State roads is significantly worse with most having about 50% of their roads assessed as poor to very poor conditions" (BANJO, 1994). Evidence on the implications for rural poverty of the poor condition of feeder roads began to emerge in 1987, when an assessment was made of the road conditions in 41 SSA countries (including Nigeria). The survey showed that nearly one quarter of paved roads in the region were in poor condition and a further quarter in only fair condition. The situation is even more serious for earth roads, where “about 39% of roads were in poor condition, and 32% in only fair condition” (Carapetis et al, 1991).

During the 1970's and the early 1980's, the increase in oil revenues resulted in a prolonged economic boom. There is an established pattern for fluctuations in construction industry demand to exaggerate those in the economy as a whole (Hillebrandt, 1995) pp10-23, and accordingly the Nigerian construction sector expanded quite rapidly during this period, with a pronounced emphasis on new construction.
rather than expanding capacity for repairs and maintenance. The Naira (currency) was strong, wages were increasing and imports were relatively cheap. As a result, there was little concern for effective use and development of the local resource base. In the construction sector import-dependent, equipment-intensive methods were apparently attractive, since the emphasis was on speedy execution rather than sustainability. The illusory prosperity was not to last. "With the collapse of oil prices in the mid 1980's the out-look changed dramatically. Foreign exchange became scarce, Nigeria's foreign debt increased, employment creation stagnated. The oil boom had distorted the resource allocation in favour of using foreign inputs, making Nigeria anything but prepared to meet the challenge of a dramatically, changed economic environment from the mid-1980's" 11(Hertel, 1994) p1.

In 1986 the Government of Nigeria adopted a full slate of structural adjustment measures to reverse the country's economic distortions. At that time, the collapse in world oil prices was biting deeply into the already diminished resources available for public expenditure. The Structural Adjustment Program initiated a series of foreign exchange auctions which resulted in the fall of the official Nigeria Naira (N)/US dollar rate of exchange from near parity in 1985 to N7.50 to the dollar in November 1989 and about N 9.60 in March 1991. Consequently, the Nigerian GNP per capita has declined in US dollar terms from US$800 in 1985 to an estimated level of less than US$300 in 1989. Daily rural wages have similarly fallen to an average of US$1.0 to $1.7 (N7-12) 12(UNDP 1993).

The substantial devaluation of Nigeria's currency (Naira) has sharply increased the value of petroleum receipts in Naira terms, and federal revenues from customs duties have also risen. These effects on revenue have, however, been offset by higher Naira costs of debt service payments and expenditures and transfers to parastatals. Under the UNDP/ILO 13(NIR/90/014/A/01/11) joint collaboration, they evaluated that; In 1987, the federal budget deficit amounted to 10 percent of GDP, and to 25 percent in 1990. Inflation in the


13 UNDP/ILO project NIR/90/A/01/11 Capacity Building and Support to pilot labour-based/light equipment supported Rural Infrastructure Works programme, Lagos, Nigeria 1993.
years 1987 to 1990 substantial with food prices (which carry a 75 percent weight in the consumer price index) rising by 50 percent from May 1987 to May 1988. In December 1989, inflation was about 50 percent, and dropped to 16 per cent in October 1990. At the same time labour wages appear to have remained stable in the 1987 to 1989 period. This has meant sharply declining real incomes for the low income groups. At the same time, the Naira prices of imported equipment (spare parts) have risen sharply and are in many circumstances prohibitive. The exclusive use of equipment-intensive methods for rural road construction requires importation of machinery and servicing parts, which was a burden on the foreign exchange reserves of the country. As a result of this, the impact has been devastating for urban employment. Urban unemployment resulting from retrenchments, layoffs and factory shutdowns which had been simmering since 1983, reached a peak with the introduction of SAP. The Government had adopted a number of measures to deal with the problem of mass unemployment, including the establishment of the National Directorate of Employment (NDE) in 1986. But much of these efforts to adjust the economic structure have led to a return migration to the rural areas which has further swelled the rural labour force and worsened the problems of rural unemployment and under-employment.

As stated earlier, the oil revenues of the late 1970's and early 1980's led to substantially increased investment in infrastructure. However, because of the relative austerity of the last several years, the funds available for further investment and maintenance have rapidly declined. As a consequence, rural infrastructure in Nigeria has deteriorated considerably in recent years. In 1995/96, during "field work study in Nigeria" the author with the support of the assisting team paid visit to inspect infrastructure profiles of some Local Government Areas (LGAs). The profiles indicate serious and continued deterioration of infrastructure in all sectors located in the States visited. The assessments in selected LGAs located in Sokoto State (case study area) revealed a similar situation.

The deterioration of existing infrastructure works are particularly apparent in the following areas: rural feeder roads, water supply, irrigation, soil erosion works, and various types of public building construction. Rural roads throughout the country have deteriorated greatly due to inadequate maintenance. The situation has been worsened by soil erosion. In Sokoto, Borno and Enugu States in particular, soil erosion works are so badly needed that this is a precondition for the development of much other infrastructure.
Investigations by the UNDP/ILO team show that, there was a bias in favor of using equipment for construction of all types of projects, including rural development projects. At the same time there is general scarcity of necessary equipment in the stores maintained by the state government agencies, the LGAs, equipment-hiring services and contractors. Most of the equipment in stock is old and in urgent need of repair or replacement. However, due to rising costs in Naira of spare part acquisition, spare part inventories have to a large extent been depleted, reducing equipment availability rates. As a result, there are frequent delays in completing even minor works. The LGA Works Departments either depend on the State Works and Agriculture Ministries for the supply of the equipment or the projects are awarded to the contractors who own equipment. A significant number of rural development projects could be implemented using labour-based techniques, but due to lack of experience this is not being done.

The indiscriminate use of heavy equipment for construction, rehabilitation and maintenance of all types of civil engineering works is often the cause of very serious damage to the environment. In many parts of the country the soils are very fragile, and the frequent vibration of heavy equipment accelerates the process of soil erosion which almost everywhere has become a serious menace. Many new gullies are created every year just by the lack of the most elementary concern for the need to protect the environment. This fact assumes particularly worrisome aspects in the case of Governmental Agencies undertaking the construction of new infrastructures and maintenance of existing ones with heavy equipment without any consideration of the requirements which stem from the fact that these infrastructures are located in an erosion prone area.

Finally, since the study is on Nigeria, figures describing the financial transactions are best reported in Nigeria’s domestic currency, though some are in US dollar. The domestic currency will serve as an alternative of adjusting for domestic prices of local tools and payment of incentives or wages. To avoid confusing due to instability of the country’s currency, the table below provides annual exchange rates from Nigeria’s oil boom era to the present year of 1997.
<table>
<thead>
<tr>
<th>Year</th>
<th>Exchange rate (Naira per US dollar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>N0.68 = US$1</td>
</tr>
<tr>
<td>1978</td>
<td>-----</td>
</tr>
<tr>
<td>1979</td>
<td>-----</td>
</tr>
<tr>
<td>1980</td>
<td>N0.90</td>
</tr>
<tr>
<td>1981</td>
<td>N1 = US$1</td>
</tr>
<tr>
<td>1982</td>
<td>-----</td>
</tr>
<tr>
<td>1983</td>
<td>N1.1 = US$1</td>
</tr>
<tr>
<td>1984</td>
<td>N1.20 = US$1</td>
</tr>
<tr>
<td>1985</td>
<td>N1.24 = US$1</td>
</tr>
<tr>
<td>1986</td>
<td>N3.40 = US$1</td>
</tr>
<tr>
<td>1987</td>
<td>N4.0 = US$1</td>
</tr>
<tr>
<td>1988</td>
<td>N4.50 = US$1</td>
</tr>
<tr>
<td>1989</td>
<td>N7.40 = US$1</td>
</tr>
<tr>
<td>1990</td>
<td>N8.00 = US$1</td>
</tr>
<tr>
<td>1991</td>
<td>N9.90 = US$1</td>
</tr>
<tr>
<td>1992</td>
<td>N17.00 = US$1</td>
</tr>
<tr>
<td>1993</td>
<td>N25.00 = US$1</td>
</tr>
<tr>
<td>1994</td>
<td>N22.00 = US$1 This is the year when the official exchange rate was introduced and the parallel market shot to N81 = US$1</td>
</tr>
<tr>
<td>1995</td>
<td>N22.00 = US$1 and parallel was 79-80 to dollar</td>
</tr>
<tr>
<td>1996</td>
<td>N22.00 = US$1 and parallel was 79-80 to dollar</td>
</tr>
<tr>
<td>1997</td>
<td>N22.00 = US$1 and Government fixed parallel to N85 to US$ in March this year.</td>
</tr>
</tbody>
</table>

14 Source: Table adapted from Miles, D 1995 p Vii, while the references are from Ahmed, I - 1984 p 264, NIR/90/014 - 1994 Annex 7 and the West Africa; The Pan-African weekly magazine, Issue No. 4142 of April 1997 p455.)

1.2 RESEARCH OBJECTIVES

A set of objectives are meant to be met by this research. Among them is encouraging the use of available local resources for the construction, rehabilitation and maintenance of infrastructure works. Engaging the use of labour-based methods and the private sector (local contractors, structured community groups and NGOs) for construction and maintenance works. The research also aimed at providing institution building at the Federal, State and local government levels, and the community level, as well as direct support to rural infrastructure programmes. Special considerations will also include environmental benefits, local participation, and CO-ordination between government levels and the community to enhance sustainability of infrastructure investment.

This research came about following the initial responses of the Government and the communication affected people (local community), and the extent of their willingness to undertake the post-impressionist approach to self-help projects. The author wish to ascertain the role of the affected community in different regions of the country with the intention to show how community management can significantly enhance effectiveness and acceptance of responsibility for maintenance of rural roads.

The General Objectives of the study were:

◊ To find means of securing sustainable improvement in rural road sector performance in Sokoto state.

◊ To propose a workable system for the maintenance by identifying appropriate technical, financial and organisational policy options that best fit the construction and maintenance of rural roads in the state.

◊ To investigate the scope for generating employment opportunities for local people, and promote the use of indigenous resources which can reduce the cost of operation and maintenance, through decentralisation of responsibilities to the level of beneficiary communities.

◊ To show the competitiveness of labour based methods vis-à-vis equipment intensive methods for the provision and maintenance of rural roads.
To show how the use of local resources can benefit local communities in the project areas, from the improvement programmes.

To create good atmosphere of co-operation and co-ordination between the served community and the providers.

To save foreign exchange that are being used for the purchase of equipment that are not even familiar to the local mechanics.

To save transporters, car owners and the general public from the excessive cost of transporting both goods and passengers due to poor maintenance, which is resulting to wastage of fuel, regular servicing and changing of spare parts and accidents all due to lack of maintenance.

The most important aim of the study was to change the thinking of Sokoto state (study area) from its illusional perception of road construction and maintenance point of view to reality. At present, the practice favoured (expensive) equipment intensive instead of the affordable labour-based methods. The research intends to provide a more detailed and accurate picture of the construction practices in the study area. Another important aspect was to define the significance in-terms of an anti-poverty approach to the economic and social development of the study area. In-terms of utilising local resource and skills, providing employment opportunities, and establishing linkages with other sectors of the economy. Of equal importance is to show the disparity in approaches of the systems variations; in methods, believes, manpower, cost and other related aspects of project execution. And lastly it was the aim of this research to propose recommendations for developing and implementing future maintenance programs for Nigeria, Sokoto state in particular, and other countries with similar conditions.

Labour-based techniques formed the focal area of the study because that is where the whole process essentially takes place. Investigation of factors that influence rural road construction and maintenance in Nigeria was based on opinion survey of selected sampled areas of the country as they are the main targets and subjects of this research. Therefore their opinion was considered as crucial to the success of this study and as such of paramount importance. The application of labour-based techniques of Eleven pilot states were investigated, with the objective of identifying the potential of the
technique for rural road improvement and its scope for productive employment opportunities in rural areas.

1.3 JUSTIFICATION OF RURAL ROAD INFRASTRUCTURE

It was necessary to first justify the notion that rural road provision in developing countries is low by using the case of Nigeria as a basis for the perceived need for improvement. The present strong emphasis of infrastructure programmes in Nigeria on using equipment-based technology does not justify effort to alleviate unemployment and underemployment, it instead, entails considerable foreign exchange expenditure and does not maximise the potential of local resources. Several factors have recently exacerbated these negative aspects of the country's predominantly equipment-based infrastructure programmes. The low world oil prices have very significantly reduce foreign exchange revenues and the resources available in foreign exchange for government expenditure. Owing to the decline in investment and maintenance resources, infrastructure, which expanded rapidly during the years of high oil revenues, has rapidly deteriorated. This and the short-run effects of the austerity measures introduced under the country's Structural Adjustment Program have substantially increased unemployment and underemployment and depressed wage rates. The present situation justify the need to reinforce the objectives of structural adjustment by increasing the use of labour-based methods in infrastructure programs, not only as a means of construction, rehabilitation and maintenance of infrastructure, but also as a means to create employment, increase the use of local resources and save foreign exchange.

The use of labour based method as a domicile construction technique for performance indicator has been subjected to some scrutiny with the objective of justifying its significance in the overall development of rural road improvement as well as socio-economic transformation.

Five issues had to be addressed in justifying this research:-

- The significance of this research with respect to other research in this area
- The policy climate
- Environmental condition
1.4 SIGNIFICANCE OF LABOUR BASED METHODS

The focus of this research was on the labour based technique due to its significance both in terms of its share in the stimulation of economy and its contribution as a seed corn for the growth of the local construction and maintenance capacity. The labour based technique provides excellent performance improvement opportunities for local contractors, local communities, and Governments in general, therefore as such forms the initial basis for research aimed at enhancing local contractors, and beneficiary community’s performance. When ever labour based technique was used in the execution of road infrastructure, a substantial technological and management expertise is passed onto local personnel. However, this is of little value unless there is continuity of work providing opportunity of utilising this newly acquired expertise. A good and sound co-operation from government will make all the difference, and create a good atmosphere for continuity in projects, there by providing a better chance to utilise and consolidate the expertise gained. “More recently in May 1992 the country experienced violent protests over deteriorating wages and growing unemployment. In response to this, the Federal Government raised remuneration levels for workers in the Federal Civil Service by 45% and elaborated a plan to create one million jobs by the end of 1992. An important component of the one million jobs programme is the use of labour-based methods for construction and rehabilitation of rural roads all over the country through which about 45% of the job creation would be achieved”(Hertel. S 1994)\textsuperscript{15}. The State Governments were left to implement their own rate of salary increase, which created allot of problems to many states, inparticular Sokoto the case study area. From the records of the interviews held with different organisations, at both the Governments and the local beneficiary levels, it was realised that, equipment intensive

method makes substantial use of externally-sourced inputs, while labour based method relies to a large extent on locally available resources which carry implications for the currency in which payments are made, timeliness and reliability of supply, linkages with the local economy, etc. which invariably affect the economic pricing of the resources. Therefore, due to sustainable nature of the labour based technique, a quite substantial benefit with greater potential for stimulating the rural economy justify the methods viability. Although, in both systems direct and indirect employment would be created, labour based has the advantage of benefiting greater number of people than the conventional Equipment intensive, and the benefit to the local contractors and their employees is an added advantage over Equipment methods.

The severity of the foreign exchange shortage in the country which has made the demand for it so high that a parallel market exists, signifies the use of labour based method. "The parallel market which prices the dollar at N85 as against the official rate of N22 (W. A April 1997)\textsuperscript{16}. This makes the opportunity cost of the foreign exchange spent on equipment much higher so that, in economic terms, the equipment based approach becomes even less competitive than the labour based method. An appreciation of the Naira might lower the competitiveness of the labour-based methods by reducing the cost of equipment and raising the cost of labour in dollar terms. But the differences in the costs structures for equipment and labour are so significant that no amount of change in the relative costs will make it more attractive to use equipment particularly in (Nigeria) a system where there is no manufacturing capacity for equipment in use. Considering the Government’s running on a huge budget deficit (about 10% of GDP) as earlier reported, there seems no reason to believe that the Naira will appreciate since Nigeria’s dept is increasing (partly due to service payment defaults). Only an unlikely dramatic increase in international fuel prices could significantly change the present situation. Since the official pegging of the Naira exchange rate at N22 to a Dollar at the beginning of 1994, the margin between the official and parallel market rates have widened considerably to highlight the growing

\textsuperscript{16} West Africa; The Pan-Africa magazine, issue of 15-22nd April 1997.
scarcity of foreign exchange in the country. It may therefore signify that a market for cost-effective labour-based construction methods will prevail for many years to come.

1.5 RESEARCH HYPOTHESIS

It is vital to have full understanding and unanimity among the communities, Government and the NGO's on issues related to infrastructure. The relationship will enhance acceptability as well as affordability at beneficiary level to make the programme sustainable.

Within this broad framework the study aims to show that rural road infrastructure damage can be minimised and the potential losses can be reduced or averted if maintenance work can be implemented efficiently and effectively by local community through;

- adept management and mobilisation of resources
- Community motivation towards importance of participation
- adaptation of labour based techniques

These considerations lead to the following hypothesis to be investigated that:

'Efficient and effective maintenance of rural roads cannot be undertaken without community management. It also provide an opportunity to test the hypothesis that, the shift of construction and maintenance technology in favour of using locally available resources instead of foreign resources is important in order to;

- create productive employment opportunities,
- stimulate the local economy and save foreign exchange;
- increase overall cost-efficiency of road infrastructure in construction, rehabilitation and maintenance; and
- encourage self reliance and popular participation.

In order to achieve this, the following enabling actions will be required:

- The development of institutions at Federal, State, and Local Government levels as well as Local communities to generate the necessary capacity to plan and implement programmes using local resource by labour based methods.
• The development of local contractors, co-operatives and non government entities to have appropriate capacity to undertake infrastructure works using locally available resource and labour based methods in particular.

In this hypothesis the definitions of the following terms are as follows:

**Efficient:** Infrastructure built with least cost and affordable for the local community.

**Effective:** Infrastructure fully utilised, acceptable to the beneficiaries, and provides full coverage.

**Reconstruction:** New construction to replace the worn infrastructure which cannot be economically repaired.

**Rehabilitation:** Restoring the road to previous condition, by strengthening or replenishing the existing vulnerable formation which suffer damage.

**Maintenance:** Keeping up to good form; i.e. to keep going with continuous repair.

**Participation:** Taking part in a programme, so as to have share of the responsibility. In this report participation aimed at bringing about a clearer identification of local needs and priorities to make use of local people's much greater perception of the obstacles and constraints to rural development within a particular locality.

**Community Management:** A joint ownership Administration of a body of people, that represent a grassroots organizations such as community development associations, age groups, local social clubs, Better Life for Rural Women committees, Chiefs and other Traditional or religious Rulers that are in charge of Associations at local level in rural areas.
This hypothesis is limited to certain areas of the developing countries where it is most likely to get the needed and applicable data. Although the research is currently being undertaken at U.K, but, since rural roads problem is not as serious in the richer countries as it is in the poorer nations, the research intends to reveal the situation in the developing world. The communities in the former category of nations usually have high literacy, and community awareness, adequate resources and independence to take decisions. The situation is almost reverse in most developing countries, particularly in the study area. The literacy levels are low, community awareness is so primitive, and very little independence when it comes to decision taking. The focus of this study is therefore restricted to poor rural communities, with emphasis to Nigerian situation and the case study area in particular.

1.6 RESEARCH METHODOLOGY

Research methodology is the procedure adopted in achieving the objectives of a research. Thus, to meet the requirements of the sets objectives, the following approach was devised:

The initial stage of this research involved, an intensive literature review, observation of sites practices and detailed discussions with community members and site engineering staff to confirm the research objectives. The need to develop a means of utilising local raw materials and skills was identified. A system of encouraging local participation, and CO-ordination between formal (governments) levels and informal (community) level to enhance sustainability of infrastructure investment was formulated. In particular, labour based technique was identified as a viable tool for embarking on a continues improvement program in construction industry. Employment generation, Foreign exchange savings, Labour surplus, Willingness in participation and stimulation of local economy were identified as key performance indicators.

The methodological framework to realise the above study objectives is discussed in detail in chapter three. Detailed descriptions are also provided where necessary in the relevant Chapters. In brief, the study requires collection and analysis of extensive data on different aspects of the rural road programme implemented in Nigeria. The essential data and information required was obtained through:-
a) Various published, unpublished sources, available in Nigeria and at Loughborough university, WEDC in particular.
b) Questionnaires, and Physical Interviews with the community/or beneficiaries and Government bodies, Physical view of the areas by the Author and his assisting groups.
c) Interviews with community leaders and top Government officials in various regions.
d) Discussion with some experts in the related field or subjects.
For this purpose a literature review was first conducted to ascertain the methodology for designing interviews and questionnaires. A set of detailed questionnaires were then prepared for use in the field (Annex). The Details of the field survey comprising interview work and data collected through questionnaires was evaluated and statistically analysed in the light of the pre-defined objective verifiable indexes (OVIS). The objective verifiable indexes for each study objective are described in chapter (3) three of this report. In this study, Labour based technique was considered as opposed to a typical equipment intensive and therefore several operations were observed. This was done via visits to a number of states and local governments including their rural remote areas. This was done in-order to get a true picture of the situation for accuracy in analysing the data.

1.7 ORGANISATION OF STUDY

Since this study is mainly concern with rural road construction, maintenance, and rehabilitation via the application of labour based/light equipment technique for efficient utilisation of local skills and resources. And majority of the states in Nigeria, case study area in-particular happens to fall in soil erosion prone areas. Therefore, it seems appropriate to discuss the causes and remedies of road deterioration. Its total negative impacts to rural populace, government and how it affects the economy in general. The common perceptions, losses to life and property due to bad roads and the various responses to face the usually enormous challenge of maintenance and rehabilitation works in the study area in-particular and the country in general.
The general organisation of the study (Figure 1), illustrates the various steps taken to achieve the stated objectives. These steps are classified into four main phases, which are presented as twelve core chapters, whose brief descriptions follows below.
Figure 1: The general organisation of the study

STUDY OBJECTIVES

Rural Roads Construction/Rehabilitation/Maintenance by Government and Local Community through the application of Labour Base and Indigenous Resources

Formal Organisation (Top Management)  Local Organisation (Bottom Management)

Significance of Labour Based Technology to Formal and Local Organisations

Data and Information Requirements and Collection

Information from Published Data

General Environment

Information from Interviews/Questionnaires

Case Studies from Pilot Sample States

Analysis of Data

Validation

Discussion of Results

Conclusion & Recommendations
The following is a brief introduction of the chapters to follow:

Chapter Two:
This chapter provides descriptive information of the study area, with a general profile description of Nigeria, which covers things such as; Population, Topography, Literacy, Local skills, Political and Economic as well as Socio-Cultural aspects. It also presents the state of rural roads in the country, the policy and plans of the organisations responsible for the sector’s development. It also touches on the leadership role of both the government and the local community for rural road improvement.

Chapter Three:
This chapter presents the methodology, which entails the general procedures for the data collection methods, and provides the general description of the (areas) regions, States, Local Governments and sites from which the research data was collected. The chapter also validated the data through the analysis of the responses from both the interviews and the questionnaires surveys, and finally it uncovers the extent, range and level of development of the rural road sector in Nigeria.

Chapter Four:
This chapter gave both, the words and the pictorial presentations of the extents of infrastructure deficiencies in Nigeria, with special emphasis on road sector. It also written about the poor condition, deterioration under the influence of certain factors, and inappropriate methods used in road construction and maintenance. The chapter also touches on the tools and construction materials, the scope for local production, their availability and purchasing status.

Chapter Five
This chapter has provided some helpful information on why should Nigeria accept change and apply full scale labour based techniques instead of the traditional and expensive equipment techniques. It also explains the prospects, concept and scope for introducing the labour based method and how it can motivate as well as involve the local community in its application. Other important issues discussed in this chapter
include; the prospect of employment, labour generation and justification for application to sustainable rural road maintenance.

Chapter Six:
This chapter describes the road system based on institutional framework in Nigeria, and the split of responsibilities in the administration of rural roads between the three tiers of governments in-charge of roads, and the effort of the Local community as a bottom level (informal) organisation in the country. The chapter also outlined the measures of autonomy in the share of responsibility enjoined at each level between the three tiers.

Chapter Seven:
This chapter provides information on contract procedures, with the objective of developing the indigenous contractors; their class category, role and struggle for survival in Nigerian environment.

Chapter Eight
This research regards education to be a vital instrument in achieving its objectives. As such this chapter provides information on Nigeria’s educational system with regards to appropriate technology. The analysis looked at the training procedures for engineers, technical personnel working in public as well as private sector, and their awareness, and understanding of alternative means of construction and maintenance as against the traditional equipment intensive methods.

The chapter outlined various ways of promoting the use of labour-based methods for construction and maintenance of rural roads, by in-corporating the Nigerian institutions of learning in the system. It became apparent that as a first step the engineers, contractors, and other technical personnel involved, need to be oriented to the use of these methods. This will provide good understanding on Planning, design, and good site administration, work organisation and popular participation for sustainable rural road programme.
Chapter Nine
This chapter described different types of road failures, and what they require to keep them in a satisfactory condition. It also described factors that are perceived to be responsible for road deterioration and failures, and the ones inhibiting its maintenance. Finally, it described the consequences of late or insufficient maintenance, the negative impact on repair and road user costs, inconvenience and reduce safety. And then conclude with the description of factors influencing the labour-based infrastructure works.

Chapter Ten:
This chapter explains the concept of popular participation in labour-based rural road construction and maintenance projects. It also demonstrates how the empowerment and the use of local resource can encourage the local people to identify with the development projects, particularly road works.

Chapter Eleven:
This chapter deals with Gap or Variance analysis, which compares systems of project executions, governments and Community managed programmes, economic and social variations from various systems. The systems contributions to development in the context of employment, income benefit, and savings. Finally, the chapter compares the costs and savings between labour-based and equipment-based techniques on road projects.

Chapter Twelve:
The chapter summarises the results and discussions derived from the previous chapters, and then it gave the conclusion from the results obtained in the research and finally gave some recommendations.

CHAPTER TWO
DISTINCTIVE NATURE OF THE ENVIRONMENT

2.0 INTRODUCTION:

It is indisputable that the instabilities in Africa especially in this terminal period of 20th century are largely (if not entirely) caused by bad governance. Conflicts, wars, civil strife, corruption, terrorism, natural and man-made disasters, climate related ecological changes and environmental degradation all contribute significantly to the Continent’s problems and have adversely affected millions of people. In both eastern (Rwanda, Burundi, Uganda, Mozambique), and central Africa, Zaire in particular, "Poor access especially rural roads, had been reported to be the major concern in preventing the Aid workers from reaching the victims of the war disasters"1 (BBC, March 1997). Somalia, Liberia, and Sierra Leone are other examples of wars and civil strife.

So many problems are associated to poor rural development, according to Commonwealth Secretary General; "Among the many factors which are to blame for the failure of development are: the lack of political commitment; inadequate resources; burgeoning population growth in vulnerable nations; failure to take into account the special role and needs of women; and failure to involve poor and hungry people in the design and implementation of development programmes meant to assist them"2 (Anyaoku, W. A Nov. 25 - 1 Dec. 1996).

Governments are responsible for creating an enabling environment for private and group initiatives to devote their skills, efforts and resources, and in particular investment, towards the common goal of access improvement. This should be undertaken with the cooperation and participation of all members of the society. Farmers, fishers, food producers, transporters, commuters, and passengers, all have critical roles in achieving the objective, and their full involvement and ennoblement are crucial for success. In Nigeria, lack of communication due to bad roads have created a big problem and constraints on access to many basic amenities, and have serious dimensions in the community’s social life. The

---

1 BBC report on channel 4 news, on the Zaire, Rwanda and Sudan issues April 1997.
result of this deficiencies is one of the principal causes of accelerated migration from rural to urban areas in Nigeria and as in many other developing countries.

However, attaining maintenance culture is a complex task for which the primary responsibility rests with the individual governments. In Nigeria, the responsibility for the construction and maintenance of rural road is split between the three tiers system that governs the country, through national laws and the formulation of strategies, policies, programmes and development priorities, in conformity with Nigerian constitution. Within the national framework the three tiers should co-operate actively with one another and with non-governmental organisations, public and private sectors, on programmes directed towards rural road improvements. They have to develop an enabling environment and policies that ensure sustainability as well as understanding between top and bottom organisations. The study therefore deemed it necessary for these governments to target those areas and people suffering most from shortage of rural road infrastructure and identify causes and take remedial action to improve the situation.

It became necessary for the three tiers of governments to first of all find out the fundamental reasons that bring about the lack of sustainable rural road through such programmes as National Road Rehabilitation Project and address them before embarking on expansion programmes. This requires the adoption of appropriate national policies and where necessary appropriate in providing technical and financial assistance to communities in rural areas. Unless these governments address the alarming situation, the economic loss, and the number of accidents with casualties in people and loss of properties will remain very high in Nigeria, particularly in the northern part of the Sahara. The research emphasise the urgency of taking action now, to lessen the danger from neglect, for the present and future generations. The study also acknowledged the fundamental role of indigenous people and their communities, and all other people involved in attaining rural road sustenance. Good sustainable development policies can promote participation that can empower people with an equitable distribution of access to many infrastructural facilities notably health-care and education.
2.1 DESCRIPTION OF THE STUDY AREA

The country of study is Nigeria, while the area of study in Nigeria is Sokoto state. The study intends to give a brief description of both Nigeria as a country of study and Sokoto as a case study area. In 1960s Nigeria had established a strong export position with six cash crops: four crops from the South Western and South Eastern states (Cocoa, Rubber, Palm oil and Palm kernel), and two field crops from the Northern states (Cotton and Groundnuts). Production of these crops has been steadily slipping; "Between 1970 and 1980, annual production of cocoa, rubber, cotton and groundnuts declined by 43%, 29%, 65% and 64% respectively" (FAO/WB 1992 p9-10). The prevailing marketing system suffers a number of deficiencies, and among them are; high wastage and spoilage; problems with transporting produce from farm-gate to village and wholesale markets. All these are due to bad roads and lack of maintenance, as a result the system is slow to respond to producer and consumer demands, is not cost-effective, and entails a high degree of losses, especially of perishable commodities.

In rectifying these deficiencies, the three tier structure have accepted the importance of road to economic development, realising that better road linkages between the agricultural production areas and the main consumption areas are a necessary complement to any Market improvement programme. "Between 1972 and 1980 the length of paved road in the country increased by 60 per cent. At 13 km per 100 sq. km, it has one of the highest road densities in Africa" (Barwell, et al 1985 p34). The resulted road investments which was due to its oil revenue, has left rural roads unattended. Local Government Councils (LGCs) are legally responsible for the provision and maintenance of rural roads in Nigeria. However, they are financially and operationally the weakest link in the three-tier structure of governance. The lack of financial resource, couple with shortage of skilful personnel to advise the LGC, on the prospect of rural road maintenance/improvement as a catalyst for the increase growth in agricultural production made the implementation of the programme

difficult. By Strengthening the capacity of government agencies involved in project implementation and successive operation and maintenance; and supporting the participation of beneficiaries in rural road maintenance, would enhance income generating capacity and also make the programme sustainable.

Nigeria exhibits considerable geographical and seasonal variations and, as such, the accuracy in collection of information on rural road programme, adequacy, approach and provision of access to illustrate this variety would be nearly impossible. As such States and LGCs were chosen from the three regions that comprised Nigeria, to approximately provide a representative cross section of socio-economic characteristics of the survey. The approach; therefore was to select 12 states out of the former 30 States structure, which now stands at 36 states due to recent administrative changes. A further selection of some local governments out of the 12 sample states of the three regions has been carried out. The sample areas chosen were selected to take account of the seasonal and geographical differences in Nigeria and the different levels of commitment to rural road development in each area. In addition to normal base data collection, observations and interviews were conducted at chosen locations, more details in chapter 4. The sampled regions are the North, the South West and the South East, and they all differ in many aspects. Some common features that differentiate them are:

**The North of Nigeria;**
This region has a widely scattered population and only achieves high density in Kano state. The region lies in the Savannah region which extends over more than half the country and provides good agricultural condition. Rainfall is on average of 510 mm in the extreme North, except central part of Nigeria (middle belt) which is considered North, the rainfall here is around 1,270 mm over most of central part (including Abuja Nigeria's Capital).

**The South West;**
This region has the largest number of densely populated urban centres which, apart from Lagos (Nigeria's commercial capital), the second largest city in Africa Ibadan is found in the region. Other largest towns in this region are Ogbomosho, Oshogbo, Ilorin and
Abeakuta. The South West of Nigeria, has some mangrove swamps and lavish vegetation. Rainfall is usually heavy in these region, averaging about 1,780 mm a year at the Western end of the coast. Figure 2.1 shows the map of Nigeria with demarcation of regions.

The South East;

This region by contrast has a very high rural population density and comparatively uncrowded cities, the exceptions being the commercial centres of Port-Harcourt, Aba and Onitsha. The south Eastern part of Nigeria is dominated by mangrove swamps which in some places are 100 kilometres wide. This region has the highest record of Rainfall which is on average of 4,320 mm along the Eastern section of the coast.

Figure 2.1: Latest Map of the Federal Republic of Nigeria Showing the 36 States

Source: Nigeria High Commission, London
2.1.1 Case study area

The main case study area is Sokoto state, which is situated in the North West of the country. It is an area lying along the North West boarder of Nigeria adjacent to the Southern most boundary of Niger Republic as shown in figure 2.1. It is within the Zone of Sudan Savannah and covers an area of about 104,000 squares kilometres. The topography consists predominantly of a gentle west ward undulating plain with an average elevation varying from 250 to 550 metres above sea level (Min. of Agric. and Water Resources, Sokoto 1990). Until 1976 it was massively big and was North Western State, but in an attempt to speed up development and direct resources, Niger State was created. A further division was made in 1991, which resulted in the creation of Kebbi state and finally Zamfara state in late 1996.
2.1.1.1 Climate
Sokoto lies within the hot/dry semi desert climatic type, located between latitude 10° to 14° and longitude 30° to 70°. The area experiences two major as well as two minor seasonal changes that are closely related to cultural activities within the population. The dry season (February to May (Bazara)), is characterised by very hot air with afternoon temperatures that range between 30 °C and 40 °C. Night time temperatures drop to between 14 °C and 20 °C, giving the characteristic wide diurnal range typical of this type of climate. The Wet or Rainy season ((Damina) May to August), is the time for intense activity in the rain-fed agricultural economy. In this season, the intensity of rainfall is often exceptionally high, both daytime and Night-time temperatures are generally hot, accompanied by high relative humidity and high pressure, reaching a peak during mid-August. Another season "Harmattan" (Hunturu) is relatively cold, and last from August to December. The last season is the transition season between the Harmattan and the dry seasons (December to February), the time when predominant social community activities are harvesting, marketing of produce, marriage ceremonies and the maintenance of social infrastructures (Aikin gayya).

2.1.1.2 Population of case study area
According to the 1991 National Population Census(NPC), Sokoto state has a population of some 4,392,391 people (including Zamfara). Of this number, 2,158,111 were specified as Males and 2,234,280 as Females(NPC 1991). The vast majority of these people live in scattered settlements; Harmlets, Villages, and Towns. Like most states in the Northern region, Sokoto is among the least industrially developed parts of Nigeria. Its location in Savannah vegetation belt helps boosts its agricultural conditions as farming practices and general living conditions are similar throughout the North. Presently, Sokoto state has more rural villages and small towns than the major towns, making the majority of its population to be ascribed as rural. The rurality of these people, couple with inadequacy of rural road connections means that, there are often wide tracks of empty lands between villages and towns.
### Table: 2.1.1 Sokoto State Local Government Councils and their Populations

<table>
<thead>
<tr>
<th>L.G.A. Name</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ankra</td>
<td>135,989</td>
<td>136,363</td>
</tr>
<tr>
<td>B'nga</td>
<td>56,837</td>
<td>58,080</td>
</tr>
<tr>
<td>Bun'du</td>
<td>94,919</td>
<td>99,190</td>
</tr>
<tr>
<td>D/Shuni</td>
<td>74,664</td>
<td>73,532</td>
</tr>
<tr>
<td>Gada</td>
<td>73,526</td>
<td>79,449</td>
</tr>
<tr>
<td>Goyyo</td>
<td>48,970</td>
<td>55,767</td>
</tr>
<tr>
<td>Gumi/Bukk</td>
<td>163,143</td>
<td>169,644</td>
</tr>
<tr>
<td>Gusau</td>
<td>134,644</td>
<td>125,802</td>
</tr>
<tr>
<td>G'bawa</td>
<td>67,510</td>
<td>72,449</td>
</tr>
<tr>
<td>Illela</td>
<td>64,314</td>
<td>67,673</td>
</tr>
<tr>
<td>Isa</td>
<td>85,683</td>
<td>96,809</td>
</tr>
<tr>
<td>K'/Na'da</td>
<td>129,616</td>
<td>133,185</td>
</tr>
<tr>
<td>Kware</td>
<td>55,599</td>
<td>56,807</td>
</tr>
<tr>
<td>Maradun</td>
<td>63,727</td>
<td>66,809</td>
</tr>
<tr>
<td>Rabah</td>
<td>42,231</td>
<td>45,741</td>
</tr>
<tr>
<td>S/Birni</td>
<td>63,647</td>
<td>75,706</td>
</tr>
<tr>
<td>Silame</td>
<td>29,317</td>
<td>30,967</td>
</tr>
<tr>
<td>Sokoto</td>
<td>141,819</td>
<td>127,706</td>
</tr>
<tr>
<td>T/Mafara</td>
<td>66,934</td>
<td>72,592</td>
</tr>
<tr>
<td>Tamwal</td>
<td>71,938</td>
<td>71,900</td>
</tr>
<tr>
<td>Tangaza</td>
<td>61,348</td>
<td>64,649</td>
</tr>
<tr>
<td>Tsafe</td>
<td>81,681</td>
<td>82,729</td>
</tr>
<tr>
<td>Wamko</td>
<td>63,630</td>
<td>64,024</td>
</tr>
<tr>
<td>Wurno</td>
<td>45,986</td>
<td>49,945</td>
</tr>
<tr>
<td>Yabo</td>
<td>77,457</td>
<td>78,265</td>
</tr>
<tr>
<td>Zurmi</td>
<td>83,152</td>
<td>90,156</td>
</tr>
<tr>
<td>Binji</td>
<td>24,345</td>
<td>26,669</td>
</tr>
<tr>
<td>Bakura</td>
<td>57,734</td>
<td>61,781</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2,158,111</td>
<td>2,234,280</td>
</tr>
</tbody>
</table>

**Source:** (NPC) Nigerian Population Commission 1991 Census Result.

In this study, settlements were categorised as towns (population greater than 2,000), villages (population between 1,000 to 1,500) and Harmlets (population between 500 to 999). The category of settlements highlights the greater need for rural road infrastructure in those areas. The major towns are as conspicuously represented in figure 2.1.1 below.
2.1.2 Country’s Population

The 1991 head count (NPC 1991) put the Nigeria’s population at 90 million. However, recent evaluation by Federal Government and the United Nations' population Fund, put the country's population at 111.7 million (W. A March 1997). The population is spread over a total area of 923,770 km$^2$. The country’s population density according World Bank evaluation is 122 people per square kilometre, with annual population growth rate averaged at 3.0 (1980-1995 %) and estimated to be 2.6 per cent from 1995-2010, (W. B, 1997). Based on FGN/UN's evaluation, a breakdown shows that people above the age of 60 accounts for 4.5 percent of the population, while 25-59 account for 31.7 percent, and

---

the 15-24 age group form 18.7 percent. The aged 14 and below make up 45.5 percent.

The average household size is 8.7 in the North, 5 in the South East and 6.7 in the South West of Nigeria. The overall average for Nigeria is 6.5, and life expectancy is 53 years (on average for the country), while the percentage of male and female population is almost equal. Official Government statistics put the rural population at about 70%-80%. The provisional results of 1991 census is reported in table 2.1.2, and a graphical representation of the result in figure 2.1.2.

Table 2.1.2 Tabulation of Nigerian States by Population

<table>
<thead>
<tr>
<th>State Name</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abia</td>
<td>1,108,357</td>
<td>1,189,621</td>
</tr>
<tr>
<td>Adamawa</td>
<td>1,084,824</td>
<td>1,039,225</td>
</tr>
<tr>
<td>Akwa Ibom</td>
<td>1,162,430</td>
<td>1,197,306</td>
</tr>
<tr>
<td>Anambra</td>
<td>1,374,801</td>
<td>1,393,102</td>
</tr>
<tr>
<td>Bauchi</td>
<td>2,202,962</td>
<td>2,091,451</td>
</tr>
<tr>
<td>Benue</td>
<td>1,385,402</td>
<td>2,394,996</td>
</tr>
<tr>
<td>Borno</td>
<td>1,327,311</td>
<td>1,269,278</td>
</tr>
<tr>
<td>Cross River</td>
<td>945,270</td>
<td>920,334</td>
</tr>
<tr>
<td>Delta</td>
<td>1,273,208</td>
<td>1,296,973</td>
</tr>
<tr>
<td>Edo</td>
<td>1,082,718</td>
<td>1,077,130</td>
</tr>
<tr>
<td>Enugu</td>
<td>1,482,245</td>
<td>1,679,050</td>
</tr>
<tr>
<td>Imo</td>
<td>1,176,031</td>
<td>1,307,468</td>
</tr>
<tr>
<td>Jigawa</td>
<td>1,419,726</td>
<td>1,410,203</td>
</tr>
<tr>
<td>Kaduna</td>
<td>2,059,302</td>
<td>1,909,670</td>
</tr>
<tr>
<td>Kano</td>
<td>2,858,724</td>
<td>2,778,316</td>
</tr>
<tr>
<td>Katsina</td>
<td>1,944,218</td>
<td>1,934,126</td>
</tr>
<tr>
<td>Kebbi</td>
<td>1,024,334</td>
<td>1,037,892</td>
</tr>
<tr>
<td>Kogi</td>
<td>1,055,964</td>
<td>1,043,082</td>
</tr>
<tr>
<td>Kwara</td>
<td>790,921</td>
<td>775,548</td>
</tr>
<tr>
<td>Lagos</td>
<td>2,999,528</td>
<td>2,986,253</td>
</tr>
<tr>
<td>Niger</td>
<td>1,290,720</td>
<td>1,191,647</td>
</tr>
<tr>
<td>Ogun</td>
<td>1,144,907</td>
<td>1,193,663</td>
</tr>
<tr>
<td>Ondo</td>
<td>1,956,228</td>
<td>1,925,557</td>
</tr>
<tr>
<td>Osun</td>
<td>1,079,424</td>
<td>1,123,592</td>
</tr>
<tr>
<td>Oyo</td>
<td>1,745,720</td>
<td>1,743,069</td>
</tr>
<tr>
<td>Plateau</td>
<td>1,646,730</td>
<td>1,637,974</td>
</tr>
<tr>
<td>Rivers</td>
<td>2,079,683</td>
<td>1,904,274</td>
</tr>
<tr>
<td>Sokoto</td>
<td>2,150,111</td>
<td>2,234,280</td>
</tr>
<tr>
<td>Taraba</td>
<td>754,754</td>
<td>725,836</td>
</tr>
<tr>
<td>Yobe</td>
<td>719,763</td>
<td>691,718</td>
</tr>
<tr>
<td>Abuja</td>
<td>206,535</td>
<td>172,136</td>
</tr>
<tr>
<td>Total</td>
<td>44,544,531</td>
<td>44,974,970</td>
</tr>
</tbody>
</table>

Source: (NPC 1991)
2.1.3 LOCAL SKILLS

The distribution of skills and competence of any labour force lies with its manpower capability. In Nigeria as in other places, local people took keen interest in the economic development of their areas through their famous craftsmanship, blacksmithing, and other trading skills relevant to the need of labour based techniques. Their financial constraint, due to lack of support from financial institutions deter their progress as far as local skills are concerned. The large number of skilful local technicians (local blacksmiths, fabricators, craftsmen and small-scale manufacturers) who do not have the facilities, and financial capability for large scale production finds it difficult to maintain the desired standards of equipment intensive method.
One of the aims of this research is to encourage self-reliance through the application of local resources for rural road improvement. The application of a friendly technique (labour-based) which suits community's local skills would definitely boost their morale and competence, and as such would bring confidence in them by encouraging them to manufacture more, as well as concentrate on repairs and maintenance of local tools. Since labour-based technique is generally known to be management-intensive, it will therefore require a large number of lower level managerial staff to organise and supervise a large labour force. Therefore the locally available unskilled labour if trained could perform the work items effectively. To ensure a sustainable adoption of this system requires the development projects planned and carried out by local communities to meet their own needs, with or without government participation. The manpower stock in Nigeria is enormous, and therefore looks good for the application. On the basis of the technical reports by UNDP/ILO/NDE prepared under projects NIR/87/001 and NIR/87/025, there is indication that, high levels of labour surplus prevail in the rural areas to the extent of about 70% of total available time during the dry season months: January, February, March and December. In many places, the rain-fed agricultural pattern is such that even during the main farming season, some sizeable underemployment exists (details in chapter 5). The application of labour-based construction methods in this situation will generate increased demand for hand-tools, which entails high prospects for local skills. A typical example of a local Blacksmith / Carpenter sharpening an axe is shown in the figure 2.1.3 below:

Figure 2.1.3 An illustration of typical blacksmith / Carpenters in rural areas.
2.2 GENERAL ENVIRONMENT

The unique characteristics of rural environment in Nigeria has a direct bearing on the choice of development program. Rural areas, particularly in Northern Nigeria has suffered neglect and proved elusive to development efforts in spite of the good intentions of the various governments to build an egalitarian society. Some of these characteristics being; access to rural communities is difficult due to scattering nature of the society, lack of technical and managerial skills due to migration of able ones, and financial inadequacy of the rural communities.

However, the present haphazard planning and development of rural roads may be related to the political and economic instability in the country. Right from the independence (1960), Nigeria has never had a stable government to guarantee such a development, more-so that we are now in the seventh National Development Plan, at a period of economic and political uncertainty. Apart from the second and the fifth National Development Plans (1970-74) and (1985-1990) respectively, no other plan was planned and executed by the same regime \(^6\) (Nwosu, et. al 1984, author 1997). They have all been subjected to one form of review or the other, to reflect so called "realities of the situation". The constraints range however, is the lack of a well established, adequately trained staff, institutional framework, with a definite responsibility for the development of rural road in accordance to laid down national objectives towards achieving set targets.

The essentiality of rural roads in development and related infrastructures improvement cuts across many economic sub-sectors, such as agriculture, transport, and the social sub-sector of communities in general. The spread of rural road development activities across various sub-sectors resulted in complicated coordination arrangements during the First, Second and the Third National Development Plans of Nigeria. However, in realizing the earlier mistake, a new strategy of integrated rural development was eventually introduced, in the Third National Development Plan and also elaborated by the Fourth National

\(^6\) Federal Agricultural CO-ordinating Unit, Federal Department of rural development, Nigeria. Edited by Nwosu, P. O and Balogun, R. D, Published by Communications sections FACU 1984 Lagos - Nigeria.
Development Plan (1980-1985). The strategy had two main components; the Agricultural Development Projects (ADP), whose objective was to combine agricultural production with economic and social infrastructures such as schools, hospitals, housing etc., and the Accelerated Development Areas (ADA) concerned with the construction of feeder roads and generally providing a sound framework for the smooth take off of the ADP.

The positive experience gained with the integrated rural development strategy influenced the decision of the previous Military administration (1985-1993) to establish the Directorate of Food, Roads and Rural Infrastructure (DFRRRI) in 1986, as its main instrument to change the future of the rural Nigeria. The Directorate's efforts on rural infrastructure were directed at the rapid development of rural feeder roads, and liaison with other Government Ministries for the provision of same rural infrastructures in rural areas. "Under the rural feeder roads program, 90,000 km of rural feeder roads were-projected for construction" (UNDP 1993).

2.2.1 Political Aspects

The most conducive atmosphere to achieve sustainable development is to ensure an enabling Political, Social and Economic environment. Achieving that would create best conditions for road improvement. Today's Nigeria does not warrant the required conduciveness as expected. In recent time a lot of international attention was concentrated on Africa's most populous country, owing to; the 1993 botched attempt at transition to democracy; the upheavals that followed immediately after; the troubles in Ogoniland and the executions that came in their wake; the subsequent stand-off between Nigeria and the Western nations which still persists to this day, albeit with less intensity. But all this are lessons which most of the developed nations have gone through in the process of development.

2.2.2 Economic Aspects

Nigeria is a low income developing Nation according to the World Bank by income table, which classified low income under countries with GNP of $765 or less (W. B 1997). "The robustness of Nigeria’s economy stops at the doorstep of the oil sector". All other sectors are stagnant. In-spite of the oil resource, Nigeria is among the poorest nations compared to its' other oil producing nations. Average per capita income according to Edmonds and Mile's estimate was about 717 US $ per annum in 1979. Although this figure may not be truly representative, because a major part of the country's wealth is in the hands of a small high-income minority. The spatial differences in cost of living within Nigeria alone makes the comparison difficult. There is also a wide variation in wealth even among the low income groups, but the emphasis of this study lies with the lower income groups, particularly the rural poor.

The intractable foreign debt and balance of payment problems of Nigeria has drastically reduced its capacity in economic growth and infrastructure development programmes. The tabulated data in the tables below was derived from the Annex 2 Construction Statistics circa 1979 (Endmond and Miles 1984), where they compare almost 120 countries of the World based on their GNP and construction output. The author made his comparison in graphical formation based on data which relates to Nigeria's circumstances. "Value added measures the value that an industry has added to the bought-in materials and components by its processes of production" (G. A. Endmond and D. W. J. Miles 1984).

Table 2.2.2 A: Nigeria compared with its neighbours based on GNP and constn. output

<table>
<thead>
<tr>
<th>Country</th>
<th>GNP/capita in $</th>
<th>Type</th>
<th>Value added as % of GDP</th>
<th>Value added in constn./capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin Rep.</td>
<td>221</td>
<td>A</td>
<td>3.6</td>
<td>8</td>
</tr>
<tr>
<td>Cameroon</td>
<td>612</td>
<td>B</td>
<td>5.2</td>
<td>32</td>
</tr>
<tr>
<td>Chad Rep.</td>
<td>172</td>
<td>A</td>
<td>2.8</td>
<td>5</td>
</tr>
<tr>
<td>Nigeria</td>
<td>717</td>
<td>B</td>
<td>9.2</td>
<td>66</td>
</tr>
</tbody>
</table>

World Development Indicators; The World Bank 1997 U.S.A
Figure 2.2.2 A: Graphical representation of Nigeria versus its Neighbours

Table 2.2.2 B  Comparing Nigeria with its group of oil producing nations

<table>
<thead>
<tr>
<th>Country</th>
<th>GNP/capita Type</th>
<th>Value added as % of GDP</th>
<th>Value added in constn./capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gabon</td>
<td>3,294 D</td>
<td>7.7</td>
<td>250</td>
</tr>
<tr>
<td>Indonesia</td>
<td>331 A</td>
<td>5.8</td>
<td>19</td>
</tr>
<tr>
<td>Iran</td>
<td>2,209 D</td>
<td>3.3</td>
<td>73</td>
</tr>
<tr>
<td>Iraq</td>
<td>1,226 C</td>
<td>2.3</td>
<td>28</td>
</tr>
<tr>
<td>Ivory Coas</td>
<td>1,014 C</td>
<td>8.8</td>
<td>69</td>
</tr>
<tr>
<td>Jordan</td>
<td>931 B</td>
<td>6.8</td>
<td>64</td>
</tr>
<tr>
<td>Libya</td>
<td>7,262 E</td>
<td>10.9</td>
<td>790</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1,620 C</td>
<td>4.3</td>
<td>70</td>
</tr>
<tr>
<td>Nigeria</td>
<td>717 B</td>
<td>9.2</td>
<td>66</td>
</tr>
<tr>
<td>Oman</td>
<td>3,952 D</td>
<td>7.7</td>
<td>304</td>
</tr>
<tr>
<td>Saudi Arat</td>
<td>9,284 F</td>
<td>15.2</td>
<td>1,410</td>
</tr>
<tr>
<td>U.A.E</td>
<td>19,360 F</td>
<td>10.2</td>
<td>1,976</td>
</tr>
<tr>
<td>Venezuela</td>
<td>3,035 D</td>
<td>8.4</td>
<td>255</td>
</tr>
</tbody>
</table>
2.2.3 Socio Cultural Aspects

Culture binds a community together, as such, is one of the most successful means of sustaining rural infrastructure. Hence, it is vital to take into account, the role and nature of cultural influences on indigenous resources. An argument put across by the ODA stated that; “traditional development projects have erred by focusing unduly on technical prescriptions, ignoring the need to adapt development assistance to the local cultural environment and to ensure the local identity with such assistance efforts”¹⁰(ODA 1994).

The research agrees with ODA’s claim, that, most governments, and agencies responsible have failed to understand and work with (rather than around) the distinctive traditional cultural and social values held by the recipient populations on such issues as the exercise of power, and accountability. The assumption has been that creation of infrastructure and acquisition of western degrees are the key to development and growth. The flaws in this logic are now apparent in Nigeria, and considerable attention is being given to the community to developing a new version of “best practice” for sustainable maintenance of their rural infrastructures. It is therefore, very important to always assess the social and cultural context within which the projects would operate in order to gain local acceptance of what is proposed. This is related closely to the concept of ownership. ODA’s paper also reported that; “the social context within which projects operate is important, many development projects having “failed to achieve their objectives, because they have not been responsive to the existence of the complex network of local institutions which have often diverse interests in the project”\(^{11}\) (ODA-1994).

2.3 GENERAL STATE OF RURAL ROADS IN NIGERIA

Experience has shown that most of the roads experiencing neglects are rural. They are either poorly maintained or not maintained at all. This creates negative effects on the Socio economic activities in the rural areas. Some factors responsible for the poor maintenance culture on rural roads can be ascribed to inadequate maintenance funds, lack of sustainable institutional framework for road maintenance and political considerations. The author’s six months field work study in Nigeria has shown that; it is imperative to develop a technical means of capacity building, relevant to the application of labour based/light equipment supported methods of construction, and rehabilitation works to serve all the three arms of government in the country. This will help as a sustainable maintenance

strategy for roads especially rural roads. The system will provide the best suitable option for the maintenance of roads under prevailing conditions.

2.3.1 Present Situation of Rural Roads

Over the years, several rural roads have been built in different parts of LGAs to open up the rural areas and enhance the socio-economic development of the rural setting. It is however the general observation that these roads in the rural areas are usually not given due consideration during their preparation and construction. Consequently, there is no integrated approach to the maintenance of such roads. Furthermore, there are other contributory factors responsible for the poor maintenance culture on rural roads. These include inadequate funding, low priority accorded to road maintenance by the governments due to other competing areas of the economy, the lack of sustainable framework and inappropriate maintenance methodologies.

2.3.2 Inadequate Funding

Insufficient funding is one of the major factors responsible for poor maintenance. Roads as important catalyst for Socio-economic development were often left at the mercy of State governments which in turn passed the responsibility to the LGCs and local communities who are usually handicapped by insufficient funds. The financial capacity of the State government is usually limited because of other competing priority areas of development such as health, education etc. Hence, there is usually limited or no funds to carry out maintenance activities, even when this is considered appropriate. Budgetary allocations for road maintenance are usually inadequate, often times, the funds that eventually get released are small fractions of the original requirement. This limits the scope and quantity of maintenance work that can be done. Generally, whenever the maintenance funds were released, they are grossly inadequate, rural roads are the first casualty for neglect. The application of labour based method in this circumstances will ensure sustainable road maintenance system, and also allow creation of strategies and
institutional arrangements which will facilitate the maintenance of rural roads within such limited funds.

2.3.3 Low Priority for Maintenance

As mentioned earlier, rural roads are usually given low priority in governments' budget allocations. Consequently road maintenance is neglected or delayed. But it is important to emphasis that a road needs maintenance right from the day it is constructed. Routine maintenance is necessary to keep the road in its original shape. This requires little cost if properly articulated. But if the road maintenance is neglected or delayed, the road further deteriorates and the replacement costs become astronomical when the time value of money is considered.

2.3.4 Inappropriate Method of Road Maintenance

It is the general observation that there is a traditional bias in favour of using heavy equipment for road maintenance even in rural areas. Most of the available equipment stock are old and in urgent need of replacement or repairs. But the current low value of the Naira and the scarce foreign exchange have resulted in serious difficulties in obtaining the necessary spares for urgent maintenance of the equipment. The net effect is that there is delay in effecting even minor works. This contributes to the outright neglect of the road facility. Furthermore, the mobilisation of heavy equipment for routine maintenance tasks is not economical. Consequently, simple routine maintenance tasks are usually neglected and the road is allowed to deteriorate further to justify mobilising equipment for maintenance. This problem can be addressed by the application of labour-based methods to road maintenance, particularly routine maintenance. Indeed, the World Bank assisted Road Maintenance Initiative (RMI) in Nigeria recognised the use of labour based/light equipment supported method of road maintenance as one effective policy option for maintaining rural roads.
2.4 POLICY AND PLANS

Policy guidelines in Nigeria are not in anyway short in supply, in fact, they abound and are amongst the best one can find anywhere in the World. The problem lies with their application. Nigerians know that theirs is a country that boasts of some of the most qualified and gifted persons you can find anywhere, a country which has never been short on ideas but is unfortunately weak on implementation. Many of good policies have been written only to be locked up in some office cabinet. In its place, directives are issued by ministerial or departmental chiefs for execution without any proper planning. The end result is a chaotic situation of unplanned or hurriedly executed projects; more as emergency or remedial measures to a crises situation, rather than a conscientiously programmed process of development for the betterment of the generality of the people.

Many Nigerians have long wondered why their country with its population of over 100 million people - the largest on the African continent - with abundant natural and human resources including oil and vast potential for agricultural development, enjoying all the attributes of boisterous, energetic, hard-working people with rich culture and a potentially viable internal consumer market, should fail to account among the industrialized and technologically advanced nations.

On the brighter side, Nigeria appeared to be getting its bearings. This development was witnessed by the Author while on a field work study in Nigeria. On November 27 1996 the Head of State inaugurated a 172- strong ‘vision 2010’ committee to work out plans for transforming the country into a developed economy within the next 14 years. In the words of the Head of State, “history is being made today in development planning in our country with the assemblage of technocrats, intellectuals, academics, leaders of thought and professionals from all spheres brought together to study, brainstorm, consult, discuss and CO-operate in working out an achievable guide to our collective efforts to realize our country’s potential for future prosperity”(Nigeria’s Military ruler Nov. 1996). The goal is to make Nigeria, economically prosperous, politically stable and socially harmonious 12(NBC Abuja 1996).

12 Nigerian Broadcasting corporation Abuja 27th November 1996
The composition of the committee, which deliberately reflects almost every segment of Nigerian society (notwithstanding criticisms of its size), may be another strong foundation for achieving desired benefits. On the committee are representatives of traditional institutions, the media, the private sector, religious and non-governmental organizations, the public sector and the political class. The 172-strong membership represents all shades of opinion in the country. So the real issue is what these people can do to pull the country up from its present level of low economic performance and eventually leapfrog into the future. The answers necessary for the expected major transformation in almost everything imaginable may on the surface look utterly simple, but remain complex and multifarious. “The first step is to identify where the country went wrong and then consolidate its gains as a nation” (Author 1997).

However, on the rural road initiative, Nigeria has already shown its commitment rather than statement of policy when it embarked on the application of labor based road networks programs in 1986 as a means of construction and maintenance of road infrastructure and as well as reconstructing it’s already dilapidated rural roads. More information would be found in chapters 5, 8, 11 and 12.

2.4.1 Government Concerns

Experience with labor-based construction programs in other countries has shown that, some certain conditions must be met for such program to be mounted successfully, and among the conditions is government commitment. The question of rural infrastructure deficiencies has been one among many nagging questions, which for long have been a source of both private and public worry to many, until they have become the concern of the government today. Now, they are beginning to be addressed.

The Nigerian Government has recognized the need to use labor-based methods in rural infrastructure works, in order to achieve both shorter as well as longer term benefits from the scheme. However, the tradition in the country is to use equipment-based methods for all types of construction and maintenance activities. In many cases, equipment intensive methods led to overdoing (extra-wide feeder roads to facilitate the use of equipment) and so causing additional costs. Subsequently infrastructure maintenance has, with few exceptions, been completely
inadequate. The import intensive use of machinery has placed a burden on the foreign exchange reserves of the country. The Federal Government of Nigeria has now identified exclusive use of equipment intensive methods as a major shortcomings of rural development strategy. In addition to the findings, it was realized that employment generating effects are small compared with a labor based approach. Therefore, the Government decided to tackle the shortcomings, firstly by designing some pilot infrastructure works program in some local Government areas in May 1991, with the estimated costs of about $20 million as a test to labor based/light equipment supported approach.

The Government had the belief that, a lot of benefits are associated with labor based methods. The specific ones among many includes:

- creating productive employment opportunities
- saving the scarce foreign exchange
- increasing the cost efficiency of infrastructure construction, rehabilitation and maintenance
- stimulating the local economy
- encouraging self reliance and popular participation
- and the benefit from the scheme's to institution building
- In the long term the program will promote a more efficient use of economic resources and thus supporting the long term aims of structural adjustment which will benefit the economy as a whole.

2.4.2 Community’s concern

Until recently, the administration of rural development in Nigeria has been highly centralized within the three tier structure. Communities in Nigeria has always been out of the system, as a result much of the rural development planning has been based on inadequate knowledge of local constraints.

Community's concern is an important phenomenon for the success of any rural development scheme and as such, very crucial for rural road program to be sustainable. Therefore, in this regard, Community’s concern is implying to community participation,
and that is not just a different way of talking about community management. Quoting a remark by the proceedings of 16th WEDC conference stated that; “Planners began to realize that in order to share the responsibilities for maintenance, beneficiaries or users would have to be involved in some form or other in the on going maintenance of their own systems”\textsuperscript{13}(Wendy Quarry and Robert A Boydell 1990).

It is now realized that in order for the community to take on responsibility for maintenance, it must also be involved in the planning and implementation of the project right from the initial stages, to develop a sense of ‘ownership’ for the system and an ensuring understanding that if the system is to be maintained, it is the community’s responsibility to do so. That would be a good expression of terms from “Beneficiary to Client to Manager”. \textsuperscript{14}(WEDC lectures 1994). Community management implies that the community does more than contribute labor or small inputs into the planning process but emphasizes the community’s decision making power over the project.

2.5 ORGANIZATIONAL AUTONOMY

Nigeria is a country of over 111 million inhabitants, with a very complex structure to be governed. The successive Nigerian governments have contrived a remarkably complex administrative system, in which rural road industry has often found itself enmeshed. The complexity of the country’s structure, and the rural road project’s involvement of a variety of organizations at the different tiers of government and the private sector, called for an absolute autonomy or Authority to organizations responsible. Unlike most other types of infrastructure, roads are neither built nor maintained by those who use them to market output or services. However, to have efficient and reliable road maintenance institutions, it has to be managed as well as any commercial business

\textsuperscript{13} Proceedings of the 16th WEDC conference: Regional Centre for Urban and Environmental Studies(RCUES) Osmania University, Hyderabad India. 27 - 31 August, 1990. INFRASTRUCTURE FOR LOW INCOME COMMUNITIES Edited by Michael D. Smith, published by WEDC August 1991.

\textsuperscript{14} Author’s Msc Lecture notes from WEDC 1994.
organization. Roads maintenance in Nigeria are the public services under the control of Federal, State and Local Governments. Each of the three arms of governance has a role in the provision and maintenance of roads. Although there is still tight central control, the structure of the governing bodies is such that at each level there is a measure of local autonomy. The Federal Government is presently led by a military (Head of State) instead of civilian president under the civilian system. In this case, the highest ruling body is the military ruling council instead of legislative. The state governments are presently run by the military governors, instead of civilian governors with the state executive councils, Local governments are the only tier presently run by the elected chairmen with their local councilors as the government is heading towards democratization. The question of autonomy is therefore still far from adequate. This is for the fact that, under the present system of military rule the States are administered by military governors, who have powers at state level based on directives from the head of state at the federal level, while the elected chairmen at local governments enjoy substantial devoted authority of execution at their own level. Organizations responsible for road industry in Nigeria are as shown in the table 2.5.

2.5.1 Government Structure

The Federal republic of Nigeria possesses three tiers of Government: Federal, State, and Local, embodied in the Local Government Authorities (LGAs). The Federal Government is responsible for the overall administration of the Nation, including the development, use and distribution of its' resources. The State Government, supported by Federal funds and in some cases Federal Staff, is responsible for the administration of the State, employing a set of State ministries to that purpose. Locally, the administrative hierarchy is based upon a progression from the most local to wider spheres with administrative bodies representing villages, towns and districts culminating in the LGAs.
2.5.2 Community’s structure

The communities, particularly in rural areas of Nigeria are willing to co-operate with one another to satisfy their mutual interest. It may be argued that, given the present poor state of Nigeria’s economy, a fundamental factor in the promotion of rural development is the awareness and initiative of the rural community itself and the extent of its involvement and participation in the development of its area. This argument, is supported by Adedayo’s report, where he based his argument based on the notion that, “the resources of the Federal government (which is wholly dependent on a mono-product economy) are limited and cannot therefore provide everything for every community” 15 (Adedayo, 1985).

Rural development in Nigeria is taking place on two broad forms. First, there are major schemes of improvements inspired by the economic planners of government or international agencies. These range in scale from the major agricultural development projects (ADP’s) such as the Sokoto Agricultural Development Projects, to the medium-sized exercises at improved agriculture, co-operative arming and village regrouping which are common in most parts of Nigeria. Second, there are other types of rural development programs which involves the apparently piecemeal diffusion, through self-reliance, of social services such as motorable roads, bridges, health facilities, rural electrification etc.

15 Adedayo, Adebisi; University of Ilorin - Nigeria; in a Journal of community development Vol. 20 No. 1 1985.
2.6 LEADERSHIP

Many rural development projects in Nigeria are either affiliated to the governments, or to the private organizations. In reality it is often leadership at this level which was primarily responsible for initiating the project and which makes major decisions concerning the project’s future. Too often such decisions are made without adequate input from the local level (bottom up).

The six months field work study in Nigeria highlights a number of points for rural development programmes:

- The present government approach may not succeed unless there is more research into grassroots approach to rural development programs
- The direct approach to integrated rural development through government agencies rather than through the accepted leaders of the rural population may have unintended results. Because the projects initiated and executed by various communities are seen by the communities as the ones meeting their needs
- The present pattern of rural self-help development projects remains largely unplanned and un-coordinated because the governments appear unconcerned about the duplication and uneven spatial distribution of these communal efforts.

Therefore, participation in development revealed by the six months study in Nigeria, and supported by some ideas from Adedayo Adebisi, means that much more support will be received for projects in which the local people have an input and where they have the right to choose their representatives. In this situation, the community leaders in a rural setting command respect and can therefore mobilize the people. Now that there is an evidence of community’s concern in rural development through communal efforts, if CO-ordinated, could help the various state governments to avoid duplication of effort, waste of money and resources on projects which are not on the priority list of rural dwellers. There now appears as always was, a need for governments in Nigeria to support, through the community leaders to establish a sustainable rural road maintenance institution.
2.6.1 Governmental Leadership

Nigerian Governments usually use rural development programs as a vehicle to broaden their political participation, reinforce political patronage, or realize ideological objectives. These multiple and, at times, conflicting objectives have often rendered overall rural development strategy inconsistent and sometimes even self-defeating. “Government planners, therefore, have the difficult job of reconciling the needs for growth as well as for broadening participation and of finding a coherent rural development strategy which is politically feasible and economically sound and can be implemented administratively” 16 (Lele, 1984). Such planning is by no means easy to realize. The Nigerian Governments, thus, had to reconcile two apparently conflicting but basically interdependent goals:

- the need for decentralization to take into account local potential and constraints and to channel the knowledge and energies of millions of rural people into the development process
- the need for central control to foster national integration, regional specialization, and outside stimulus.

The introduction of the DFRRI by the Nigerian government, was in recognition of the need for adjustment to arrest economic and social decline through rural development programmes. The DFRRI in collaboration with States and local Governments through the application of appropriate technology enhances self reliance. The simplicity and the low capital requirement needed to apply the technology made it an attractive opportunity for Local government and community’s to join.

2.6.2 Community’s Leadership

In Africa, societies have a long history of traditional democracy, as most ethnic groups have always been elements of democratic choice in the selection of leadership and resolving issues affecting community as a whole. However, the catalogue of problems associated with rural areas of Africa and many other developing countries include abject

poverty, inadequacy of infrastructural facilities, roads in particular, unemployment, mass migration of the able-bodied and generally low level of living. The transformation of rural life has become the main challenge to the economic and social development of developing countries. This challenge arises from the need to promote the welfare of the people in the rural community so as to acquire a better standard of living in their locality rather than drifting to towns where they think the pattern of life is better. Although little research has been undertaken to assess the effectiveness of these strategies, this study is one contribution to remedying that situation. It focuses on the role of community leaders in community self-help projects undertaken as part of a strategy for rural development. There are many ways in which members of a Community can work together towards solving these problems. While some Communities rely on traditional leaders, such as council of elders or a chief to make decisions for them, others organize new means of making decisions such as village development committees. Whatever method is adopted, the aim is to achieve a more effective participation in self-help projects. In a related field Adedayo quotes Mbithi’s statement of more than two decades, that; “grassroots participation in development means consulting and involving the local people in the identification of local needs, and conception, formulation and implementation of any project in order to develop the necessary self-reliance and self-confidence needed among the rural people for accelerated development” 17 (Mbithi, 1974; Adedayo, 1985).

2.6.3 Special Features - Nigeria

During the sixties colonial era, LGCs in North were to the large extents different from those of the Eastern and Western parts of the country. The existence of the powerful Sokoto Caliphate, made all the difference.

“The British colonial administration met an impressive apparatus of administration with well developed procedures of direct taxation and an institutionalized judiciary”\(^{18}\) (Brown 1979). The British administrators thus found the existing traditional hierarchical Socio-political structure of Sokoto Empire in the North a convenient apparatus for the establishment of their Indirect Rule system of local administration. Under this system of indirect rule, the Sultanate was given unlimited control over the affairs of government through it’s various Emirates at local level.

However, the colonial administration made little modification to secure an effective system of local government, to cover the rural areas as against the towns specific. The changes allows for representatives from Farmers, industrial workers, social clubs and the educated minority. Realizing that, wide powers were given the Native Authorities (N.As) by the regional government and most of the rural people knew Government to be Native Authorities. Unlike their counterparts in the East and West, however, N.As in the North had a wide number of functions to perform. Indeed, there was hardly any category of public services in which the N.A did not play a role. Furthermore, most of the N.As in the North were wealthy and almost self-sufficient partly because it seemed the regional government consciously wanted them as effective organs of the government. With regard to local participation and representation, however, the Native Authority system in the Northern Nigeria was far from being satisfactory.

The Distinctive feature of a community development in today’s Nigeria is a complex one. Unlike in the colonial period, it’s implication lies with the issue of power relations between ministries of central Government. Community development in Nigeria covers a wide range of activities, ranging from; rural roads, social services, education, health etc. as such, virtually all ministries are involved. This has resulted to community development department being tossed from one ministry to the other depending on the whim of the Government in power. This lack of consensus as to the proper place of community development within governmental machinery derives from a larger problem, the low priority accorded to rural and therefore community development.

It is pertinent to note that while government in its planning documents often promises to give priority to programs and projects directly benefiting the rural population. "The actual governmental investments at the end of the plan period by way of grants in aid, loans or even technical assistance, is often a paltry sum" 19(Olowu and Ayo 1985). Given example with Bendel State far back in 1973; where government provided only 13 per cent of promised grant in aid of self help projects.

2.6.4 Special Features - Sokoto State
The case study area (Sokoto state) is the best for any typical example in Nigeria, especially with it’s commanding power of leadership role in Nigeria. As mentioned earlier the traditional form of leadership in the North through the Sokoto empire allows for a marriage of convenience between the Sultanate and the colonial administration. Both sides accept the agreement of indirect rule with little modification in the administration. The collaboration gave the Sultanate a recognition from the British administration. The influence allows a suggestion of how and when Nigeria was to be Independent. The Sultanate was confronted for nomination of people to head Nigeria’s first cabinet. That was how the independence was achieved, and one of the reasons why, Sokoto to date, still commands a greater role in the leadership of Nigeria.

However, in the present system, Sokoto state is among the 36 states that comprised Nigeria, therefore could not have any better option than the Federal system. It has the same problems of power relations between ministries. The Ministry of Local Government is charged with the responsibility of overseeing community development efforts in the State, while the necessary power to enforce it’s guidelines and suggestions are bestowed with the Federal Government.

In many occasions local government makes promises of some paltry amount to help the local self-help projects. Unfortunately part of the amount promised would not be released to many projects for execution by various communities. The reason given for not releasing

19 Olowu, Dele and Ayo, S. Bamidele; Senior lecturers, University of Ife Nigeria, in a Community Development Journal Vol. 20 No. 4 1985 pp.284.
or utilizing these funds had always been an unexpected drop in the grants promised by the State and Federal governments.

In spite of false promises and lack of support from the formal governments, some tremendous achievements were recorded in community self-help development efforts in recent years. An illustration of attempts in Sokoto State by communities involved in rural development through self-participation, using data from the case study area and the Author’s own survey is reported in chapter 10.

However, the objective is to determine the special features to be taken into account in Sokoto State. Consequently;

- the lack of consensus and neglect of community development can be minimized if wider areas of autonomy and discretionary authority are accorded to the local governments
- the ministry of local government should assume more of a supportive rather than supervisory or control role
- it is observed that, the Federal, States, the LGAs and the communities all have general and specific roles to play to ensure effective execution, monitoring and evaluation of the programs. Each is therefore urged to play it’s role successfully.
- Lastly, since LGA is the pivotal link between Government and the people, each LGA should do everything within it’s power to ensure program success.

2.6.5 Special Features - Village level

Community development at village levels in every region in Nigeria have unique capabilities to offer and their approach to offering the services each have special needs. The Communities in the villages of Sokoto state are organized in such a way that, they fit in with the wishes and capabilities of the community. Others are adapted to the organizations that already make decisions on behalf of the community, as practiced during N. As regional governments.

The traditional village meeting was and is mainly an arena for full and free expression of all shades of opinion in order to reach a high degree of consensus, good or bad. An example is demonstrated below of how such meetings are held. An illustration of village
community’s meetings in two different regions of Nigeria is as below. Figure 2.6.2 A is a village in Sokoto State, Northern region, while Figure 2.6.2 B is a typical meeting in South Eastern Nigeria’s village. The difference in culture is very clear, as demonstrated in the two different villages. While there was no single Female participant in the Northern village, the opposite was the case in the Southern village, as few Men are involved compared to Women.

Pictorial illustrations of typical village level meetings in the North and South East Nigeria for consensus on crucial decisions.

Figure 2.6.2 A
Figure 2.6.2 B

2.6.6 Scope for improved Co-ordination

In Nigeria, the three tier's structures (Federal, State and Local governments) are responsible for rural development programs. They all have the Authoritative control in rural road's development. A number of other government Agencies are associated in the execution. They include DFFRI, ADPs, Federal Ministry of Economic Planning, Fed. Ministry of Agriculture, State Department of rural development, State Ministries of social development, Local Government community development departments etc., The mixed sharing of responsibilities had resulted to several problems in the design and implementation of various projects.

First, “the overlapping responsibility due to the hierarchical structure of the various governments involved in rural development has resulted in most decisions having made in Abuja and passed down to the State, which after it’s alteration passed down to the local government, then to the field staff for execution”(author’s interview with DFFRI’s Staff).
Second, “different programs have been the responsibility of different agencies. Given the generally inadequate inter-ministerial as well as inter Agency coordination, many services have been duplicated while others have been completely omitted”20(author-1995, ADP’s Engineer).

Poor coordination, had caused Government a huge loss of resources due to delays and waste of projects. Delays are caused by Governments bureaucracies which eventually hinders progress. While waste are due to many factors, which includes;

- inflating of contract prices, with no enough money to execute
- non utilization of the Direct Labor Organization within the ministries
- non use of labor-based (affordable) methods
- Poor selection of contractors (e.g. ones with no idea of road works)

In order to achieve the purpose, and benefit from the huge investment, here are suggestions for realistic alternatives.

a) First, inter-governmental coordination and inter-ministerial cooperation are crucial factors to the program’s success. Therefore, coordination between ministries, central to local, agency to agency would no doubt create good atmosphere for the rural development program to be sustainable.

b) The Governments at various levels must show their commitments and seriousness in programs execution. This could be achieved by appointing sincere and honest leaders with bias knowledge in the field of assignment.

c) Both the organizations and the personnel must have the initiative, to make the implementation possible. Contractors must have the knowledge in the field of the contracts to be awarded to them.

d) The personnel must have a good remuneration and be rewarded for any excellence as well as be punished for any malpractice.

20 Field work study; Interview surveys, a physical interview with the Engineer in charge of rural road’s development, SADP Sokoto State - Nigeria January 1995.
CHAPTER THREE
METHODOLOGY

3.0 INTRODUCTION
Research methodology is the procedure adopted in achieving the objectives of the research. A simplified overview of this process may be stated as: research design; data collection; data processing; and analysis (adapted from Babbie, 1989).

In order to identify the problems affecting rural roads in Nigeria, Sokoto state in particular, several methods were employed. A number of structured questionnaires were administered. In addition to that, numerous structured interviews were conducted with several people representing different organisations. The organisations include among many, Engineers, Contractors, Local people, Community leaders, Farmers, Transport owners, Drivers and many other beneficiary members of communities, on selected samples within the three regions.

The selected sites (samples) provided content and support data which enabled the author to select few hundreds people for study and discover things that apply to thousands and millions of people not studied. Incidentally, the Nigerian authority created six newly states and 183 additional local governments between December 1996 to March 1997 after the data collection process. The alteration from original survey may result to changes in names of pilot states and the local governments. The author is looking for the possibility of accommodating the changes to suit the study.

3.1 RESEARCH PROCEDURE

The procedure is based on the academic literature review (theoretical) of materials from both the U.K and Nigeria, and the field work study (practical review) on extent of rural roads deficiencies in Nigeria and the case study area in particular. The materials were mainly from the IDE in Loughborough university, World Bank, and the Nigerian sources (especially the case studies), with many other sources available from other parts of the World. Thus the combine effort of both the desk study and the field work made it possible to arrive at this stage.

3.1.1 Research design

Research design is the 'logic that links the data to be collected (and conclusions to be drawn) to the initial questions of a study (Loughborough 1995). In the most elementary sense, the design is the logical sequence that connects the empirical data to a study's initial research questions and ultimately, to it's conclusion.

The design of the questionnaires and interviews which formed the major part of the studies was based on the requirements of the literature review. The survey questions were established using the procedures recommended by supervisor Derek Miles and Robert Petts in conformity with ILO/MART draft questionnaire, and Hoinville et al (1977), Fowler (1993), and Prescott (1993).

These recommendations requires the questionnaire to be:

- written in simple language
- clear, unambiguous and easy to answer
- of non biased terms in order to get a real view from the respondents
- brief and of short sentences
- self-explanatory
- translated in to regional dialects
- flexible where the respondents express their views and comments
- ranked in order of importance
- attractively spaced and uncluttered
- designed to enable easy analysis

Copies of the questionnaires are included in appendices at the back of this report.

3.2 Data collection Methods

The technique involved two primary methods that have been widely used for data collection. These are interviews and Questionnaires (Brevker et al 1984, Welbank

---

2 Loughborough University 1995; Lectures on how to carry out research studies for PhD students.
-Tenant Feedback : A step-by-step guide to tenant satisfaction surveys, HMSO.
-Welbank, M., (1987), Perspective on Knowledge Acquisition, proceeding of SERC workshop on knowledge acquisition for engineering application.
Hand delivery of questionnaires was used instead of postal, as not all potential respondents are covered by the postal services.

In survey analysis literature, a test of homogeneity is usually used to study the homogeneity of the distribution of a response variable over a set of non-overlapping regions (Lehtonen 1995). In this study, three segregated regions comprising Nigeria were involved. They exhibit considerable geographical and seasonal variations, making the collection of information on rural road to illustrate this variety quite difficult. Therefore, separate consideration by region was adopted for the following reasons:

- Firstly, to allow uniformity of data, so that all surveys in the samples cluster fall in the same region;
- Secondly, there are differences in values and culture in the three regions that would influence what effect the same technological innovation could have;
- Thirdly, there is a huge difference in human and natural resources available between the three regions;
- Fourthly, there are different levels of rural roads development that are already found in the three regions, and
- Lastly, there are lots of disparities between the regions, on such things as level of awareness and willingness to participation, gender-related effects, and population composition, which are important components for labour-based application.

The study areas chosen in each region were selected to take account of the above listed varieties. At the initial stage, community leaders (district heads) in all the three regions were contacted for permission to approach local people and undertake interviews within their communities. In the North these leaders are known as HAKIMI while in the Western region are called BAALE, and in the Southern Region are called NZE. As in most traditional communities, these leaders have lots of roles to play within their locality, as such their support is crucial for success.

3.2.1 Field Work Survey Procedure

The field work study in Nigeria lasted for six Months. The survey team was financially handicapped and this meant that only in exceptional circumstances (such as case study
area) was it possible to include areas of the country at considerable distances from main roads or cities. In addition to normal base data collection, observations and interviews were conducted at the chosen samples in all the three regions. The interviews and questionnaires, covered all aspects of life ranging from Government representatives, private individuals, and the local communities. These includes among many; Farmers, Transporters, Car owners and Drivers, Traders and their customers, Contractors, and many others in the community set up.

The method involved selecting 11 states (out of 36) and 30 LGCs (out of 774) and their sampled district units in all the regions as demonstrated by the table below.

Table 3A Regional Selection of States, LGCs and sampled Districts

<table>
<thead>
<tr>
<th>States of the North</th>
<th>3 States of the south-west</th>
<th>2 States of the South-East</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>23 Local Governments</td>
<td>4 Local Governments</td>
<td>3 Local Governments</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>48 District Units</td>
<td>8 District Units</td>
<td>6 District Units</td>
</tr>
</tbody>
</table>

3.2.1.1 Case study area

In the light of the material collected in the study area it now appears that the non selected areas, are either heavily or equally affected with acute shortage of road facility. Their vastly superior numbers means that a more representative sampling method would have been more desirable. Because of shortage of funds, it was not possible for the author to visit each relevant deserving area of Sokoto state. This would have involved long journeys, on foot in many cases. Rather the local community leaders, unions, social clubs, and all sort of community representative groups were notified in advance of the survey, it’s purpose and the desired nature of the sample of areas. The areas thus selected were told to be available at certain times on the appropriate days.

3.2.1.2 Other areas

These other areas are the two regions (i.e. South West and South East), and some selected states in the Northern region. In each case two districts were selected, one
closer to main road and the other more distant from the road, and approximately 10 per cent sample within each of these states was studied.

3.2.2 Project value

To estimate the value of this project, we need to look at Nigeria’s total network of rural roads, which according to Banjo’s 1994 evaluation was estimated at 108,700 km. The country’s road density according to World Bank’s 1992 report was 166 km per 1,000 km² of arable land, and 1.0 km per 1,000 population (FAO / WBCP-March 1992). Nigeria’s population according to current estimate by West Africa Magazine of March 1997 was 111.7 million.

Therefore, the study’s 10% coverage to Nigeria’s population implies a service coverage to 11.17 million people. At the same instance, 10% of total network would be 10,870 km. Now considering the total network (108,700 km), @ 1 km per 1,028 population, the coverage is going to serve 10.9 million people.

The value of the project would be determine based on identification report by Nigeria’s rural roads and marketing project; project cost summary of March 1992, which states an annual estimate for various categories of road conditions as below:

- Rehabilitation cost US$ 10,000 per km (roads in poor condition)
- Periodic Surfacing US$ 4,000 per km (roads in good or fair condition)
- Periodic grading US$ 200 per km (Good to fair condition)
- Spot Improvement US$ 500 per km

Based on the above estimate, the average annual project value over all responding sites was calculated as:

10,870 km * US$ 10,000 = US$ 108,700,000 for Rehabilitation
10,870 km * US$ 4,000 = US$ 43,480,000 for Periodic surfacing
10,870 km * US$ 250 = US$ 2,717,500 for Routine maintenance
10,870 km * US$ 200 = US$ 2,174,000 for Periodic grading.

The above computations would be used to give an idea for estimating the value of the project (covered by this study) for different kinds of conditions in the three regions.

3.3 QUESTIONNAIRES AND MEASUREMENT

In order to measure the scale of neglect to rural roads in Sokoto State, it was found necessary to look at the factors responsible through survey questionnaires. To ease the measurement, the questionnaires had to be categorised to a format that conform with the respondent groups.

The questionnaires took in to considerations the factors that influence sustainability of road infrastructure using local resource base. These factors includes; Technology and Equipment, Institutional framework and Capacity (Road Authority personnel), Labour availability and its surplus, Contract and Contractors, Training and Education, Policy and plans, Region and Culture, Road network and the practice in application by both Sokoto (case study) and Nigeria.

The procedure involved administration of self questionnaires by various categories of respondent groups, Face to Face interviews with selected representative samples of people across the regions, and the sites observation.

3.3.1 Survey Responses

Specific questionnaires and interviews targeted Road Authority Personnel, mainly; Engineers / Technicians and related fields and the domestic contractors, whereas the General questionnaire was addressed to the general public, mainly the road users, transport owners, and beneficiary communities in rural areas of the three regions. Each question response was analysed separately according to the respondent group. Sample sizes were regarded as sufficient to be representative of the population unless otherwise stated.

From the 11 selected states of the three active regions, containing 62 district units (as sample sites) of 30 LGCs, 3,800 questionnaires were distributed, and 2,544 of these number responded. Much as not all questionnaires were completed, as indicated below.

<table>
<thead>
<tr>
<th>Regions</th>
<th>Q. Distributed</th>
<th>No. of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern region</td>
<td>2,400</td>
<td>1,652</td>
</tr>
<tr>
<td>South Western region</td>
<td>900</td>
<td>520</td>
</tr>
<tr>
<td>South Eastern region</td>
<td>500</td>
<td>372</td>
</tr>
</tbody>
</table>
Figure 3B

Distributed Questionnaires as a proportion of Responses by region

Northern region: 2400
South Western: 1850
South Eastern: 500

Regional bands

Figure 3B1  Per centages of total survey responses by regions

South Eastern: 15%
South Western: 20%
Northern region: 65%
Table 3C  Total survey responses by group

<table>
<thead>
<tr>
<th>Group</th>
<th>Survey Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Personnel</td>
<td>800</td>
</tr>
<tr>
<td>Engineers</td>
<td>80</td>
</tr>
<tr>
<td>Local Contractors</td>
<td>104</td>
</tr>
<tr>
<td>Local Communities</td>
<td>1400</td>
</tr>
<tr>
<td>Others</td>
<td>160</td>
</tr>
</tbody>
</table>

Figure 3C

Analysis of average survey responses by group

Table 3D  Group Responses by regions

<table>
<thead>
<tr>
<th>Groups</th>
<th>Northern region</th>
<th>South West region</th>
<th>South East region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mangt. personnel</td>
<td>480</td>
<td>190</td>
<td>130</td>
</tr>
<tr>
<td>Engineers</td>
<td>42</td>
<td>26</td>
<td>12</td>
</tr>
<tr>
<td>Local Contractors</td>
<td>46</td>
<td>30</td>
<td>28</td>
</tr>
<tr>
<td>Local Communities</td>
<td>980</td>
<td>240</td>
<td>180</td>
</tr>
<tr>
<td>Others</td>
<td>104</td>
<td>34</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>1652</td>
<td>520</td>
<td>372</td>
</tr>
</tbody>
</table>
Figure 3D

Respondents groups by region

- Mgt. Personnel
- Engineers
- Local Contractors
- Local communities
- Others

Groups band

- Northern region
- South West region
- South East region

Figure 3D1

Groups respondents from the North

- Mgt. Personnel 29%
- Engineers 6%
- Local contractors 3%
- Local communities 59%
- Others 3%
3.3.2 Results Analysis

By and large, 70 out of 100 questions were returned fully answered by the various groups involved. The answered questions were analysed as below:

Management personnel (policy makers) 8, Engineers 25, Local communities 12, Local contractors 15, and others 10 questions. This gives in total 70 successfully answered questions by various categories of respondents. It is as tabulated in table below:
Table 3E. Respondents Categories

<table>
<thead>
<tr>
<th>Management Personnel</th>
<th>800*8</th>
<th>6400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineers</td>
<td>80*25</td>
<td>2000</td>
</tr>
<tr>
<td>Local Communities</td>
<td>160*10</td>
<td>1600</td>
</tr>
<tr>
<td>Local Contractors</td>
<td>104*15</td>
<td>1560</td>
</tr>
<tr>
<td>Others</td>
<td>160*10</td>
<td>1600</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>28360</td>
</tr>
</tbody>
</table>

The questions asked covers the Road networks, Technology and Equipment, Contract and Contractors, Training and Education, Policy and plans, Education and training, Institutional changes and Alternative technologies, all for the purpose of justifying the need for application of labour based road infrastructure works in Sokoto state.

3.3.3 Some Selected Road Networks

Below is an illustration of Road statistics in some LGCs of selected states covering Geographical zones of the three regions in Nigeria.

A) Northern Region;

1) Table 3F: Road in lengths and densities Alkaleri LGA of Bauchi state.

<table>
<thead>
<tr>
<th>Type of road</th>
<th>Length (km)</th>
<th>Density (km/km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal road</td>
<td>60.8</td>
<td>0.007</td>
</tr>
<tr>
<td>State road</td>
<td>100.6</td>
<td>0.012</td>
</tr>
<tr>
<td>LGA road</td>
<td>440.0</td>
<td>0.052</td>
</tr>
<tr>
<td>Total</td>
<td>601.4</td>
<td>0.071</td>
</tr>
</tbody>
</table>

Source: Alkaleri LGA Works Department and Bauchi state M.O.W & T, 1995.
### Table 3G: Road lengths and densities in Rafi LGC, of Niger state.

<table>
<thead>
<tr>
<th>Type of road</th>
<th>Lengths (km)</th>
<th>Density (km/km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal road</td>
<td>115</td>
<td>0.017</td>
</tr>
<tr>
<td>State road</td>
<td>34</td>
<td>0.005</td>
</tr>
<tr>
<td>LGC road</td>
<td>240</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>389</strong></td>
<td><strong>0.062</strong></td>
</tr>
</tbody>
</table>

Source: Rafi LGC Works Department, Niger state M.O.W & T, and FMW&T Niger state Branch 1996.

### B) South West Region;

1) **Table 3H:** Road lengths and densities in Okpebho LGC, of Bendel state.

<table>
<thead>
<tr>
<th>Providing Agency</th>
<th>Bitumen surface</th>
<th>Earth surface</th>
<th>Total</th>
<th>Road density (km/km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bitumen Earth</td>
</tr>
<tr>
<td>Federal</td>
<td>84</td>
<td>Nil</td>
<td>84</td>
<td>0.05 Nil</td>
</tr>
<tr>
<td>State</td>
<td>201.6</td>
<td>110</td>
<td>312</td>
<td>0.11 0.06</td>
</tr>
<tr>
<td>LGA</td>
<td>Nil</td>
<td>399</td>
<td>399</td>
<td>Nil 0.22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>285.6</strong></td>
<td><strong>509</strong></td>
<td><strong>795</strong></td>
<td><strong>0.16 0.28</strong></td>
</tr>
</tbody>
</table>

Sources: a) Bendel state M.O.W and T, statistic 1988  
b) Okpebho L.G. works department: Road statistics 1990

### C) South East Region;

1) **Table 3J:** Road lengths and densities in Uyo LGC, of Akwa-Ibom state.

<table>
<thead>
<tr>
<th>Providing Agency</th>
<th>Road Length (km)</th>
<th>Road Density (km/km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Government</td>
<td>17.4</td>
<td>0.03</td>
</tr>
<tr>
<td>State Government</td>
<td>133</td>
<td>0.24</td>
</tr>
<tr>
<td>Local Government</td>
<td>379.6</td>
<td>0.69</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>530</strong></td>
<td><strong>0.96</strong></td>
</tr>
</tbody>
</table>

3.3.4 Regional Disparities on rural roads service coverage

The field survey provided information on rural road densities and their average distances from production centres for selected states. The chosen states were Six from the North, three each from the South East, and South West regions. The result is as tabulated in table 3K below.

Table 3K: Regional disparities on rural roads service coverage

<table>
<thead>
<tr>
<th>Region</th>
<th>Selected states</th>
<th>Km /1000 popl.</th>
<th>Km/1,000 sq km arable land</th>
<th>Av. dist. to rural rd (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>1. Bauchi</td>
<td>1</td>
<td>40</td>
<td>6.04</td>
</tr>
<tr>
<td></td>
<td>2. Gongola</td>
<td>0.8</td>
<td>38</td>
<td>7.86</td>
</tr>
<tr>
<td></td>
<td>3. Kad/Katsina</td>
<td>0.9</td>
<td>34</td>
<td>5.46</td>
</tr>
<tr>
<td></td>
<td>4. Niger</td>
<td>1.4</td>
<td>154</td>
<td>1.52</td>
</tr>
<tr>
<td></td>
<td>5. Sokoto</td>
<td>0.9</td>
<td>36.3</td>
<td>6.89</td>
</tr>
<tr>
<td></td>
<td>a) Bendel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Lagos</td>
<td>3.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>c) Oyo</td>
<td>2.6</td>
<td>239.9</td>
<td>1.04</td>
</tr>
<tr>
<td>S/West</td>
<td>1) Akwa-Ibom</td>
<td>0.9</td>
<td>-</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>2) Anambra</td>
<td>1</td>
<td>506</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>3) Imo</td>
<td>0.8</td>
<td>542.9</td>
<td>0.46</td>
</tr>
</tbody>
</table>

Source: From Various Ministries of Agriculture's, M.O.Ws, and UNDP report 1990.

Figure 3K

Regional disparities in rural road densities and av. distances from production centres
Table 3L below: Length of rural roads around selected markets (km).

<table>
<thead>
<tr>
<th>Geographical zone</th>
<th>States visited</th>
<th>Markets visited</th>
<th>Av. length of road (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>Bauchi</td>
<td>Alkaleri</td>
<td>48 km</td>
</tr>
<tr>
<td></td>
<td>Kaduna</td>
<td>Kachia</td>
<td>38 km</td>
</tr>
<tr>
<td></td>
<td>Katsina</td>
<td>Duts’ma, Daura, Kankia</td>
<td>45 km</td>
</tr>
<tr>
<td></td>
<td>Niger</td>
<td>Rafi, Kontagora</td>
<td>36 km</td>
</tr>
<tr>
<td></td>
<td>Sokoto</td>
<td>Tambuwal, Yabo, Wam’ko</td>
<td>50 km</td>
</tr>
<tr>
<td>South West</td>
<td>Bendel</td>
<td>Okpebho</td>
<td>22 km</td>
</tr>
<tr>
<td></td>
<td>Lagos</td>
<td>Ife, Ikorodu, Maroko</td>
<td>20 km</td>
</tr>
<tr>
<td></td>
<td>Oyo</td>
<td>Ago-are, Sabo e.t.c</td>
<td>25 km</td>
</tr>
<tr>
<td>South East</td>
<td>Anambra</td>
<td>Ezeogu, Aquata</td>
<td>35 km</td>
</tr>
<tr>
<td></td>
<td>Imo</td>
<td>A/oru, Eke Nguru, Nkoala</td>
<td>30 km</td>
</tr>
</tbody>
</table>

Source: Field work survey, various LGCs reports, and M.O.Agrics. in selected states.

Figure 3M:

Two selected states in the Northern region
Table 3M: Regional comparison of performances in rural road Construction, Rehabilitation and Maintenance (km)

<table>
<thead>
<tr>
<th>Region</th>
<th>State</th>
<th>Year</th>
<th>New construction</th>
<th>Rehabilitation</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Target</td>
<td>Actual</td>
<td>Target</td>
</tr>
<tr>
<td>North</td>
<td></td>
<td>1987</td>
<td>-</td>
<td>-</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1988</td>
<td>100</td>
<td>95.7</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1989</td>
<td>100</td>
<td>67.3</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1990</td>
<td>200</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Kano</td>
<td></td>
<td>1987</td>
<td>-</td>
<td>-</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1988</td>
<td>-</td>
<td>-</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1989</td>
<td>-</td>
<td>-</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1990</td>
<td>-</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Akwa-Ilborn</td>
<td>1987</td>
<td>-</td>
<td>-</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1988</td>
<td>-</td>
<td>-</td>
<td>75</td>
</tr>
<tr>
<td>South-East</td>
<td>1989</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1990</td>
<td>-</td>
<td>-</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1987</td>
<td>20</td>
<td>23</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1988</td>
<td>30</td>
<td>18</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1989</td>
<td>30</td>
<td>30</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1990</td>
<td>30</td>
<td>10</td>
<td>200</td>
</tr>
<tr>
<td>Bendel</td>
<td></td>
<td>1987</td>
<td>-</td>
<td>-</td>
<td>150</td>
</tr>
<tr>
<td>South-West</td>
<td>1988</td>
<td>-</td>
<td>-</td>
<td>150</td>
<td>93.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1989</td>
<td>-</td>
<td>-</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1990</td>
<td>-</td>
<td>-</td>
<td>200</td>
</tr>
<tr>
<td>Ondo</td>
<td></td>
<td>1987</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1988</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1989</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1990</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Figure 3 N below:

Two selected states from South-East region

Figure 3P

Two selected states from South-West region
3.4 LABOUR AVAILABILITY

Labour availability and surplus has been estimated from the sample state’s LGAs using both primary (questionnaires and Interviews) and secondary data (statistics from Government, ILO and the World Bank). Detail basis of the estimates is explained in the respective groups responses. While the results of the estimates and all assumptions made are reported and tabulated in table 3Q.

Table 3Q  Estimates of the Labour availability between the three regions

<table>
<thead>
<tr>
<th>Region</th>
<th>State</th>
<th>LGA</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>Bauchi (Alkaleri)</td>
<td>3,583,847</td>
<td>3,583,847</td>
<td>3,583,847</td>
<td>3,583,847</td>
<td>3,583,847</td>
<td>3,583,847</td>
<td>3,583,847</td>
</tr>
<tr>
<td></td>
<td>Kaduna (Kachia)</td>
<td>8,028,300</td>
<td>8,028,300</td>
<td>8,028,300</td>
<td>8,028,300</td>
<td>8,028,300</td>
<td>8,028,300</td>
<td>8,028,300</td>
</tr>
<tr>
<td></td>
<td>Katsina Dutsin-Ma</td>
<td>3,530,658</td>
<td>3,530,658</td>
<td>3,530,658</td>
<td>3,530,658</td>
<td>3,530,658</td>
<td>3,530,658</td>
<td>3,530,658</td>
</tr>
<tr>
<td></td>
<td>Niger (Rafi)</td>
<td>953,943</td>
<td>953,943</td>
<td>953,943</td>
<td>953,943</td>
<td>953,943</td>
<td>953,943</td>
<td>953,943</td>
</tr>
<tr>
<td></td>
<td>Sokoto (Yabo)</td>
<td>3,193,200</td>
<td>3,193,200</td>
<td>3,193,200</td>
<td>3,193,200</td>
<td>3,193,200</td>
<td>3,193,200</td>
<td>3,193,200</td>
</tr>
<tr>
<td>S/West</td>
<td>Anambra (Ezeagu)</td>
<td>1,906,627</td>
<td>1,906,627</td>
<td>1,906,627</td>
<td>1,906,627</td>
<td>1,906,627</td>
<td>1,906,627</td>
<td>1,906,627</td>
</tr>
<tr>
<td></td>
<td>Benin (Okpebho)</td>
<td>2,698,361</td>
<td>2,698,361</td>
<td>2,698,361</td>
<td>2,698,361</td>
<td>2,698,361</td>
<td>2,698,361</td>
<td>2,698,361</td>
</tr>
<tr>
<td></td>
<td>Oyo (Obokun)</td>
<td>3,870,627</td>
<td>3,870,627</td>
<td>3,870,627</td>
<td>3,870,627</td>
<td>3,870,627</td>
<td>3,870,627</td>
<td>3,870,627</td>
</tr>
</tbody>
</table>

Source: Computed from field work survey Data (Sept. 1995-Apr. 1996), which entailed both the Primary and Secondary Data (sources) in Nigeria.

In principle, the estimates were based on the assumptions that:

- the registered unemployed in urban areas represent a labour availability;
- school children age 15 and above have been subtracted from the labour supply;
- In certain cases an estimated supply of migrant workers has been added;
- The differences in farming periods by three regions has been taken into account;
- Figures in the North except Kaduna represents only Male adults aged 15-59 years, since by custom Women are not allowed to participate in public works;
- Figures in the Southern regions represents the workforce aged 15-59 years and the cultural practices regarding female participation in construction work;
- Labour demand was worked out for an average work-force of 3.5 persons per household in the Southern (monogamy) states and 8.5 persons per household in the Northern (polygamist) states.
- Labour supply includes both formal and informal sector, and each adult worker assumed to work on average of 19 days a month;
- Labour supply excludes working age groups who are in school, also excluded are labour lost to holidays, illness and injuries which was estimated at 1.25 man-days per worker per month (i.e. 15 man-days per worker per year).

**Figure 30**

*Regional computation of labour availability in sampled LGAs of selected states*
3.5 EQUIPMENT AND TECHNOLOGY

The equipment holding situations of two states in Nigeria was used to demonstrate the country's craziness in the use of heavy equipment intensive techniques on rural road works. The results show that the majority of the equipment owned by these states were mostly broken down and could hardly meet demands by the authorities. The field work survey has revealed the enormous talents in local people, and in great numbers with skills in manufacturing local handtools required by labour-based techniques. Although most of them are small scale manufacturers and when interviewed they complained of not having the facilities for large scale production. Their response gave an indication that, labour-based techniques in Nigeria can generate increased demand for their markets (handtools). The tables and figures, Rs and Ss below, shows the equipment holding situations for road construction in the case study area (Sokoto) and one other state in the South-Eastern Nigeria respectively.

Table 3 R: Equipment holding situation of road Construction and Maintenance at Sokoto Agricultural and Rural Development Authority (SARDA, 1995).

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Number</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rollers</td>
<td>14</td>
<td>8 good, 4 B/D, 2 B/ER</td>
</tr>
<tr>
<td>Champion Graders 740</td>
<td>5</td>
<td>3 good, 2 B/D</td>
</tr>
<tr>
<td>Champion Graders 720</td>
<td>8</td>
<td>5 good, 1 B/D, 2 B/ER</td>
</tr>
<tr>
<td>Medium/Mini Tractor</td>
<td>1</td>
<td>1 good 1 B/D</td>
</tr>
<tr>
<td>D&amp;H Bulldozer</td>
<td>1</td>
<td>1 good</td>
</tr>
<tr>
<td>Mercedes 1621 Tipper</td>
<td>1</td>
<td>1 B/D</td>
</tr>
<tr>
<td>CAT 140G Grader</td>
<td>1</td>
<td>1 B/ER</td>
</tr>
<tr>
<td>Fiat T2 Trailer</td>
<td>2</td>
<td>1 good, 1 B/D</td>
</tr>
</tbody>
</table>

Source: Chief Engineer (Mechanical) SARDA, February 1995.

Note: Good = Working order      B/D = Broken Down
       B/ER = Broken Engine under repair
Sokoto state rural road construction and maintenance equipment holding situation.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Nos.</th>
<th>Status</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulldozer D8</td>
<td></td>
<td>Under repairs</td>
<td>Est'd cost is N650,000</td>
</tr>
<tr>
<td>Bulldozer D6</td>
<td>3</td>
<td>2 serviceable; 1 being repaired</td>
<td>Est'd cost about N400,000</td>
</tr>
<tr>
<td>Front end Loaders</td>
<td>2</td>
<td>1 serviceable; 1 to be repaired</td>
<td>Estimated cost is N10,000</td>
</tr>
<tr>
<td>Motor Graders</td>
<td>3</td>
<td>1 serviceable; 2 need repairs</td>
<td>Est'd cost is ab't N233,000</td>
</tr>
<tr>
<td>Rollers</td>
<td>2</td>
<td>1 serviceable; 1 broken down</td>
<td>N5,000 needed for repairs</td>
</tr>
<tr>
<td>Low loaders</td>
<td>1</td>
<td>Under repairs</td>
<td>N100,000 will be needed</td>
</tr>
<tr>
<td>Tractors D4</td>
<td>1</td>
<td>Broken down</td>
<td>N120,000 needed for repairs</td>
</tr>
<tr>
<td>Water Tankers</td>
<td>1</td>
<td>Under repairs</td>
<td>Estimated cost is 45,000</td>
</tr>
<tr>
<td>Farm Tractors</td>
<td>18</td>
<td>6 boarded; 2 operational; 7 broken down; 1 to be boarded</td>
<td></td>
</tr>
</tbody>
</table>

Source: Chief Engineer (Mechanical) IMOSADP, January 1995.
Labour-based method’s primarily reliance on the use of labour does not mean total labour reliance, without support of light equipment. There are many construction activities where the use of light equipment would improve quality of construction. For instance, a certain level of compaction is required in the construction of a road embankment. A construction equipment is considered as light when it has an output which is compatible to the output of the workers \(^1\) (UNDP/ILO and NDE). It should also be easy to operate, repair, maintained and should have relatively low initial cost. Although it is possible to use hand rammers to achieve this level of compaction but the use of mechanical rollers / compactors like the pedestrian type, small self-propelled type or tractor-drawn type would ensure a more uniform compaction.

There are situations where it is just not technically feasible to use labour for a construction activity. For example, the following haulage modes are recommended for various distances:

<table>
<thead>
<tr>
<th>Haul distance (m)</th>
<th>Recommended haulage mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5</td>
<td>Shovelling</td>
</tr>
<tr>
<td>5 - 50</td>
<td>Headpan</td>
</tr>
<tr>
<td>50 - 150</td>
<td>Wheelbarrow</td>
</tr>
<tr>
<td>50 - 8000</td>
<td>Tractors and trailers</td>
</tr>
<tr>
<td>&gt;8000</td>
<td>Tipper trucks</td>
</tr>
</tbody>
</table>

With reference to the above haulage modes recommendation, light equipment also have their limitations: if the laterite quarry is located beyond 8 km, it is better to use tipper than tractor and trailer combinations. Therefore, the proliferation of labour-based methods will encourage an increase in the local component of handtools and other construction equipment currently being manufactured in Nigeria from imported completely knocked down (CKD) parts. This will ultimately lead to the manufacture of many advanced equipment in the future.

3.6 CONTRACT AND CONTRACTORS

The results in table 3T represent the opinions of domestic contractors of the three regions in Nigeria. Both the questionnaires and interviews conducted, asked questions on personal characteristics of respondents and their opinion on 15 constraint items, and their restraints to the Nigerian industry development. The draft questionnaires were first discussed with International experts in this field, Miles, Derek of IDE and Petts, Robert of MART. They suggested additional questions by providing a draft copy of ILO/MART questionnaire to be included in the survey. The ILO/MART draft and author’s questionnaires were both pre-tested on survey support team to check the suitability and appropriateness of the questions in Nigeria.

A total of 104 pieces of questionnaires with each comprising 15 questions were administered by local contractors from the three regions in the country. Of this total, 11 women were among the contractor respondents. The age distribution of the sample was between 25-60 years of age, and 50% of the respondents were under 50 years. Of this total, 62% had formal education beyond secondary school level, while 45% had attended labour-based training on road construction/maintenance, and 8% had degree
and postgraduate qualifications. Of the 104 local contractors sampled, 51% had less than 12 employees, but according to them, they could raise more than 100 at anytime required. About 56% of the total have been in road business for more than 10 years, and 25% operated as limited liability companies, while the rest of them were sole proprietorships (11%) or partnership (8%).

However, majority of the respondents (66%) indicated that, they were involved in only Building and Civil engineering works, while the rest (34%) indicated engagement in other activities, such as farming, Trading and Government employment. Very few contractors had input into the early project design stages (less than 30%) and detailed project design stages (less than 60%), areas which could benefit from better understanding between all project parties. The standard form of information is very poor, as such, sub-contractor information can be inaccurate and irregular causing delays. The level of project information on site is appalling - both content and legibility are a problem. By and large, 46% were registered to tender for small/medium sized contracts valued under 2 million Naira (1 Naira was equivalent to $1.50 in 1982 when the contractor registration categories was last reviewed). While 36% were registered to tender for the jobs under N1,000,000. The rest (20%) had no formal registration with the Federal or state registration board. They solely depend on verbal agreement with the registered contractors for sub-contracting. Government was the main client for the majority of respondents (68%), while 32% procure their jobs from the main contractors. The payments after completion would then be made in the name of the main contractor to share the profits between themselves. The result of the survey is tabulated below.
Table 3 T  Tabulation of contractors responses to survey questionnaires

<table>
<thead>
<tr>
<th>Variables or Criteria</th>
<th>No. responded out of 104 respondents</th>
<th>Contractors with serious difficulties</th>
<th>Contractors with less difficulties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to loan or credit facilities</td>
<td>98</td>
<td>55</td>
<td>43</td>
</tr>
<tr>
<td>Breach of verbal agreement on small contracts</td>
<td>86</td>
<td>52</td>
<td>34</td>
</tr>
<tr>
<td>Changes in Government (difficulties due to)</td>
<td>104</td>
<td>78</td>
<td>26</td>
</tr>
<tr>
<td>Communicating with client/representative</td>
<td>104</td>
<td>55</td>
<td>49</td>
</tr>
<tr>
<td>Corruption (complaints about)</td>
<td>104</td>
<td>88</td>
<td>16</td>
</tr>
<tr>
<td>Difficulty in claiming retention fees</td>
<td>104</td>
<td>65</td>
<td>39</td>
</tr>
<tr>
<td>Difficulty in meeting contract deadlines</td>
<td>104</td>
<td>60</td>
<td>44</td>
</tr>
<tr>
<td>Difficulty in obtaining insurance cover</td>
<td>104</td>
<td>82</td>
<td>22</td>
</tr>
<tr>
<td>Difficulty in payment arrangement</td>
<td>104</td>
<td>65</td>
<td>39</td>
</tr>
<tr>
<td>Negotiating variation payments</td>
<td>96</td>
<td>60</td>
<td>36</td>
</tr>
<tr>
<td>Procuring work</td>
<td>84</td>
<td>50</td>
<td>34</td>
</tr>
<tr>
<td>Shortages of skilled labour</td>
<td>94</td>
<td>65</td>
<td>29</td>
</tr>
<tr>
<td>Theft and fraud by own employees</td>
<td>97</td>
<td>60</td>
<td>37</td>
</tr>
<tr>
<td>Transporting materials and equipment</td>
<td>74</td>
<td>62</td>
<td>12</td>
</tr>
<tr>
<td>Uncertainty in supplies and prices of materials</td>
<td>104</td>
<td>70</td>
<td>34</td>
</tr>
</tbody>
</table>


Figure 3 T

Domestic contractor's response to survey questionnaire

Legend: Description is as below:
Legend A

Series 1: Contractors with serious difficulties
Series 2: Contractors with less difficulties

Legend B Description of criteria:

<table>
<thead>
<tr>
<th></th>
<th>Access to loan or credit facilities</th>
<th>Changes in Government</th>
<th>Corruption complaints</th>
<th>Meeting contract deadlines</th>
<th>Difficulty in payment arrangement</th>
<th>Procuring work</th>
<th>Theft and fraud by own employees</th>
<th>Uncertainty in supplies and prices of materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>15</td>
</tr>
</tbody>
</table>

3.7 TRAINING AND EDUCATION

The questionnaires and interviews administered results have pointed that, construction practices in Nigeria are currently geared towards the use of heavy equipments. Consequently, engineers and other technical personnel working in public or private sector are only exposed to this method of construction. Investigation of Nigerian institutions, further revealed that, during their university / polytechnic education, these engineers and technicians had little opportunity to know about the use of alternative methods of construction. Thus, it became apparent, as a first step to promote the use of labour-based methods for construction, rehabilitation and maintenance of rural roads. The engineers, contractors and other technical personnel involved in technical aspects all needs to be trained so that they can be oriented to the use of these methods. The most essential areas that need training most are:

- Work Organisation; to enable the trainee to know the construction sequence;
- Planning; to enable the trainee to know why planning is important, which role he has to play in planning, and what basic steps are to apply;
- Design; to know the basic considerations for the design of roads, and how to select a suitable route alignment, and the construction standards for these roads;
- Site Administration; to know what is the word 'site', what is necessary to make a site function well, and to be able to describe the type of site working on;
- Light equipment; to know what constitute light construction equipment, their role in labour-based construction, their types and what activities they are suited for;
- Site clearing; to know why it is necessary, the various steps involved and to be able to recognise the tools for that purpose;
- Rural road structures; know the importance of water-crossing structures, and factors to be considered for their design and construction; and lastly,
- Hand tools; to know the right tool for each activity, and how to maintain and use these tools.

**Table 3U:** Analysis of responses to questionnaire by Academic Institutions in Nigeria

<table>
<thead>
<tr>
<th>Name of Institution</th>
<th>Acad. staff strength</th>
<th>Civil Engr. students ppn.</th>
<th>Procedure for introducing new topics</th>
<th>Knowledge of National construction policy</th>
<th>Availability of courses on local res. utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABU</td>
<td>14</td>
<td>250</td>
<td>can be handled in house</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td>Kadpoly</td>
<td>35</td>
<td>450</td>
<td>NBTE must in-house</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td>Unisok</td>
<td>n.a</td>
<td>n.a</td>
<td>Not applicable</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Sokpol</td>
<td>11</td>
<td>86</td>
<td>NBTE must be contacted</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>UNN</td>
<td>12</td>
<td>201</td>
<td>can be handled in house</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>IMT</td>
<td>12</td>
<td>36</td>
<td>NBTE must in-house</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>ESUST</td>
<td>5</td>
<td>100</td>
<td>can be handled in house</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td>UNILAG</td>
<td>13</td>
<td>270</td>
<td>can be handled in house</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Yabatech</td>
<td>14</td>
<td>450</td>
<td>NBTE must in-house</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Ibadanpoly</td>
<td>21</td>
<td>250</td>
<td>NBTE must in-house</td>
<td>No</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Results of field work’s Questionnaires and Interviews (Oct 95-Apr 96) and from both primary and secondary sources in Nigeria.

**Figure 3U**

![Responses from selected Academic institutions in Nigeria](image-url)

- Availability of course(s) on local res. utilisation
- Knowledge of Nat. constrn policy
- Procedure for introducing new topics
- Civil Engr. students ppn.
- Acad. staff strength
3.8 ENGINEERS' RESPONSES

The respondents here represent a good sample of cross-section of professionals in the three regions. All the respondents had tertiary education (minimum of diploma). Their ratio stand as 48%, 33%, 12% and 7% having qualifications in Civil engineering, Building engineering, Quantity Surveying and Architecture respectively. About 35% of the respondents had degree qualifications, 45 had HND qualifications and 20% had OND and it's equivalent professional qualifications in civil engineering. Knowledge wise, about 60% of the respondents had between 10-15 years experience in the industry including 30% with 15-25 years and 10% with over 25 years' of experience. And 88% of the respondents indicated employment in the public sector, while 12% were employed in the private sector.

Majority of the respondent engineers confessed that, before their recruitment to their respective agencies, they had little or no experience in labour-based construction. The advantageous among them were those recruited by organisations like UNDP/ILO and the NDE, where they have been receiving hands-on training since 1988. Since the inception (1987) of organisations like UNDP/ILO and NDE, a series of training courses have been taking place for engineers and other technical personnel selected from various government agencies in Nigeria. A typical programme involving engineers and technical personnel from Ministries of Works, Ministries of Agriculture, Agricultural Development Projects (ADP's), Directorate for Rural Development, River Basin development Authorities, Local Government Engineers, and NDE is as tabulated below.
Table 3V: Number and Distribution of Participants Trained under labour-based programme

<table>
<thead>
<tr>
<th>Government Agency</th>
<th>A'lbom</th>
<th>An'bra</th>
<th>Bauchi</th>
<th>Bendel</th>
<th>Gon'la</th>
<th>Kaduna</th>
<th>Kat'na</th>
<th>Lagos</th>
<th>Niger</th>
<th>Oyo</th>
<th>NDE HQ</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. of Works</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Dir'te for Rural devlpt</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Local Gov’mnt</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Agr’tural Dev. Proj’t (ADP)</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>23</td>
</tr>
<tr>
<td>Min. of Agr’tre</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>River Basin Dev. Auth.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>NDE (states)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>21</td>
</tr>
<tr>
<td>State Dev. Board</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NDE (Headqtrs)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>10</td>
<td>9</td>
<td>10</td>
<td>6</td>
<td>16</td>
<td>12</td>
<td>8</td>
<td>7</td>
<td>18</td>
<td>23</td>
<td>123</td>
</tr>
</tbody>
</table>

Figure 3V: Number and distribution of participants trained under labour-based 1988/92
3.9 DATA FINDINGS

From the result of the field studies carried out in Nigeria (September 1995 to April 1996) as data collection, the lacking in awareness amongst the local people is the most worrying. The main emphasis of the Government (implementor) was focused on providing infrastructures by means of heavy equipment, which were manufactured and serviced as well as maintained by the same foreign experts. A good look at most of these infrastructures suggests that the local resource were not fully utilised. The local community (victims), whose local knowledge and experience was important resource, were ignored in the implementation process. This manipulative approach made the programme less acceptable, and therefore less sustainable in most places visited.

3.9.1 Interview Findings

Interviews covered all the three regions of the country, so as to identify problems affecting rural roads in various areas. A total of 48 interviews lasting approximately 15 - 20 minutes each were conducted in those areas with Contractors, Sub-contractors, Engineers, Planners, Transport owners, Car drivers, Government representatives, and Local communities and their community leaders, etc. It was also intended that information and data collated from the interviews would, through more specific examples, support the overall picture presented by the survey results. From the result of the in-depth site interviews, it was found that all typical construction/rehabilitation and maintenance of roads in Nigeria were mostly carried out by equipment intensive method. This involved the input of several foreign and as well as indigenous staff. Engineers were the most affected respondent group confessing a lot of errors in practices of infrastructure provision. All personnel interviewed were keen to try out any trial on labour based solutions - particularly its application in rural areas - but many expressed concern that adequate and appropriate training in this field for local people would be needed.

Local communities were the most enthusiastic respondent group to want to implement labour based method, while management personnel were the most resistant. Approximately more than half of all responding professionals would be ‘happy’ to implement labour based approach compared with only a third of personnel managers. Both interviewers and questionnaires respondents were noticeably apprehensive about
labour-base techniques, particularly due to disrepair of rural roads and costly nature of equipment based technique. In addition, labour-based has less regard for educational attainment, compared to equipment method with high regard to qualifications. With labour based approach the majority of illiterates in rural areas stands a good chance for employment, and therefore bound to be beneficial to the public and the government in general.

3.9.2 Scope for Improvement

Respondents were also asked for their opinion on whether there was any Scope for improvement in their areas with the introduction of Labour based. The term ‘introduction’ implied application of local resources in areas where it was not familiar and improvement to areas where it has already been tested. Except only in very rare circumstances where the local communities have someone in the government, some remote areas of the North had no idea of existence of rural road authority. As such, options for implementing infrastructure improvements for these local communities were not specified.

Figure 3 W  Group responses on potential for rural road improvement

The figure 3W above, indicate where respondent groups did not answer ‘Yes’ or ‘No’ in the questionnaire: These obviously relate to areas of total neglect by the authority,
or an indication of a lack of awareness of how the improvement could be implemented in some areas, on the existing system, where involvement of local community has never been in place. Although some interview results focused on change attitude rather than illusional approach to labour based method. All respondents felt that the general notion on equipment intensive application should be tackled, Engineers and Planners also cited Technical Queries.

However, in comparison with the local communities interview comments - where the lack of utilising local resource base was criticised by all parties, the overall relative balance between 'Yes', 'No' and Don't Know' questionnaire results seems to indicate that respondents merely thought about how the existing un-affordable (predominantly) equipment based system could be eliminated to give room for the attractive and affordable Labour-based system. This indicate some theoretical awareness of the benefits of labour-based by professionals in the field, and the lack of implementation by the providing agencies, perhaps a major reason why rural roads had suffered serious neglect by the Authority.

3.9.3 Alternative technologies

When asked which evolving technology would be beneficial to local need, the most popular answers were labour-based technology. Below is a demonstration of how the construction cost of 1 km of an access road was compared by alternative technologies. The results shows the amount spent by labour-based method as N223,332, while the average estimated cost of constructing the same length of road by equipment-based method is N233,162. This estimate compares with the ADP average construction cost of N251,985 for new rural roads in Nigeria as indicated by the World Bank.

The results suggest that between N9, 939 and N28,762 can be saved per kilometre in the construction of a new rural road if labour-based methods are used in place of the conventional equipment-based methods. Thus, construction costs can be reduced by up to 13% by shifting from equipment-based to labour-based methods. The results further show that under labour-based methods the labour cost made up 70% of total cost while only 2% of construction costs under equipment-based method are accounted for by wages. On the other hand, 91% of construction costs are incurred on heavy equipment while the light equipment, a vibratory pedestrian roller, used under the labour-based methods, accounted
for 14% of cost of constructing the 1 km of rural road. The table also shows that while handtools accounted for 12% under labour-based, it accounted for 1% under equipment-based method.

Table 3 W: Comparison of construction costs by alternative technologies

<table>
<thead>
<tr>
<th>Item</th>
<th>Actual cost of constn by labour-based methods</th>
<th>Est’d average cost by equip. based methods</th>
<th>ADP’s costs (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>%</td>
<td>Amount(N)</td>
</tr>
<tr>
<td>Labour</td>
<td>155,000</td>
<td>70</td>
<td>5466</td>
</tr>
<tr>
<td>Handtools</td>
<td>27,433</td>
<td>12</td>
<td>2237</td>
</tr>
<tr>
<td>Materials</td>
<td>9,100</td>
<td>4</td>
<td>9100</td>
</tr>
<tr>
<td>Equipment</td>
<td>31,681</td>
<td>14</td>
<td>211787</td>
</tr>
<tr>
<td>Supervision*</td>
<td>-</td>
<td>-</td>
<td>4572</td>
</tr>
<tr>
<td>Total</td>
<td>223,332</td>
<td>100</td>
<td>233,162</td>
</tr>
</tbody>
</table>

* Supervisory costs are included in labour costs for labour-based method.

Hiring costs for equipment-based method also includes operator’s wages.

Source: “Rural Road Question and Nigeria’s Agricultural Development” MADIA Discussion - 1989.

In view of the acute shortage of foreign exchange needed to import heavy equipment, the savings accruable by adopting labour-based methods are likely to be higher if the cost items are shadow priced to reflect the true scarcity value of equipment relative to labour. The two methods of construction are also different in the extent of their local resource utilisation. The labour-based methods can utilise local resources to the extent of 86% of total

---

construction costs in the form of labour, handtools and materials. But in the case of
equipment-based methods, allowing for operator's wages, only 11% of total costs are
accounted for by local resources, as much as 89% being incurred on imported items. Thus,
through the application of labour-based methods, it is possible to save more than N170,000
which would have been spent as foreign exchange for each kil'ometre of new rural road
constructed by equipment-based method.
This implies that the bulk of the money for construction by the equipment-based method
involves the use of foreign exchange as Nigeria does not manufacture it's own construction
equipment yet. The labour-based method provided 11,111 workdays of unskilled labour
and 585 workdays of skilled labour. In comparison, the equipment-based method provided
only 607 workdays and 331 workdays of unskilled and skilled labour respectively.
CHAPTER FOUR

INFRASTRUCTURE DEFICIENCIES IN NIGERIA

4.0 INTRODUCTION

The need to meet the ever increasing demand for road infrastructure (particularly in the rural areas), has become an important policy problem in Nigeria. Rural roads are reported to be in very critical demand for improvement, with a huge backlog of economically justified rehabilitation at the same time. According to a World Bank evaluation, about 70% of the 85,000 km of rural road network is in poor to very poor condition with extensive loss of trafficability in the wet season. Less than 2% of these roads are bituminous-surfacéd, and have deteriorated to an unmaintainable condition due to neglect, and most cannot now be maintained unless first rehabilitated. At the present rate of progress, the backlog will not be cleared before year 2012 (WB, 1991). In relation to the effect on local communities, Dawson and Barwell noted that, “the community-level studies, complemented by a substantial volume of related research, point to transport as being a major drain on the time and energy budgets of rural households” (Dawson, and Barwell 1993). Nigeria basically has an agrarian economy with “agriculture providing over 80 percent of the nation’s employment opportunities and a respectable proportion of the annual rate of growth of our GDP,” (SFG to FG, 1997). Road transport is essential to market agricultural products, but has suffered many decades of neglect. Nigeria’s rapidly growing population, coupled with the global weakness in oil prices (the country’s main export), have weakened the economy, and road financing has suffered accordingly. LGCs have the largest network of roads to care for (85,000 km), yet they are financially and institutionally the weakest of the three tiers.

2 Dowson, J. and Barwell, I., 1993; Roads are not Enough: New perspective on rural transport planning in developing countries, by Intermediate Technology Publications, London.
Sokoto the case study area, has a population of over 4 million (figure 2.1.2 before state creation of 1997), and is predominantly rural. Sokoto has 36,548 km of roads, of this 558 km (21%) is paved, and 50% of this is in 'good' condition, with 25% 'fair' and 25% in a 'poor' state (FMWH, 1988). Failure to respond adequately to demand for roads affects productivity and the quality of life in the rural areas. In order to alleviate the hardship faced by the State's majority (80%) rural populace, there is a need for better understanding of:

- management problems with regard to road maintenance in the State and the LGCs;
- the ways in which neglect and inadequacy of rural roads is jeopardising business operations and peoples' activities, hence the overall productivity in rural areas;
- the options for more efficiently providing and maintaining the delivery of rural roads;
- potential costs savings from improved services.

More specifically the study examines two vital issues, the demand and supply of rural road infrastructure service in Nigeria and the case study area in particular. On the demand side; research is required into how rural or local communities respond to constraints imposed by deficiencies in road access, considering both quantity and quality. What are the alternatives and the costs of these alternatives to local communities and the society in general? Is there any option for private provision to substitute for publicly provided services? On the supply side; research will focus on the causes of failure in delivering services to poor rural communities. The extent of failures due to lack of capacity, and poor operations and maintenance. The options for efficient operation and delivery of services such as; technology, institutions, training, and participation.

The availability and quality of rural road access differ between the three regions, and across different locations. Roads in Nigeria, as in most other developing nations, are public services; hence their provision, availability and quality are influenced by public policies. The adequacy in supplies of rural roads in Nigeria can influence the productivity of farmers and many activities in rural areas, but they are so dispersed that

---


94
their power to influence decision-making on resource allocation is weak. In places where roads have been provided, sustainable road maintenance is necessary to protect the substantial investments and sustain the socio-economic role which these roads play in the development of a society.

4.1 CAUSES OF INFRASTRUCTURE DEFICIENCIES

In many states in Nigeria, infrastructure provision suffers from various inefficiencies. Almost a decade ago, a World Bank discussion paper (Anas and Lee) observed that; "It is common knowledge that Nigerians suffer from frequent interruptions of publicly provided services and by the poor quality of these services when and where they are available" (W.B 1989). One problem has been a lack of consistent and sustained interest in establishing and maintaining a satisfactory national road network. There was a substantial network expansion of 1976 which linked the state capitals and major towns with a major network (trunk A routes). Then, following almost 20 years of gradual decline, emerged the present Petroleum Trust Fund (PTF) programme for infrastructure development which started in 1996, with the aim of directing revenue from oil production to rehabilitate the road networks. The causes of failure remain essentially unchanged over the entire decades of 80's and part of 90's. Apart from a simple lack of funds, there is the question of whether the limited funds are used effectively. This is evidence to suggest that they are not because of two factors:

- in appropriate technology, and
- lack of training in road maintenance.

4.1.1 In appropriate technology

Some causes of failure in this sector are primarily related to reliance on imported equipment and lack of spare parts or delays in obtaining them. In addition, shortages of materials and foreign exchange are another factors causing infrastructure deficiencies. In recent years these factors have been aggravated by the sharp fall in the price of oil

---

which has reduced the public budget, while the sharp devaluation in the value of the
Naira (currency) makes imported spares even more expensive.

4.1.2 Need for training

Choosing the best infrastructure maintenance policy will remain a theoretical exercise
until institutions can efficiently put policy into practice. “The World Bank advanced
more than $1.2 billion between 1971 and 1985 for training, technical assistance and
management of road administration in developing countries” (WB, 1988). Nigeria’s
equipment intensive bias is a major constraint on performance in the road sector,
partially due to the lack of properly trained personnel in labour based techniques. The
use of local contractors could reduce the burden on the road authority and get work
done at reasonable cost, but they also require training in appropriate techniques and
business practices. Due to the limited institutional capability in LGCs, outside
management consultants may be needed to help to develop management systems and
contract instruments as well as provide training for government staff and contractors.
Since well established domestic contractors are not generally available, the trial
introduction of small contracts (say, for routine maintenance that is technically simple
and requires little investment) would reduce risks during the transition period and help
develop the capabilities of government and contract personnel.

Low and inflexible civil service salary scales make it difficult for the public sector to
retain competent managers, engineers, technicians, foremen, and others with special
skills. Sometimes incentives can help an agency retain its most productive staff. In
view of the low wages, use of labour-based techniques could also contribute. Nigeria
had good results with the use of unskilled labour in the 1960s with the simple
“lengthman” system. Under this system people living alongside a road are responsible
for maintaining it, and their payment and continuing employment are contingent on
satisfactory performance. This encourages them to take the job, and sometimes turn
the activity into a ‘family business’.

---

6 The World Bank Policy Study 1988, Road deterioration in developing countries; Causes and
Remedies, by the World Bank, Washington D.C.
4.2 EXTENT OF INFRASTRUCTURE DEFICIENCIES IN NIGERIA

The analyses in this chapter are based on the empirical results from six months survey and site observations conducted in Nigeria. The author's observations reveal that there are large variations in the availability and quality of road infrastructure services across regions in the country. This implies an important role in government strategy regarding road infrastructure policy reform.

The Northern region compared to the other two regions, has a higher demand for rural roads, and the burden of inadequacy seems to be more serious there. The extent of deficiencies in some states, notably the case study area, has an implication for the growth of agriculture, industries and the generation of employment. It was observed that, villages and towns in the Southern regions are located in areas closer to highways for easy access to transport links. Conversely, the nomadic northern inhabitants, are living in scattered agricultural villages, many of them remote from the transport system, which makes the accessibility even worse.

As anecdotal evidence, during the course of field study in 1995, the author was trying to reach the village of Kesoje in Yabo Local Government area by automobile. Four villagers were taking their goods to market by head portage, which has by far the highest unit of costs of any transport mode. In those villages, people can usually look after their most basic needs, but economic distance from markets makes it difficult to produce and sell to the world outside, and consequently difficult to buy what the outside world produces.

The study also observed seasonal influences on transport links in the north, as most village links may not exist in the wet season. The Southern regions having their villages closer to road networks have comparatively good opportunities, as villagers get a better price for their commodities. In contrast, the North is at disadvantage, as the trucks and other related transport vehicles incur very high operating costs negotiating the village roads to distribute farm inputs (fertiliser or seeds), or to collect farm outputs (e.g. cotton, ground nuts, and perishable vegetables). The local community in these areas strenuously supports proposals for road improvement, which would release the most serious constraint on economic development. The author was born and brought up in this environment, besides having carried out the six months field work.
studies in this area, and is therefore a witness to the growing concern on roads' deficiencies in the region. The transport sector plays a vital role in both interregional and international trade. It is estimated that, road transport accounts for 98% of total volume (in ton-km) of domestic freight and almost 90% of domestic passenger traffic. Air freight is in the range of about 2% of total volume (in ton-km) and about 4% of the domestic freight and passenger traffic in total respectively (Author 1998).

4.3 SITUATION IN THE CASE STUDY AREA

Sokoto is one of the land-locked states in Nigeria, and most of its present population of over two million live in scattered agricultural villages, many of them remote from any transport system. Road transport plays a major role in the economy of Sokoto State. The condition of both highways and feeder networks is generally poor. Only the most recent road maintenance assisted by the Petroleum Trust Fund (PTF) gives satisfactory operating conditions. The secondary gravel and earth (rural) roads, which are a vital complement to the paved trunk road system, are in especially poor condition. Local governments as the third tier of governance, are mostly responsible for these rural roads, but due to fiscal constraints few local authorities are able to maintain these roads regularly. Consequently, vehicle operating costs from wear and tear are much higher than necessary and these costs are eventually passed on to the consumers in the form of higher fares and haulage charges. Due to the poor condition of rural roads, “some 30 - 40% of the market price of agricultural produce, particularly food crops, is accounted for by transport cost and other incidental services” (WB, 1991)⁷.

Roads facilitate the commercialisation of agriculture, including exploitation of Sokoto’s significant gypsum, groundnuts, cotton, and other resources. These materials and products are transported in heavy trucks, as such, extensive periodic rehabilitation of rural roads is necessary, and any positive long-term economic returns from the roads may be mitigated by the high cost of such rehabilitation.

Sokoto has one major industry, the Cement Company of Northern Nigeria (CCNN). There is an abundance of limestone just few yards away from the plant location. Gypsum is also available in commercial quantity not very far from the industry in Yabo, Dange and Wurno LGCs which are within 30 miles radius from the cement plant. Sadly, the poor road links with the villages possessing these minerals hinders the industrial performance of CCNN. The resulting neglect of these roads (Author’s discussion with LGCs Engineers and the CCNN production Engineer 1997) means the LGCs concern are losing tangible amount in revenue terms, while the CCNN is left with the option of either lower it’s production costs or purchased gypsum from far distant areas.

A proposal has been put forward by Engineering Department of Yabo local government, to the LGC for the improvement of some roads in the mineral located areas. A crude estimate on the basis of economic analysis comparing the estimated cost of works per km of road with the stream of net benefits to be expected after the improvement has been calculated.

The cost estimates for equipment, spares and tools are based on the manufacturers quotations at the time. Cost estimate for road construction materials are based on estimates per km as practice in Sokoto State. In this regard, the foreign component of the costs of equipment, tools and construction material stand as; local costs (about 10% for equipment and tools and 20% for materials) are for handling, delivery, and dealers’ commission. Further to that, a contingency allowance (15%) is applicable for equipment, tools and materials because few suppliers are represented in Sokoto State. In addition to equipment, materials and consultants’ services, the cost of rural road improvement includes expenditures which will be incurred by the LGC for engineering the proposed improvement, operating the mechanised units and building some drainage structures. Tables 4B and C gives estimates for these items based on estimated volume of work per km, estimated output of mechanised units, and based on the current prices of fuel, lubricants, and so on. These costs have been estimated to include a foreign exchange component of 55% covering imported suppliers and parts. A contingency allowance of 15% has been added to cover overruns. Table 4A contains the selected rural roads considered for improvement by the LGC in 1995/1996 fiscal year. The selected roads includes type A which is paved and type B laterite and earthed.
Table 4A: Design Standards and Cost Estimates of the Proposed Roads 1995/96

<table>
<thead>
<tr>
<th>Roads</th>
<th>Length of road (km)</th>
<th>Produce within the road’s catchment area</th>
<th>Basic Agric / comm. traffic in 1995/96 (ton/yr.)</th>
<th>Proposed type of Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yabo L.G.:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dadin-mahe Rd</td>
<td>12</td>
<td>Limestone and groundnuts</td>
<td>10,600</td>
<td>A</td>
</tr>
<tr>
<td>Lambara Rd</td>
<td>14</td>
<td>Lime stone and millet</td>
<td>8,000</td>
<td>B</td>
</tr>
<tr>
<td>Ruggar Malan Rd</td>
<td>5</td>
<td>Limestone</td>
<td>4,200</td>
<td>B</td>
</tr>
<tr>
<td>Iyaka/Ginga Road</td>
<td>18</td>
<td>Cotton and limestone</td>
<td>3,800</td>
<td>B</td>
</tr>
<tr>
<td>Kambama Rd</td>
<td>16</td>
<td>Limestone and cotton</td>
<td>2,600</td>
<td>B</td>
</tr>
</tbody>
</table>

Total type A to be improved: 12 km  (of paved roads)
Total type B to be improved: 83 km  (of Laterite and earth roads)

Design standards

<table>
<thead>
<tr>
<th></th>
<th>Type A</th>
<th>Type B</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Clearing</td>
<td>9 m</td>
<td>7 m</td>
</tr>
<tr>
<td>-Roadway Width</td>
<td>5.5 m</td>
<td>4 m</td>
</tr>
<tr>
<td>-Laterite course</td>
<td>15 cm thick</td>
<td>8 cm</td>
</tr>
<tr>
<td>-Typical drainage</td>
<td>Ditches and outlets</td>
<td>Ditches and outlets,</td>
</tr>
<tr>
<td>structure</td>
<td>Culverts, dikes and</td>
<td>culverts and stone</td>
</tr>
<tr>
<td></td>
<td>concrete fords</td>
<td>fords</td>
</tr>
</tbody>
</table>
Table 4B: Itemised Costs per Km (million Naira) for the Categories of Roads

<table>
<thead>
<tr>
<th>Item (work involved)</th>
<th>Type A (000,000)</th>
<th>Type B (000,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surveying and Planning</td>
<td>0.10</td>
<td>0.04</td>
</tr>
<tr>
<td>Roadway:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Equipment depreciation</td>
<td>0.20</td>
<td>0.07</td>
</tr>
<tr>
<td>-Operating expenditures</td>
<td>0.36</td>
<td>0.12</td>
</tr>
<tr>
<td>Structures:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Materials (cement, steel..)</td>
<td>0.18</td>
<td>0.08</td>
</tr>
<tr>
<td>-Installation</td>
<td>0.20</td>
<td>0.09</td>
</tr>
<tr>
<td>-LGC’s overheads</td>
<td>0.06</td>
<td>0.02</td>
</tr>
<tr>
<td>-Supervision</td>
<td>0.26</td>
<td>0.11</td>
</tr>
<tr>
<td>Total</td>
<td>1.36</td>
<td>0.53</td>
</tr>
<tr>
<td>US$ = 80N</td>
<td>(US$ 17,000/km)</td>
<td>(US$ 6,375/km)</td>
</tr>
</tbody>
</table>

Table 4C: Costs Estimate for roads category

<table>
<thead>
<tr>
<th>Costs (million Naira)</th>
<th>Type A: 12 km</th>
<th>Type B: 83 km</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local</td>
<td>Foreign</td>
<td>Total</td>
</tr>
<tr>
<td>Equipment depreciation</td>
<td>85</td>
<td>72</td>
<td>14</td>
</tr>
<tr>
<td>Supervision by consultants</td>
<td>111</td>
<td>109</td>
<td>30</td>
</tr>
<tr>
<td>Imported materials</td>
<td>62</td>
<td>70</td>
<td>22</td>
</tr>
<tr>
<td>Execution costs incurred by L.G.:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surveying and planning</td>
<td>42</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Fuels and Lubricants</td>
<td>53</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>40</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Repairs, parts</td>
<td>80</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Salaries</td>
<td>63</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Local materials</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Overheads</td>
<td>27</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Sub-total</td>
<td>(315)</td>
<td>(285)</td>
<td>270*</td>
</tr>
<tr>
<td>Contingencies (about 15%)</td>
<td>86</td>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>TOTAL</td>
<td>659</td>
<td>616</td>
<td>386</td>
</tr>
</tbody>
</table>

Note: * (implies multiple of either 55% for foreign or 45% for local with the total).
Source: Yabo Local Government Works Department (YBLGWD) 1996.
The proposed roads above, were selected for the purpose of economic analysis in order to compare the cost of road improvement with the flow of net benefits after the improvement. Although, the work has not yet been carried out, the author applied the available data (from YBLGWD) relating to candidate roads for computation. The analysis here was based on a relatively crude estimate, for the purpose of illustrating how the poor condition of agricultural roads and tracks is hindering agriculture and commercial trades in Yabo LGC. The agricultural products in those areas (groundnuts, rice, millet, cotton, vegetables tobacco and gypsum) are among the major sources of Nigeria’s income after oil.

Although no details were available on traffic flows as at the time of data collection, an estimated forecast of production record for the year 1995/96 is as tabulated in the table above. The author’s visit to Nigeria in October 1997 revealed a remarkable increase in agricultural and mineral production in those areas, mainly due to the impact of PTF’s projects directed much needed additional funds to some of the more important roads. When local people were asked about their views on production increases achieved in those areas due to improvement of roads, many thought their production capacity has nearly doubled compared to ten years record in most commodities, author(1997). As for benefits, there would probably be benefits in increases in net value added of agricultural production, avoided increases in vehicle operating costs for road users, LGC’s revenue on road user tax, CCNN will have it’s production cost reduced, and many local people would be employed by farmers and trucks loaders and so on.

In Sokoto State, many of these local crops (cotton, groundnuts, tobacco, millet) are produced by smallholders in villages and small settlements along feeder roads. Most of them grow other produce besides the main crop, part of which is also commercialised. These roads thus not only serve to evacuate the basic agricultural production but also to transport other products, such as general consumer goods, passenger traffic and most importantly, farm inputs. According to Yabo LG. Agric. Department, 250 tons of inputs (seeds, fertiliser, insecticides, tools, etc.) are required for the production of 1,000 tons of cotton. For groundnuts, inputs represent about 10% of produced tonnage’s. SADP normally use 5-ton trucks for the collection of the groundnut production. A production of 1,000 tons would thus result in traffic flow of 400 5-ton trucks per year. Taking into account all other kinds of transport, total traffic on a
feeder road carrying 1,000 tons of basic agricultural production has been conservatively estimated at 600-700 vehicles (5-ton truck equivalent) per year, or about 2 vpd. Traffic volumes for higher tonnages of basic agricultural traffic would be proportionally higher. Based on SADP's experiments on road improvement in the State, benefits for a ten year period as an estimated economic life of improvement, would amount to savings in vehicle operating costs of up to 50% and 40% for A and B categories improvements respectively (SADP-FASCO 1995)\(^8\).

4.4 APPROPRIATE TECHNOLOGY

There is sufficiently large pool of manpower in Nigeria (Table 3Q) who possesses skills in complete mismatch with appropriate disciplines to improve the use of local technology. Enos, 1991 has stated that, “no country is without technology, not even the most primitive (Enos, J. L. 1991).\(^9\) However, the recognition of ‘best practice’ technology is no easy matter. Considering that, Miles defines appropriate technology, to mean one to be judged as to its appropriateness according to the way it changes people’s lives (Miles 1977)\(^{10}\). MART defines appropriate road equipment as; “Simple or intermediate equipment designed for low initial and operating costs, durability and ease of maintenance and repair in the conditions typical of a limited - resource environment, rather than for high theoretical efficiency” (MART 1996)\(^{11}\). They suggest it is preferable if the equipment can be manufactured or fabricated locally. Nigeria has suffered almost two decades of dependence on labour-saving, capital-intensive technology. The ILO/UNDP’s introduction of labour-based techniques in 1986, has taught Nigeria that valuable know-how as well as suitable equipment fitting into the constraints and limitations of poverty and suitable for genuine development exists in the country. It is because different levels of technology are suited to different environments and locations, that the search should be in each case for a level of technology that is appropriate. With the impressive record of progress so far achieved,

---

\(^{8}\) Sokoto Agricultural Development Project, Farmers Agricultural and Supply Company 1995.


\(^{11}\) Intermediate equipment for labour-based roadworks; A workshop report in a MART working paper No.5 MART- ASSIST - DFR, Ghana 19 & 20 April 1996.
from the country's sampled pilot states, appropriate technology in Nigeria, could means suitable technology whose choices over a wide range of human activities are becoming available today. Just as low cost technologies exist in agricultural equipment, and water supply, energy, and building materials, so does it apply to civil engineering, particularly roads and transport. Technology choice in this circumstance means selecting amongst small scale or simple technologies, which are competitive with capital-intensive methods.

In Nigeria today the economy is very weak, and the manufacturing base is even weaker. A decade of low foreign exchange earnings has meant less re-investment, and a general decline of manufacturing and service industries. Wachuku, 1992 at a seminar on the choice of technology, supported the application of appropriate technology in Nigeria by stating that; "the relative levels of resource input - land, labour and capital in the process of production define the prevalent technology which in turn determines how resources are shared for the benefits of production and growth (Wachuku, 1992)". He suggested that; "as construction plays a pivotal role in the economy with nearly sixty per-cent of gross revenue going into various construction projects, the National Directorate of Employment (NDE) views the sector with considerable interest" (Wachuku 1992).

Unfortunately, the irony of Nigeria's situation is that, despite the relative abundance of labour and scarcity of capital, the technological systems have continued to rely on labour-saving devices that are almost totally dependent on imported items. Their spares also strain plant maintenance schedules as delivery time is typically over three months, and foreign exchange allocation is never guaranteed. Why? This probably reflects the answers to administered questionnaires during the author's six months field work survey in Nigeria. It was gathered that there is a lack of commitment to self reliance in deeds, or discrepancy between laws and regulation, so also are the weak administrative controls, neglect of enforcement, and corruption widespread in the country. Therefore, in order for Nigeria to progress developmentally it has to get rid of the lax attitudes towards infrastructure, enforce proper regulations and attack corruption.

12 Seminar on “Construction, Rehabilitation and Maintenance of Rural Infrastructure works - Choice of Technology and the Curriculum for Civil Engineering Education” held at the Gateway Hotel, Ijebu-Ode, Ogun state on 6th May, 1992, by Chief Chuku WACHUKU (NDE - Nigeria).
13 C. C. Wachuku; Director-General, National Directorate of Employment, at the Seminar on “Construction, Rehabilitation and Maintenance of Rural Infrastructure Works, Choice of Technology and the Curriculum for Civil Engineering Education” held at Ijebu-Ode- May 6th 1992, Ogun State - Nigeria.
The choice of technology was described as, “that which demands considerations of qualification, and size of technical personnel, maintenance requirements, and climate etc.” (Masanja, E. 1990)\textsuperscript{14}. Often however, the choice is between the new, high technology on one hand and the old (probably obsolescent) technology on the other. The appropriate choice lies somewhere between the two extremes. Although any of the technologies selected, become appropriate if and only if it can be adopted to fit in the local environment. Schumacher 1984, suggested that; “The poor can be helped to help themselves, but only by making available to them a technology that recognises the economic boundaries and limitations of poverty-an intermediate technology (Schumacher, E.F 1984)\textsuperscript{15}. Briscoe 1988, warned that; “Unless the chosen system is affordable (irrespective of who actually pays for it) it is unlikely that sufficient funds will be available locally for maintenance” (Briscoe and de Ferranti, 1988)\textsuperscript{16}.

4.5 APPROPRIATE ROAD TECHNOLOGY

“Since the early 1970’s the ILO and other organisations have promoted the development of efficient labour based roadworks, initially through the road administrations and more recently encouraging the development of domestic private contractors” (MART 1996)\textsuperscript{17}. The promotion came to Nigeria in 1986, through the same ILO, WB and NDE as part of their efforts to find a mean between intense capitalization and surplus labour, in which they identified appropriate technology to be lagging behind in Nigeria’s road sector. Nigeria like many developing countries, is characterised with the problem of deteriorating economic conditions, a cripling scarcity of foreign exchange and abundant supply of labour. The reliance on capital intensive methods for infrastructure development and maintenance during a period when resources have not been sufficient to make this a potential policy, has resulted to many roads’ deterioration, especially in rural areas.

The application of appropriate road technology to effect construction/maintenance of rural roads, could provide a more flexible response and enhance Nigeria’s developing economy.

\textsuperscript{14} Technology Transfer or Technology Development: Third World Engineer’s Dilemma, by Masanja Enoch University of Dar-Es-Salaam, Tanzania, March 1990.
\textsuperscript{15} SMALL IS BEAUTIFUL: A study of economics as if people mattered, by Schumacher E.F 1984.
\textsuperscript{17} Intermediate equipment for labour - based roadworks; A workshop report in a MART working paper No.5 MART- ASSIST - DFR, Ghana 19 & 20 April 1996.
Amongst the benefits are; it can bring about a long term change in the mix of available resources and create more jobs, it can conserve scarce foreign exchange, and stimulate related economic activities in rural areas and thereby check rural/urban drift. Training in labour based methods, and the overwhelming acceptance given to it by Nigerian government can convince both small and medium sized local contractors to participate in the system. Equipping them with appropriate tools would enable them undertake road rehabilitation and maintenance activities using a mix of selected plant/equipment and employing a lot of labour that have been found more appropriate. MART working paper No. 5 compiled a list of 11 specific items ranked in order of importance for roadworks operation. The five highly prioritised are (MART 1996):

- Haulage
- Compaction
- Structures
- Spreading
- Supervision

While the six lesser priority in ranking are; Excavation, Bitumen, Ancillary Equipment, Survey and Testing Equipment, Soil Stabilisation, and Crushing.

4.6 APPROPRIATE TOOLS AND CONSTRUCTION MATERIALS

The availability of tools and materials necessary for roadworks are crucial in promoting labour-based methods of construction. Experience has shown that using tools of poor quality adversely affects productivity and thus increases total construction cost. In a study (MART 1996) on the impact of handtool quality on the productivity of workers on labour based road works in Ghana, two groups were compared; one with new tools and the other with the worn tools. According to the results obtained on the effect of tool quality on the productivity of ditching and sloping operations, up to 3 to 4 hours can be saved per day with new tools (IT Transport 1996)\(^{18}\), due to higher productivity it reduce worker fatigue.

\(^{18}\) Effects of Worn Handtools on Worker productivity in labour based roadworks, IT transport Ltd. Mart Working paper No.9 by the Institute of Development Engineering, Loughborough Univ. - U.K.
Hand-tools are not new in Nigeria; they are already in use in agriculture for bush clearing, tillage, weeding, etc., and in the construction of buildings and minor civil engineering works like drainage excavation and maintenance. Although some of these tools are imported, the majority are locally manufactured. They can be procured from open markets, shops or departmental stores like UTC, Leventis Technical, etc., in many towns and major cities of Nigeria.

However, there is a wide variability in the standards and specifications of the available tools, as some were not necessarily made for the type of rugged usage experienced in the construction or maintenance of roads. There is therefore a need for careful selection of tools to ensure that they will be able to efficiently perform the functions for which they are intended. For the purpose of technical specifications, efficient hand-tools should satisfy the following (UNDP/ILO 1992) requirements:

(i) they should be strong and durable;
(ii) they should not cause undue fatigue to the user;
(iii) they should be safe to use.

The most common tools required in the construction and rehabilitation of rural roads are locally manufactured and sometimes imported. Tools such as wheelbarrows, spreaders, matchetes, are sometimes imported from Asia (particularly Korea and China). The local hand-tools in use for road projects include pickaxes, mattocks, spades and shovels, machetes, head-kins, wheelbarrows, rakes, hoes, watering cans, and hand rammers.

Pickaxes are commonly used for excavation activities, such as digging at borrow pits and roadsites, drainage excavation, and excavation of circular trenches during stumping. The pickaxe is usually preferable to other digging tools in firm and stony soil formations relatively free of roots. Pickaxe heads are usually sharpened by blacksmiths, but subsequent sharpening is also possible on site with a manually operated grinding stone. Spades and shovels are similar in many respects except for the shapes of the heads. The head of the shovel is almost straight along its length and curved at the sides, while the spade is almost straight in both directions. Two types of shovels were found to be common: the round and square mouth types. The spades and the shovels are connected to their handles by a metal strap. Their hilts are metallic and Y-shaped and are riveted to the wooden handles. The metallic hilts are provided with wooden grips.

4.6.1 Maintenance and Scope for Local Production

Maintenance is a very important component of hand-tools management. Most striking tools are subject to variable stresses, resulting in periodic breakage of the handles. It is very important to establish a procedure for getting the handles replaced promptly. Most of the hand-tools are available in Nigeria, therefore the necessary artisanal skills are readily available. Local artisans produce handles for agricultural hand-tools, while local blacksmiths produce metallic blades.

The local artisans normally produce handles in abundance for agricultural uses. They can be guided on the production of handles with better shapes to suit the need for road works. With their knowledge of the properties of local wood varieties, they are able to identify the best stems for good handles. They always have a stock of these timber varieties that they seasoned by the natural method. Thus, whenever there is a request, they can supply them very quickly. The quantity of handles produced by these local artisans varies from region to region, but they can be dimensioned and shaped as required. The frequency of changing these handles varies from one day to three months. The handles which need replacement most frequently are those of pickaxes, mattocks, machetes and axes; handles of shovels and spades break less frequently. The main problem with shovels and spades is the pulling of the grip from where it was riveted to the hilt.

Many hand-tools like machetes, axes and mattocks require sharp edges to be effective. They should be well sharpened initially with an electric grinding stone by a blacksmith, subsequent sharpening while at work could be possible using sharpening files with a manually operated grinding stone which is readily available in most places in Nigeria. Wheelbarrows need a lot of attention, as their chassis and tray are held together by numerous bolts, nuts and washers. Some of these fall off and get lost easily, so a stock of spare bolts, nuts and washers, spanners and screw drivers should be available for replacements and tightening these bolts and nuts periodically. This work is simple and can be carried out by unskilled labour in most villages. Occasionally, headmen and gang leaders do the tightening, while problems beyond their efforts, e.g. breaking of the bearing, wearing away of the axle and connecting rod, shearing of the hub, damage of the wheel especially in the case of the ones using tubeless tyres, are dealt with in local workshops.

Some groups of unskilled workers save money to set up their own small workshops, so that whenever there are repairs, fabrications of tools like hand rammers and spreaders it
could be done easily between them. If small enterprises of this kind become more common, the problems in the routine and remedial maintenance of the tools would be minimised.

4.6.1.1 Scope for Local Production

Most of the hand-tools in use have been manufactured in Nigeria. Of the three wheelbarrows available in the country, one (Ifeco) is manufactured in Nigeria while the other two are made in China. It was interesting to observe that the Nigerian made wheelbarrow was more effective for hauling of soil and laterite on sites. According to field work observation by UNDP/ILO in 1992, “Nigeria’s wheelbarrow worked for about one month before showing signs of wear and tear which were quite easily handled while in comparison, the Chinese brands started manifesting problems after less than two weeks of use, the worst of which was the poor quality of their wheels which shattered very easily (the wheel cost being almost two-thirds of the total cost of the wheelbarrows)”\(^{20}\). The constraint on local manufacture is that need to establish and police common standards and specifications to reduce the wide variability of hand-tools in the market. The specifications should be related to the type of work the handtool is required to perform. For instance, the specifications of wheelbarrows to be used in technical workshops for occasional haulage cannot be the same as those to be used on a construction site where they are subjected to continuous heavy duty usage.

Existing medium and large-scale manufacturers of hand-tools already have the necessary infrastructural facilities required for large scale production and they are also equipped to maintain the required quality standards. On the other hand, local blacksmiths and small-scale manufacturers do not have the facilities for large scale production and it would be difficult for them to maintain the desired standards; they should therefore be encouraged to concentrate on repairs and maintenance of hand-tools in conjunction with their traditional role of making hand-tools for agriculture. The growth of labour-based construction methods in Nigeria will generate increased demand for hand-tools. Production of hand-tools will also receive a boost when the production of flat steel comes on stream in the nation’s steel factories at Ajaokuta and Aladja.

Local artisans producing handles for tools are very knowledgeable in the properties of local wood varieties and their experience should be tapped to identify suitable wood species for handles all over the country. This should be extended to all LGAs in the country, and

properly documented. It is necessary to conduct some training for these artisans to expose them to more desirable qualities and shapes for handles than what they are used to.

4.6.2 Light Equipment for Construction of Rural Feeder Roads

The use of light equipment for roads in Nigeria has mainly been concentrated on maintenance works. Labour based methods for rural feeder works require the support of compatible light equipment. Light equipment used for road maintenance works includes agricultural tractors, trailers, tractor-drawn water bowsers, chain saws, locally fabricated hand-drawn water bowsers, wheelbarrows, pedestrian rollers etc. Pedestrian vibrating rollers are used for compacting road shoulders in major road projects as well as for the compaction of estate roads. In recent times, the use of this light equipment has become more common in the construction of both urban and rural roads. For instance, the recent Petroleum Trust Fund (PTF) projects are making significant use of light heavy equipment where the geological formation has permitted its application.

One of the most important factors that determines the quality of a road is the degree of compaction of the fill material. Both new and rehabilitated roads can be compacted using pedestrian vibrating rollers. There is the need for the spreading of aggregates and watering, filling material for compaction in strips, with passes of rollers when the vibratory mechanism was not in used. An overlapping pattern of about 50% is required between strips. From the result of a test carried out by the Nigeria’s National Building and Roads Research Institute (NBRRI), it was found that; “The degree of compaction achieved with 6 passes of the roller ranges between 78 and 80% Proctor density. The degree of compaction increased to over 90% when 8 passes of the roller were made (NBRRI 1992)". This is quite difficult to achieve using labour only methods, therefore light equipment here gives both the speed and efficiency. In practice, some capable contractors normally purchased second-hand plant from larger contractors or overseas sources. Nevertheless (Petts, 1996) “the risks from undocumented previous use and abuse are obvious, with the potential for poor availability of spares and expensive repairs for the new owner"(MART 1996i). Most trees on new road sites are felled manually, but the largest ones are cut down using the chain saws. Both hand drawn and machine towed water bowsers are commonly in use in Nigeria, but in order to expedite action, a machine towed bowser is more appropriate.

---

21 National Building and Road Research Institute, 1992, Lagos - Nigeria.
The hand drawn has a drum connected on the underside by a short length of 3/4" pipe. It has a perforation and attached to the back of the drum is the braking system, while a provision for pulling the bowser is located at the front.

4.6.2.1 Availability and Purchase

During the field work study (author 1995), very few firms had equipment like pedestrian vibrating rollers, tractor and trailers. Most of the private firms owned between one to two tractors and trailers at most, and are unwilling to risk hiring them except to local farmers (who have a better reputation for proper use and settlement of charges). In terms of purchase, not all light equipment are available. Equipment like tractors and trailers could easily be purchased in most states in Nigeria, from established suppliers such as, Leventis Technical, UTC, Tractor and Equipment, Fiat, J. Allen, etc. But others like the pedestrian vibrating rollers are not readily available for purchase. The author’s field work survey enquiries indicated that, they were not available because of lower demand for them, but could be imported by the marketing firms and delivered within 12 weeks if ordered.

Figure 4A: Some Light Equipment suitable for both Agric and the Roadworks

A Gravel Haulage Trailer  Tipping Trailer  Tractor Towed Scraper

4,500 Ltr. Water Bowser  2 Tonne Light Grader  5 Tonne Heavy Grader

Grader/Ripper Attachment  Tractor, Loader & Grader  5 Tonne dead wght Roller

2 Tonne Plant Transporter  Engine d’veen Road Sweeper  Tractor Fitted with Hydraulically Driven Road Sweeper and 550 Litre Bitumen Emulsion Sprayer

Source: Adapted from (MART 1996)23 Robert Petts’s Agricultural Tractors in Roadworks

---

Figure 4B: Some Basic Equipment used in Roadworks operations in Nigeria

80 Litres Haulage Wheelbarrow for hauling fill material and concrete less than 150 mm.

Shovel/Spade for loading and stockpiling, digging soft formations and top soil removal.

Rake (Spreader) for spreading fill material and litterite.

700-kg Smooth Drum Pedestrian Vibrating Roller, for compaction.

Hand Operating Power Rammer, used for compacting embankment.

Hand Rammers for compaction.

Plat Type Hand Rammer, for compaction.

Pickaxe for excavation activities.

Matchet (Cutlass) for cutting of vegetation and roots.


CHAPTER FIVE
WHY LABOUR BASED METHODS FOR NIGERIA?

5.0 INTRODUCTION
The discussion in this chapter and recommendations based on it include data from the field work which is recorded and analysed in Chapter 3. The field work study has shown that, Nigeria continues to be dependent on the use of imported heavy equipment instead of cheaper available local resources for the construction of its infrastructure works. Consequently, even rural infrastructure works like rural roads, small earth dams, small-scale irrigation works, are often implemented by equipment-based methods. The country is currently experiencing serious economic recession that has resulted in large labour surplus and shortage of foreign exchange, resulting in increasing difficulties in replacing or importing enough spares to maintain the existing old worn-out construction equipment in stock. The few units of serviceable equipment available in the country are over-stretched, causing delays in the execution of many projects, particularly rural infrastructure projects.

The current economic situation calls for more realistic and sustainable methods of construction, which must utilise all the available local resources, particularly labour. The analysis of the data collected (figures 3K, M, & N and tables 3K, M & Q) from different parts of the country (author 1995/96) confirms the availability of surplus labour, which justifies labour based methods. The labour-based method of construction implies the use of labour primarily, supported by compatible equipment for the construction, rehabilitation and maintenance of infrastructure works. This method provides positive impact on the economy by, among other things, conserving foreign exchange, providing productive employment opportunities, and promoting greater grassroots participation in rural development.

The main features of the labour-based/light equipment-supported method (author 1995)\(^1\) includes:

- its ability to effectively utilise locally available unskilled labour to perform the work items;
- making use of appropriate supplementary equipment to support labour in order to achieve higher productivity levels, quality standards and make the process cost effective;

---

\(^1\) Author's Literature Review, Loughborough University, U.K 1995.
• flexibility for project execution, either by direct labour or contracts;
• compatibility with maintaining technical standards and engineering inputs in a project;
• meeting the required quality standards with appropriate level of supervision;
• it is management-intensive but does not require sophisticated management skills, that requires numerous lower level supervisors to organise and supervise large labour force;
• it encourages self-reliance via the application of locally sustainable methods;
• available data have shown that it results in net savings in costs and foreign exchange;
• labour cost constitutes about 35%-60% of the total project costs, providing local employment opportunities.

5.1 CONCEPT OF LABOUR-BASED CONSTRUCTION
The concept underlying labour-based programmes is an age-old one, evidence available from different parts of the world, suggests just that. In ancient times, the State called on the services of its unemployed population to participate in public utility works or prestige projects. In most cases these were isolated activities which did not form part of any overall policy designed to combat poverty or unemployment. Often, factor prices did not even justify such an approach. More regularly, many traditional societies required their members to perform statute labour for the common good in order to safeguard their common heritage. Howenstine, 1968 reported that, “industrialised countries, typically the United States of America, during the periods of economic depression, launched public works programmes, or compensatory employment programmes, to provide work for those who would otherwise be unable to find employment”. What were described as “test” work relief programmes, were also established in times of famine by British colonial administrators to provide temporary relief for the unemployed people of the colonies (Thomas, J. W. (1973)3.

However, the idea of deliberately introducing unemployed labour as an investment factor to speed-up the take-off of developing countries by launching infrastructure works, as well as to bring about a more rapid and lasting reduction in the amount of poverty, unemployment,

---


and underemployment, only began to find its way into theory and practice in mid fifties of this century. A number of countries initiated programmes aimed at mobilisation of surplus labour for implementation of infrastructure projects. By the mid-seventies many employment creating public works programmes had been successfully mounted. These for example includes in Africa: Morocco, Tunisia and Malagasy Republic, in America: Brazil, Mexico and Peru; in Asia: China, India, Bangladesh, Indonesia and the Philippines (Thomas, 1973).

The Meaning of Labour-based Construction Programmes was defined by the International Labour Conference of 1964, in an attempt to synthesise ideas and the experience acquired in this field, with particular reference to rural areas, as the “means adapted to local conditions for the fuller utilisation of local manpower in rural development may include: “local capital-construction projects, particularly projects conducive to the increase in agricultural production, such as small and medium irrigation and drainage works, the construction of storage facilities and feeder roads and the development of local transport (U. N, 1964).

The Committee for Development Planning of the United Nations Economic and Social Council considered Labour-based programmes “a possible leading sector”. Similarly, the Special Report on Employment Policy in the Second Development Decade, drawn up by the United Nations Administrative Committee on Co-ordination, considered that “one of the better ways of finding a partial but rapid solution to the problems of poverty and unemployment is to institute what might be called ‘a major programme of minor works’ in rural areas”(U. N 1974). This view is shared on the whole by the various United Nations bodies as well as by the World Bank.

Generally speaking, Labour-based Infrastructure Works Programmes include all those programmes which are aimed at developing infrastructure, Roads and Transport, Land and Water resources, and are specifically designed for providing, as a matter of urgency,

---


employment for a particular sector of the population through the widest possible use of available labour with a minimal investment in capital. The definition given here stresses on a "programme" of works as opposed to isolated works undertaken on a day-to-day basis and without cohesiveness. If the works are to form an integral part of a clearly defined employment policy, then it is essential to have a programme.

Though labour-based programmes mainly comprise small-scale rural works such as feeder roads, minor water and drainage projects and building construction, they in no way exclude urban development projects or large-scale works such as construction or maintenance of major roads and dams in so far as these can be carried out by using labour-based methods. The institutional framework in which they are set can vary considerably. They may be works already included in a national or regional development plan, which have been specially selected as suitable for labour-based methods, or they may be supplementary works programmes specifically devised to absorb identified labour surpluses at the national or local level. They may also include development projects planned and carried out by local communities to meet their own needs, with or without government participation.

5.1.1 Labour Availability
The labour-based/light equipment-supported method of construction relies primarily on the use of local labour. The key aim of labour-based programmes in Nigeria is to create employment. It is therefore, necessary to undertake at the initial stage, the study of circumstances of labour availability. The situation of labour availability would provide the basis for final screening of the projects proposed, and possibly contribute to the decision as to whether the choice is justified.

It is important that, after an assessment of labour availability for the project, to make further assessment of labour availability for the local resource based construction or maintenance of rural roads. The assessment at this stage is to provide evidence of under-employment which conventional investigation usually fails to capture.

Therefore, as already discussed in chapter three, a survey was undertaken prior to the start of the write up, to assess the availability of labour in the sampled states. Table and figure 3Qs shows the distribution of labour demand, supply and surplus by source and month as estimated in 1995/96. Details of the estimate with all the assumptions made were based on the author's Questionnaires and Interviews survey result of 1995/96 in Nigeria. The tables
in chapter three shows the abundance of labour for construction all through the year in most places, except for some couple of months, during which land preparation for farming takes place.

5.1.2 Labour Motivation
Labour motivation is a way of inciting the local community to participate in paid labour. In Nigeria where the labour market is well developed but has traditionally served a capital intensive production regime, it is necessary to work out systematic procedures that take account of the deep-seated existing arrangements, interactions and linkages, and the new patterns of associations that will emerge in response to local resource based methods.

The road and other infrastructural sectors faces serious constraints as the abundant local resources (human and material) are not being used due to wrong choice of technology. The equipment intensive method is inconsistent with local socio-economic conditions. As a result, a large number of unemployed are desperate for any form of employment. This highlights a prospect for motivation as well as an advantage in an environment of free choice. This prospect is even more pronounced in the study area, where the local community suffers from serious deficiency of infrastructure and individuals sometimes freely choose to work without remuneration to redress a common problem.

5.1.3 Labour Management
Labour management is an important factor for site administration. Apart from maintaining discipline among workers, it is important to keep records of output on daily basis. A typical site management needs a site engineer as supervisor, assisted by front line supervisors such as gang leaders and headmen. Each of the members of a team has a specific task to handle and a labour force to supervised. The actual number depends on the effect of the particular activity and its complexity. For instance, while a headman can supervise a task like site clearing (made up of bush clearing, tree felling, stumping and grubbing), top soil removal, a gang-leader is required to look after subgrade shaping/sub-base formation, laterite surfacing (including borrow pit activities) and drainage.

However, headmen are responsible for recording the daily physical output which is then collated by the gang leader and the engineer to ensure that correct and reliable data are recorded. The gang leaders are selected from amongst the manual labourers. They are
expected (in Nigeria) to have gone through formal education up to West African School Certificate level; they are also required to demonstrate leadership qualities. The headmen do not necessarily require any formal education but they are expected to show leadership qualities before their recommendation by the gang leaders. Both the headmen and gang leaders undergo basic training (theoretical and practical) in work organisation, labour management, elementary mathematics and safety, hand-tools, and so on in order to be assessed in a written examination before being confirmed.

The headmen and gang-leaders are granted reasonable authority to maintain discipline and ensure the smooth running of the site. This gives them courage in administering the hand-tools on the daily basis, with assurance they are kept in good working conditions, safe, and provided in the required numbers.

In relation to guide issues labour management has a role in facilitating employment of female casual labour in labour-based projects, especially in terms of attitude to work, activity preference, skill acquisition, and the attitudes of male workers regarding female participation.

5.2 EMPLOYMENT GENERATION

One of the key aims of labour-based programmes in Nigeria is to generate employment to mop up the abundance surplus labour. A detail statistical estimation of labour availability and surplus from selected states and local governments has been reported in chapter three, with tabulated result in table 3Q. A demonstration project at one of the selected local government, Epe LGA to assess the scope for employment generation in the labour-based construction of rural infrastructure works was carried out by a joint UNDP/IL0 and NDE project NIR/87/025.

Before the commencement of construction work “an assessment of the labour availability at Epe, revealed a labour surplus of about 800,000 workdays in 1988” (UNDP/IL0/NDE 1992). This according to the report represented the component of the labour force that was redundant in 1988 due to unemployment and underemployment. The assessment showed that in the immediate catchment area of the road project, up to 50,000 workdays of

---


118
communities labour were idle in 1988. Official records released by the Federal Office of
Statistics (FOS) and the State planning authorities indicated that the unemployment rate for
the LGA was as high as 20% during 1988. It was thus apparent that employment creation
would be an important impact of the demonstration project.

Table 5A: Monthly expenditure on wages and level of employment generation at

<table>
<thead>
<tr>
<th>Month</th>
<th>Total Wages (=N=)</th>
<th>Employment Generation (Workdays)</th>
</tr>
</thead>
<tbody>
<tr>
<td>February/March 1989</td>
<td>4,014</td>
<td>441</td>
</tr>
<tr>
<td>April</td>
<td>7,083</td>
<td>778</td>
</tr>
<tr>
<td>May</td>
<td>14,670</td>
<td>1,612</td>
</tr>
<tr>
<td>June</td>
<td>25,222</td>
<td>2,772</td>
</tr>
<tr>
<td>July</td>
<td>27,567</td>
<td>3,029</td>
</tr>
<tr>
<td>August</td>
<td>39,390</td>
<td>4,329</td>
</tr>
<tr>
<td>September</td>
<td>39,492</td>
<td>4,340</td>
</tr>
<tr>
<td>October</td>
<td>44,220</td>
<td>4,859</td>
</tr>
<tr>
<td>November</td>
<td>53,599</td>
<td>5,890</td>
</tr>
<tr>
<td>December</td>
<td>40,357</td>
<td>4,435</td>
</tr>
<tr>
<td>January 1990</td>
<td>45,459</td>
<td>4,995</td>
</tr>
<tr>
<td>February</td>
<td>44,890</td>
<td>4,933</td>
</tr>
<tr>
<td>March</td>
<td>53,645</td>
<td>5,895</td>
</tr>
<tr>
<td>April</td>
<td>25,943</td>
<td>2,851</td>
</tr>
<tr>
<td>May</td>
<td>36,030</td>
<td>3,959</td>
</tr>
<tr>
<td>June</td>
<td>33,031</td>
<td>3,630</td>
</tr>
<tr>
<td>July</td>
<td>31,656</td>
<td>3,479</td>
</tr>
<tr>
<td>August</td>
<td>40,525</td>
<td>4,453</td>
</tr>
<tr>
<td>September</td>
<td>34,968</td>
<td>3,843</td>
</tr>
<tr>
<td>October</td>
<td>36,288</td>
<td>3,987</td>
</tr>
<tr>
<td>November</td>
<td>38,487</td>
<td>4,229</td>
</tr>
<tr>
<td>December</td>
<td>27,947</td>
<td>3,071</td>
</tr>
<tr>
<td>January 1991</td>
<td>22,512</td>
<td>2,474</td>
</tr>
<tr>
<td>February</td>
<td>24,167</td>
<td>2,656</td>
</tr>
<tr>
<td>March</td>
<td>20,640</td>
<td>2,268</td>
</tr>
<tr>
<td>April</td>
<td>19,995</td>
<td>2,197</td>
</tr>
<tr>
<td>May</td>
<td>20,268</td>
<td>2,227</td>
</tr>
</tbody>
</table>

Total                  852,065          93,632
### Table 5B: Employment Generation in the Construction of 1 km of a Farm Access Road under Alternative Technologies in Epe LGA, Lagos State

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CONSTRUCTION METHODS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LABOUR-BASED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EQUIPMENT-BASED</td>
<td></td>
</tr>
<tr>
<td><strong>Total Cost (=N=)</strong></td>
<td>223,322</td>
<td>233,162</td>
</tr>
<tr>
<td><strong>Wages (=N=)</strong></td>
<td>155,009</td>
<td>14,274</td>
</tr>
<tr>
<td><strong>Employment (Workdays)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unskilled Labour</td>
<td>16,182</td>
<td>1,491</td>
</tr>
<tr>
<td>Skilled Labour</td>
<td>852</td>
<td>78</td>
</tr>
<tr>
<td><strong>Total Employment</strong></td>
<td>17,034</td>
<td>1,569</td>
</tr>
<tr>
<td>Cost per employment N/workday</td>
<td>13</td>
<td>149</td>
</tr>
</tbody>
</table>

Tables 5A and B above are adapted from a demonstration project at Epe, Lagos State, Nigeria by UNDP/ILO and NDE in 1992.

#### 5.2.1 Comparison of Employment Generation

Evidence from the demonstration project (Table 5B) indicates that labour-based methods of construction create substantially more jobs than equipment-based methods. The results show that up to 17,034 workdays of employment could be generated on a kilometre of new rural road constructed by labour-based methods. On the other hand, only 1,569 workdays of employment can be generated for the same length of rural road when conventional equipment-based methods are used. Thus, a shift from equipment-based methods to labour-based methods could result in the creation of about 11 times more employment opportunities. It has been noticed that, being a new site of demonstration, labour productivity was very low, but it is likely that under normal working conditions with an experienced work-force employed by cost-conscious contender the labour productivity would increase appreciably.
Table 5B further compares the relative efficiencies of employment generation under the two approaches. According to the evidence, the cost of generating one unit of employment under the labour-based approach was only =N=13. On the other hand, the cost of one unit of employment under the equipment-based methods can be as high as =N=149. This fact further emphasises the advantages of using labour-based methods from a cost-efficiency point of view.

5.3 SCOPE FOR INTRODUCTION OF LABOUR BASED PROGRAMME

The labour based sector of construction/maintenance had faced a serious constraint in Nigeria, as the abundant engineering manpower in the country lacks the know-how to make the right choices of technologies consistent with the socio-economic conditions. In 1987, the attention of the Nigerian government was drawn to the need to introduce the programme as part of the efforts to relieve mass unemployment in the country. The Federal Government having accepted the call and launched “the National Construction Policy” (FGN 1987)\(^9\) to shape the economy, stressing the need for effective use of the labour resource. The recommendation No.8 of “the Road Maintenance Policy Seminar organised by the Federal Ministry of Works and the World Bank in 1991 in Otta, Ogun State, emphasising the use of labour-based and light equipment supported methods for maintenance as demonstrated by the NDE is indeed another example of the result of success” (FMW and WB 1991)\(^10\). In addition to that, from the period 1989 - 1991, a total of 135 engineers holding Higher National Diplomas (HNDs), Bachelor and Masters degrees (civil engineering bias) were drawn from the Ministries of Works, and Agriculture, and ADPs, DFRRI, River Basin Development Authorities, NDE and Local Governments based in the eleven Pilot States, for preliminary training on the application of labour-based methods (ILO/UNDP/NDE 1992)\(^11\). However, the National Directorate of Employment (NDE) in its attempt to address the constraint has also designed a three-part intervention targeted at the professional, policy and educational levels. At the professional level, the focus was to provide a reorientation to

---


\(^11\) The ILO/UNDP/NDE 1992 sponsored meeting; The development of effective management capacity in the implementation of labour-based projects in both the public and the private sectors NDE Lagos - Nigeria.
engineers and contractors practising in private and public sector organisations. At the policy level, they stick to persistent calls on government to modify the existing systems and procedures to allow for the full development of labour-based construction technologies. And at the educational level, the Directorate requested that, in addition to training in equipment based methods, the students should be exposed to labour-based construction methods so that when they start practising as engineers, they can respond with greater flexibility to the construction needs and resource profile of the country.

The Head of State on the 1/5/1992, announced the government acceptance of the direct labour based approach for the purpose of increasing employment generation to a large extent. The Directorate then continued to press on for complete implementation of the process at all levels of Government and including the private sector of the economy. In the same month, the Ijebu-Ode seminar concluded with some recommendations in favour of “introducing into Nigerian Civil engineering curriculum of Universities and Polytechnics, labour based methods, with topics such as financial and economic cost of labour and equipment, concepts of technology choice, application and management techniques” (1992 Seminar report). This can help build capacity of civil engineering departments in Nigerian institutions.

5.4 SCOPE FOR PRODUCTIVE EMPLOYMENT IN RURAL ROAD MAINTENANCE

"In response to the Government's request, the UNDP/ILO fielded in 1987 a Multidisciplinary Mission to Nigeria" (UNDP/ILO 1987). The objective of the mission was to assess the scope for productive employment opportunities in the construction, rehabilitation and maintenance of rural infrastructures. The mission confirmed the bias in favour of using equipment in the construction, rehabilitation and maintenance of rural infrastructure works. Furthermore, the mission concluded that while the Government is committed, the labour is available and the wages are competitive, there is a need to modify the present systems and procedures and develop appropriate managerial capacity, both in


government and the private sector, for the successful implementation of labour-based methods on a large scale. However, such development needs to be pursued with vigour combined with proper planning. To this extent, concern with employment must necessarily be accompanied by an interest in technology choice. The mission therefore, endorsed the Government's phased approach towards the introduction and promotion of labour-based technology.

The introduction of labour-based construction methods in Nigeria will generate increased demand for hand-tools. The demand can mitigate the sufferings of the destitute unskilled workers from the immediate catchment areas of the construction project. Although rural wage rates are low and also fluctuate considerably from season to season. Because of few employment opportunities, and the fact that the proposed infrastructures will address local basic needs, the rural population declared intense willingness to work on the construction activities.

5.5 ECONOMIC AND SOCIAL JUSTIFICATION OF LABOUR-BASED TECHNIQUES IN NIGERIA

The scope for introduction and employment opportunities of labour-based technology in construction, rehabilitation and maintenance of rural infrastructure works, implies its justification as well as importance in Nigeria's economy. The lack of manufacturing capacity for construction equipment in the country means all the equipment is imported. The acute shortage of foreign exchange constrains the replacement of worn out equipment or importing spares for their repair. This means over-stretching of the already available units of equipment in the country, resulting to delays in the execution of many projects, particularly the rural development programmes. The existing equipment-intensive approach to rural development projects also reduces the employment opportunities, and the scope for the beneficiaries to carry out regular maintenance and minor repair works, as they lack access to the use of heavy equipment.

The current economic situation in the country, with a labour surplus and shortage of capital, is in fact highly appropriate to the application of labour-based methods. The application of these methods infers the use of surplus labour and minimum light compatible equipment. Therefore the use of labour-based methods in rural development projects would have a positive impact on the economy. The employment opportunities will increase during
the construction, and will be possible to minimise delays and benefit from early implementation of projects and in addition considerable foreign exchange can be saved.

The NDE, having identified rural infrastructure works as a potential source of productive employment opportunities in Nigeria, are “being assisted by the UNDP and ILO towards the introduction and promotion of labour-based/light equipment-supported approach to the construction, rehabilitation and maintenance of these works within the framework of the Government's strategy to increase employment opportunities” (NDE 1992). While Nigerians remain hopeful about an eventual turn-around in the economy, recent developments with respect to oil prices, interest rates, exchange rate and inflation make it even more urgent to shift to the rational and optimal use of available resources.

In order to dispel the widespread scepticism, doubts and allay fear (particularly among technical personnel) about the feasibility of labour based techniques in Nigeria, it was necessary to launch a practical demonstration of the methods. “A demonstration Project at Epe LGA, in Lagos State confirmed the technical feasibility and cost effectiveness of the labour-based technology” (Husaini I, et al 1992). It also shows how the rural population were generally willing to participate in the labour-based construction activities.

5.6 INSTITUTIONAL ASPECT OF LABOUR BASED TECHNIQUES

For an institution to be effective and sustainable in Nigeria, it must take cognisance of the existing three tier structure in the country; i.e. Federal, State and Local Governments. The latter is the least, weakest, and most financially deficient tier of governance, but shoulders most responsibilities for the rural roads programme. Consequently, many rural roads are in a state of disrepair. The communities in the affected areas have to find ways of communicating with one another and their markets in order to promote their harvest. At the State level, there are government agencies like the ADPs, Ministries of Works, Ministries of Agriculture and Directorates of Rural Development, that have interests in rural roads programme. At the Federal (national) level, there are NDE, Federal Ministry of

Agriculture, and other federal agencies claiming to have concern for rural roads. Unfortunately, due to engineering training in the Universities and polytechnics emphasising the use of equipment-intensive technologies, most civil engineers have their expertise in the use of capital methods but lack the necessary know-how to make effective use of all available resources, particularly labour.

One of the principal needs in the country, is to develop an effective institutional framework for the implementation of appropriate technology in both the government and the private sectors. Labour-based as an affordable technology reduces the pressure on foreign exchange, enhances productive employment opportunities, maximises the effective use of available resources, encourages self-reliance, and opens up opportunities for grassroots participation in the development process. Therefore, in order to ensure a sustainable development, labour based institutional aspect it is necessary to intervene at three levels: provide a reorientation to those engineers already practising in the field within private sector and governmental organisations, recommend modifications to the existing systems and procedures to allow the labour-based technology to develop to its full potential, and prepare the students conceptually and expose them to the alternative construction methods. It was expected that such intervention will promote among engineers a more flexible response to the country's technological needs appropriate to the socio-economic conditions prevailing in the country.

5.7 SUSTAINABLE MAINTENANCE ON RURAL ROADS

The author's six months field work survey in Nigeria reveals the ineffectiveness of the lower tiers of government to maintain the rural roads under their responsibilities. The foregoing problem context associated with the maintenance of these roads necessitates the author's drawing up of a framework for the establishment of a sustainable routine road maintenance system. The system spells out suitable strategies and procedures that will take into account the necessary institutional arrangements for effective organisation of maintenance works as well as the financial and technical aspects, including training requirement of such procedures.

In its effort to rescue the deteriorating state of rural roads in Nigeria, the Directorate of Foods, Roads and Rural Infrastructure (DFFRI) recommended generating a five year historical records on the maintenance of rural roads. This action it says, "is necessary
because of the dearth of information on the level of funding, the type and quality of
maintenance carried out" (DFFRI 1988). "This back-up information will according to
DFFRI, greatly assist in the evolvement of a suitable and sustainable maintenance strategy
for rural roads" ditto. In addition to the DFFRI's recommendation for a five year historical
record on road maintenance, the author suggests the generated data to include information
on the volume and conditions of existing rural roads (paved or unpaved), level of budgetary
allocations for maintenance, actual maintenance funds released and the proportion utilised
over the past years. Other relevant information includes maintenance methods employed
and equipment/tools available as outlined in chapter three of this report.
The author's strategies for adoption includes:
* the maintenance activities to be simple tasks that can be carried out at relatively low cost
and with hand tools/light equipment.
* developing an operational framework in collaboration with local communities for
effectively executing routine road maintenance.
* setting up sustainable demonstration projects on routine road maintenance and spot
improvement in rural roads by the LGAs.
* establishing work plans based on field experiment and experiences gained on the
demonstration projects to facilitate replicating the maintenance system for communities
in rural areas.
* documenting the experiences gained and disseminating same to villages in remote areas,
and through seminars.

However, in developing a sustainable system for maintenance on rural roads, the
methodology requires the routine maintenance and spot improvement activities to be
carried out periodically based on needs, availability of resources and prioritisation of the
spots to be improved. This approach should involve the application of labour-based
methods.

---

16 Proposal for the establishment of a sustainable routine maintenance by Directorate of Foods and Rural
Infrastructure (DFFRI) 1988, Tafawa Balewa Square, Lagos - Nigeria.
CHAPTER SIX

NIgerian road system and the split of responsibilities

6.0 INTRODUCTION

The discussion in some sections (e.g. 6.6) of this chapter reflects data from the field work analysis reported in Chapter 3. This chapter highlights the split of responsibilities in Nigerian road system. There is a three tier system of roads in the country, with administrative responsibility distributed among the Federal, States and the Local Governments. "Nigeria's total road network was 144,000 km in 1988 (FRN 1991)1, and increased over the rest three years to about 167,800 km (Banjo, G. 1994)². The networks are shared as; comprising about 28,600 km (18%) of Federal highways, and 30,500 km (17%) of State highways, while the rest 108,700 km of rural roads (65%). Of the total networks, 34,300 km are paved, leaving 133,000 km of earth and gravel roads. The percentage shares (Banjo 1994) of paved roads shows Federal Highways Authority is responsible for 67%, while the State highways 30%, and only 3% of the total are designated as rural roads.

The root of the roads problem in Nigeria begins from Independence due to frequent changes in policy on maintenance of both federal and the state highways. After Independence in 1960, maintenance was carried out by the public works departments of the then four regions as agents to the Federal Government. The results proved to be unsatisfactory and in the early 1970s, FMWH decided to maintain federal highways itself by force account. By 1979, after working for several years to establish this system, FMWH decided progress was too slow and reverted to employing the States as agents, and ceded to them the equipment from the force account operation. After only a year, FMWH found the results unacceptable and decided to maintain all federal roads by contracting procedures. However, due to political interference, unqualified contractors and weak supervision resulted in unsatisfactory results from the nascent

contracting system. They were gradually able to reduce the worst abuses. When their contract was completed in September 1985, however, a systematic supervision routine for maintenance contracts was not established yet, and consequently the supervision became weak.

The Nigerian road system between 1976 to 1981 experienced a remarkable expansion and improvement in both the quality and coverage. The proportion of bituminous surfaced roads on the federal system increased from 58% to 73% and the local road system expanded from 60,000 km to 85,000 km (FHD 1989). A substantial length of state and local government roads were constructed or rehabilitated to improve standards, including some 15,500 km under World Bank-assisted Agricultural Development Projects between 1976 and 1987.

However, neglect of maintenance and failure to carry out timely strengthening of these roads, threatened the networks, raising the possibility of irretrievable loss of past road investments and serious repercussions for the economic well being of the country. From 1985 to 1988 the percentage of roads in good condition in the total federal highways fell from 62% to 56%, and of roads in poor condition increased from 23% to 28% (WB 1991). Inadequate funding was partially responsible for this situation. Of these limited funds (WB 1991), over 80% was spent on new construction rather than strengthening and rehabilitation. In addition, a significant part of the recurrent budget was spent on capital items with the result that only 11,000 km of the 29,000 km network received routine maintenance in 1988.

The Nigerian public are paying a heavy price in economic terms due to roads neglect. Road accidents impose a heavy toll in terms of fatalities, injuries, and property damage. Available road accident statistics for 1980 indicate that Nigeria has an exceptionally high road accident fatality rate (about 33 fatalities per 100 million veh-km) a rate that is about 16 times higher than in UK and USA (FHD 1989). "The total number of road accidents declined from a peak of 40,900 in 1976 to 31,600 in 1980, possibly due to improvements in road geometry and condition". A conservative estimate on

annual economic loss to the country due to road accidents was put at N2.0 billion in 1988 (when $1 = N4.6) prices (WB 1991)⁶.

A recent Interview with the head of Nigeria’s Federal Road Safety Commission (FRSC) by News Agency of Nigeria reported about 5,432 persons die annually via road accidents in Nigeria (NAN 1998)⁷. This record placed the country second after Ethiopia as the most dangerous nation on earth in terms of road accidents. According to the Interview report, 18,105 persons sustained injuries every year through road accidents. The FRSC boss further stated that, empirical evidence and police records revealed that 154,667 people died in road mishaps between 1960 and 1988, with 522,513 persons sustaining injuries in 619,429 reported cases of road traffic accidents nationwide. “A visit to the general and orthopaedic hospitals will convince you of these chilling scenario,” he said. “This situation compelled government to establish the FRSC under decree 45 of February 1988” (FRSC 1998)⁸. The Marshal hinted that since the 1992 amendment of decree 45 to date (Dec. 1997), the commission had achieved substantial reduction in road accident, presumably up to 66 per cent.

6.1 INSTITUTIONAL FRAMEWORK

Many studies and seminars have reiterated the importance of capacity building as well as utilisation for economic development (Foirry, 1991; Edmonds and Miles 1984; WB, 1984,)⁹. The 1997 Abuja workshop has warned that, “for Nigeria to catch up with technological revolution in a globalised World, capacity building and utilisation must proceed simultaneously not only at an accelerated pace but in an incremental and co-ordinated fashion” (Ani, A. 1997)¹⁰. Ani, went further to state that, it would not be exaggeration to claim that Nigeria possesses capacity to some reasonable degree in several spheres, adding that the unacceptable large brain drain from Nigeria to the World at large

---

7 News Agency of Nigeria, Interview with the Corps Marshal general, Federal Road Safety Commission, 18th February 1998, Lagos -Nigeria
8 Federal Road Safety Commission, Marshal General’s Interview with NAN 18th February 1998.
10 Ani, Anthony, Nigeria’s Minister of Finance: Workshop on capacity building and utilisation by Federal Ministry of Finance in collaboration with the World Bank, 10th December 1997, Abuja - Nigeria.
meant that the major problem in the country was more of capacity utilisation than capacity building per se.

The poor conditions of Nigerian roads that has resulted mainly from a variety of institutional inadequacies, especially at the local government levels; faulty prioritisation towards capital rather than recurrent investments in the road sector, and inappropriate choice of technology, have propelled considerable community actions in road maintenance. Most of these activities are executed, using local resources and levies raised by the communities themselves. However, these community - based initiatives and organisational abilities, have been constrained by lack of technical capacities, thus limiting the quality and scope of their operation in maintenance.

The responsibility for the planning, construction and maintenance of roads in Nigeria is shared by a number of government agencies, ranging from the Federal, State to local government levels. The management responsibility for federal trunk road networks lies with Federal Highways Department in the Federal Ministry of Works (FMW); while at State levels, Ministries of Works and Transports (MOWTs) manages the State roads, and at Local Government levels, (LGCs) are responsible for the local roads. These are the main institutions responsible for the country’s road networks.

State governments and their local authorities were (between 1854-1960) responsible for about a half of the nation’s public expenditures, leaving the balance to the Federal Government. This continued up to the immediate post-independence years. By 1970, however, these arrangements had become severely distorted by three major events: the military rule, the three year old civil war and the emergence of petroleum as a major revenue earner. These three development led to an extreme centralisation of public resources and management, in spite of the country’s federal political arrangement.

Beginning from 1967, successive Federal Military Administrations in Nigeria created more State units (from the three which they inherited to the present 36) even as they took away resources and responsibilities from them. In turn, the State Governments took away a number of resources and responsibilities from the local governments. Hence, in spite of the various reforms sponsored by regional/state governments (both civilian and military) it became apparent by the late 1970s that only the Federal Government could muster the authority and resources to reactivate the nation’s local government. This led to 1972 analysis of problems of local governments in Nigeria.
(Adedeji doctrine), which argued that "local governments were enmeshed in a vicious circle of poverty and that of the various elements of intervention capable of breaking the circle, finance was the most potent" (Adedeji 1972: 2-3). Problems of inadequate management and supervision of works have contributed to the worsening condition of the country's roads system. Nonetheless, "Nigeria's draft constitution of 1995 has mandated the three tiers of government to have independent planning, financial and institutional capacity for their roads" (Devolution Committee 1997). The road maintenance capability is weak at all levels of Governments, with the LGCs being the weakest level. The problem is compounded by weak organisational structures for managing the road system. Although, their present capacities are very much limited, however, Local Governments play a very important role in assisting local communities in implementing self-help projects either by providing direct financial and material support or recommending such projects for State Government support. Thus, the LGCs serve as the interface between the top-down and bottom-up development processes. Most of the Federal and State Government agencies involved in this subsector work through the Local Governments to reach the large number of rural communities affected by their programmes.

6.1.1 Agencies Involved In road Operation

The projects under the rural infrastructure subsector (road) are implemented by various government departments and agencies at the Federal, State and Local Government levels. Considering the many agencies involved in roads operation, one would expect an overlapping of responsibilities. The various agencies involved includes; the Directorate of Food Roads and Rural Infrastructure (DFRRI), the Agricultural Development Projects (ADPs), the National Directorate of Employment (NDE), Ministries of Works and Transports (MOWTs), and the Local Government Councils (LGCs). The role and respective activities of these agencies are discussed below.

6.1.1.1 Directorate of Food, Roads and Rural Infrastructure (DFRRI)

The agency was created in 1986 by the federal government to focus attention on food production, provision of rural infrastructure (roads, water, etc.), and promotion of grass-roots social mobilisation for integrated rural development. It had direct federal support for rural roads, and attached to the office of the Head of State and with State directorates established in each state Governor's office before it was phased out. The overall target of DFRRI program was to contract or rehabilitate 90,000 km of rural roads in three two-year phases of 30,000 km each; 75% was to be new construction and 25% rehabilitation. States were allocated an average N10 million per phase. The formula for allocation of funds to each State is 49%, and 23% depending on the number of LGCs in the State, State land areas 15.4%, and ecological factors 12.6%. Contributions are required from states (15%), LGC (7%) and benefitting rural communities (3% in cash or kind), in addition to DFRRI's contribution of 75%. Average payment per km is N9,000 to N10,000 (FRN 1991).^{13}

6.1.1.2 Agricultural Development Projects (ADPs)

ADPs financed by the Federal and State Governments, and the World Bank were initiated as enclave projects in the northern states in the mid-70's to stimulate agricultural development and production. The programme aimed at improving rural access for agricultural inputs and outputs, particularly for small farmers. The policy was to concentrate on rehabilitation and maintenance of existing rural roads in order to reduce the backlog of 70,000 km deteriorated rural roads. The then planned rate of rural road rehabilitation by ADPs to minimum maintainable standard was 2,250 km per annum.

Table 6A: Annual road construction and rehabilitation undertaken by ADPs 1978/87

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayangba</td>
<td>29</td>
<td>570</td>
<td>379</td>
<td>630</td>
<td>59</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,667</td>
</tr>
<tr>
<td>Bauchi</td>
<td>(81)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,260</td>
</tr>
<tr>
<td>Bida</td>
<td>(79)</td>
<td>22</td>
<td>157</td>
<td>91</td>
<td>159</td>
<td>0</td>
<td>429</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>858</td>
</tr>
<tr>
<td>Borno</td>
<td>(86)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>35</td>
<td>10</td>
<td>0</td>
<td>15</td>
<td>60</td>
<td>120</td>
</tr>
<tr>
<td>Ekiti-Akoko</td>
<td>(80)</td>
<td>0</td>
<td>82</td>
<td>100</td>
<td>35</td>
<td>54</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>271</td>
</tr>
<tr>
<td>Funtua</td>
<td>(74)</td>
<td>24</td>
<td>151</td>
<td>99</td>
<td>139</td>
<td>106</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>521</td>
</tr>
<tr>
<td>Gombe</td>
<td>(74)</td>
<td>24</td>
<td>131</td>
<td>199</td>
<td>86</td>
<td>66</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>505</td>
</tr>
<tr>
<td>Gusau</td>
<td>(74)</td>
<td>145</td>
<td>269</td>
<td>181</td>
<td>53</td>
<td>112</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>750</td>
</tr>
<tr>
<td>Ilorin</td>
<td>(79)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>n.a</td>
<td>20</td>
<td>52</td>
<td>n.a</td>
</tr>
<tr>
<td>Kaduna</td>
<td>(84)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>118</td>
</tr>
<tr>
<td>Kano</td>
<td>(81)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>87</td>
</tr>
<tr>
<td>Lafia</td>
<td>(77)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>201</td>
<td>242</td>
<td>49</td>
<td>71</td>
<td>60</td>
<td>73</td>
</tr>
<tr>
<td>Oyo North</td>
<td>(80)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>61</td>
<td>125</td>
</tr>
<tr>
<td>Sokoto</td>
<td>(82)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>143</td>
<td>361</td>
<td>427</td>
<td>442</td>
<td>198</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>193</td>
<td>541</td>
<td>508</td>
<td>847</td>
<td>666</td>
<td>894</td>
<td>444</td>
<td>444</td>
<td>953</td>
<td>1200</td>
<td>1194</td>
<td>1673</td>
</tr>
</tbody>
</table>


Figure 6A: Annual road construction and rehabilitation undertaken by ADPs 1978/87

6.1.1.3 National Directorate of Employment (NDE)
The NDE like DFRRI was also established in 1986 in order to identify the productive employment opportunities in all sectors of the economy including construction, rehabilitation and maintenance of rural infrastructure works. NDE also serves as a collaborative agency between Government and ILO for the promotion of labour intensive techniques. The aim was to train Federal, State and LGC staff as well as small private contractors in labour-intensive road rehabilitation and maintenance techniques.

6.1.1.4 State Ministry of Works and Transports (MOWT)
The primary responsibility of State MOWT is planning, design, construction and maintenance of state highways. State MOWT also acts as executing agent for federal highway maintenance, if required. MOWT generally operates with direct labour units, although contract work is becoming common in many states on an increasing scale. Activity on rural roads usually is limited to hiring plant and providing technical assistance on request by LGCs, often following a natural emergency such as a bridge washout. Present staffing and equipment levels are generally inadequate even for the primary state road function.

6.1.1.5 Local Government Councils (LGCs)
The experience of Nigerian local governments was quite typical of those of other African countries up to the early 1970s (Mawhood 1983, Olowu 1989)\(^\text{15}\). Before the independence in 1960, local governments played major roles in maintaining law and order, as well as provision of maintenance of basic social services such as roads, water, health and education. These services were financed from a variety of revenue sources, the two most important of which were their own `independent` or assigned revenue sources and grants from regional or state governments.

The major changes for LGCs after Independence began in 1971, and a reorganisation to make them more effective in 1973. But, there was continuous abuse of power, which made the then Military Government to make a big reorganisation in 1976, by creating

additional states and LGCs and made them autonomous tiers of the republic. That was how the 300 LGCs started as autonomous tiers of the Republic. LGCs have since been increasing with the changes in governments, with over 200 LGCs created in 1984, and further 44 established in 1989, with another 136 in 1991, and finally the recent 187 creation in 1997 which brings altogether to the present 776 LGCs in the country. The functions of LGCs includes development schemes, collection of fees and construction and maintenance of rural roads in their areas. LGCs acknowledge their responsibility as rural road authorities, but for many years the financial and technical resources have been inadequate to meet the responsibility. That has resulted in their road networks deteriorating to an unmaintainable condition. In the boom years of the 70s, LGCs acquired a miscellany of mechanical plant for road construction and maintenance, and abandoned all labour-intensive work. Due to combination of mismanagement and old age, almost all their plant is now either beyond repair, or is unreliable and uneconomical to operate.

In keeping with Federal Government (FG) policy of decentralisation, LGCs now receive FG funds directly (rather than through the SGs, which often retained part of these funds for their own use). The initiatives in 1988 have improved LGC funding, the statutory allocation of FG revenues to the LGCs has doubled from 10% in 1990 to 20% in 1992 and this accounts for 90-95% of their total revenue. For instance markets and associated motor parks contribute less than 1% of total revenue, while collection costs consume 45-55% or more of these fees due to poor road connections. An average LGC allocates from 5-9% of its annual recurrent budget (N560,000) to “Works”, which includes roads, water and building maintenance. For the majority of rural based LGCs, roads are the most important item of capital expenditure. Permanent staff are few and unskilled. LGCs realistically accept that operation of construction plant has become too expensive for them, and they are enthusiastic to adopt part-time contractual manual maintenance methods as being a cheaper and more effective alternative, with the added benefit of considerable job creation.

A comparison of Nigeria’s rural road distribution with other countries in the region having broadly similar population, income or regional characteristics, has shown Nigeria to have the lowest road density, an indication of serious neglect to rural road sector.
Table 6B: Comparing Nigeria’s rural roads distribution with other African countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Km per 1000 pop.</th>
<th>km per 1000 sq.km arable land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigeria</td>
<td>1.1</td>
<td>166</td>
</tr>
<tr>
<td>Ivory coast</td>
<td>4.8</td>
<td>189</td>
</tr>
<tr>
<td>Cameroon</td>
<td>6.5</td>
<td>141</td>
</tr>
<tr>
<td>Senegal</td>
<td>1.8</td>
<td>137</td>
</tr>
<tr>
<td>Ghana</td>
<td>2.3</td>
<td>119</td>
</tr>
<tr>
<td>Kenya</td>
<td>2.8</td>
<td>438</td>
</tr>
<tr>
<td>Malawi</td>
<td>1.9</td>
<td>328</td>
</tr>
<tr>
<td>Tanzania</td>
<td>2.5</td>
<td>165</td>
</tr>
</tbody>
</table>


---

Figure 6B: Comparing Nigeria’s rural roads distribution with other African countries

6.2 FEDERAL ROAD SYSTEM

Nigeria’s federal highway network is deteriorating because of poor maintenance. During 1988, the capital budget for highways was N210 million ($52 million) about 3% of total capital budget, which was very low by international standards. As a result of that, only 11,000 km out of the total 28,600 km of federal road networks could be maintained" (FHD 1989)\textsuperscript{17}. The Trunk Road Study (TRS) identified rehabilitation and strengthening needs of N2,600 million over the next five years to preserve the existing network, excluding the construction of new dual carriageways. In addition TRS found that, at least N770 million would be required to complete the then ongoing construction works. Aggregating these two, the total capital requirement for the coming five years amounts to N3,370 million for rehabilitation, strengthening, and completion of ongoing projects (TRS 1988).

In another development, the World Bank reported that; "Failure to carry out timely strengthening of roads over the past decade have already caused a loss of N2.00 billion in the capital stock of federal highways, the total replacement value of which is estimated at about N18.5 billion" (WB 1991)\textsuperscript{18}. The Bank warned the government that, if future funding for federal highways continue at the level of the 1988 releases and most of those funds are allocated to new projects, the pace of deterioration will increase. The Bank suggested an underspending of N4.00 billion on rehabilitation strengthening over the period 1989 - 1993 would result in a N5.6 billion rehabilitation and reconstruction backlog and a N6.00 billion in additional costs of operating vehicles, totalling N11.6 billion. Thus, every naira spent on road rehabilitation and maintenance would result in a three naira benefit in terms of reduced user costs and reconstruction costs, with two of these naira in foreign exchange (WB 1991).

A recent report by National Concord Newspapers, stated that, “the replacement value of Nigeria’s 193,200 Km road network is estimated at $23 billion, according to World Bank sources (NCN, 1996)\textsuperscript{19}. The paper also stated that, commercialisation of

\textsuperscript{17} Federal Ministry of Works and Transport, Federal Highways Department’s record 1990, Lagos - Nigeria.
\textsuperscript{18} World Bank Report No. 7844-UNI (WB-002 1991), Country Department; Africa Region-Lagos Nigeria.
\textsuperscript{19} National Concord Newspapers Friday 12 July 1996, Lagos - Nigeria.
Nigeria's 28 road toll plazas has yielded a revenue of 100 million naira in the first four months of 1996.

6.3 STATES ROAD SYSTEM
Nigeria's Trunk Road Study of 1988, reported an estimated 30, 500 km of state roads, with a replacement cost of about N5.26 billion as a network in transition ranging from engineered two lane asphalt surface roads to dry season earth tracks (TRS 1988)\textsuperscript{20}. The aggregate traffic on the system in 1988 was about 15 million vehicle-km per day or about 25% of the traffic flow on the federal system. The corresponding road user costs on the state system were about N17 million per day or N6.2 billion per annum in 1988. Only about a third of the state roads are bituminous surfaced.

According to another road study of 1991, a road improvement program (comprising resealing, rehabilitation, strengthening and upgrading works) is economically justified for some 11,000 km of state roads (FRN 1991)\textsuperscript{21}. These works are estimated to cost about N200 million per annum or N2.0 billion in total over the next ten years, in 1990 prices (US$1=N7.8). These capital expenditures are over and above recurrent expenditures needed for routine maintenance. States differ in their needs to improve their road networks and their financing capability, but in about half of these states, the backlog of road rehabilitation is so large that direct borrowing with federal support or concessional external assistance would be required to prevent poor roads from becoming a serious impediment to economic stability and growth.

6.4 LOCAL GOVERNMENT ROADS (rural roads)
Induced agricultural output would be one of the most important benefits of a program to rehabilitate and maintain rural roads. Rural road improvements are crucially important in creating markets for agricultural produce and inputs. If economic growth through free markets and private enterprises is a serious long-term objective, the creation of agro-related markets through the rehabilitation and maintenance of rural roads would be one of the most promising areas of investment. Nigeria was found to

\textsuperscript{20} Trunk Road Study of 1988, sponsored by Federal Ministry of Works and Housing, - Lagos Nigeria.
have the lowest rural road densities when compared to other nations having similarities in population, income and regional characteristics.

In 1988, there were an estimated 85,000 km of rural roads in Nigeria. About 70% of these rural networks were in poor to very poor condition with extensive loss of trafficability in the wet season, and less than 2% are bituminous surfaced. LGC, the most poorly financed tier is constitutionally responsible for the provision and maintenance of these roads. It has so many competing projects in stock, as a result there is no maintenance system in place for rural roads. Other factors faced by LGC in addition to financial, are technical, and administrative constraints. Hence, in order to recoup the neglected rural roads, there is immediate need for the below suggested types of interventions:

- to increase investment for rural road rehabilitation about three times the present level covered by DFRRI and ADPs;
- to develop a maintenance culture for rural roads, via LGCs and other institutions such like Community involvement;
- a development of a permanent institutional capacity at LGC as well as Local Community;
- a strong support by State Government to develop LGCs capacity to provide and maintain rural roads in their areas.

According to the report by Trunk Road Study and the World Bank (consultants to the FMW&H) rough analysis of various benefits associated with rural road improvements, "about 55,000 km out of the 85,000 km network of rural roads in Nigeria would yield an ERR exceeding 15% on basis of 1998 road rehabilitation and maintenance costs" (TRS 1988, WB 1991)². The cost of rehabilitating rural roads up to a minimum maintainable standard was estimated at US$10,000 per km in 1988 prices. Rehabilitation of 55,000 km of economically justified rural roads would according to TRS cost about N2,750 million (at N4.6 per US$). This level of expenditure is beyond the capacity of LGCs. Direct federal subventions or concessional external assistance would again be required to clear the huge backlog of rehabilitation and to maintain the rehabilitated roads to a reasonable standard.

---

6.5 ROAD SYSTEM IN SOKOTO STATE

An efficient and reliable transport system is vital for the economic development of Sokoto State. Considering its land-locked position (1,003 km from the coast), and the long hauling distances for internal communication, road transport is believed to be a cardinal requirement. Because the maintenance of roads (especially the complementary systems of laterite and earth roads) have been neglected, their conditions have rapidly deteriorated. Agriculture is particularly severely hampered by the lack of adequate and well maintained roads. Though, the condition of roads in the states varies considerably, depending on state’s regards for roads and its spending priority. Notably, the financial allocation to road authorities is very limited, hence the availability of trained and experienced staff within the State Ministries of Works and Transport (MOWTs) is always hard. Moreover, the need to bolster road planning and maintenance capacity, remains critical in all states. Yet, “the worst road conditions (50% in poor condition) are to be found in Anambra, Bauchi, Kwara, Niger, and Ondo States” (FHD 1994)23.

This is due partly to weak state institutions for road development and maintenance, also partly to financial constraints. Though Sokoto happens to be out of the worst conditions, because it made an incredible investment on roads in the last two decades. The state now face a heavier maintenance burden due to poor funding of roads in recent years. This is mostly due to ignorance and partly due to frequent changes in government. As mentioned earlier in chapter two, road financing in Sokoto varies between the government in power and its spending priority. An illustration of recent five years of ruinous funding by Sokoto state (table 6C) reveals the neglect.

Table 6C: Illustration of recent five years of road funding in Sokoto State

<table>
<thead>
<tr>
<th>Year</th>
<th>Allocation (N000,000)</th>
<th>Type of Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992/93</td>
<td>70,000,000</td>
<td>Military</td>
</tr>
<tr>
<td>1993/94</td>
<td>85,000,000</td>
<td>Civilian</td>
</tr>
<tr>
<td>1994/95</td>
<td>75,000,000</td>
<td>Civilian</td>
</tr>
<tr>
<td>1995/96</td>
<td>less than 14,000,000</td>
<td>Military</td>
</tr>
<tr>
<td>1996/97</td>
<td>less than 14,000,000</td>
<td>Military</td>
</tr>
</tbody>
</table>


24 Data obtained from road maintenance unit, civil engineering department, Ministry of works and transport, Sokoto state - Nigeria 1997.
Table 6C above shows the allocations to road construction/maintenance for the period 1992 to 1997 fiscal years by different administrations. Studying the disastrous trend of ruinous road allocated funding by Sokoto State over the past five years, suggest that, the future development of road networks will depend on the ability of the State to mobilise financial resources for road development and maintenance, and their capacity to plan and utilise these resources in a cost effective manner. Creation of appropriate institutional arrangements within the State Ministries of Transport for planning, management, resource mobilisation, and maintenance is essential, and development of a master plan for state roads is recommended in order to strike a proper balance between expansion of roads and preservation of existing assets.

6.6 RURAL ROADS IN SOKOTO STATE
Available data (chapter 3, tables; K, L, M and figure K) have illustrated the deficiency of rural roads in Sokoto State. Most rural roads in the State have deteriorated to an unmaintainable condition due to neglect, and most cannot now be maintained unless they are first rehabilitated. Evidence from six months practical field survey in Nigeria, with Sokoto as the base of study, has revealed the physical condition (Author 1995/96 and 97)25. The majority of respondents to questionnaires, have either complained of inadequacy or serious neglect of rural roads as a major setback. Road density varies considerably between regions and states within Nigeria, highlighting even more critical situation in a number of states. A study of agricultural marketing conditions in Northern Nigeria (Niger, Kwara and Gongola states) noted that “the average distance between a village market and a major town varies between 150 km to 200 km, with an average travel distance of 30 to 35 km from a village to an engineered all-weather (blacktop, or gravel surfaced) road” (TRS 1988 and FRN 1991)26. Despite Sokoto’s average village distance to market being 50 km (table 3L), not a km of the rural roads in the state is bituminous surfaced. There is thus an enormous need for rehabilitation and maintenance of rural roads in the State.

25 Author’s Six Months practical field work for data collection October 1995 to April 1996, and the recent visit October 1997.
According to Transport Research Study and World Bank, “at present rate, it will take more than 30 years to clear the backlog of Nigeria’s rural road rehabilitation” (TRS 1988, WB 1991). The Bank’s investigation reveals that, farm to market transport costs on existing rural roads are estimated to cost N1.4 per ton-km, which could be reduced to N0.5 per ton-km with satisfactory rehabilitation and maintenance of the roads. When roads become so bad that produce has to be moved by head-loading, the cost can be much more, about N20 per ton-km. Due to the poor condition of rural roads, some 30-40% of the market price of agricultural produce, particularly food crops, is accounted for by transport cost and other incidental services.

As a proof of the creditability of rural roads to agricultural markets in Nigeria, an estimation report by the Bank shows that, “if all rural roads are rehabilitated and well maintained, agricultural production would increase by 1-3 million metric tons and its value would amount to N500-1,500 million per annum” (WB, 1991). Transport costs savings on production and the increase in output as well as additional input costs for agricultural production would be quite important benefits from rural road maintenance, and of significant benefit for Nigeria.

A typical agreement for manual routine maintenance of Access/Fadama roads between Sokoto Agricultural Development Project and the Local Governments in a form of Memorandum of Understanding could be found in the appendix of this report.

A prototypal structure of a road sector in Sokoto State with bureaucratic formation of authority is as shown below. Even though they are officially known to be responsible for the roads in the state, any approval in the range of N100,000 ($4,000) has to seek governor’s consent.

---

Figure 6C: A prototypical structure of a road sector in Sokoto State

Sokoto State Government, Ministry of Works and Transport

Highway Administration Organisation Chart

Honourable Commissioner of Works and Transport

Director General Ministry of Works and Transport

Personnel Management Department

Arch.&Building Department

Civil Engineering Department

Electrical/Mech Department

Plann Dept.

Laboratory and Workshop

Direct Labour Operation (unit)

Project Implementation Office

Training Unit

Labourers and Gangs
CHAPTER SEVEN

EMPLOYMENT OF LOCAL CONTRACTORS

7.0 INTRODUCTION

The contractor is the private individual, organisation or government department who enters into a contract to do the work required by the client (Andersson et al 1994)\(^1\). The relationship between the client and the contractor (Miles 1996) is governed by the contract itself. Therefore it seems logical to ask a basic question “What is this contract?” Miles defined a contract as an agreement between two or more parties which is intended to be legally binding (Miles, 1996)\(^2\).

Construction organisations in every country have their own comparative advantages and their domestic markets each have special needs. Although they compete for contracts, they have much to gain by cooperating in the exchange of knowledge and technology, by learning from each other, and by collaborating in selected projects and markets. This chapter focuses on the deficiency of local contractors in Nigeria, and tries to suggest means to strengthen their capabilities.

Foreign construction firms dominate the major projects in Nigeria as a result of deficiencies in indigenous construction capacity. “A plethora of measures have been formulated and implemented to promote development of domestic contractors in developing countries, but most attempts have achieved little success” (Adams 1997)\(^3\).

It has been argued that “local consultants and contractors have the potential to be more effective and efficient than government organisations and foreign firms” (Neale and Miles)\(^4\). They advised that, if carefully encouraged, local firms would be better suited to finding technical solutions appropriate to local skills and resources, and to manage the work within local commercial, social and political constraints.

Sustainability of the continued use of labour based technology for roadworks

---

1 Improve Your Construction Business (IYCB 1); Pricing and Bidding Handbook, ILO Geneva 1994.
4 Miles D, and Neal R H: In a proceedings of Seminar; Planning and Management of Roads in Developing Countries, with the co-operation of the World Bank and the Economic Commission for Africa, 11-15 September 1989, University of Sussex, England.
therefore, depends mainly on the private sector’s willingness and ability to adopt and to adapt this technology for the construction and maintenance of roads. A report on contractor field studies in Ghana, states that, “as far as the private sector is concerned, the high sounding socio-economic benefits associated with labour based methods are not really the most important issues” (ILO/DFR 1993). “Pre work done on the technology showed that, the profitability of labour based operations can be enhanced by improved management of resources - mainly labour” ditto.

Wells warned the developing economies “to concentrate upon the development of an indigenous construction capacity, as reduced foreign exchange earnings and international recession would limit the production of the capital goods required to maintain economic growth in their countries” (Wells 1985). The indomitable foreign debt and balance of payment problems have drastically reduced Nigeria’s import capacity, economic growth and infrastructure development programmes. As a result, in 1986, the Government of Nigeria adopted a range of structural adjustment measures to reverse the country's economic distortions. At that time, “the collapse in world oil prices was biting deeply into the already diminished resources available for public expenditure” (Hertel, 1994). The Structural Adjustment Programme (SAP) has enhanced local sourcing of inputs, mainly because of a lack of foreign exchange for imports, and the depreciation of the local currency (Ojo, 1989).

Due to a diminishing and sharply fluctuating market for their services, the implementation capacity of most local contractors in Nigeria is limited. Whereas there may not be a shortage of these contractors, their work quality is comparatively low. Yet they are a vital resource if rural roads are to be improved, since the large and well established contractors do not usually bid for rural road contracts, because they are scattered in smaller lots and not as attractive as other road contracts. Small contractors interested in rural road contracts, generally do not possess the required equipment and are also not well trained. Hence, they do not understand technical specifications and

---

5 ILO/DFR/UST Collaboration agreement; Project Report on Contractor Field Studies Phase One for ILO, by Civil Engineering Department University of Science and Technology, Kumasi - Ghana 1993.
6 Wells, J. 1985; The role of construction in economic growth and development. Habitat International.
the need for timely execution of contracts. They also depend on hired equipment either from the ADPs, State MOWTs, or well established contractors, and availability is likely to fluctuate. This has led to work delays and poor quality output. As such, there is a strong need for all the three tiers of governance in the country to ensure that sufficient funding is available to create a satisfactory market, and to introduce the contractors to an alternative, and cost effective technology, such as the labour based techniques, which reduces the over reliance on heavy construction equipment. Miles (1996), in his paper entitled; promoting small contractors in Lesotho, shows how international interest in privatising public works activites has been stimulated by growing appreciation of the significant savings that can be made through improved operational efficiency, but cautioned that, in developing countries, the main difficulty is the lack of a resourceful and experienced private sector which can be readily mobilised to meet the new market opportunities (Miles 1996)9.

In order to promote the participation of local indgenous contractors (Miles, 1996), contract conditions and procedures should be simplified. On large projects where the responsibilities are onerous and the risks are great, so detailed FIDIC contracts are needed and well justified. However, (Miles) on small jobs executed by typical labour based contractors, it is open to question whether complex contracts are really needed to protect a relatively wealthy and powerful client from a relatively poor and weak small entrepreneur (Miles, 1996)10. Miles suggests how easy a contract can be, by citing example to those who accept the logic of Fritz Schumacher's arguement, that in development term "small is beautiful", "there is no reason why the principle should not be extended to designing small and simple (if not beautiful!) contract documents" (Miles, 1996)11. This led to Miles's proposition that, the ideal contract document in any given case would be the simplest formulation that permits effective accountability.

---

9 Miles, D.W.J., Promoting Small Contractors in Lesotho; privatisation in practice, in a proceeding fo institute of Civil Engineers, Civil Engineering Journal 114, August 1996, 124 -129.
7.1 DEVELOPMENT OF INDIGENOUS CONTRACTORS

Nigeria has a large number of contractors of various sizes; major, medium and small. The development of smaller ones are of greater significance, for improvement of productivity of labour based contracts. Small scale contractors are perceived to be the most important vehicles for ensuring the domiciling of the labour based techniques as well as its sustainance in Nigeria. Most large to medium contractors have developed expertise in the use of equipment intensive technologies, and they dominate particularly civil construction works. However, small contractors use labour based methods but their expertise is primarily in building construction. The deficiencies and lack of encouragement in indigenous construction capacity have resulted in an unsatisfactory dependence on imported inputs: construction materials, machinery, and the skilled manpower required to implement much needed infrastructure (road) for economic growth and to improve living conditions.

Therefore, the development of indigenous contractors both small and medium sized could itself promote labour based techniques. The maintenance of rural roads by labour based methods would form a basis from which Nigerian indigenous contractors could progress to undertake a wider range of work. A test site in Ghana revealed the progress of developing company capabilities of contractors by giving them 5km each of real life trial sites to run on their own under DFR supervision. “Their performance at that stage was suggested to be the main criterion for selecting the firm for the next phase of Standard Contractors” (Ashong, 1995)\(^\text{12}\). Neale and Miles in a paper on the use of local contractors and consultants suggested action plans which include: “encouraging the creation and management of a stable market, within which enterprises can flourish; sensitive management of the necessary organisational changes, especially the transfer from government agencies to the local enterprises; formulation of effective forms of contract; and support for a program of training and consultancy, preferably based on local institutions” (Neale and Miles 1989)\(^\text{13}\).

\(^{12}\) The Labour based programme in Ghana; Facts and figures as at December 1995, by E.N.K.Ashong - National Co-ordinator.

\(^{13}\) Miles D, and Neal R H; Use of Local Contractors and Consultants; Sub-Saharan Africa Transport Program, the World Bank and the Economic Commission for Africa, 11-15 September 1989, University of Sussex, England.
More attention should be given to contractor training to promote management
development of trained construction professionals, now emerging as the new crop of
construction entrepreneurs. However, to curtail dependence on imported capacity for
roads and other infrastructure development (Neale and Miles), the primary concern
should be establishing appropriate development programmes to ensure sustainable
development of domestic contractors. It is also required to promote their effective
participation in the local construction industry, thus reducing dependence on imports.
According to SSATP’s broad generalisation, local, private companies have simpler
objectives than public sector organisations; they have a sharper and more immediate
motivation, and are able to operate much more flexibly. These characteristics
according to Willoughby, make them better suited to problem solving; they will be
better at “doing more with less” (SSATP 1989)\textsuperscript{14}.

Local firms were found to be generally not sufficiently developed (SSATP) in size,
numbers or substance to have a significant effect, and so require an effective program
of assistance. Since the objective is to foster development of enterprising, flexible,
problem-solving firms it is axiomatic that any program of assistance must be directed
towards self-development rather than subsidy and protection; that is, the emphasis of
the program should be to reward successful enterprises while providing a minimum
level of protection against risk. Neale and Miles in their 1989’s paper ‘Use of Local
Contractors and Consultants’ have suggested four sets of elements to be considered in
developing a strategy for increased use of local firms:

- The technical aspects of road maintenance, and the managerial implications;
- The potential benefits of the use of local firms;
- The problems and impediments to implementation: analysis of the difficulties which
  must be overcome; and
- The action plans: recommendations for investigations and initiatives for sustainable
development of local firms.

The following section draws on Neale and Miles’s analysis of elements to be
considered in amplifying a blue print for increased use of local firms.

\textsuperscript{14} Sub-Saharan Africa Transport Program, the World Bank and the Economic Commission for Africa,
7.1.1 Technical Aspects of Road Maintenance and Managerial Implications

Government road maintenance has to be managed so as to provide an efficient public service. In the case of private firms it has to be managed to produce commercial results. Communication and supervision are more difficult, and it is likely that the site will traverse a variety of terrain and ground conditions, and perhaps climatic variations. The social topography will also vary - pastoral (provincial), rural, village, urban.

Neale and Miles's analysis found the management of maintenance work to be in some ways more difficult than new construction. New construction works are designed to fairly consistent pattern, and much of the work can be standardised, planned and organised in advance. When roads deteriorate, they do so for a variety of reasons, and in a variety of ways. They suggested the general sequence of maintenance work to be: investigating, diagnosing, removing any deterioration, and returning to original standard (or perhaps a revised standard). Normal maintenance has few technical difficulties. In the case of gravel roads, this involves such activities as periodic regrading, ditching, clearing culverts and so on. Over time this has to be extended to include repair of potholes and minor repairs to structures and culverts; and in badly neglected cases, to substantial renovation with some reconstruction. Paved roads are more durable, prolonging the period before they begin to show signs that maintenance is required. Thereafter, a maintenance pattern similar to that for unpaved roads develops, but the solutions are more technically complex, often requiring substantial items of equipment and non-local materials and more difficult managerial tasks.

In Nigeria, having chronic shortages of many of the basic requirements of road maintenance, these problems may become acute. Technically, local firms who are familiar with the environment would be more efficient than foreign firms; their managers speak the local language, know the local customs, and understand the topography and climate. Also, they will be less constrained in their working practices than government agencies. Routine maintenance would cause them few technical problems, and would be well placed to mobilise local resources. As restoration of badly deteriorated roads presents more of a challenge, Neale and Miles call for local consultants to use their skills and local knowledge to produce effective solutions within the capabilities of local contractors.
Although, technical problems of maintenance demand some on-site decisions, the response of most government agencies has been to codify their requirements quite tightly and explicitly, imposing a system of standardisation upon designers and constructors. This follows the practices commonly used in developed countries, but in Sub-Saharan African countries this may mean that available resources are concentrated in the maintenance of some roads to high standards, and doing nothing at all for others. When formulating a road maintenance strategy in circumstances where resources are severely limited, it may be that uniform national standards have to be one of the casualties of compromise. Similar problems arise in the supervision of contractors on maintenance work. It is difficult to specify the work in a way that allows for design flexibility, difficult to measure it and equally difficult for the contractor to price it. These problems can be overcome, but it will be difficult to write contract documents that will provide the client with a sound basis for controlling the work, and yet be readily comprehensible to contractors.

7.1.2 Potential Benefits from the Use of Local Firms

Neale and Miles went further to suggest three quite distinct factors which needs greater consideration for economic development:

- the transfer of work from government ministries and agencies to private firms - “the efficiency factor”,
- the replacement of foreign firms by local ones - “the national development factor”; and
- changing designs and construction methods to suit local needs, skills and resources - “the employment and economic growth factor”.

7.1.2.1 The Efficiency Factor

The explanation here is a modification of Neale and Miles phraseologies on developing countries, modified to suit Nigerian conditions. There are many reasons for the need to improve the administration of road management in Nigeria. The three tiers system responsible for road governance and their agencies are corrupt and over staffed. They provide little real incentive for their staff to perform well, work to rigid rules, and ignore or resist local needs and representation, rather than respond to them. It can be
argued that the fundamental structure of such organisations is inappropriate. Usually conceived and structured along the lines of similar organisations in developed countries, they may lack the institutional characteristics essential to achieve good results in Nigeria: flexibility of approach, a positive and innovative problem solving management culture, and incentives to do more with less.

By contrast, the private firm has simple objectives (survival, profit, growth), recognises the need to motivate its staff to perform well (and has the means and flexibility to do it), and being market orientated is used to responding to local needs, provided that response is commercially profitable. It is likely that local contractors could do a better job than government organisations using directly employed labour. Flexibility of action, and the ability to respond to problems, may well produce better results than inflexible governmental organisations trying to satisfy a diversity of influences. In short, the private firm is motivated to succeed, and therefore is likely to find imaginative ways to overcome obstacles to success, whereas the government organisation may be principally concerned with the application of standard procedures, to avoid taking risks and making mistakes.

7.1.2.2 The National Development Factor

The argument for replacing foreign firms with local ones is more clear cut, and less controversial. First, it is a simple matter of national development to encourage national professional and industrial growth. Strengthening the professions is one of the key factors in increasing the use of local contractors. Professionally qualified people in labour based techniques are a very scarce resource in Nigeria. Government and aid agencies (UNDP/ILO, NDE) devote much time, effort and money to educate and train people in order to relieve this shortage. Unless those who benefit from such programmes find stimulating and challenging work at home, they will either perform ineffectively or find work abroad, leaving their countries more dependent on foreign expertise.

In principle local firms are likely to be more effective technically - effectiveness being judged on the basis of producing solutions to road maintenance problems with minimum consumption of scarce resources such as plant and equipment, imported materials, and skills possessed only by a small minority. By contrast, foreign firms may
be constrained to apply standard solutions, designing and building to codes of practice chosen because their technical staff are familiar with them although they may be technically inappropriate.

7.1.2.3 Employment and Economic Growth
The main drive of this argument is the remarkable capacity of construction work to create relatively low-skilled employment. The ILO/UNDP in collaboration with NDE have sought to promote this approach to Nigeria's construction industry via labour based application for roads projects. Neale and Miles (1989) summarised the potential benefits for using local contractors as:

- **Political:** a clear commitment to national development, promoting economic growth, professional development and employment, and reducing dependency on imported goods and services;
- **Economic:** the economic benefits stemming from the above political commitment, and the inherent benefits that accrue from a better road system; and,
- **Cultural:** stimulation of education and training, and the development of professions and professional institutions.

7.1.3 Problems and Impediments to Implementations
Neale and Miles (1989) suggested that some of the main problems which needs to be addressed in the promotion of local contractors are:

- **Creation of the market:** an "enterprise culture" cannot be driven, it must be stimulated by market forces.
- **Control:** it is difficult to simultaneously promote initiative and maintain control, particularly with respect to construction quality control and cost of works carried out by contractors.
- **Effects of Organisational Change:** redundancies or overstaffing in road agencies; staff compelled to undertake tasks for which they are not qualified; and the reality of local business practices.
- **Time Scale:** where there is little existing local capacity, the time required to see the results of policies which encourage more use of local firms will be relatively long.
7.1.3.1 Creation of the Market

It is clear from the various studies that have been done on the state of local contracting capacity that, it is generally very weak and fragmented (Adams, 1997, Larcher and Petts, 1996, UNDP/ILO &NDE, 1994, Neale and Miles, 1989, Edmonds and Miles, 1984)\(^\text{15}\). This is an indication that market for construction design and contracting services does not provide a suitable commercial environment within which local firms can flourish. Some possible reasons for this, and the effects on the proposed use of local firms are:

7.1.3.1(a) Political philosophy and structure

One of the most important factors in the creation of a domestic contracting capacity is a stable market, otherwise there may not be an “enterprise culture” and much would have to be done to create an environment which encourages people to become entrepreneurs. This may imply that some substantial change is required in the basic philosophy of government.

7.1.3.1(b) Aid donor policies

Foreign aid tied to the use of goods and services from the donor country limits the market for local firms to that of suppliers of local services as subcontractors. Furthermore, the requirement that plant and equipment has to be acquired from the donor country creates a severe problem of maintenance. Countries in receipt of aid from several countries acquire such a diversity of machines that training their mechanics to be proficient in repairing all of them, and holding sufficient spare parts, becomes quite impossible.

7.1.3.1(c) Clients’ requirements

Technically complex or large scale projects, are generally not suitable for design and construction by small under-capitalised local firms. Usually, the technology is too advanced, or the scope too wide, or the risk too great given their experience and skills.

7.1.3.1(d) Form of Contract and Contract Documents
The form of contract is often derived from those used in developed countries, which requires a level of commercial sophistication, risk taking, and contract administration that most local firms cannot meet. The contracts are usually heavily weighted in favour of the client.

7.1.3.1(e) Uncertain Payments
It is common for Nigerian governments to cope with their cash crises by delaying payments to contractors, which is quite dangerous for small, fragile businesses. Contractors in these circumstances find it difficult to obtain credit, as a result suffer severe operating problems due to lack of regular and adequate cash flows. This situation offers a significant comparative advantage to strongly capitalised multinational construction enterprises (Lemunge 1980)16.

7.1.3.1(f) Fluctuating Workload
In all the three tiers responsible for road development in Nigeria, the funds allocated for road maintenance fluctuate from year to year, sometimes quite widely as explained in Sokoto State's practice.

7.1.3.2 Control
In any project, there are three elements to be controlled; quality, cost and time. To control these elements, project managers need information, knowledge, technical, authority, skills and management systems and resources. Unfortunately, in Nigeria there are shortages of all these except, perhaps, authority. One result is that local professionals feels disadvantaged in comparison to their foreign counterparts, and so lack the confidence to build their own businesses and compete on equal terms. A further factor that determines confidence is that information and knowledge acquired from developed countries is much more highly prized than that which relates to local

conditions. Thus a strong initiative is required to “localise” education, training and professional development. Good systems for drafting contract documents, contract administration, and the control of payments are crucial to effective control of maintenance and construction work. A contractual system that has simple measurement, is a better foundation for control than a legally complex document employing sophisticated concepts and measurement systems. Control will be more easily exercised if road maintenance contracts are structured in such a way that encourages client, designer, and constructor to work together towards a common purpose.

7.1.3.3 Effects of Organisational Change
The Daily Times of Nigeria 26 February 1998, reported that the Nigerian Civil Service with 800,000 strong workforce will be cut by 240,000 between February to March (Daily Times 1998)\(^7\). This implies a 30\% cut in the workforce, and the staff of government organisations that might become redundant as a result of the contraction exercise could be of any field including design consultants, potential contractors, engineers, supervisors, and many other fields relevant to roads maintenance. The categories of people to be affected could be part of the technically able, those with some flair and confidence in their own ability. Unfortunately, if they had no one to stand for them, they would be the first casualties.

Development strategies such as “the introduction of modern management practices” must be viewed with some concern. Studies have shown that local contracting capacity in most African countries, particularly Nigeria is generally weak (Adams, 1997, Miles, 1996, WB, 1988, and Edmonds and Miles 1984). Nigeria Daily Times of 26 February 1998 and Road Deterioration Study of 1989, indicates that most government organisations are over-staffed and that their equipment is under-used. A policy of transferring work from the government organisations to local, private firms, will only be effective if it is accompanied by training and human resource development initiatives to change attitudes as well as develop appropriate knowledge and skills.

---

\(^7\) Daily Times of Nigeria 26th February 1998, a daily news reporter of activities within and outside Nigeria, Founded in June 1926.
The problem reflects the growing concern of many officials working for development agencies: the time scale of many projects is far too short. The working environment for many projects in Nigeria are such that projects take time to mobilise and mature, and this period would be usually much longer than the two or three years that is usually allowed.

7.1.4 Action Plans
The purpose of these action plans is to suggest what investigations and development programmes will be necessary for effective development of local construction firms. The prime concern is the development of organisations with determined, enterprising, and problem solving management cultures. Logically this must begin with the development of the market.

7.1.4.1 Market Development
Work must be made available to firms in a form that they can do without undue strain, within an acceptable level of risk, and within the knowledge, information, skills and resources available to them. This has technical implications, requiring a move towards smaller projects based on local technology, and using appropriate construction techniques. Unless and until the market for road maintenance becomes stable, with a sufficient and foreseeable annual demand, it would not be prudent for firms to concentrate solely on maintenance work. Maintenance work should be seen only as a good basis for new firms to establish themselves and existing ones to develop. The introduction of stabilising measures such as funding that would provide an assurance that an adequate number of projects would be available regularly over a substantial period of time, with timely payments, can help reduce risks.

Given the difficulties that local firms face in getting finance and credit, some form of assistance will often be necessary. Preferably this should be a simple system of making finance and credit easier to obtain. One of the main problems is that construction is perceived (frequently correctly) by most commercial banks as a high-risk business. Routine maintenance for road contracts should offer a lower-risk entrepreneurial opportunity than new construction, since the work content and hence the cost is more predictable. It is in the interest of clients to ensure that financial risks are minimised by
committing themselves to prompt and regular payments. Careful thought needs to be given to devising equitable methods of calculating payments due and ensuring that reasonable guarantee that funds will be available to honor payment applications promptly.

7.1.4.2 Measures to Effective Control
Where road maintenance is executed on a force account basis, control structures are largely internal to the public sector organisation which is responsible for setting the task and carrying it out. When private contractors are brought in, the situation becomes more complex. The potential for an improved and more economical service will only be achieved if simple but effective control procedures are in place. This implies both the development of appropriate forms of contract and training of supervisory staff such as clerks-of-works and inspectors.

7.1.4.3 Facilitating Organisational Change
The development of local contractors should lead to a reduction in the size of government organisations. One of the difficulties is the transition period, and this may have a fairly long time scale. There are two distinct elements: the “efficiency factor” indicating a transfer of emphasis from government to private firms; and the “national development factor” indicating the substitution of foreign firms by local ones. It may be impractical to work on both of these aspects at the same time, in which case a decision on priorities will have to be made.

7.1.4.4 Institution Building
Local institutions obviously can take a major part in a programme aimed at finding local solutions to local problems. Experience has shown that successful institutional change depends on a concerted action by those involved in the industry - client, and contractors. Governments have a major part to play, especially in Nigeria, where governments are the predominant clients of the industry. Therefore governments can take a strong position to promote the emergence of capable and well motivated domestic construction businesses.
7.2 CATEGORIES OF CONTRACTORS IN NIGERIA

Nigerian contractors range from the multinationals at the apex, to the small local domestic contractors at the bottom. The cultural and operational background for indigenous contractors in Nigeria varies within the country itself. Indigenous contractors in themselves vary in size depending on the region of operation. In Nigeria they can be categorised as;

- Multinational construction firms
- Foreign indigenised construction firms
- Direct Labour Operations (DLO) firms
- Small local domestic contractor firms
- Local Grass-roots clubs and association firms

The Government indiginisation policy of 1976 made it possible for some Nigerian entrepreneurs to acquire shares in the former foreign firms. The establishment of these firms was encouraged by government’s initiative to increase indigineous participation in medium to large sized construction projects. Under this programme, the government devised the ‘mobilisation fee’ clause whereby 10% of the contract sum was given to indigineous contractors to cover initial overhead expenses of setting up large construction sites. This was necessary because foreign contractors, with their large capital base, out performed the indigines in large sized contracts.

Both the multinationals and the indigenised construction firms pursuits major projects such as motorways, dams and power stations. While the small contracting firms work close to their base and specialise in simple building and public works such as drainage and feeder roads.

7.2.1 Multinational Foreign firms

There are many foreign firms operating in Nigeria, most of them are American, British, Chinese, French, Germans, Japanese, and so on. The common and most popular ones among them are the Julius Berger Plc, Strabag Construction Co. Ltd, Siemens constructors, Impresit Bakolori Plc, Kopek Construction Ltd, Solel Boneh Ltd, Elite
7.2.2 Indigenised firms

These are the former foreign firms that now have between 40 and 60% Nigerian equity ownership as a result of government indigenisation policies. The country has a large number of them, ranging in between the large and the medium size contractors. They includes AZ Nigeria Ltd, Roads Nigeria limited, Leabub (Nig) Ltd, Dantata and Sawoe Nigeria Ltd, Triacters Civil Constructors Nigeria Limited, Stirling Civil Engineering Nig. Ltd, Solei Boneh (Nig.) Ltd, Reynolds Const. Co. Nigeria Ltd, Hopel Nigeria Ltd, Monier Construction Co. (Nig.) Ltd, Datum/Setraco Const. (Nig.) Ltd, (PTF 1998). They each have a relatively high turnovers, as for example AZ Nigeria Limited, was reported to have a turnover exceeding ($64 million) N300 million in 1988 (Olomolaiye 1988)\(^\text{19}\). Their current turnover according to author’s field work survey in Nigeria is between N5.00 - 6.00 billion ($48 - 58 million), based on present currency status (Author 1996). Many of the efforts to promote these local firms have not been successful due to abused and invariably failed in their objectives (Adams 1997)\(^\text{20}\). Although, some of the rural infrastructure projects, because of their modest size, will not attract the interest of medium size contractors. Their participation in these programme would greatly facilitate the dissemination of the approach on a nationwide scale.

7.2.3 Direct Labour Operations (DLO)

There are two modes of executing maintenance work, either by direct labour or by contract.

Direct Labour implies that, the implementation of road maintenance work is carried out directly by the Agency. Labourers can be engaged on regular employment basis by the Agency or hired for particular tasks on lengthman or muster roll basis. The success


of this system depends to a large extent on the levels of supervision provided during the maintenance work.

While Contract implies that, the maintenance work is contracted out on a periodic basis. Among the benefits of this system is that there is limited bureaucratic procedures in the procurement of materials. Furthermore, there is flexibility in the motivation of workforce and optimum utilization of available resources. Another advantage is the greater effectiveness in the achievement of desired results, and the Agency will only provide supervision of the maintenance work.

The general tendency is to award maintenance contracts to professional contractors who are competent and have the expertise in the tendering/bidding system. This can be extended by awarding maintenance contracts to:

* Petty contractors who are members of communities adjacent to the road, or
* Community contractors or community associations or unions.

The latter will involve the participation of community leaders and community development unions. The job can be carried out in many ways depending on the peculiarities of the adjoining communities. For example, after getting the contract, the community can mobilize voluntary services from its citizens or can mobilise farmers with farms adjacent to the road to carry out the maintenance tasks. In the alternative, labourers can be hired on muster roll basis. All these will be done under the supervision of the agency.

The advantage of this approach of involving communities in maintenance work particularly routine maintenance, is that the community have a sense of belonging to the road and there is more commitment as the community act as a check on the agency (Local Government Council or State Government) to ensure their roads are promptly maintained. It also generates employment for the community members. However, the success of this system depends on the existence of a mutual memorandum of understanding between the community and the agency. To do this implies that the contract award procedures such as design specifications, contract conditions and payment should be modified and made adaptive for effectiveness.
7.3 SMALL SCALE CONTRACTORS

Small contractors have a very important role to play for effective execution of rural roadworks. However, the number of contractors who can execute labour based civil construction projects, which constitute the bulk of the rural infrastructural projects is currently very limited in all the three regions visited (author, 1996). As a result, there is urgent need to train small contractors in labour based civil construction works. The serious unemployment, and economic problems made Nigerian government to make some efforts in promoting indigenous contractors, by increasing their participation in the industry, as primary measures to increase access to work and provision of financial support. Indigenous Nigerian construction firms are however, predominantly small and medium sized. It was estimated that “indigenous construction firms undertake only 5% of the purely civil engineering construction and 25% of the building works, while indigenised foreign firms undertake not less than 85% of the civil and building construction combined” (Adams, 1997)21.

The only serious and first real indication of genuine government interest in the development of small domestic construction capacity, was “the National Construction Policy (FRN, 1991)22. The policy effectively addressed some major difficulties faced in the industry; lack of construction materials, manpower, equipment and finance. However, the policy once again failed to address specific issues, such as contractor development. Policy strategies recommended are not explicit or concerted enough to ensure sustainable development of indigenous contractors.

The use of local contractors in Nigeria could take advantage of improvements in the efficiency of resource use, and by adapting them to local conditions could not only reduce environmental costs but also “stretch” the resource base. The use of small scale contractors would therefore help solve a lot of problems, especially as stated earlier, in situations where it is likely that the site will traverse a variety of terrain and ground conditions, and perhaps climatic variations, social topography (e.g. pastoral (provincial), rural, village, urban). Local firms in this circumstances, who are familiar with the environment would be more efficient than foreign firms; their managers speak

the local language, know the local customs, and understand the topography and climate. Most importantly it would contribute to the economic development of the area and reduce poverty, by providing opportunities for gainful employment.

7.4 SURVIVAL OF SMALL SCALE CONTRACTORS

It was noted that there are a significant number of small scale contractors who are engaged on building construction and very few on road construction. The former use labour-based methods, but have not got the experience of working in civil engineering. In majority of cases, these small contractors have very limited financial resources. Therefore in order for these contractors to take advantage of new opportunities in road construction and maintenance a number of actions are necessary.

• Firstly, projects should be split into small segments so as to be manageable by small scale contractors.

• Secondly, the contracting procedures need to be made neutral to allow them to use local resource through the application of labour based.

• Thirdly, it will be necessary to ensure that they get some support on financial matters, e.g. exemption from payment of deposit when a contract is awarded.

• Fourthly, there is a need for more frequent settlement of bills so that the contractors can make regular payment to their workers, and the retention money to be kept at a minimal level.

• Fifthly, where appropriate, introduction of contract systems where main materials, bulk of hand tools and light equipment are provided by the Government or otherwise.
CHAPTER EIGHT

EDUCATION AND TRAINING FOR LOCAL RESOURCE UTILISATION

8.0 INTRODUCTION

The discussion in this chapter and recommendations based on it include data from the field work which is recorded and analysed in Chapter 3. Education is potentially a vital change agent. Education and training on local resource use could be a vital factor that can influence Nigeria’s transition from traditional equipment (foreign dominance) approach to labour-based (local resource option) approach for its construction industry. This training should start with engineers in both the public and the private sectors, emphasising the increase of the resources in the society. Educating technical persons on local resource use for all their construction practices, could enhance their talents, expand their interests, and improve their competence in their working environment. It could also boost the public confidence in local resource use and facilitate the professional growth of Nigeria’s local construction industry. Thus, both the attitudes of the trainers and the trainees are important particularly in their roles to the views of the employers and the public in general. Nigeria’s Structural Adjustment Programme (SAP) measures of 1986, coupled with the experience of a tight job market, and attacks by employers, demanded favourable response from the country’s local institutions of learning to aid self-development effort in their instructional roles.

The massive road investments of the 1970s (oil boom era), which linked cities, ports, industrial and rural areas have greatly outstripped Nigeria’s ability to provide the trained manpower needed to maintain and repair them. Road maintenance as part of building and civil engineering constitute the first step on the path to many claimants on Nigeria’s overstressed educational and training facilities. The objective of road maintenance training is essentially practical; such training should lead to a change in the behaviour and approach of the trainee as well as providing additional knowledge and skills. “If trainees are to achieve a change in their behaviour patterns, they must apply the new techniques in their working situation soon after they have learnt” (Miles 1997). Thus training delivery systems should

---

aim at reaching individuals as they are moving into management positions, and then provide further support as the individual gradually requires supplementary knowledge and skills to cope with greater responsibilities ditto. Besides no country can confidently lay claim to self-reliance while its educational training has no relevance to supporting its infrastructure and its domestic construction industry falling far short of being able to cope with realistic demand.

It is envisaged that training on various fields or modules would serve as a reference material to practising engineers, contractors, students of universities and polytechnics and others who are involved in the planning and implementation of road infrastructure works. A sound training is vital in all the fields of operation for road development, in order to enumerate the essential factors to be considered for establishment of construction standards in road building. Table 8A below illustrates the training needs of various activities with their emphasis and the result of adherence to their teachings.

Table 8A: Training needs of activities and their resulting effects

<table>
<thead>
<tr>
<th>Training</th>
<th>Emphasis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Design</td>
<td>Emphasises engineering in-puts.</td>
<td>Guide engineers, contractors, and other technical personnel in design, construction, rehabilitation, and maintenance of roads.</td>
</tr>
<tr>
<td>Construction materials</td>
<td>Emphasises aspects of road works</td>
<td>Guide to the descriptions of simple tests for determining relevant soil properties, and behaviour in constr., and application of soil mechanics principles for their improvement.</td>
</tr>
<tr>
<td>Earth Works</td>
<td>Emphasises activities that constitute earthwork</td>
<td>Guide engineers, contractors and other parties involved in planning and execution of construction involving earthworks.</td>
</tr>
<tr>
<td>Popular participation</td>
<td>Illustrate the concept in labour-based construction projects</td>
<td>Guide the attention of public sector and the traditional rulers to achieve effective popular participation</td>
</tr>
</tbody>
</table>
The Government of Nigeria having realised the importance of self-reliance for economic development, aimed to bring about a long-term change in the use of available resources in all sectors of the economy including construction of rural infrastructures. Within this framework, a UNDP/ILO project team examined the scope for the introduction and promotion of labour-based technology in the construction, rehabilitation and maintenance of rural infrastructure works in the country. The NDE, acting on behalf of the Federal Government, then designed a Pilot Infrastructure Works Programme which was assisted by UNDP and the ILO. The ultimate objective was that at the end of UNDP/ILO assistance, the Nigerian engineers would have acquired the capacity to make a choice between the equipment-based methods and labour-based methods as the practical situation demands. In their initial assessment mission, the UNDP/ILO team identified three areas that need to be addressed to ensure a sustainable adoption of the labour-based construction approach:

• “Modifying the present systems and procedures that favour only the use of equipment intensive approach to construction;

• strengthening the capacity of practising engineers and contractors towards local resource-based construction; and

• exposing civil engineering students in universities and polytechnics in the country to alternative methods of construction so as to provide a more flexible response to the country's technological and socio-economic conditions” (NDE, 1992)².

The programme started in July 1991 with a phased pilot programme planned by the NDE, and was endorsed by the UNDP/ILO to address the constraints identified in their initial investigations. The first pilot programme was prepared for 11 States of the Federation, known as Pilot States, covering all the three regions that comprised Nigeria. The second phase involved a Demonstration/Training Project at Epe, in Lagos State, during which the technical feasibility and socio-economic viability of the labour-based method of construction was demonstrated and a core group of engineers was trained from the Pilot States and the NDE.

---

8.1 RESPONSIBILITY FOR THE PROVISION OF TRAINING

In Nigeria, Universities, Polytechnics, and Colleges of Higher Education are the main institutions responsible for the provision of relevant training, supported by government agencies and adult education establishments within the public sector. The history of higher education in Nigeria (Fafunwa) "began over one hundred years ago, and nowhere in Africa have progress and change in higher education been more dramatic than in Nigeria" (Fafunwa 1971). Nigeria in the seventies (Fafunwa) spends over 30% of its annual budget on education, and had approximately one quarter of the continent's total school population, teachers and university undergraduates. The primary school population in Nigeria then was between one million to 3.5 million, and the secondary school population from 30,000 to 200,000. There was only one university in 1950 with a student population of about 300, and the supporting higher institutions had a number of pupils. In contrast, Nigeria in the nineties and approaching the twentieth century is experiencing a serious setback in terms of educational funding. The recent budget report has shown that Nigeria spends 7.42% and 10.94% of its annual budget on education in 1997 and 1998 respectively (FRN 1998). The 1998 budget acknowledged the neglect to education, by reporting that; "it is a known fact that education in the country have deteriorated. Also, teachers' salaries are inadequate, and working conditions in the sector are generally poor ditto." These conditions have adversely affected the country's quality of the products of the educational system. Nevertheless, a breakdown of school statistics in 1995 listed the country's enrolment figures as 15,744,78 and 4,448,991 pupils for primary and secondary schools respectively (FGN 1997).

According to Saint, "universities in Africa have grown from just six in 1960 to more than hundred in 1992, with a corresponding rise in enrolment" (Saint, W.S 1992). In Nigeria today, there are 25 Federal and 11 States' universities making the thirty six in total, plus the thirty two (32) federal and state polytechnics, and fifty five (55) federal and state colleges

---

of educations (FGN 1997). Despite the numbers of these institutions, the 1996 author's study tour of educational establishments in Nigeria, discovered a lot of biases in the context of their curricula. None of these institutions has reflected on the tradition and culture or indigenous fashion prevailing in the country in their modules (table 3U). Sadly, the most widely acclaimed Nigerian university (Ibadan) is the most arid in this regard. This originated from the university's beginning as a direct transplantation of the university of London, from London to Ibadan. "The objective was clearly to establish as close a version of London as possible at Ibadan, hence it was unnecessary for the new university to have any other objectives" (IKE, V. C 1976). Its success lay in how closely it approximated to London. That was the genesis of the whole problem, as many colleges in Nigeria tends to copy the system from the premier university.

Thus, considering Nigeria's present economic hardships, and the extreme desire for the use of local resource, the curricula of Nigerian institutions (as indicated by table 8B below) is misleading. The current economic situation in the country earnestly demand the use of local resource in order to save the much needed foreign exchange, and provide employment for the local populace. Nigerian universities and technical institutions requires reassessment of their curricula (table 8B) to reflect country's economic difficulties. The present training on equipment based approach (which favours foreign techniques) does not help the country or its public both economically and otherwise. This approach affect local labour market as the type of skills acquired may not conform with local resource based requirement. Nigeria's high population growth rates and increased access to education have boosted the social demand for higher education, leading to rising university enrolment and a proliferation of tertiary institutions. These educational institutions have changed in recent years, becoming mass-based and diversified institutions operating under severe financial constraints. Their conditions have deteriorated to the point where the need for action is now urgent.

This study demands Nigerian educational institutions to remodel the training of graduates in order to achieve self sufficiency in local resource utilisation. It is the aim of this study to provide guidance to persons committed to renewing and expanding the capacity for human

resource development within Nigerian institutions of learning. As the scope of the problem varies, Nigerian institutions of learning face the following challenges:

* The 1995 enrolment figures and the 1998 budget allocation to education (FRN 1997, FGN 1998), contradicts the rapid increases in schools enrolment than the capacity to plan and finance for their growth. Consequently, student population in the country is growing higher than institutions' budget.

* Current patterns of higher education expenditure are unsustainable in many cases due to financial inefficiency. During the mid 1980s, the capacity of Nigerian governments to finance public services fell sharply. Higher education suffered in consequence, with its share of overall education sector budgets sliding to its minimum. Recurrent budget expenditures per student, fell by about two-thirds during this period, mainly due to negative result of cutbacks in research, staff development, library acquisitions, and maintenance prompted by rising enrolments.

* There is general agreement that educational quality is declining as a result of increased enrolments and reduced funding. This decline is manifested in reduced rigor in staff recruitment, falling quality of products of educational system, diminished research output, and complaints from employers regarding the performance ability of graduates.

* Rising graduate unemployment, inadequate performance on the job, and weak research production combine to bring the relevance of universities to national needs under growing public scrutiny. Relevance is understood to include educational choices within the university that are in tune with the national economy and responsive to the prevailing labour market; appropriate curricula; capacity for critical and innovative thinking on issues of national importance; the transmission of essential professional and cultural values; institutional processes and behaviour that equip graduates for leadership in society; and adequate regional, gender, and ethnic representation in the composition of staff and students.

* The costs of university training are high and often unsustainable.

* University management is weak and needs considerable strengthening.

* The working relationship between government and university is ineffective.

* Access to university raises a number of equity issues.

---

In initiating reform to address these concerns, Nigeria must first find answers to the below three questions.

* What kind of educational institutions do we have?
* What kind of educational institutions do we need?
* What kind of educational institutions can we afford?

Any reasonable answers to the above questions have to address national circumstances, culture, and priorities. With varying emphases, a general consensus in Nigeria holds that its principal higher education issues are quality, relevance, finances, efficiency, equity, and governance. Sadly, Nigeria's training institutions are scanty in all the mentioned attributes. However, this study offers alternatives, for consideration in tackling the complex challenges of higher education reforms. During the course of author's field work survey in Nigeria, some responses from academically experienced Nigerians, suggested:

- broad public consensus for sustainable education reform,
- more investment in public education,
- sharing of institutional development proposals between government, donors, and private sector representatives for the purpose of building agreement regarding the future roles and objectives of educational institutions,
- the curricular of Nigerian educational institutions to reflect the reality of life, by being relevant to societal need.

8.2 CIVIL ENGINEERING CURRICULA IN NIGERIA

The Structural Adjustment Programme (SAP) of the Federal Government of Nigeria aimed at encouraging the development and utilisation of local resources for most sectors of the economy including construction of infrastructure works. Within this framework, the UNDP/ILO has provided technical assistance to the National Directorate of Employment (NDE) in the introduction and promotion of labour-based technology in the construction, rehabilitation and maintenance of rural infrastructure works.

The current construction practices in the country are heavily biased in favour of heavy construction equipment. In contrast, the labour-based method primarily utilises labour for construction supported by compatible light equipment. A New National Construction Policy launched in May 1991 by the Nigerian government recognises the scope for using
local resources and emphasises the need for appropriate training to ensure their effective utilisation. Having realised the importance of the use of local resource, the Nigerian government then stressed on exposing the students of civil engineering of universities and polytechnics to choice of technology in construction, rehabilitation and maintenance of infrastructure works. The analysis of Nigerian education system in chapter three, and table 8A shows the biased and neglect of local resource utilisation. According to the result of the author’s survey of the civil engineering curricula of universities and polytechnics in Nigeria, there are a number of problems associated to the staff situation, the possibility of introducing new topics into the existing courses, the awareness of the institutions of the existence of the new National Construction Policy and what departments co-operate with the Civil Engineering Department. Details of the analysis of responses are shown in table 3U, and figure 3U.

Although Nigeria was found to have a large pool of technical personnel. Evidence from tables 3U, 8A, and figure 3U have suggested that thousands graduate in civil engineering annually and many technical persons from the numerous institutions of learning in the country are being thought in the field of infrastructure works by equipment-based techniques. The result is that they are usually handicapped when it comes to the use of local resources, especially labour, for construction. After graduation, these engineers and the technical persons are not exposed to alternative methods of construction as the government and private sectors where they are usually employed only use equipment-based methods. In contrast to the engineers and technical personnel, Nigeria has a large pool of administrators, policy makers and planners, who are trained to appreciate the use of local resources. Thus, these groups only needs appropriate training on planning and effective implementation of labour-based construction programmes. The focus of training activities should therefore be related to training of trainers to ensure a rapid growth of the labour-based programme in Nigerian institutions. By adopting this method, the technical persons, would be convinced that the labour-based methods are technically feasible and competitive with the equipment-based methods of construction which they are already familiar with. This was necessary because they would eventually be responsible for the actual implementation of labour-based construction. There is need to convince them of the quality standards, time of construction and costs of the labour-based methods of construction are comparable to those of the equipment-based methods.
Table 8B: Typical Curriculum of Nigerian Institutions' Civil Engng. Departments

<table>
<thead>
<tr>
<th>ITEM</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Name of Institution</td>
<td>UNN ABU ESUST UNILAG IMT KADPOLY YABATECH IBADAN POLY</td>
</tr>
<tr>
<td>2. Academic Staff Strength</td>
<td>12 14 5 1 12 35 14 21</td>
</tr>
<tr>
<td>3. Civil Engineering Students' Population</td>
<td>201 250 100 36 450 450 250</td>
</tr>
<tr>
<td>4. Procedure for Introducing New topics</td>
<td>Can be handled ditto ditto ditto ditto NBTE must Can be handled in-house Can be handled in-house</td>
</tr>
<tr>
<td>5. Knowledge of National Construction Policy</td>
<td>No Yes No Yes No Yes No No</td>
</tr>
<tr>
<td>6. Availability of course(s) on local resource utilization</td>
<td>No No No No No No No No</td>
</tr>
</tbody>
</table>

Source: National board for technical education, and author's field work study 1995.

8.2.1 Academic Curricula of Universities

According to table 8C which sampled Nigerian universities on academic curricula, they are basically similar in contents, consisting of four or five-year duration depending on the academic qualification of the entrants. Those with the West African School Certificate or General Certificate of Education (O' Level) are admitted for the 5-year programme while holders of the advanced level GCE are admitted for the 4-year programme. The first year programme consists mainly of courses in the basic sciences (physics, chemistry and mathematics). The second year courses, which are also common to all engineering students consist of introductory engineering courses (thermodynamics, basic electrical technology, strength of materials, engineering materials and workshop practice). Some universities have different names to some courses, e.g., a university in the Eastern region of Nigeria, UNN has a course in its first year and second year called Engineer in Society which is designed to acquaint the students with developments in the society in relation to science and technology. The last three years are devoted to the following five areas of civil engineering:
structural, geotechnical, water resources, construction, highways and transportation. In both the tables 8B and C, there are no topics in the existing courses that address the choice of technology. However, construction equipment are discussed under various courses depending on the university's modular formation. For instance the UNN programme discusses construction equipment under a course titled Civil Engineering Practice while ABU discusses it under Highway Engineering; and the ESUST, discusses construction equipment under Construction Management as well as Highway and Transportation Engineering. Hitherto, none of the tables (8B and C) has indicated any of the universities reflection on local resource utilisation in their curricula. The neglect by Nigerian institutions of the choice of technology is depriving the trained engineers the necessary skills required to face the actual challenges facing them. The present system of thought courses, is highly irrelevant to the needs of the society, and in no way reflect to the country's circumstances. Consequently, the local universities and other technical institutions responsible for the training needs of the public are required to remodelled their courses to reflect local needs for the benefit of the society whose interest were meant to protect. They should heighten their efforts to see that considerable researches in the use of local construction materials are carried out. This could be achieved by exposing students through laboratory works, and industrial works with organisations practising the use of local resources. This could help in gaining experience on the schemes leading to wider acceptance of the programme.

Table 8C: Typical Curriculum of Sampled Universities in Nigeria

<table>
<thead>
<tr>
<th>Name of University</th>
<th>1st yr</th>
<th>2nd yr</th>
<th>3rd yr</th>
<th>Last years</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABU</td>
<td>Basic sciences</td>
<td>Introductory engineering courses</td>
<td>structures, geotechnic, water, construction, &amp; highways and transptn</td>
<td>Highway engineering</td>
</tr>
<tr>
<td>UNN</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Engineering practice</td>
</tr>
<tr>
<td>ESUST</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Constn mgt, and highway &amp; transptn eng’g</td>
</tr>
<tr>
<td>BUK</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Construction management</td>
</tr>
</tbody>
</table>
8.2.2 Academic Curricula of Polytechnics

The polytechnics and colleges of technologies in Nigeria run a basic programme for civil engineering students prepared by the National Board for Technical Education (NBTE). The curriculum is mandatory to all polytechnics and colleges of technology and failure to adopt it means that the institution's diploma will not be recognised as it would not be accredited to offer civil engineering certificates. However, individual institutions are free to add to the basic programme but cannot subtract from it. All the polytechnics visited were at various stages of introducing the new programme. In reality, some of the institutions are already groaning under the weight of the new programme and cannot see how any new courses can be accommodated.

The standard NBTE curriculum consists of the Ordinary National Diploma (OND) and Higher National Diploma (HND) programmes. The OND prepares the student to function effectively as a site foreman. At the end of the second semester of the first year OND programme, the student undergoes about three months of supervised industrial attachment. The HND programme consists of courses in Structural, Water resources, Highway and Transportation engineering technology. All the students take the same courses during the first year of the HND programme, but are free to choose from any of the three major sections during the final year. Like the degree programmes, the HND programmes have a component of topics on construction machinery and equipment in such courses like construction technology and highway engineering. Although, there is hardly a mention of local resource utilisation in the syllabus; still, there are a lot of staff research and students' projects on local construction materials.

Most of the Heads of Department contacted agreed that there is a need to incorporate topics on local resource utilisation in their curricula and went ahead to recount how much was being done in the use of local construction materials. However, there was little appreciation of the importance of labour as a resource for construction, rehabilitation and maintenance of infrastructures like roads, small earth dams, erosion control projects, etc. All the institutions except Kaduna polytechnic believed that they would have no problem introducing new topics into existing courses as this can be concluded at the Departmental and Faculty level while the Academic Planning Committee/Academic Board and Senate can ratify. Kaduna polytechnic believed that the NBTE has to ratify but the other polytechnics did not think it is necessary. One surprising outcome of the survey was that most of the
institutions (over 62%) had not heard of the new National Construction Policy. The few that have heard of it had no access to the document. In spite of the Federal Ministry of Works and Housing has formed a committee to create awareness of the Policy all over the country.

8.2.3 Prerequisite Conditions for effective introduction of labour based technology

The field work survey has confirmed the earlier assessment that there is a gap in the training of civil engineers in polytechnics and universities to enable them respond more easily to the socio-economic conditions of the country. If the use of labour-based methods for construction, rehabilitation and maintenance of infrastructure works is to be introduced into these institution’s civil engineering curricula then it should include the following:

- Appreciation of Financial and Economic Cost of Labour and Equipment;
- Concepts of Technology Choice;
- Labour-based Techniques; and
- Management aspects of labour-based method.

Similarly, in order to ensure the effective introduction of local resource-based technology in the curricula of these institutions, it is necessary to identify and address constraints that may militate against it. These constraints are:

- Strengthening the capacity of Civil Engineering department;
- Strengthening the civil engineering curricula; and
- Supply of Educational Materials.

8.2.3.1 Strengthening the Capacity of Civil Engineering Departments

Many lecturers in the universities and polytechnics may not have been exposed to alternative methods of construction. In that case they will not be able to effectively handle courses on labour-based construction or technology choice for construction. The lacking of exposure in local resource use by these lecturers may also have a tendency to look down on labour-based construction or the so-called appropriate technology as inferior technology. Therefore these lecturers (trainers) have to be convinced of the technical feasibility and economic viability of this method of construction before they can effectively impart the knowledge on their students. One way to do this is by adopting the training of trainers method for labour-based technique introduced by the ILO/UNDP programmes. This
approach will enable the lecturers to be exposed to concepts of labour-based technology through short courses, seminars, symposia, workshops, conferences, and related research as widely promoted in Nigeria by ILO/UNDP programmes. The lecturers having attended these courses and demonstrations procedures would certainly adore the labour-based techniques. This could provide opportunity for the feasibility of incorporating aspects of choice of technology and management of labour-based/light equipment-supported methods of construction in the curriculum for civil engineering department of their respective institutions. The trained lecturers would therefore serve as a pipeline for transmitting the knowledge to their students. This can enlarge the staff strength of the departments with expertise in application of labour-based technology, and ensure the development of the capacity of local institutions' civil engineering departments in the promotion of local resource use for construction and maintenance of infrastructure works in the country.

8.2.3.2 Strengthening the Civil Engineering Curricula to Utilise Local Resources

It is essential to emphasize the significance of labour-based technique as a thought topic in the curricula of civil engineering of Nigerian local institutions. This would help strengthen the use of local firms in the construction and maintenance of country's infrastructure works, particularly roads. Neale and Miles in their paper on the use of local contractors and consultants report (SSATP-WB/ECA 1989)\textsuperscript{10}, argued that local firms (consultants and contractors), if carefully encouraged would be better to finding technical solutions appropriate to local skills and resources, and to manage the work within local commercial, social, and political constraints. In contrary to Neale and Miles' mission, local firms in Nigeria are not generally sufficiently developed to face the challenges suggested. Therefore strengthening the curricula of Nigerian local institutions is a driving factor for the local firms to have the potential to be more effective and efficient, as well as to being able to challenge the present government organisations and foreign firms market dominated. Similarly, in order to cover the broad groups of administrators, policy makers, planners, and technical persons in addition to, local firms, on the issue of fostering road development through the application of local resource approach. It was found relevant and suitable for

\textsuperscript{10} SSATP Road Maintenance Initiative: Planning and management of roads in developing countries, with the co-operation of the World Bank and the Economic Commission for Africa by PTRC Education and research services ltd, England 1989.

175
Nigerian local institutions to adopt the four elements suggested (by Neale and Miles), to be considered in developing a strategy for increased use of local firms:

- The technical aspects of road maintenance, and the managerial implications;
- The potential benefits of the use of local firms;
- The problems and impediments to implementation: analysis of the difficulties which must be overcome; and
- The action plans: recommendations for investigations and initiatives for sustainable development of local firms (Neale and Miles in SSATP-WB/ECA 1989).

8.2.3.3 Supply of Educational Materials for Local Resource Utilisation

Considering the country’s economic hardship (SAP measures in 1986), and the worsening cut of spending on education (7.42% in 1997 & 10.94% in 1998)\(^\text{11}\) from country’s budget, the local institutions are hardly able to cope with the provision of teaching materials for their courses. However, anticipating the abundant of materials from the piles of good works carried out by the ILO/UNDP and the World Bank on labour-based construction in the country, which have been documented in books, journals, working papers, reports, slides and videos. These materials would be affordable, and sufficiently enough for local institutions’ use in teaching their pupils. These documents will be of great benefit to the institutions for teaching and demonstration to make their students aware of developments in labour-based method of construction.

Thus, co-operating with the ILO, World Bank and other sources in this circumstances is obvious for the institutions’ success in promoting the use of local resource. This can assure the country’s development in the choice of technology and the local resource-based construction if monitored closely by the local institutions.

8.3 TRAINING FOR CAPACITY BUILDING

Capacity building simply means creating technological capability, which is learning how today and how tomorrow. For Nigeria which only just started the labour based methods as a means of replacing, the traditional equipment intensive methods, building the capability in the former is as good as climbing the ladder of competence. The ladder as described by

Enos, is raised upwards, “its rungs representing accomplishments; the lower, the simpler and more easily attained; the upper the more complex, attained with difficulty” (Enos 1991). The foundation on which the ladder stands is universal primary education, and the highest rung represents the technological goal of a society which, having achieved it, is then capable of choosing, utilising and advancing any appropriate technique.

Change is part of industrial life, therefore with change in technology there must be changes in the skills' requirements of industry. That skills are changing is in any event an observable fact; quintessential to that is, Nigeria’s capacity building which for a very long time has been on equipment intensive techniques. The present economic distortion made Nigeria to turn to labour based techniques for rescue, and as such requires skills development to operate the system. Enos reported that; whatever the size of the economy, whatever its political system, however distributed its income and wealth, for a developing country to become technologically capable overall its population must be educated in technical matters (Enos, J. L. 1991).

---

In coherence with Enos’s demand, Nigeria has shown the desire to progress technically in the field of labour-based techniques. Albeit the labour-based method was quite new to Nigeria (introduced in 1986), the ILO/UNDP organised a training programme through the NDE in 1988 for the training needs of Nigerian society. Table 3V and figure 3V illustrate the category of individuals trained under the labour-based training schemes. Various training centres were established in different parts of the country for the purpose of training the engineers and other technical personnel on the technical feasibility of labour-based methods and its viability as an alternative to the traditional equipment-based methods. Each batch of trainees were expected to having returned to their various states, to disseminate the same conviction to their subordinates and the private sectors in their areas to adopt labour-based techniques.

The sole purpose of launching the Demonstration and Training Project was to equip the trainees and the NDE with necessary skills that would enable them to provide basic advice to their State Governments on the use of labour-based techniques, as well as train personnel in government technical departments to plan and implement labour/or local resource-based rural works. Other training programmes followed afterwards, this time with the objective of achieving effective capacity building in both the semi-skilled and unskilled workers to build the infrastructures on which the practical training and demonstration aspects would focused. The site work force, eventually to become the trainers, themselves also needed initial training since there was no local know-how in the application of the labour-based approach. To this extent, the Demonstration/or Training Project had two distinct outputs in terms of trained manpower; the technical personnel for the implementation of the Demonstration/Training Project; and the core group of engineers from NDE and Pilot States.

Besides Nigeria’s sizeable manpower deficiency in application of labour-based techniques as a hindrance to the use of local resource, the private sectors exclusive ignorance of the technique is an issue in question. Experience with community-based labour-intensive road crews in Sokoto State has shown that, if trained the local community can provide effective low-cost road repair and maintenance in rural areas. Similarly, spinning rehabilitation and maintenance off to small contractors and village groups can also reduce the State’s workload on road maintenance organisations trying to cope with diminishing resources and crippling foreign exchange shortages (more details in the next chapter). The success of
arrangements with the local organisations depends greatly on incorporating the local private sector and training them to embrace the use of local resource in construction and maintenance of infrastructure works. Efficient and cost-effective labour-based programmes may be impossible to establish unless sufficient attention is given to local private sector. Training of local private sector is therefore of paramount importance for cost effective development of rural areas.

8.4 TRAINING AND DEMONSTRATIONS

Training and demonstration are the readiest way of educating trainees the aspect of labour based methods. According to Cohn, 1990, "there is no novelty in the idea of setting a price on human individual" (Cohn and Geske 1990). Imparting knowledge on individuals helps in resourcing the society. The UNDP/ILO in liaison with the NDE sets demonstration and training projects for the purpose of educating the Nigerian public, the importance of labour based techniques. The objective of setting the project was for the following reasons:

- demonstrating the technical feasibility, economic viability and the social acceptability of the labour-based method of construction;
- generating basic data on productivity, construction costs and employment generation;
- providing preliminary training to a group of selected technical personnel from the selected states in Nigeria.

The strategy adopted under the Project was to convince technical persons on the feasibility of the labour-based method by demonstrating that the Cost of construction by this method is competitive, the required quality standards are attainable and the time taken is reasonable. The "hands on" training approach were adopted during the preliminary training. As a result of the training, a core group of engineers exist in many states in Nigeria, who are convinced about the feasibility of the labour-based approach to the construction, rehabilitation and maintenance of rural infrastructure works. Some amongst them participated actively with the promptest response to the questionnaires of this study.

8.4.1 The Demonstration Effect

According to UNDP/ILO 1991 programme’s report in Nigeria, the demonstration project was intended to achieve a favourable change in the attitudes of persons who are in a

position to influence public policy on the introduction of the labour-based technology. These persons include the political leadership of the country, engineers and other technical personnel working in government organisations and the private sector, administrators, traditional leaders, and the leadership of grassroots associations.

At initial stage, there was scepticism about the effectiveness of the labour-based approach to the construction, rehabilitation and maintenance of rural infrastructure works. The technical persons doubted the workability of the methods and many uncomplimentary remarks were made about the approach. For instance, it was said that the approach was a retrogression in an age of computer and space technological miracles, and could only perpetuate underdevelopment.

The need for introducing the labour-based methods into the country was evidently not recognised. Changing the attitudes of these persons towards the labour-based technology and making them recognise the need for such an approach was thus adjudged a major achievement of the demonstration project. According to UNDP/ILO report 1991, project records show that the new road site played host to visitors every three week. As at 31 May 1991, the site had hosted about 39 visits from various groups.

8.5 TRAINING OF LABOUR BASED TRAINERS

Training of labour based trainers is a good channel of disseminating capacity to subodinate co-workers. Training could also serve as a better way of building the capacities of government agencies, and NDE as well as contractors, to be able to plan and implement infrastructure projects by labour based methods. Labour based trainers in this regard, implies the engineers, technicians, and persons in the local community engaged as workers on the construction sites. Though these trainers are responsible for the implementation of rural infrastructure programme, they lack the necessary skills required to carry out the work using local resource methods. Thus, provision of training to this group of implementors is crucial to skill acquisition. They are expected to ultimately assume the role of trainers in the future particularly at the end of technical assistance. Accordingly, training them would have a considerable multiplier effect on the project, in addition to its significance as an important factor in assuring the sustainability of the labour-based technology.

The training centres sets (by UNDP/ILO) at various locations in the country, targets various cadres (engineers, technicians, supervisors, foremen, gangleaders and headmen), of
profession. One of the training centres in the Northern part of Nigeria (Kaduna State) took off in May 1989 responsible for the road engineers' group. The Centre built up an in-house capacity to work with the project CTA in implementing the Demonstration/Training programme. When the training commenced, the Centre had eight trainers consisting of the CTA, six engineers, and one lower level supervisor.

The demonstration project of each of the centres had a training component under which preliminary training was provided to a core group of trainees from the various participating States and the NDE, in order to develop the indigenous capacity to assist in the implementation of the Programme. These trainees as mentioned earlier, came from different States, and agencies (ADPs, State Ministries of Works, State Ministries of Agriculture, Directorates of Rural Development), small and medium size contracting firms, Local Governments, River Basin Development Authority and representatives of grassroots organisations, etc. The training programme also targeted at policy makers and planners at all levels of government to change their bias in favour of the equipment based method of construction. On the whole, a total of 123 engineers received 'hands-on' training in the planning and implementation of the labour-based construction technology. From the results obtained by them, the trainees observed that the cost of construction by labour-based method was invariably lower than by equipment-based method, whereas the construction time was only marginally higher. This was beyond their wildest expectations. They were surprised and excited by the nature of their findings and all signs of scepticism disappeared. They were invariably convinced about the viability of the labour-based method and eager to see it implemented on a nation-wide basis.

Some trainees suggested that this training programme should be followed up by a programme to enlighten the policy makers so as to introduce radical changes in the existing government systems and procedures for the implementation of infrastructure works. From the evidence, there now exists a core of engineers in most States of Nigeria, who are convinced about the feasibility of the labour-based approach to rural infrastructure works. These engineers are expected to contribute to the implementation of the Programme, and the subsequent nation-wide expansion of the labour-based strategy.

As mentioned in chapter five of this report, during the course of project implementation, a seminar was also held for Heads of Department of Civil Engineering of Universities and Polytechnics, during which their curricula was examined. The participants agreed that there
was a need to incorporate topics on labour based construction into their curricula so as to expose trainee engineers to the alternative methods of construction during their training.

8.5.1 Projects Results over the Period of Time

The role of government and engineering commitment are vital in establishing a sustainable programme. By and large, if the political and engineering commitment exists to make the required front-end investment in establishing proper systems and procedures, the experience in most African Countries has shown that sustainable labour-based systems can be successfully established. The labour-based method of construction was introduced to Nigeria in 1986, and the implementation of projects by labour-based trainers began in 1988, under military regime of Gen. Babangida. The environment was favourable especially from the good indication of government commitment to local resource use. Ominously, the 1993 military’s annulments of national elections caused chaos, which succumbed the country into its present political turmoil. Since then, Nigeria has witnessed three changes in government (Mid 1993, November 1993, and the recent July 1998), resulting to political instability and severe economic hardship. Essentially, the experience in subsequent years has not been encouraging.

Nevertheless, in this context the ILO/UNDP financed projects made significant progress in Nigeria. The 1991 illustration at one of their production training unit (ptu), revealed a remarkable achievement. The project constituted a team of trainees (engineers, technicians, and local contractors) undergoing an extensive training and coaching on labour-based techniques. They were assigned with the task of constructing a km of access road by alternative methods. At the end of their assignment, their comparison indicates that, a lot of benefits could result from a shift from equipment intensive to labour-based methods. For example up to 17,034 workdays of employment was generated on a km of road by labour-based methods. On the other hand, only 1,569 workdays of employment was possible with equipment-intensive methods. Indicating the creation of about 11 times more employment opportunities, with shift from equipment to labour-based techniques. The result also shows the inexpensiveness of labour-based as against equipment-based method. Emphasising the advantages of labour-based method from cost-efficiency point of view. The total cost of the project shows that, a km of rural access road in Nigeria would amount to saving as much as
13% when compared equipment techniques. Details on advantages of labour-based over equipment method is reported in chapter 11 of this report.

A similar development by World Bank/UNDP financed and ILO executed project in Ghana indicates impressive performance. The project began with two-year pilot phase during which a team of specialists provided extensive training and coaching to government and contractor staff carrying out a set of trial contracts. In each case, four months of practical training was followed by a two month trial contract period. The lessons learned in this process were then applied to the design of full-scale contracts.

Each of the small contractors trained by this programme is reported to be able to produce 2 km., of high quality gravel road per month using labour-based methods; on a yearly basis they are able to rehabilitate some 450 km. The contractors produce the roads at a cost 15 percent below that of the capital-intensive crews; perhaps more importantly, the foreign exchange costs of these projects have fallen 40 percent, as the only large equipment used is tractors, trailers, and compactors.

8.6 TRAINING FOR GREATER PARTICIPATION

Training of members of community is crucial for success in assuring an affective local involvement and proper work orientation. Training community is a way of sensitising them and increasing their receptivity and ability to respond to development programmes as well as to encourage local initiatives. In order to meet the objectives set out in this report, the training should focus on developing local skills, self-reliance, genuine participation and responsibility that can leads to:

- acquiring appropriate technical skills that can best fit the construction and maintenance of rural roads;
- generate more employment for local people, promote the use of indigenous resources and reduce the cost of operation and maintenance;
- saving in foreign exchange that are being used for the purchase of equipment, that are not even familiar to local mechanics;
- showing the competitiveness of labour-based methods vis-à-vis equipment intensive methods in rural road maintenance; and
- most importantly, a change in attitude and thinking from illusion point of view to reality (equipment-based to labour-based methods).
According to African Development Indicator report of 1992, 49% of Nigeria’s population (15 years of age and above) are ascribed as illiterates, and 64% of total population as rural (WB 1992). Thus, highlighting the extent of need in necessitating training of sufficient depth to enable illiterates to acquire and retain vocational skills, knowledge and attitudes for effective use in their local development.

Local people in Sokoto State (case study area) takes part in decision making about need for a project in a number of ways. One way is by making representations to the local elite about the need for a particular facility. The community voice their opinions about the project in a specially convened village meeting or use of the opportunity of a village gathering to draw attention to felt need. A typical illustration of how such meetings are held in two different regions of Nigeria was reported in chapter two figures 2.6.2 A and 2.6.2 B. The planning of a rural development project particularly road may involve technical details beyond the competence of the local community. But these locals have information about geophysical setting, ground water characteristics, and flooding history etc. Training these people in this circumstances has the advantage of saving the expert’s time on things like route selection, surveys, and knowledge of geological formation.

---

CHAPTER NINE

ROAD DETERIORATION AND FAILURES

9.0 INTRODUCTION

Nigeria's total road network of 167,800 km (Banjo, G 1994), comprised the Federal trunk system of 28,600 km (17%), States system of 30,500 km (18%) and the rest Local Government Councils' 108,700 km (65%) are rural roads. Although the road network is increasing annually, insufficient attention is paid to their maintenance by the responsible agencies (Federal, State and GCS), because of other competing areas of priority (e.g. Health, Education). Eventually, these roads deteriorate, and without timely intervention, they gradually become impassable, thereby reducing their utility. It is clear that in order to protect the huge investments on roads and sustain the socio-economic role which these roads plays in the development of a society, sustainable road maintenance is necessary. The success of this sustenance depends on carrying out the required remedial activities, at the right time, according to standard methods and according to local requirements. The benefits as well as the consequences of neglect to road maintenance are sequentially reported in this chapter.

9.0.1 Benefits from road maintenance

When a road is properly maintained, it maintains its value as an infrastructure asset, and provides a proper service to the various road users, thereby enhancing the socio-economic activities of the immediate environment surrounding it. Specifically, effective and regular road maintenance;

- prolongs the life of the road and considerably extends the period between expensive rehabilitation, it is therefore cost-effective;
- reduces vehicle operating costs, as with the general experience that good roads will minimise the wear and tear on vehicles (including expensive imported spare parts); and
- improves the riding comfort for road users, facilitates movement of people and goods regularly, (including the movement of farm produce to cities and strengthening the economy in rural areas).

9.0.2 Consequences of neglecting or delaying road maintenance

Postponed or delayed road maintenance leads to:

- frequent and expensive reconstruction and rehabilitation;
• high economic implications in terms of high vehicle operating costs and the consequent pressure on scarce foreign exchange;
• retarding national development and growth in all sectors of the economy. For example, accessibility to farmlands, hospitals etc., is impaired, while business and commercial activities are considerably reduced.

9.1 FACTORS RESPONSIBLE FOR DETERIORATION AND FAILURES

Roads deteriorate at different rates depending on whether they are earth, gravel or paved. There may also be a number of reasons for their deterioration and failures, but the most obvious ones are the neglect, delays, and lack of priority accorded to road maintenance (in sums institutional failures). Looking at paved roads for example, new paved roads, if inadequately maintained, deteriorate slowly and almost imperceptibly during the first half to two-thirds of their service life, depending on the traffic. After that grace period, which may last ten to fifteen years, the pavements deteriorate much more rapidly. Without timely maintenance they break apart. As roads become rougher, the costs of operating vehicles and of transport goods begin to shoot up. The neglect of maintenance continues, however, because it is the vehicle operators that pay these costs and pass them on if they can. Road authorities are not directly affected by these costs, and they come under no immediate pressure to improve road conditions. Road users are often slow to see the link between road conditions and the prices of goods and transport services and are usually not organised to influence decision makers.

In the absence of public pressure and lacking a clear understanding of the seriousness of the problem, few governments have given road maintenance a high priority in their budgets. This issue is recognised by the World Road Association (PIARC) and is currently being studied by an international task group within its committee C6: Road Management. The urgency of the situation has not always been fully appreciated by all donors and lending agencies, some having been readier to provide funds for new construction than for maintenance and restoration. New construction has sharp political visibility, maintenance little glamour. Inadequate maintenance in developing countries has various causes, but institutional failure is the only explanation for its wide extent. At the heart of this failure is the absence of public accountability.
9.1.1 Institutional Failure

An effective road institution is a precondition for road sustaining. However, the capacity of a road institution or agency to deal with its maintenance depends on how effectively and efficiently it can use funds to protect and rehabilitate the road infrastructure. A road agency has certain requirements to meet. One is the pool of resources (either contractors or direct labour), that can be applied to the activity. Others are the soundness of the maintenance strategy type, level, and timing of intervention and managerial and operational efficiency with which the strategy is executed. The above demands depend on such factors as government commitment, institutional structure, managerial ability, staff quality, accountability and incentives.

Allocation to road maintenance is a political decision about national priorities. Severe setbacks in income growth for most African countries clearly explain some important instances of underfunded maintenance and consequent road deterioration. Indeed, countries differ according to their need to improve their road maintenance and growth of political attention to the preservation of infrastructure, the strengthening of internal accountability in the institutions charged with managing it. It has been observed that several higher-income developing countries have poor roads, while some of the lowest-income countries have better ones. The illustration below compares Nigeria’s road network (paved and the unpaved portions) with its immediate neighbouring countries.

Table 9 A: Comparison of paved networks with Nigeria’s immediate neighbours.

<table>
<thead>
<tr>
<th>Country</th>
<th>Popn in mns</th>
<th>Total GNP (mn $)</th>
<th>Total network (km)</th>
<th>Density in Km per /100km², -/1,000ppln</th>
<th>Paved net’ks (km)</th>
<th>Condition (% cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>3.9</td>
<td>1,053</td>
<td>7,500</td>
<td>6.6 1.9</td>
<td>986</td>
<td>58 36 6</td>
</tr>
<tr>
<td>Cameroon</td>
<td>9.9</td>
<td>7,056</td>
<td>64,905</td>
<td>13.7 6.6</td>
<td>2,900</td>
<td>60 30 10</td>
</tr>
<tr>
<td>Chad</td>
<td>4.9</td>
<td>392</td>
<td>31,300</td>
<td>2.4 6.4</td>
<td>163</td>
<td>4 0 96</td>
</tr>
<tr>
<td>Niger</td>
<td>6.2</td>
<td>1,178</td>
<td>19,000</td>
<td>1.5 3.1</td>
<td>2,609</td>
<td>70 20 10</td>
</tr>
<tr>
<td>Nigeria</td>
<td>96.5</td>
<td>70,445</td>
<td>108,000</td>
<td>11.7 1.1</td>
<td>21,100</td>
<td>62 15 23</td>
</tr>
</tbody>
</table>

Source: World Bank surveys and reports (WB, 1988)
Table 9 B: Comparison of Unpaved networks with Nigeria’s immediate neighbours.

<table>
<thead>
<tr>
<th>Country</th>
<th>Popln in mns</th>
<th>Total GNP (mns $)</th>
<th>Total network Length (km)</th>
<th>unpaved network Length (km)</th>
<th>Condition (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>good</td>
</tr>
<tr>
<td>Benin</td>
<td>3.9</td>
<td>1,053</td>
<td>7,500</td>
<td>3,940</td>
<td>15</td>
</tr>
<tr>
<td>Cameroon</td>
<td>9.9</td>
<td>7,056</td>
<td>64,905</td>
<td>10,600</td>
<td>20</td>
</tr>
<tr>
<td>Chad</td>
<td>4.9</td>
<td>392</td>
<td>31,300</td>
<td>3,637</td>
<td>8</td>
</tr>
<tr>
<td>Niger</td>
<td>6.2</td>
<td>1,178</td>
<td>19,000</td>
<td>3,760</td>
<td>30</td>
</tr>
<tr>
<td>Nigeria</td>
<td>96.5</td>
<td>70,445</td>
<td>108,000</td>
<td>8,000</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: World Bank surveys and reports (WB, 1988).1

9.2 TYPES OF ROAD DETERIORATION AND FAILURES

The main types of road deterioration and failures are:

- Ruts, potholes and carriageway deformation
- Silting of the drainage
- Erosion of the drainage
- Loss of gravel
- Accidental obstruction

9.2.1 Factors Responsible for Road Deterioration and Failures

Many factors are known to be attributable to road failures, some are more serious than the others, and intrinsically, it is good to go through a number of logical steps to diagnose the problems. Clearly knowing why a road fail will make it much easier to apply the correct measures to repair it, and prevent occurrence in the future. Some factors which cause road deterioration and failures are (UNDP/ILO 1992):2

- rainfall
- gradient
- excessive traffic
- pavement construction errors
- vegetation.

---

1 The World Bank Policy Study 1988, Road deterioration in developing countries; Causes and Remedies, by the World Bank, Washington D.C.
The single most destructive factor is rainfall, which if not properly and timely drained, weakens the pavement structure. The type of gradient also affects the severity of deterioration. For example, an excessively steep gradient promotes erosion while a gradient which is too flat results in silting and blocking of drains. Traffic causes rutting of the pavement surface, while construction errors in pavement structure lead to weak spots. Lack of vegetation can promote erosion, while thick vegetation encourages silting. Generally all these factors work in combination, so road maintenance management requires knowledge and experience in order to ensure that scarce funds are used to best advantage.

9.3 TYPES AND CHARACTERISTICS OF ROAD MAINTENANCE SYSTEMS

Road maintenance as mentioned earlier involves carrying out tasks that are geared towards preventing and reducing the risk of road deterioration and correcting defects whenever they occur. Roads require maintenance in order to keep the pavements, shoulders, slopes, drainage facilities and all other structures and property within the roads margins as near as possible to their as-constructed or renewed condition. Maintenance thus includes minor repairs and improvements to eliminate the cause of defects and avoid excessive repetition of maintenance efforts.

The Nigerian government is doing its best to institute an axle load control programme in order to curb the premature failure of pavements which takes place due to the overloading of the pavement by overloaded vehicles. In addition the transportation of bulk goods on roads is being discouraged in favour of the rail system which is potentially more efficient for this type of loads. Four oil refineries for the servicing of the country's regions, and many depots have been built with pipelines connections covering the entire nation in an effort to reduce the overloading of the road networks.

Unfortunately the area of study’s focus (Sokoto State) has not been covered by these services, indicating the extent of isolation in the country. Another disadvantage was that, Sokoto has been left out of the selection to the pilot states for the labour-based application designed in 1987 by the ILO/UNDP programmes. Yet, the state emphasised the use of labour-based techniques, anticipating that a more flexible and sustainable maintenance approach could be developed based on the use of labour with possible savings and fewer operational constraints than the traditional equipment-based system.
The three types of systems which can be applied to road maintenance are:

- Routine Maintenance (suitable activity)
- Periodic Maintenance (intermittent activity)
- Emergency Maintenance (urgent activity)

9.3.1 Routine Maintenance

These are simple tasks usually carried out several times in a year and aimed at reducing the risk of road deterioration. These operations are typically small scale and simple, but widely dispersed and require skilled or unskilled manpower. The need for some of these can be estimated and planned on a regular basis e.g. vegetation control.

The main routine maintenance tasks include:

- removal of obstructions and debris from the road;
- patching of potholes;
- repairing minor corrugations on the carriageway;
- repairing and reshaping of the carriageway;
- repairing erosion gullies in drains;
- clearing drains (ditches, culverts, mitre, catchwater drains etc.);
- cleaning or repairing of drift inlets and outlets;
- controlling vegetation on the shoulder and drains; removal of fallen branches, trees and placement out of the right of way.

Generally, these routine maintenance tasks are easily carried out without the use of heavy equipment. Simple tools usually suffice. However the need for routine maintenance should be estimated, work standard set and the execution of the work properly planned and controlled. In Sokoto State, the systems utilised labour recruited in the villages along the road network. These involve the lengthmen arrangement whereby the workmen are engaged to carry out all routine maintenance on a particular section of road. Another alternative was that of petty contracts. Under this system one or more routine maintenance activities are contracted to a village-based contractor organising a group of workers over a longer section of road. Occasionally some maintenance activities may require small-scale resealing, in which case gravel and premix for patching are usually supplied.
9.3.2 Periodic Maintenance

These refer to road maintenance activities that are usually carried out on a frequency of at least once a year. They are normally large scale and require more specialist equipment and skilled resources to implement, and usually necessitate the temporary deployment of those resources on the road section. Generally, the requirements for periodic maintenance are determined during the annual maintenance needs assessment. The planning, organisation and execution of periodic maintenance are more involved as they are relatively capital intensive and substantial funding is required because of the specialised nature of their tasks. These operations being costly therefore require specific identification and planning for implementation, and often require design.

These tasks include:

- Spot improvement; which may include reconstruction of short road section, construction or repair of drift, structure; construction of missing structure and missing drift, removal of unnecessary drift etc.,
- Regravelling;
- Stockpiling gravel for drift bed maintenance and pothole patching; and
- Road furniture maintenance

9.3.3 Emergency Maintenance

These are maintenance activities carried out when sudden and unforeseen damage occurs on the road. This may be due to:

- landslides blocking the road;
- structure damaged by flood;
- drift washed away or eroded by floods;
- fallen tree on the carriageway; and
- road section heavily damaged and not passable.

9.4 Factors inhibiting besides prioritising maintenance

In Nigeria and indeed many developing countries, there is need to give greater priority to various maintenance tasks. Funds for road maintenance are always inadequate for the volume of maintenance work required, while labour, tools and materials resources at a required time may be inadequate. Thus, the setting up of priorities for road maintenance
activities is aimed at the allocation of limited resources available in the best way possible to achieve the desired result.

9.4.1 Factors Inhibiting Road maintenance
The main factors that have been found to inhibit relevant authorities from carrying out regular road maintenance are:

- The erroneous belief in some quarters that new roads require no maintenance. Ignoring the fact that maintenance is necessary for every road right from the day it is constructed.
- Insufficient maintenance funding: Due to the low priority given by the government and its agencies to road maintenance, the budgetary allocations are usually very small when provided for. Despite this, the funds that eventually become released for road maintenance are even smaller and inadequate for the proposed maintenance activities. In such cases, the first casualty that usually becomes neglected are the tertiary roads which link up rural communities and account for 65% of the total road networks in Nigeria.
- Insufficient skills and manpower; which are crucial to ensuring a co-ordinated and sustainable road maintenance system.
- The non-optimum use of available resources. As elaborated in chapters 4, 5 and 8.

9.4.2 Factors influencing Prioritising Maintenance Operations
In prioritising road maintenance operations, several factors have to be considered and these include:

- financial allocation,
- importance of the road,
- political considerations,
- technical factors,
- climatic consideration, and
- organisational factors

Generally, all these factors are considered together to establish a priority criteria. The effectiveness of road maintenance organisations is impaired by the factors mentioned above which are largely beyond the control of the responsible road maintenance staff. In Sokoto State, because authorities responsible for the road networks are financially handicapped,
they could not maintain their networks effectively. Table 9C below illustrate the ruinous funding of road authorities in recent years.

Table 9C: Financial allocation 1991-1997

<table>
<thead>
<tr>
<th>Year</th>
<th>Allocation (Naira)</th>
<th>Type of Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991/92</td>
<td>20,000,000</td>
<td>Military</td>
</tr>
<tr>
<td>1992/93</td>
<td>90,000,000</td>
<td>Military</td>
</tr>
<tr>
<td>1993/94</td>
<td>95,000,000</td>
<td>Civilian</td>
</tr>
<tr>
<td>1994/95</td>
<td>60,000,000</td>
<td>Civilian</td>
</tr>
<tr>
<td>1995/96</td>
<td>8,600,000</td>
<td>Military</td>
</tr>
<tr>
<td>1996/97</td>
<td>60,300,000</td>
<td>Military</td>
</tr>
<tr>
<td>1997-</td>
<td>58,200,000</td>
<td>Military</td>
</tr>
</tbody>
</table>

Source: (MOF), Budget office, Ministry of Finance, Sokoto State.

Figure 9C

Sokoto State Trend in road allocated funding

Table and figure 9C shows the typical distribution of funds for road maintenance in the case study area. The table reflects the current weakness of capacity for road maintenance and even growing weaker in recent years, highlighting the state of neglect to road networks in

---

1 Data from the annual report of the budget office, Ministry of Finance, Sokoto State - Nigeria 1998.
Sokoto as in many Nigerian states. A large portion of available maintenance budgets has to be spent merely on keeping the roads in a passable condition. Relatively limited funds are spent on preventive, periodic and routine maintenance. In general, the trend is that emergency activities increase at the expense of periodic and routine works. Roads provide the principal mode of access, and are a key factor to trade, industry and social development of Sokoto State. They ease queuing and waiting time between exchange and production activities. In order to compliment their importance for the state development, requires their sufficiency as well as prioritising their maintenance.

The system for management of roads in Nigeria is relatively complex, with the responsibilities split between three formal tiers (federal, state, and local) and one informal tier as illustrated below. It is an unfortunate fact that no system in Nigeria is without some possibilities for patronage or nepotism, and political support is a factor in the way in which roads are selected for improvement at all levels.

Figure 9D: Four tiers of government concerned with rural road development in Nigeria.

Political commitment to change must be strong to overcome this habit, as establishing a workable system for road management in this situation is not an easy task. It requires both political and technical commitments. Training is required to develop organisational and supervisory skills to direct a centralised federal networks and the decentralised state networks. The confusion lies with the rural roads' systems, which all the tiers shares the
responsibility for their maintenance. The lack of explicit responsibilities in rural roads results in resource shortages, preventing adequate routine maintenance programmes. It is therefore necessary to find a proper balance among the tasks to be assigned to each tier in order to have an effective repair system in place.

9.4.3 Priority for Emergency Maintenance

Top priority is always required for emergency maintenance as it cannot be planned for, due to the sudden occurrence of defects to the road, but effective routine maintenance could often reduce the need for emergency maintenance. As a result of the damaging effects of water on the road, top priority is always given to the maintenance of the drainage system (drifts, culverts etc.). The primary objective is to get rain water run-off the road before it causes damage. The next priority is given to the maintenance of defects on the carriageway particularly for gravel and earth roads. After this, consideration is then given to other activities such as bush clearing, slope maintenance. Setting up priorities for road maintenance work is also influenced by climatic variation. For example, during rainy season some maintenance activities have to be given top priority. Typical priority ratings for some routine maintenance activities based on seasonal variations is provided in table 9E below:

### Table 9E: Priority ratings for routine maintenance based on seasonal variations

<table>
<thead>
<tr>
<th>Season</th>
<th>Priority Rating</th>
<th>Unpaved Activity</th>
<th>Paved Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Season</td>
<td>1</td>
<td>Patch Potholes</td>
<td>Patch Potholes</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Reshape Carriageway</td>
<td>Seal rack</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Repair Carriageway</td>
<td>Patch Surface edge</td>
</tr>
<tr>
<td>Before Rains</td>
<td>1</td>
<td>Clear obstructions from road</td>
<td>- Patch Potholes</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Clean/repair drifts, inlet and outlet</td>
<td>- Clean Culverts</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Clean/repair drains</td>
<td>- Patch and reshape shoulder</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Cut vegetation</td>
<td></td>
</tr>
<tr>
<td>Rainy Season</td>
<td>1</td>
<td>Clear obstructions from road</td>
<td>- Patch potholes</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Clean/repair drains</td>
<td>- Clean Culverts</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Reshape carriageway</td>
<td>- Clean/repair drains</td>
</tr>
<tr>
<td>After Rains</td>
<td>1</td>
<td>Repair drift bed, inlet or outlet</td>
<td>- Patch potholes</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Reshape carriageway</td>
<td>- Clean culverts</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Patch potholes</td>
<td>- Clean/repair drains</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Cut vegetation</td>
<td>- Cut vegetation</td>
</tr>
</tbody>
</table>
9.4.4 Priority for Periodic Maintenance

Generally, periodic maintenance exerts a high demand on available resources. However, due to funding constraints, top priority is generally given to activities which require the least resources. Typical priority rating for periodic maintenance is shown in table 9F below.

Table 9F: Typical priority ratings for periodic maintenance

<table>
<thead>
<tr>
<th>Priority</th>
<th>Activity</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unpaved</td>
<td>Paved</td>
</tr>
<tr>
<td>1</td>
<td>Stockpile gravel for pothole patching and repair of drift</td>
<td>Stockpile gravel for patching potholes</td>
</tr>
<tr>
<td>2</td>
<td>- Reconstruction of structure - Road furniture maintenance</td>
<td>Make cold asphalt premix for patching surface edge</td>
</tr>
<tr>
<td>3</td>
<td>- Reconstruction of short road section - Construction of missing Structure, drifts etc.</td>
<td>- Reconstruction of structure - Road Furniture Maintenance</td>
</tr>
<tr>
<td>4</td>
<td>Regravelling</td>
<td>Regravelling shoulder</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>Road Painting</td>
</tr>
</tbody>
</table>

9.5 RESOURCES FOR ROAD MAINTENANCE

Petts defines local resources to include human resources, local government, private, NGO and community institutions, local entrepreneurs such as contractors, consultants, industrialists and artisans, local skills, locally made or intermediate equipment, local materials such as timber, bricks and marginal materials, locally raised finance or provision of materials or services in kind (Petts, Robert 1996).4

As regards Petts definition, and the research objectives, it is therefore authentic to say that, whatever maintenance operation depends on three factors namely; human resources, materials and tools which have to be utilised to execute the maintenance activities. The effectiveness of the execution and the success of the desired results depends to a large extent on how these elements are managed and utilised under the constraint of limited funds. The principles of modern management have to be applied as the maintenance operations require careful planning, organisation, supervision, directing, controlling and monitoring. This is even more so in labour based methods where series of low to medium level management are required to manage the resources and activities. For effective maintenance, it is necessary to adequately mobilise the main resources of:

◊ Labour
◊ Materials
◊ Equipment or Tools
◊ Funds

9.5.1 Labour

The use of labour based methods for routine maintenance of roads facilitates employment generation. The labour force must be trained to gain enough expertise to carry out maintenance work plans according to specifications and under adequate supervision. The labour requirements are determined after the assessment of road maintenance needs.

9.5.2 Materials

The materials required for maintenance are determined after carrying out an assessment of maintenance needs and prioritising them. For routine maintenance in Nigeria the materials required, such as laterites can usually be obtained nearby or at very short haulage distance. For periodic maintenance where the scope of work is higher, the materials may need to be imported with tractors and trailers or tippers over long distances.
9.5.3 Equipment or Tools

For routine maintenance, light equipment and simple tools like shovels, cutlasses, wheelbarrows and hand tampers are usually employed. For periodic maintenance where specialised activities have to be carried out, additional equipment may be required depending on the scope of work. These have to be predetermined during the preparation of maintenance work plans. For emergency maintenance, requisite equipment has to be readily mobilised.

9.5.4 Funding

Funding is a basic problem in the maintenance of roads in Nigeria, as in many developing countries. There is rarely enough budgetary allocation to road maintenance from the governments, in spite of the increasing kilometrage of roads to be maintained.

9.5.5 Resource Utilisation

The success of road maintenance depends to a large extent on the effective mobilisation and utilisation of all available resources in the face of the ever present tight funding. This means that the maintenance operations have to be carefully planned, supervised and monitored. For each of the maintenance activities, the size of labour force to be used; the type, quantity and sourcing of the materials, and the type and sourcing of the tools and equipment required have to be predetermined while preparing the workplans.
CHAPTER TEN

CONCEPT OF POPULAR PARTICIPATION FOR RURAL ROADS

10.0 INTRODUCTION

Popular participation (team formation) in road development is one of the most effective forms of overcoming a scarcity of resources. This option gives participants an opportunity to solve their own problems and develop into teams capable of producing measurable improvement in project performance. The Government of Nigeria in 1986 introduced the Structural Adjustment Programme (SAP), which emphasised the need for community participation based on labour-based methods of rural infrastructure development. The UNDP/ILO defines popular participation as “the involvement of members of a community in activities under a project based in that community” (UNDP/ILO, 1991). The local population can be involved in a project in several ways, notably:

a) taking part in decision making about the need for the project;

b) taking part in the planning of the project;

c) taking part in the implementation of the project;

d) taking part in the operation and maintenance of the project;

e) taking part in the evaluation of the project.

10.0.1 Decision making

Local people take part in decision making about the need for a project in a number of ways. One way may be to make representations to the local elite about the need for a particular facility. Local people may voice opinions about the project in a specially convened village meeting (fig. 2.6.2A and 2.6.2B) or use the opportunity of a village gathering to draw attention to a felt need.

10.0.2 Project Planning

The planning of a rural development project may involve technical details beyond the competence of the local people. But they can participate at this level by providing information about geophysical setting of the community, such as, information about groundwater characteristics, flooding history and so on.

---

1 UNDP/ILO project NIR/87/025, National Directorate of Employment, Lagos, - Nigeria.
10.0.3 Implementation phase

Popular participation may take various forms at the implementation phase of the project. This can be by way of contributing resources such as cash and construction materials for executing the works. Popular participation in this phase can be by way of contributing labour services for the project free of charge or working on the project at an agreed wage rate. In some rural development projects executed by self-help, some groups participate by supplying traditional music to the work team.

One of the main objectives of this research is to formulate a feasible and sustainable strategy for rural roads maintenance in Sokoto State, and to build the capacity of the LGCs' and communities with the techniques, systems and procedures for an effective execution and implementation of a labour based road maintenance programme. In the process of achieving this objective the author had to visit some selected LGCs in the state to which data was collected from the various communities concern.

The study also aimed to explore the scope for promoting popular participatory arrangements in all aspects of rural road maintenance in Sokoto State as a central objective of the overall strategy. This is with a view to integrating the long recognised roles, efforts, and initiatives of the local communities and institutions (of the State) in the execution of road maintenance activities. It is also intended to ensure the longer term objective of sustainability for the maintenance strategy. The main focus of the participatory strategy and arrangements will be on:

♦ Soliciting and ensuring acceptance at all institutional levels (but especially at community levels) of the importance of road maintenance and its potential benefits. Thus, in addition to memorandum of understanding (in the appendix), sustained level of contacts, and follow up visits with established mediums (for awareness creation and information dissemination) will be maintained. These will include relevant technical departments and units at the local government levels, traditional power elites and opinion leaders, as well as leaders of grassroots organisations at the community levels.

♦ Obtaining and using local knowledge to adapt maintenance techniques and strategies to various operating conditions in LGCs. This is to be achieved through consultations and regular popular participatory seminars-a two way process of both information gathering and dissemination.
Effecting resource mobilisation and commitments on the part of the LGC, and local beneficiary communities to match current practice by the state technical assistance and investment. This will lay a background for sustainability. It will essentially involve devising a workable participatory arrangement for funding, labour and material contribution (mainly hand tools and light equipments), as well as technical staffing.

Establishing and strengthening the links between the communities, trained local elements (skilled and semi-skilled e.g., foremen, gangleaders e.t.c), and trained local contractors. This is to enhance the capacity of the communities, and to match local needs with adequate capacity in road maintenance.

Encouraging the participation of women. This is to extend and to optimise the distribution of income and employment to be generated in maintenance activities. Skills acquired by women during demonstration project, will also enable their participation and employment in infrastructural development activities in the communities and LGC.

The light repetitive nature of the tasks involved in routine maintenance and spot improvement, highly conforms with the established patterns of women participation in road construction and rehabilitation activities in most communities. It is therefore expected that, women participation and gains in the maintenance project will be considerable.

10.1 EMPOWERMENT

Empowerment is defined by oxford dictionary (thesaurus) as “grant of power, or authority, strength or competence to” (the subject). Kinlaw defines empowerment as a process for improving organisations by developing and deploying competent influence(Kinlaw 1995)². Therefore unequivocally, in community development term, the word empowerment infers, in essence, gaining the power to make community’s voice heard, contribute to plans and decisions that affects community. Thus, empowerment can promote the community participation far beyond the limit of participative management inasmuch as it makes use of psychological resources of several individuals.

In order to make effective use of a community’s workforce, central governments should delegate authority to rural communities so as to develop their competence and maximise their opportunities to influencing road sector development in rural areas. Empowerment is

an idea whose potential utility is limited only by the potential of communities. One important advantage of empowerment is its way of using human resources that is driven by market conditions and the unavoidable requirement to do all work more efficiently. Delegating authority to a community, implies letting them (closest to a problem) solve their own problem. This will increase their sense of ownership, especially if they are giving the job and stayed out of their way so that they can manage themselves.

10.2 COMMUNITIES ROLES IN ROAD MAINTENANCE

 Communities involvement in road maintenance and improvement is important to reduce costs, and to increase their commitment and skills for subsequent maintenance jobs. Besides, subject to the scope of a maintenance job involved (whether a state, LGC or community road), there is a need to achieve a certain degree of competitiveness and efficiency in maintenance execution. This could possibly be achieved by striking an appropriate balance between the public sector (as represented by the state and LG’s), private sector (all categories of contractors), and communities self initiatives in the maintenance of roads infrastructure. All efforts in community or rural roads maintenance, has been towards devolving and increasing roles and responsibilities for the communities. The poor conditions of Nigerian rural roads has resulted from a combination of; institutional inadequacies especially at the local government levels; faulty prioritisation of capital rather than recurrent investments in the rural road subsector; and inappropriate choice of technology, the above, has propelled considerable community actions in road maintenance. Most of these activities are executed using local resources and levies raised by the communities themselves. However, these communities initiatives and organisational abilities, has been constrained by inadequate technical capacities, thus limiting the quality and scope of their operation in maintenance.

 Considerations for communities technical needs, and the prospects of their impact in road maintenance, therefore implies and calls for their participation in capacity building and in demonstration projects. Expected communities role within the state rural areas, is to provide unskilled labour and organises this with the assistance of the project. This commitment could be gradually increased to contributions in terms of wages and other forms of funding, and later to technical staffing (this is envisaged with adequate amount of
training). Finally, a collaborative mode of executing maintenance will be worked out between the LGCs and the communities, resulted by a 'community maintenance contract'.

10.3 ROAD MAINTENANCE AND SCOPE FOR COMMUNITY PARTICIPATION

Road maintenance in Nigeria has been executed by two well-known methods: direct labour (force account) and contract methods.

10.3.1 Direct Labour

The main actors in this mode of maintenance are the LGCs, and the scope for community involvement is limited. In this method, communities participation is usually restricted to labour supply and seldom some forms of resources contribution especially financing, depending on the type of road involved. Technical inputs, management, organisation and actual implementation are the responsibilities of the local governments. In addition to poor cost control, this method fails to provide for effective community involvement. The prospect of skills transfers from the LGC to the communities, and of building up technical competence at this level to enable autonomous community actions, especially within the context of self help efforts and community development activities is very limited.

10.3.2 Community Contract

Community contracts, as embodied in the contracting method of executing routine maintenance, offer a considerable scope for community participation. In this mode of execution, the community in collaboration with the local government, organises itself, sets its priorities, and takes on the role of contractor and carries out routine maintenance or spot improvement with minimal assistance from the LGC. Local government involvement is limited to financing, and supervision to ensure quality and standards. The scope for community participation is only limited by the nature of road involved that’s whether a state or community road (in some instances categorised as minor or major works - the distinction being the kind of financing and technical requirements for their executions. In minor works, labour or cash contribution is acceptable, and often crucial for local improvement to be undertaken).
The use of community contract mode of executing road maintenance, can be initiated by assessing the capability of affected communities, and strengthening their capacities in relevant areas. This entails training some selected community elements in the labour based techniques, systems and procedures of rural road maintenance. The LGCs takes the tasks of improving organisational and management capabilities. In the same vein, some level of organisational intensity (as define by the level of emphasis, high or low, with which a programme invest in social software, building organisational structures and institutional capacity) could be realised by targeting some few grassroots organisations with rudimentary experiences in community road maintenance. In the end, the LGC should be encouraged to limit direct labour operation to no more than 20% and use community contracts and local small contractors for the remainder of planned maintenance works.

10.4 INSTITUTIONAL SETTING FOR POPULAR PARTICIPATION

There are many institutions which work to achieve popular participation in Nigeria. These may be Federal, State, LGC or grassroots institutions. The Federal institutions are national in the coverage of their programmes and have representation in all States of the federation. The State institutions operate within the State boundaries and cover only the Local Government Areas (LGAs) within the particular State. The LG institutions are those under the supervision of the LG authorities with their programmes covering only communities in the LGA. The institutions that are confined to the local communities are known as grassroots organisations which draw membership from the members of the community and address one aspect of the community’s development or the other. These categories of institutions are described as follows:

10.4.1 Federal Government Institutions
The best known Federal Government institutions working for popular participation are the Federal Ministry of Social Development (involved in rural development co-ordination), and the Directorate of Food, Roads and Rural Infrastructures (DFRRI). As its name implies, DFFRI is charged with the responsibility to improve the condition of the rural areas particularly in respect of their roads and other rural infrastructures. This institution also tries to improve the rural food production systems. DFRRI is represented in each State by a State DFRRI based in the Military Governor’s Office. In order to achieve its aim, the
DFRRI enters into collaboration with rural communities and the Local Governments. For instance, in the construction of a rural road, the State DFRRI provides some funds, the LG Works Department may provide equipment, while the local community may provide materials and labour.

10.4.2 State Government Institutions
At the State level, rural development with focus on popular participation, is organised by the Ministry of Social Development, under the Ministry's Community Development Division. In some States the Community Development Division is not based in a Ministry. The work of this Division is to assist the rural people to identify viable projects and guide them towards executing such projects. Where funds are available, the Division recommends some community development projects for government's support. The Division posts field staff to zonal and LGA offices to implement its programmes.

10.4.3 Local Government Institutions
Local Governments (LGs) are nearest to the rural communities. Each LGC has a Community Development Unit (CDU) which co-ordinates self-help activities in the LG. The Unit operates in all the communities within the LGA through its District and Development Area Offices. In addition to the Community Development Unit, the technical departments such as the Works, Agriculture and Medical Services Departments carry out development projects in collaboration with the local population.

10.4.4 Local Community Level Institutions
These institutions work to promote popular participation within the confines of a rural community. They are commonly known as grassroots organisations, and include the age grades, women's groups, dance groups, etc. In addition to these, there are now community development associations in every community. These have been formed following a directive from the DFRRI, and draw membership from all the grassroots organisations in the community. All these institutions identify and execute rural development projects by self-help and sometimes with assistance from government. They rely mostly on the active participation of their members.
10.5 A TYPICAL COMMUNITY SET UP IN NIGERIA
In Nigeria, a system of traditional administration operates within the rural communities in each LGC. Depending on the region, the communities are organised in a hierarchical order. As for instance; in the northern parts of the country (including Sokoto), the smallest entity is the ward which comprises a group of households settled in one area. A number of wards within a given geographical area constitute a village while a group of villages make up a district, which is at apex of the hierarchy within the LGA. Two or more relatively independent districts can be found within an LGA. At each level there is a traditional council which is the governing body of the community. The council consists of the traditional ruler as the council chairman, and members of his cabinet. The traditional heads of the wards, villages and districts in northern Nigeria are known locally as Mai Unguwa, Mai Jimilla, and Hakimi, respectively. The Emir is often the highest ranking ruler in the LGA.

However, in the southern parts of the country the village is the basic unit and a group of these make up a clan. Indeed, in some parts of south eastern Nigeria, this pattern has been slightly modified with the clan being split into a number of autonomous communities. The titles are not so standardised in southern Nigeria, and vary from place to place according to the language and custom. For instance, in the Eastern region, the higher rank rulers are either Igwes, or Ezes, while the lower rank rulers are known as Chiefs. Though, in the western region, the higher rank rulers are the Obas while the lower rank rulers are the Baales.

10.5.1 Selection and Role of Leadership in a Community Development Program
"Among the special roles that superior team leaders fulfil are initiator of team development, model of a team player and coach" (Kinlaw 1995). In Nigeria, the system of team leading is vested on traditional rulers, whose system of selection varies from place to place. Over much of the North and West regions, the traditional rulership is hereditary. In some parts of the East region, the office is hereditary, while in other parts, the traditional rulers are selected by the people through democratic procedures.

The traditional leadership plays an important role in rural development. Under the present arrangement, each rural community has a Community Development Association (CDA) which has responsibility to identify projects to be executed by self-help often with some
assistance from the Local Government, or the State Government. The actual responsibility for project identification rests with the community Development Committee (CDC) of the CDA. The proposal is then presented to the traditional council which reviews the project and decides on the nature of contributions required from the citizens. The councils also set up an appropriate machinery to ensure that the people comply with the directives regarding their participation on the project. Such directives usually include requirement for the physical presence of all relevant groups at work sites, payment of levies, etc. Defaulters are penalised according to the prescriptions of the traditional council. Such penalties could be in the form of a reprimand, ostracism, imposition of fines, or confiscation of property. Essentially, in many communities, the spirit of self-help is strong and the rulers are highly respected. Hence, cases of wilful failure to participate in communal works are very infrequent and there is little need to impose a penalty. In addition, the traditional council helps to maintain law and order in the community. The traditional ruler and his cabinet members could also play an important role in the introduction of new technology into the community. In this respect, they help to transmit the details about the new technology to the local people and clarify issues that can block acceptance of the new idea. The traditional leadership can also play an important role by assisting in the management of labour under the labour-based construction projects. Such projects depend for their implementation on the participation of the local people. Naturally, the work force will consist of different types of persons, including those likely to have some disruptive effect on the site. It will be unpopular to try to deprive such people of the opportunity to earn income on the project. But it will always be of great help to the project management if such individuals are identified and measures devised to check and control them. Traditional rulers can assist with the identification of such persons, and can collaborate with the project management in promoting proper behaviour on site through regular checks.

10.5.2 Rural Community self-help projects (on road sector) in Sokoto State

The catalogue of problems associated with the rural areas in Sokoto State include abject poverty, inadequacy of infrastructural facilities (particularly road), and a generally low standard of living. Rural development in Sokoto State is taking place on two broad fronts. First, there are the major schemes of improvements inspired by the economic planners of the state and federal governments or international agencies. At one end of the scale are the
major agricultural development projects (ADP's), such as Sokoto Agricultural and Rural Development Authority (SARDA), Agency for Rural Development, Sokoto River Rima Basin Development Authority (SRRBDA), DFRRI, UNDP and the World Bank assisted programmes. The alternative type of rural development involves the apparently piecemeal diffusion, through self-reliance, of social services such as rural electrification, motorable roads, bridges, water supply, markets and places of religious worship. Little research has been undertaken to assess the effectiveness of these strategies and this research is one contribution to remedying that situation.

It may be argued that, given the present poor state of Nigeria's economy, a fundamental factor in the promotion of rural development is the awareness and initiative of the rural community itself and the extent of its involvement and participation in the development of its area. This argument is based on the notion that the resources of the Federal government (which is wholly dependent on a mono-product economy) are limited and cannot therefore provide everything for every community, but people are usually willing to co-operate with one another to satisfy their mutual interests. It is perhaps in recognition of this fact that, the Federal government as part of the objectives of the 1976 local government reforms included "the mobilisation of human and material resources through the involvement of members of the public in their local development" (FGN, 1976)3.

The research illustrates attempts in Sokoto State by various communities involved in rural development through self-participation, using first the data from Yabo Local Government (exclusively for roads) Works Department, and the available data from the annual report of Sokoto State Ministry of Social Development as well as the author's own survey. Data from Kwara State is used as a basis for comparison with Sokoto State. Although the data from Kwara State was adopted from a Community Development Journal Vol. 20 No.1 of 1985 as documented by Adedayo 1985. Kwara State is chosen for her renown community development record in the country, and as against Sokoto's average performance in terms of Self-help development programme which was promoted by UNDP/ILP in 1987. The efforts by the various communities are tabulated in the tables 10A, B and C, whereas the result of the tabulation is represented in the figures 10A, B and C below.

---

### Table 10A

**Number and Value of Self-help (roads) projects in Yabo LG 1991-to-1995/96**

<table>
<thead>
<tr>
<th>Financial year</th>
<th>Number of projects</th>
<th>Value of projects, (Naira), ($1=N5, 1991 rate)</th>
<th>Local Govnm't contribution %</th>
<th>Local Comm. contribution %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991/92</td>
<td>12</td>
<td>669,325</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>1992/93</td>
<td>16</td>
<td>754,700</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>1993/94</td>
<td>25</td>
<td>321,3750</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>1994/95</td>
<td>5</td>
<td>336,200</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>1995/96</td>
<td>6</td>
<td>499,925</td>
<td>58</td>
<td>42</td>
</tr>
</tbody>
</table>


### Figure 10A

**Number and value of self-help projects in Yabo LGA, Sokoto State 1992-1995**

- **Value of projects, in Naira currency, ($1=N5 in 1991)**
- **No. of projects**
- **Local Government contribution**
- **Local Community contribution**
Table 10B


<table>
<thead>
<tr>
<th>LG Area</th>
<th>No. of completed projects</th>
<th>Value of completed projects</th>
<th>No. of on-going projects</th>
<th>Estimated cost of on-going projects</th>
<th>Local Govt contrib' n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bodinga</td>
<td>6</td>
<td>180,000</td>
<td>6</td>
<td>123,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Goronyo</td>
<td>33</td>
<td>750,000</td>
<td>26</td>
<td>167,000</td>
<td>550,000</td>
</tr>
<tr>
<td>Gwad'wa</td>
<td>17</td>
<td>168,000</td>
<td>18</td>
<td>204,000</td>
<td>24,000</td>
</tr>
<tr>
<td>Isa</td>
<td>11</td>
<td>95,000</td>
<td>22</td>
<td>148,000</td>
<td>42,000</td>
</tr>
<tr>
<td>Kware</td>
<td>7</td>
<td>75,000</td>
<td>9</td>
<td>97,000</td>
<td>24,000</td>
</tr>
<tr>
<td>Rabah</td>
<td>13</td>
<td>198,000</td>
<td>19</td>
<td>247,000</td>
<td>40,000</td>
</tr>
<tr>
<td>Silame</td>
<td>15</td>
<td>114,000</td>
<td>17</td>
<td>162,000</td>
<td>72,000</td>
</tr>
<tr>
<td>Sokoto</td>
<td>7</td>
<td>201,000</td>
<td>33</td>
<td>312,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Tambuwal</td>
<td>13</td>
<td>142,000</td>
<td>41</td>
<td>420,000</td>
<td>68,000</td>
</tr>
<tr>
<td>Yabo</td>
<td>16</td>
<td>265,000</td>
<td>62</td>
<td>563,000</td>
<td>132,500</td>
</tr>
<tr>
<td>Wamakko</td>
<td>9</td>
<td>112,000</td>
<td>17</td>
<td>234,000</td>
<td>64,000</td>
</tr>
<tr>
<td>Wurno</td>
<td>8</td>
<td>78,000</td>
<td>28</td>
<td>256,000</td>
<td>46,000</td>
</tr>
</tbody>
</table>

Data Source: Ministry of Social Development, Sokoto State -1996.

Figure 10B: Community development projects and the Government assistance in Sokoto State (1994 - 1995)
Table 10C:

Number and Value of Self-help projects in Kwara State 1975/76 - to - 1978/79

<table>
<thead>
<tr>
<th>Financial year</th>
<th>No. of completed projects</th>
<th>Value of completed projects (Naira)</th>
<th>Number of on-going projects</th>
<th>Value of on-going projects (Naira)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975/76</td>
<td>216</td>
<td>2,571,247</td>
<td>260</td>
<td>6,563,198</td>
</tr>
<tr>
<td>1976/77</td>
<td>197</td>
<td>2,789,110</td>
<td>454</td>
<td>10,638,306</td>
</tr>
<tr>
<td>1977/78</td>
<td>219</td>
<td>2,568,820</td>
<td>628</td>
<td>26,602,121</td>
</tr>
<tr>
<td>1978/79</td>
<td>356</td>
<td>7,696,256</td>
<td>797</td>
<td>30,309,351</td>
</tr>
</tbody>
</table>


Figure 10C:

Number and value of Self-help projects in Kwara State 1975/76 -to- 1978/79
CHAPTER ELEVEN
GAP ANALYSIS BETWEEN ALTERNATIVE TECHNOLOGIES, AND OBLIGATING ESTABLISHMENTS

11.0 INTRODUCTION

A huge gap of understanding exists between the extremes of equipment and labour-based techniques in Nigeria’s construction industry. A similar gap exists between state and the private enterprises responsible for building the infrastructures. The need to understand and appreciate the nature of these gaps is a challenge facing the responsible organisations, particularly in rural road works. The concept of ‘gap analysis’ in this research describes techniques to assess the variations between equipment, and labour-intensive techniques, and also recognises the differences between bottom up (community managed), and the top down (agency managed) programmes. Among the primary objectives of this study, is narrowing the existing gaps between the systems.

However, Nigeria’s long era of dependence on equipment-based techniques, at the expense of more affordable labour-based systems, coupled with governments’ tendencies to favour the supply driven instead of demand driven projects contributed to the widening of the gaps. The aim should be to achieve a more balanced understanding of the alternatives and to focus on choice rather than dictation. Chapters (3, 4, 5, 7, & 8) have explained that, equipment intensive techniques continue to dominate Nigeria’s construction industry. Hence, judged by the scale of investment, number and sustainability of full scale programmes, or major aid agencies committed to technology use, choice of technology in civil engineering remains a fragile concept. Until 1986, the need for proper use of local resources in the country was evidently not recognised, and the waste in the public sector due to excessive foreign imports was substantial. Further significant savings could have been realised if private firms (using local resources) instead of public sector was employed on road works. The private sector would also have been more likely to have provided employment for the local communities in the jobs which pertain to their areas. A final problem has been the general neglect of maintenance compared to new construction.

The desire to copy the rich west lead to the imitation of the production methods of the western economy. This desire is translated into action through the direct economic activities of the public sector, and the policies which shape the allocation of resources in the
private sector, as well as the interference of the government in investment decisions and in
the relative prices (including exchange rates, and wage rates). It can be argued that the
planning strategies in Nigeria have more often than not been based upon imitation of
developed economies which applies expensive and advanced technology. Consequently,
development planning becomes an exercise in technocratic imitation, usually carried out by
the engineers or bureaucrats with little respect for the economic analysis of the situation. To
what extent this has been a wise strategy cannot be resolved in any simple manner.
However it remains a fact that many burning issues of development such as emphasis on
road sustenance at the cost of neglecting local resource utilisation (import substitutions),
and lacking local community support, have part of their origins in the policy makers
imitating the structures, products and technologies of the richer countries.
The frustration created by gap also has implications, in a longer perspective on the
development of cultures and civilisations. In Nigeria today, the dull atmosphere of imitating
technologies and, through this, imitating cultures is grievous. As elaborated in chapter 8 of
this report, the bedrock of training rests with the educational institutions as a foundation.
Sadly, the field work survey has confirmed the existence of yet another gap in the training
of civil engineers in Nigeria’s institutions of learning, denying them the capability to
respond to the socio-economic conditions of the country (tables and figures, 3U and 3V).
Nigeria’s recent economic difficulties have encouraged policy-makers to look again at the
potential to local resource use for the development of infrastructure. The government
regards local resource use to be of fundamental importance to the country and the rural
communities owing to its potential prospect for infrastructure sustenance. This has resulted
in some exciting new opportunities for education and training on local resource use. Having
realised the potentialities of the system, government initiatives at providing road access to
the rural communities led to the establishment of the defunct Directorate of Foods, Roads,
and Rural Infrastructure (DFRRI) in 1987. Conceptually, DFRRI was a unique innovation
at grass root programming for provision of services to the rural communities, hence a
suitable mode of promoting labour-based technique. Before the phasing out of DFRRI, all
the demonstrations and training, research and mobilisation of top down and bottom up
(grassroots) levels by the UNDP/ILO programmes in various parts of the country were
channeled through DFRRI. The responsibility for rural roads after the termination of
DFRRI fell on the three government tiers and other agencies, like ADPs, and the NGOs.
11.1 TOP DOWN VERSUS BOTTOM-UP APPROACHES

The theme top-down versus bottom-up approaches in this analysis points to the further issue of supply versus demand approaches, particularly to rural road improvement. The demand responsive approach (DRA) is one in which supply is tailored to meet the economic demands of users, unlike supply dominated approach (SDA), where the supply is administered on users. Evidently many in the World Bank have concluded that “demand orientation” is a good thing, given the frequency with which Bank documents claim that activities being promoted (including anything participatory, decentralised, or involving social action) are demand-oriented (WB 1998)\(^1\). The analysis here is a logical extension of the Dublin principles (Sara, et al 1998)\(^2\) endorsed by the international community in 1992. Since then, these principles have been tested, refined and modified to reflect learning from operational experience, analytical studies and regional workshops throughout the World. Three such workshops, sponsored by the UNDP/World Bank are of particular interest:

- the Colombo workshop, held in Sri Lanka in 1994, where for the first time the concept and importance of project rules as a framework for DRA were introduced.
- the Mangochi workshop, held in Malawi in 1997, where the basic principles of DRA were endorsed and eight key characteristics of DRA were developed by 80 participants from 13 Eastern and Southern African Countries.
- the Chiang Mai workshop, held in Thailand (January 1998), where more than 100 Asian participants discussed the implications of DRA on their work in RWS (Garn 1998)\(^3\).

Though the emphasis of these workshops was on rural water supply, the reflections apply equally to rural road supply. The point is, all projects (or programmes or activities) are more or less demand driven. Whether a project is supply or demand-driven is relative, not absolute. The degree to which it is demand-driven depends on who makes the decisions about the type and what range of decisions the users make (instead of having decisions made for them). In this regard, the research intends to logically associate the DRA that are widely held at various levels of stakeholder groups in Nigeria. The author’s field study of 1996 in Nigeria analysed stakeholders of various interest groups through consultation (road

---

users, transport owners, local communities, and various agencies) on road sustenance, and challenges, and rewards of moving towards DRA. Among the principles which form the basis of the demand responsive approach as endorsed by majority of respondents suggest:

a) rural roads should increasingly be managed as an economic as well as a social good,

b) management should be focused at the lowest appropriate level,

c) the current splits of responsibility shared between the three formal, and one informal tiers should be resolved, and

d) the full responsibility for rural road improvement should be explicitly defined.

Economic demand is demand at a price and will be expressed by users, not by suppliers. The demand for rural roads in Nigeria has reached a critical stage, with many local communities providing road links to their areas with little assistance from LGCs (chapter 10). Evidence from Table 6B which compares Nigeria with its immediate neighbours on rural roads distribution coverage, shows Nigeria to have the least coverage of Km per 1000 population, highlighting the state of deficiency. Nigeria’s rural population estimated at 70 - 80% (FGN 1990)\(^4\), compared to the country’s 167,800 km total road networks (Banjo, G. 1994), shared between the Federal highways 28,600 km (18%), State highways 30,500 km (17%), and the LGCs 108,700 km (65%) rural roads (ceded to the least and weakest tier) attest to the deficiency. Similarly, the percentage shares (Banjo 1994) of paved roads designated as; Federal highways 67%, State highways 30%, and only 3% of the total to the rural roads.

The demand responsive approach is a radically different approach to supply oriented approach. DRA requires a new way of designing projects to pay closer attention to the correct incentive structure that will elicit appropriate responses from wide range of stakeholders - communities, NGOs, private sector and government. DRA also promote innovation and flexibility, in-contrast supply oriented approach is uncompromising and discourages innovation. Almost 85% of Nigeria’s (LGCs) rural roads are supply oriented, with no consultation of beneficiary communities of any kind. The World Bank recent evaluation of Nigerian rural roads has indicated that, nearly 70% of (LGCs) rural roads are in poor to very poor condition (WB 1991)\(^5\), and less than 2% are bituminous surfaced.

---


Federal government policy of 1991 concentrated on rehabilitation and maintenance of existing rural roads in order to reduce the backlog of 70,000 km of deteriorated rural roads (FRN 1991)\(^6\). The then planned rate of rural road rehabilitation by ADPs to minimum maintainable standard was 2,250 km per annum.

The demand driven are found to be more sustainable than the supply oriented approaches. Projects are likely to be more demand-oriented if the decisions to participate are made locally and if decisions about which type and level of service to build, over what period of time, are based on users preferences. “Organisations can only be successful if people are face with personal choices which are favourable to themselves as well as having favourable outcomes for collectivity” (Curtis, 1991)\(^7\). Besides, negotiated arrangements for cost-sharing based on transparent rules tend to be more demand-oriented. The greater proportion of costs the users pay, the more likely a project is to be demand-oriented (although there is no magic ratio for cost-sharing). Tables 10A, B and C, and figures 10A, B and C are indications of how demand oriented projects can produce the intended results (by keeping social services e.g. motorable roads, bridges, maintainable) and as well as sustainable. The illustration by Nigerian communities has shown that, there are no rules as to when group projects are and are not appropriate. People must be free to make their own decisions, and the role of government, NGO or whatever assisting agency should be “to show people the options that are available and to facilitate their doing what they want to do” (Harper, 1996)\(^8\). Therefore, no agency should promote group enterprise because they believe that they are the only ‘correct’ form of business, or because they are more convenient for them to assist.

11.2 PUBLIC VERSUS PRIVATE SECTOR ENTERPRISES

Publicly owned construction and maintenance firms usually face considerably more constraints for achieving efficiency than do private enterprises. Public sector enterprise has dominated infrastructure domain in most low-income countries, with inefficiency impact even larger in countries with more dominant public sectors like Nigeria. “The inefficiency of


\(^{7}\) Curtis, Donald 1991: Development Studies; Beyond Government, organisations for common benefit, by Macmillan Education Ltd., Lagos, London and Hong Kong.


216
public enterprises and the spread of their losses throughout the economy continue to drag
down savings, investment, and economic growth” (WB 1995)\textsuperscript{9}. In terms of remuneration,
Nigerian civil servants are among the worst paid employees in the country. For instance
whereas a graduate working for the civil service earns at most N5,000, his counterpart, a
“graduate working for private sector earns about N60,000” (Abubakar 1998)\textsuperscript{10}. The
unrealistically low salary levels in Nigeria’s public enterprises demotivate staff; while
limitations on civil service careers induce complacency, lack of commitment of the senior
staff, and a reluctance to take risks. Also, restrictions on the freedom to hire and fire staff
and the use of public employment as a social or political tool do frustrate managers; and
cumbersome bureaucratic procedures affect procurement. Apart from the three tier systems
duplicity in Nigeria, several agencies with wide disparities in terms of size, management and
implementation capacity are involved in rural road improvement. In practice, “these
agencies have little equipment of their own and lacks adequate and appropriate trained
personnel to carry out the activities for which they are mandated (FAO, 1992)\textsuperscript{11}. As an
offset for all these constraints, these agencies are constantly protected from bankruptcy, as
government would rather cover financial losses than liquidate the inefficient agencies. The
dominance of these public enterprises in Nigerian economy means, when they perform
poorly, that they drag down overall growth rates, and as such are a permanent drain on the
national budget.

Inefficiencies in the management of state enterprises unfortunately are commonplace. For
instance, “public enterprises account on average for 14 percent of GDP, 18 percent of
employment, and 27 percent of investment in Sub-Saharan Africa” (WB, 1995)\textsuperscript{12}. Equally,
the World Bank Report (1984) has cited a development in one African country, with
maintenance department of highway administration achieving a utilisation rate of only about
20 percent for major equipment, while employing about 3,000 labourers in excess of
requirements (WB, 1984)\textsuperscript{13}. Similarly, “in one country in the Middle East, the average
share of professional, technical, administrative, and clerical staff amounts to 39 percent of

of Sokoto State, Nigeria, a paper submitted for conference coming up in France on the 6 November 1998, by
Institute of Development Engineering, Loughborough University, U.K
\textsuperscript{11} Nigeria: Rural roads and Marketing Project Identification; Food and Agricultural Organisation of the
\textsuperscript{12} Development in Practice:Private Sector Development in Low-Income Countries, by the World Bank 1995.
\textsuperscript{13} The Construction Industry: Issues and strategies in developing countries, by the World Bank 1984, U.S.A.
the total number employed in over 20 parastatal construction corporations; this is obviously top-heavy when compared with rates of 15 to 20 percents for private companies and a few more efficient public entities in the same country" (WB, 1984). Equally, the roads department of a Latin American country, to insure against the bureaucratic delays and problems of importation, made a bulk purchase of spare parts; as a result, a few years after the purchase, it now holds about $500,000 worth of unused and obsolete parts ditto.

It is difficult to make a rigorous comparison of the overall cost-effectiveness of force account (public) and contracting (private). However, an illustration from Parana, in Brazil, where a balanced comparison of highway maintenance costs achieved by force account and by contracting showed the former to be about 60 percent more costly (WB, 1984). Experience from Nigeria, and surrounding neighbours has indicated that, management and political stability are among the important factors that can determine the success of state-owned construction enterprises. The 8 years civil war in Liberia, and the current ones in Sierra-Leone, and Guinea-Bissau, plus nearly 15 years political turmoil in Nigeria and Niger republics are in no doubt of serious impediments to construction firms' environment.

Subsequently, for private sector to compete successfully, it requires dynamic firms with strong financial backing. But private firms in Nigeria and surrounding neighbours have been held back by a difficult business environment that has increased risks and transaction costs. A World Bank private sector assessment of the business environment have produced a wealth of data about the costs faced by enterprises in starting, operating, and expanding their businesses, and about how entrepreneurs rank various impediments to doing business:

♦ In Cameroon, firms have identified access to finance, lack of demand, and taxes and tax administration as the three most important constraints.

♦ Entrepreneurs in Cote d'Ivoire note the same constraints, adding political and policy uncertainty near the top of their list.

♦ In Kenya, entrepreneurs are concerned about macroeconomics stability, infrastructure, regulations, and access to finance.

♦ In India, firms are burdened by excessive regulations that prevent them from responding to an increasingly competitive environment.
In Sri Lanka, firms have identified the cost of finance, level of taxes, poor infrastructure, labour regulations, and policy uncertainty as key constraints (WB, 1995).

11.3 LABOUR-BASED VERSUS EQUIPMENT-BASED METHODS

As earlier reported in the beginning of this chapter, a huge gap exists between labour-based and equipment-based techniques. However, the author considers four essential components (Labour, Handtools, Materials, and equipment) to compare the costs of constructing a Km of road under the two methods. The comparison intends to establish the differences, as well as the gap existence between the two alternative methods. The four components are described below:

**Labour:** The labour cost represents the labour wages as well as those of the lower level supervisory staff; headmen and gangleaders.

**Handtools:** The handtools cost represents the actual cost of purchase of the handtools as well as the cost of repairs and maintenance. The salvage-value of the handtools at the end of the Project was taken as zero.

**Materials:** The cost of materials implies the purchase and transportation of the materials.

**Equipment:** The equipment component is the cost of hire, running and lubrication of the equipment.

11.3.1 Systems Costs Variations Under a Km of Road Construction

The data was gathered from a UNDP/ ILO project during participation training events in Nigeria. The cost estimates were prepared by course participants in constructing a Km of road under the alternative methods. The estimates were presented under four components as described above. Comparably, the actual unit cost of constructing a similar road to the same standard by the World Bank assisted Agricultural Development Project (ADP) have been obtained from a recent evaluation report (WB, 1989). This provides a check on the cost estimates determined by the course participants. The unit cost for 1987 was obtained from the report and updated to 1991 by allowing a modest cost increase of 5% per annum. Based on the data described above, a cost comparison for the construction of one kilometre

---

of a farm access road by alternative methods (labour-based and equipment-based methods) at 1991 prices has been presented in Table 11A.

<table>
<thead>
<tr>
<th>Item</th>
<th>Actual costs of labour-based construction</th>
<th>Estimated Average Costs of Equipment-based Construction</th>
<th>ADP's Construction costs for new rural roads by equipment-based methods (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount (N)</td>
<td>%</td>
<td>Amount (N) %</td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td>155,009</td>
<td>5466</td>
<td>2. According to the World Bank the cost of new rural roads constructed under ADP was $20,940 per km at 1987 prices with 85% of foreign costs.</td>
</tr>
<tr>
<td>Handtools (1)</td>
<td>27,433</td>
<td>2237</td>
<td>1. $20,940 per km at 1987 prices with 85% of foreign costs.</td>
</tr>
<tr>
<td>Materials</td>
<td>9,100</td>
<td>9,100</td>
<td>4. After allowing for a modest cost increase of 5% per annum this works out to $25,453 or N251,985 in 1991 ($ = N9.9).</td>
</tr>
<tr>
<td>Light Equip.</td>
<td>31,681</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy-Equipment (2)</td>
<td>-</td>
<td>21,178</td>
<td></td>
</tr>
<tr>
<td>Supervision (3)</td>
<td>-</td>
<td>4,572</td>
<td></td>
</tr>
<tr>
<td>Total (5)</td>
<td>220,223</td>
<td>233,162</td>
<td>251,985</td>
</tr>
</tbody>
</table>

Notes:
1. (1) Handtools cost increased by 37% over 1989 prices for equipment-based method.
2. (2) Heavy equipment hiring rates increased by 33% over 1989 rates. Includes operator's wages.
3. (3) Supervisory costs at 2% of total of labour, handtools, materials and equipment costs.

5. Costs are reduced by 13% when compared with ADP costs. Costs are reduced by 4% when compared with estimated average costs of equipment based construction.

### Table 11B: Costs Variations and Percentage in Savings Under 6 Components

<table>
<thead>
<tr>
<th>Item</th>
<th>Actual costs of labour-based construction</th>
<th>Estimated average costs of Equipment-based construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Amount (N)</td>
<td>%</td>
</tr>
<tr>
<td>Labour</td>
<td>155009</td>
<td>70</td>
</tr>
<tr>
<td>Handtools</td>
<td>27433</td>
<td>12</td>
</tr>
<tr>
<td>Materials</td>
<td>9100</td>
<td>4</td>
</tr>
<tr>
<td>Light Equipment</td>
<td>31681</td>
<td>14</td>
</tr>
<tr>
<td>Heavy-Equipment</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Supervision</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Table 11C: Costs Comparisons of the Two Alternatives Approaches

<table>
<thead>
<tr>
<th>Item</th>
<th>Labour-based</th>
<th>Equipment-based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour</td>
<td>33.9</td>
<td>1.195538058</td>
</tr>
<tr>
<td>Handtools</td>
<td>6.000218723</td>
<td>0.48928259</td>
</tr>
<tr>
<td>Materials</td>
<td>1.990376203</td>
<td>1.990376203</td>
</tr>
<tr>
<td>Light Equipment</td>
<td>6.929352581</td>
<td>-</td>
</tr>
<tr>
<td>Heavy-Equipment</td>
<td>-</td>
<td>46.32261592</td>
</tr>
<tr>
<td>Supervision</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

*Table 11B above is retabulated as 11C to make it possible for a logarithmic presentation of values, and as such; All the values in the table are multiples of 4572*
11.3.2 Outcome of the Comparisons

According to Table 11A, the construction cost of a km of an access road was N223,332 by labour-based methods. The average estimated cost of constructing the same length of road by equipment-based method is N233,162. This estimate compares with the ADP average construction cost of N251,985 for new rural roads in Nigeria as indicated by the World Bank. These results suggest that between N9,830 and N28,653 can be saved per kilometre in the construction of a new rural road if labour-based methods are used in place of the conventional equipment-based methods. Thus, construction costs can be reduced by up to 13% by shifting from equipment-based to labour-based methods. The results further shows that under labour-based methods the labour cost made up 70% of total cost while only 2% of construction costs under equipment-based method are accounted for by wages. On the other hand, 91% of construction costs are incurred on heavy equipment while the light equipment, a vibratory pedestrian roller, used under the labour-based methods, accounted
for 14% of cost of constructing a km of rural road. The table also shows that while handtools accounted for 12% under labour-based, it accounted for 1% under equipment-based method.

In view of the acute shortage of foreign exchange needed to import heavy equipment, the savings accruable by adopting labour-based methods are likely to be higher if the cost items are shadow priced to reflect the true scarcity value of equipment relative to labour. The two methods of construction are also different in the extent of their local resource utilisation. The labour-based methods can utilise local resources to the extent of 86% of total construction costs in the form of labour, handtools and materials. But in the case of equipment-based methods, allowing for operator's wages, only 11% of total costs are accounted for by local resources, as much as 89% being incurred on imported items. Thus, through the application of labour-based methods, it is possible to save more than N170,000 which would have been spent as foreign exchange for each kilometre of new rural road constructed by equipment-based method.

11.4 SYSTEMS IMPACTS ON ECONOMY AND THE COMMUNITY

Comparing the labour-based and equipment-based methods could help in determining the vacuum created under the systems job creation, and relative efficiencies. Evidence from table 11D indicates that labour-based methods of construction create more jobs than equipment-based methods. The results shows that 17,034 workdays of employment were generated on each kilometre of the new rural road constructed by labour-based methods, as against only 1,569 workdays for the same length of rural road when conventional equipment-based methods are used. Thus, a shift from equipment-based methods to labour-based methods could result in the creation of about 11 times more employment opportunities for the community. It is quite interesting to note that, labour-based technique was introduced to Nigeria only just a decade ago (1987), and thus, is still a newly established programme, hence, labour productivity is not at its best, but it is likely that under normal working conditions with an experienced workforce the labour productivity might increase appreciably.

Income benefits were substantial, and consist mainly of the direct incomes to the workers and secondary incomes created through the expenditure of the workers' incomes on goods and services.
Table 11D: Employment Based on Method of Construction

<table>
<thead>
<tr>
<th>Item</th>
<th>Labour-based</th>
<th>Equipment based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cost (N)</td>
<td>223,322</td>
<td>233,162</td>
</tr>
<tr>
<td>Wages (N)</td>
<td>155,009</td>
<td>14,274</td>
</tr>
<tr>
<td>Unskilled labour</td>
<td>16,182</td>
<td>1,491</td>
</tr>
<tr>
<td>Skilled labour</td>
<td>852</td>
<td>78</td>
</tr>
<tr>
<td>Total employment</td>
<td>17,034</td>
<td>1,569</td>
</tr>
<tr>
<td>Cost/employment</td>
<td>13</td>
<td>149</td>
</tr>
</tbody>
</table>

Figure 11D: Graphical Representation of Construction Method

According to table and figure 11Ds above, the labour-based method provided 16,182 workdays of unskilled labour and 852 workdays of skilled labour. In comparison, the equipment-based method provided only 1,491 workdays and 78 workdays of unskilled and skilled labour respectively. Thus, the conclusion is that the labour-based methods have a
much higher potential for generating productive employment opportunities than the equipment-based methods.

11.4.1 Impacts from Road Projects
Considerable socio-economic benefits have occurred within and around the project areas. Prominent among them are the employment and income effects, involvement of women in the development process, and the improvement in access to areas of importance. It has been reported (UNDP/ILO 1992)\(^\text{16}\) that, construction activities in Nigeria for a new road site started in February 1989, subsequently by July 1989 three sites had become operational for road rehabilitation programmes. By the end of May 1991, the total wage bill amounted to (local currency) N1,509,377, based on the weighted average wage rate of N9.10 (N9.00 to casual workers, N10 to skilled workers and N11 to gangleaders) paid by the Project to different categories of site workers. Employment generation under the Demonstration Project was about 165,866 workdays. The period from February 1989 to May 1991 covered about 27 months or 701 working days. Thus, about 237 jobs were created during the period.

The workers employed under the Project came from different demographic and socio-economic backgrounds. Female workers constituted about 37% of the workforce as at February 1990. At the end of November 1990, there were 162 women in the workforce of 350, representing 46% of the workforce. About 94% of the workers had formal education and about 50% went to secondary schools. A sample survey revealed that about 57% of the workers had no previous employment experience before they were recruited by the project. A good number of the workers resided within and around the immediate project areas before they were employed, but about one-fifth of the workers relocated to the project areas in order to work on the projects.

11.4.2 Impacts from Project and Technology
As the traditional method of construction/maintenance has always been equipment intensive the expected impacts in the project and the technology would be significant if labour-based

techniques are favoured. As reported in earlier chapters (2, 3 and 5), the success of project and their execution techniques depends on the attitudes of the policy makers, administrators and technical persons towards them. Building of capacity in a core group of indigenous engineers and other socio-economic benefits is among the expected outcome when labour-based method is utilised.

Consequently, chapter 8 has reported on a group of selected engineers that attended the training programmes on labour-based methods. Practically various workers who worked as gangleaders, labourers, and who had never been involved in construction before, can now receive on-the-job training with the aid of these trained engineers.

11.4.3 Gap or Vacuum interpretation

Table 11E: Gap (vacuum) Disclosure from the Alternative Methods

<table>
<thead>
<tr>
<th>Item</th>
<th>Labour-based Costs</th>
<th>Equipment-based Costs</th>
<th>Gap</th>
<th>Variations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job creation</td>
<td>17,034</td>
<td>1,569</td>
<td>15465</td>
<td></td>
<td>up to 15,465 are denied access to jobs per km of road constructed by equipment method</td>
</tr>
<tr>
<td>Cost(Naira)/employment</td>
<td>13</td>
<td>149</td>
<td>136</td>
<td></td>
<td>Up to N136 could be saved per unit of employment if labour-based is used instead of equipt., indicating 12 times cheaper than equipt-based.</td>
</tr>
<tr>
<td>Labour</td>
<td>155009</td>
<td>5466</td>
<td>149543</td>
<td></td>
<td>N149,543 was saved per km when labour-based was used instead of equipt.</td>
</tr>
<tr>
<td>Handtools</td>
<td>27433</td>
<td>2237</td>
<td>25196</td>
<td></td>
<td>N25196 was saved per km using labour-based instead of equipt.</td>
</tr>
<tr>
<td>Unskilled labour</td>
<td>16,182</td>
<td>1,491</td>
<td>14691</td>
<td></td>
<td>Up to 14691 unskilled labourers are at risk per each km constructed by equipt. instead of labour-based.</td>
</tr>
<tr>
<td>Skilled labour</td>
<td>852</td>
<td>78</td>
<td>774</td>
<td></td>
<td>Up to 774 skilled labourers would be unemployed if equipment is used instead of labour-based.</td>
</tr>
</tbody>
</table>
Figure 11E  Gap (vacuum) Representation in a Spider Diagram

Figure 11F: Gap (Vacuum) Representation in a Bar Chart and line Diagram
11.5 PERFORMANCE EFFICIENCY

Table 11B compares the relative efficiencies of employment generation under the two approaches. According to the evidence, the cost of generating one unit of employment under the labour-based approach was only N13. On the other hand, the cost of one unit of employment under the equipment-based methods can be as high as N149. Thus the cost of an employee under labour-based method is almost 12 times cheaper than the equipment based method. This fact further emphasizes the advantages of using labour-based methods from a cost-efficiency point of view.

From the information gathered (tables 11A and B), it infers that the total cost of constructing a kilometre of rural feeder road by labour-based methods is about 13% less than the equipment-based method when compared with the actual ADP costs. The cost of labour constitutes the bulk of the cost (70%) of construction by labour-based methods while the cost of hiring equipment constitutes about 91% of the total cost by equipment-based methods. This implies that the bulk of the money for construction by the equipment-based methods involves the use of foreign exchange as very little construction equipment is manufactured in Nigeria.
CHAPTER TWELVE
CONCLUSIONS AND RECOMMENDATIONS

12.0 CONCLUSIONS

The research has investigated factors affecting rural road maintenance in Nigeria, and Sokoto State in particular, and also relates to sub-Saharan Africa region. The approach is justified by the statement that, "for many of the purposes and situations in which enquiry in the real world takes place, a different strategy which concentrates on studying ‘cases’ is worth serious consideration" (Robson, Colin 1996). In this regard, a comprehensive literature review was accomplished in the UK to prepare the author for the stage of practical research. A six months field study (1995/96) in Nigeria, administered through questionnaires and field interviews based on guides to the compilation of data, was evaluated and analysed. The analysis led to the discussion of results set out in Chapters 2 to 11 inclusive. Conclusions are drawn on the factors that affect rural road improvement in Nigeria and Sokoto State in particular, with relevance to sub-Saharan Africa region as a whole. The primary conclusions derived from the research are used to make some recommendations at the end of this chapter.

The study has sought to assess the reality and challenges facing rural road sector in Nigeria giving some highlights of areas of past neglect and achievements, while identifying those areas that require urgent attention for reform. The study also looked at the initiatives that are currently being implemented to improve the performance of the sector. At the end is a set of recommendations pointing to an agenda for reform based on increasing the understanding by policy makers of the sector conditions, financial and institutional challenges.

12.1 CHALLENGES IN RURAL ROAD SUPPLY

Nigeria faces major challenges in the development of its infrastructure, particularly the road sector. As governments have built up their road networks, the earlier lack of attention to maintenance has become apparent in the declining state of the existing networks, particularly the rural networks which need significant investments if they are to be rehabilitated. The country’s total road network is 167,800 kilometres, lopsidedly
shared (chapter 1) as 108,700 km (65%) rural, 28,600 km (17%) Federal and 30,500 km (18%) State roads. Whatever manner one chooses to measure, such as by the distance of good road, country’s income, or the area or population of Nigeria, one draws the same conclusion, namely that as a means of transportation the Nigerian rural road system is considerably the lowest in density to most, if not all, nations of sub-Saharan Africa, evidence is demonstrated by tables and figure 6 and 9 Bs in pages 136 and 188 respectively. At first glance the Nigerian rural road networks may appear impressive, up to about 108,700 kilometres. But of that, only 3,261 kilometres (3%) is paved, with the remaining 105,439 kilometres (97%) unpaved, and almost entirely left under the responsibility of the under funded Local Government Councils.

Travel on earth roads is often difficult. Most rural roads agencies are unable to meet the desired target, with Local governments left to fund the large part of the capital investments, debt service and operating deficits. Rural road coverage in proportion to rural population is generally low when compared to urban road coverage in relation to urban population.

According to Nigeria’s National Population Census (NPC) of 1991, the country’s population is 111.7 million, and about 90 million of the total are rural, with only about 22 million dwell the urban areas. This shows that about 90 million people in rural areas of the country are sharing 108,700 km, suggesting 1 km per 827 population. In contrast, the urban population represent less than 22 million people, enjoying a pave network of almost 50,000 kilometres of road coverage, implying 1 Km per 440 people. Considering the current level of funding in the road sector (table 6C, 9C, and figure 9C), it is clear that in real terms funding in the sector has dropped significantly. Although allocations have risen in terms of Naira, the drastic drop in the value of the currency means that purchasing power is increasingly inadequate. The reference to the dollar is important since 91% of construction costs on rural roads are still incurred on heavy equipment (Table 11A, p220), which are almost all within the foreign exchange component. The foregoing considerations call for courageous and radical decisions by policy makers on needed reforms in rural road sector, and the following areas need to be addressed, specifically:-
12.1.1 Community Participation

It is essential to create an awareness of the importance of community participation and the utilisation of local resources for road works. Community participation in the road sector varies from the fulfilment of some limited attributes to significant operational responsibility. Road (asset) ownership remains with the public sector (government), but partial or full ownership can be transferred (permanently or temporarily) to the private sector. In relation to the above, and the increasing coverage of services to ever growing populations, the study suggests the involvement of important segments of society that have been traditionally excluded. The private sector (drivers, transporters, passengers and car owners, commercial banks, traders and consultants), communities, as well as NGOs have a critical role to play in the planning, design, financing, implementation and operation of rural roads. Their potential for additional finance and technical expertise should be tapped.

The tables and figures in chapter 10 (A, B and C) authenticate the hypothesis that, the rural communities are well organised and participate actively in rural development through well-established grassroots associations. These associations are effective in mobilising considerable support in rural areas, since people readily identify with projects undertaken to deal with the direct infrastructure problems they face. The use of local resources can encourage local participation, even though communities lack the technical know-how to plan and implement effective programmes of rural road improvement. In addition, incapacity to mobilise adequate financial resources to carry out development projects hinders communities’ progress. Thus developing the construction managerial capacity of the grassroots associations and evolving an arrangement for effective funding within established channels, including local contributions in cash or in kind, can influence the community to become a powerful agent for its own development.

12.1.2 Labour availability

The unrealised scope for employment generation to utilise surplus labour is among the key outcomes of this research. Table and figure 3Qs represent the labour surplus in Nigeria’s three regions, chosen from the selected States and LGAs of the country. An official record released by the Federal Office of Statistics and the State planning authorities indicated that, the unemployment rate for one LGA was as high as 20% (at
least one in every five) all year round during 1988. However, an assessment of labour availability (UNDP/ ILO 1998) in the same LGA revealed a labour surplus of about 800,000 workdays in nine months, as a representation of the component of the labour force that was redundant due to unemployment and underemployment (labour increased due to non farm sector’s demand). Considering the total number of LGAs in the country (774), the two appraisals above is a conclusion that, Nigeria’s labour surplus situation offers sufficient scope for a substantial increase in the use of labour-based techniques for road works. It is apparent that employment creation would be an important positive impact of applying labour-intensive techniques.

12.1.3 Use of local contractors
Some indigenous construction companies have thrived in the harsh business climate of the Nigerian construction industry by their effectiveness and responsive managerial drive for success. Many other local contractors can successfully manage road maintenance if the enterprise culture in them is allowed to thrive. In various projects with which the ILO is involved, petty contractors are used to carry out routine maintenance tasks. Many such tasks can be effectively carried out by petty contract if simple contract award, monitoring and payment procedures are adopted. As explained in chapter eight (pages 165-170), the support needed should be in form of business orientation courses and a skill monitoring and development centres in form of Nigerian Construction Industry Training Centre and prioritising these training courses in the tertiary institutions of higher learning. This should be complemented with devolution of power to allow private participation in local projects. Similarly, state enterprises (e.g., DLOs) should be split into commercial companies with clear operational objectives- like road management companies and plant hiring companies. Splitting the DLOs would improve access to light equipment by the private sector (local communities and contractors).

12.1.4 Use of local Resources
The idea of using local resources for the development of rural roads has gained considerable support in recent years. However, there remain many obstacles which keep Nigerian practitioners from modifying traditional methods. This has various implications for the inception and implementation of local-resource-based programmes.
In Nigeria, where equipment and spares have to be procured outside the country, thereby draining the scarce foreign exchange, the choice of labour based methods has obvious attractions. Consequently, the long term objective of Nigeria's roads programme should be to develop further labour intensive techniques in roads construction and maintenance. This will ensure the use of the local resource of labour, effectively and efficiently. The introduction of local resource use on a pilot scale has shown that all normal constructional works, and maintenance activities (particularly roads) can be undertaken by labour with limited equipment support (ILO/UNDP, 1986).

Normal road construction activities are now carried out in rural areas by workers using simple and locally manufactured tools. Intermediate equipment is required for some activities such as gravelling of the roads, which is undertaken using tractors and trailers for haulage, while excavation, loading, and unloading and spreading is done by the workers as shown in chapter four. Although the use of labour-based methods in road construction and maintenance is a developing technology in Nigeria, the government has established ways of tackling the issues constraining its application. These include the establishment of DFRRI as a unit attached to the office of the president, with units attached to the states governors offices in all the States of the federation, as well as attached to the offices of the chairmen of local government areas to serve the grassroots level.

However, to make labour-based methods acceptable for the Nigerian environment, a system of advisory consultative and implementation committees at Federal, State and LGA levels respectively, plus the local communities in rural areas, should come together and unanimously agree on certain issues that hinders the development of infrastructure in the country. With assistance from the UNDP/ILO programmes via the NDE, the well established training activities in the country, if properly linked with those organisations / institutions who are directly or indirectly involved in the planning and implementation of rural infrastructure works, would make the programme feasible. This approach will provide an access to the appropriate channels through which the information, the data or the analysis of the data on the labour-based/light equipment-supported rural infrastructure works can be disseminated. These channels can also provide feedback which can benefit the Training Programme.
12.1.5 Manpower and Development

To accord the manpower and training functions a befitting prominence and management attention, road agencies need trained officers that can invigorate the manpower planning and management function and the associated training activities. Construction industries are expected to look after their training needs; indeed it occurs in the more developed countries, where public works departments, particularly their maintenance and workshop establishments, are a traditional source of experienced personnel. In Nigeria, Federal government once adopted a similar approval known as Training Production Units (TPUs), established during the colonial era for road construction and equipment repair and maintenance. The units had been operating under the State Ministries of Works as semi-autonomous force, completing work while training personnel. But the system was abandoned owing to the country’s oil discovery in the 1970s.

Nigeria has made a hesitant start in adopting labour-based methods, since the country’s recent political instabilities intensified in 1993, resulting in abandonment of the organisation responsible (DFRRI) to set up, fund, and operate the training system. The withdrawal of DFRRI has seriously impeded the dissemination of appropriate technology for construction to technical personnel to commit themselves to labour-intensive technology and to work in remote parts of the countryside. This is particularly true for professional engineers, who are in ample supply in Nigeria but who have not been trained in labour-intensive work which is economically viable and socially desirable. This is caused by Nigerian institutions spending a significant part of their time training engineers in modern technology, so that they are reluctant to apply the less sophisticated labour-intensive methods in construction.

12.1.6 Educational Curriculum

Attitudes are formed by education and experience, with the former often conditioning the latter. At present the educational principles of local resource use are not widely taught in the educational institutes of Nigeria. Hence, the challenge now is to move the debate on the choice of technology and measures from the text books to the classrooms of the educational institutions in the country. To ensure that the labour-based/light equipment-supported rural infrastructure development approach becomes domiciled in the country, it
is necessary that the curriculum system and mode of training in the institutions of learning become models for such a development approach and also serve as training grounds for the eventual nation-wide expansion of the approach. This strategy should have a base in the secondary structure and then follow a pattern of developing to the tertiary system. This will ensure the local communities scattered in various parts of the country benefit from the training scheme.

12.2 PRACTICE OF ROAD MANAGEMENT IN SOKOTO STATE (case study area)
Sokoto is one of the 36 states that comprise Nigeria. The knowledge of practice of road management in Sokoto is broadly representative aspect of other Nigerian states. Sokoto, as in most Nigerian states, in recent decades has suffered from deteriorating economic conditions, exacerbated by a crippling scarcity of foreign exchange. Its main asset is an abundant supply of cheap labour, and like all the northern states, it is distant from the coast. Roads provide the principal mode of access, and are a key factor to trade, industry and social development.

Figure 12A- Four tiers of government concerned with rural road development in Nigeria.
The system for management of roads in Nigeria as described earlier (chapter six) is complex, since the responsibilities are split between three formal tiers (federal, state and local) and one informal tier as illustrated in Figure 12A above.

The road networks in Sokoto consist of two classes of roads, the remnants of Trunk B roads (secondary roads), which provide important links to the Federal trunk roads (Class A), and the tertiary roads (Class C) transferred from local government councils and incorporated in the state road system of primary roads. Sokoto State has a road network of 2,628 km in total, of which 558 km (21 per cent) is tarred. The conditions of these roads are described as 50 per cent 'good', 25 per cent 'fair' and 25 per cent 'poor' (FMW&H, 1988)1.

These roads range from engineered two-lane asphalt surfaced roads to dry season earth tracks. In order to effectively sustain these networks a reasonable amount of financial resources would have to be allocated to maintenance, backed up by the availability of trained and experienced staff in the State Ministry of Works and Transport. Neither condition is currently fulfilled.

Sokoto used to be among the states with the best roads in the country (less than 25 per cent in poor condition), owing to a large investment in new roads. Accordingly, the state now faces a heavier maintenance burden and would require a major reorientation of its road expenditure priorities to preserve this investment. The capacity for road maintenance in the state is weak, and has grown even weaker in recent years. Poor funding has resulted in limited capacity in the State's road organisation.

Allocation of funds to road maintenance varies between the government in power and its spending priority. The trend in allocated funding by the State over the past five years reveals the degree of neglect. The sharp cut in road expenditure from 1995 onward is reported in table 6C, page 140 of this report.

Road users in Sokoto as in most other states face serious transport problems as a result of this inadequate funding, especially in rural areas where it acts as a constraint on economic activity as well as on social development. The drudgery and waste of time associated with long hours spent walking and carrying loads would have made a

substantial contribution to increasing agricultural productivity, while enhancing the welfare of rural dwellers.

12.3 INSTITUTIONAL DEVELOPMENT

Considering the critically monopolistic circumstances of road supply in Nigeria, to achieve optimum balance between service to consumers and the ability to finance service quality, economic regulation of the road industry is considered to be essential. Economic regulation here implies to a system of road funds, “bringing roads into the market place, putting them on a fee-for-service basis and managing them like any other business enterprise” (Miles and Abubakar, 1998) which requires a set of four complementary reforms as below:

- Create ownership by involving road users in management to win public support for adequate funding and control of road agencies.
- Establish an adequate and stable flow of funds.
- Establish a clear organisational structure and assign clear responsibilities.
- Introduce sound business practices and strengthen managerial accountability.

This regulation would be extremely desirable on rural roads, as they have suffered from neglect and as such lack proper maintenance. The research also suggests the adoption of a toll collection methods in order to provide for their maintenance. Such regulatory arrangements have not been developed on rural networks, but are currently being practice on the country’s federal highway systems. Currently, rural roads are subject to three tiers of governance, with different provisions of administrative and operating frameworks. However, whilst each level has the power to enter into contract agreement with the private sector, rural road remains firmly in the political arena with many conflicting schedules ignoring the beneficiaries’ demand.

---

Consequently, addressing the problems of institutional development in the road sector requires a high level of political commitment, strong in-country leadership and political decisiveness from all the tiers involved. Equally it is essential to have a strong political but democratic leadership that can foster interest groups and internalise their effects within government forces. A democratic leadership with a real mandate, and equal representation at all levels, could be more responsive by carrying out an institutional appraisal and taking cultural issues into account.

From the comparisons of enterprises (chapter 11) it appears that, the healthiest situation for Nigeria may be for both public and private approaches to play a part in order to provide competition and a basis for performance comparison. Rural roads (LGC’s) unlike State and Federal highways, are a special case, requiring special attention to their unique features, and taking into account the regional disparities, political, and cultural context of Nigerian regions.

12.4 CHOICE OF TECHNOLOGY AND AFFORDABILITY

Chapter eleven proposes various ways of choosing projects, and their methods of execution, choice of technology, and the relative advantage of implementation by the public and the private sectors. Comparisons of various alternative approaches were carried out using some essential components to establish the differences and the gaps that exists in the systems. These gaps, as demonstrated in tables and figures 11 D, E, F and G (pages 222-226), account for the systems positive and negative social ramifications. The benefits (positive or negatives) could be either of short-term or the longer terms effects and the multiplier effects to both the local communities and the government at large.

The two diagrams (12A and 12B) reproduced below illustrate attempts to enhance the rationality of the process of technology choice by means of pathway analysis. In any given set of circumstances the choice of technology is conditioned by a number of factors, such as design, site conditions, availability and the cost of the different approaches. The illustrations in figure 12A represents the views of two ILO staff members, the place of these factors in the decision-making process (Edmonds and De
Veen, 1992)\(^3\), whereas the illustrations in figure 12C is a South African variant of the same line of thought (Phillips et.al. 1994)\(^4\). The rebuilt diagrams (12B and 12C) conform with Nigeria’s custom, and as such summarises the contents of the research on choice of technology. Nigeria is strongly restricting importation of foreign goods, which have resulted in their becoming extremely expensive (both because of their scarcity and because of the depreciation of local currencies). The effect on the civil construction and maintenance sector, with its marked dependence on foreign inputs such as spare parts for heavy equipment, has been and continues to be devastating. One striking consequence for the development effort has been the emergence of severe transport constraints in rural areas, because of the poor state of the road networks and the high maintenance costs of conventional vehicles.

There is a growing appreciation that roads are only part of the solution to the transport problem of rural population in Nigeria. A proper appreciation of the full range of transport needs in rural areas is therefore vital if the scarce resources available are to be used to the best effect. The reality of transport in Nigeria is that people who live in rural areas spend a considerable amount of totally unproductive time and effort obtaining access to the most basic services. This lack of access to economic and social services, and also to information, social and political discourse, and employment opportunities, ensures that communities remain in poverty. Figures 12B and 12C are the illustrations of decision making regarding technology choice and its appropriate design. The illustrations are demonstrated by the method of pathway analysis in pages 240, and 241.

---


Figure 12B: Pathway Analysis Illustrating Decision Making Process Regarding Technology Choice

Design Suitable for Labour-Based approach?

No

Can changes be made?

No

Yes

Site conditions suitable for labour?

Yes

Partly

Determine appropriate mix of labour and machines

No

Is labour available?

Yes

No

Assess wage rates and incentive schemes

Positive change possible

No change possible

No (*)

Is labour motivated?

Yes

Can targets be met by labour-based methods?

Yes

Possibly

PILOT PROJECT

Performance regarding:
- Quality
- Training
- Management

Negative

Use equipment-intensive approach

Positive

Use labour-based approach

Make financial and economic analysis

(*) Based on actual performance/comparison between labour-based and equipment-intensive alternatives

Source: The figure is adopted from Edmonds and de Veen 1992.
Figure 12C: Pathway Analysis Illustrating Decision Making Process Regarding Appropriate Design for Technology Choice

Are Appropriate Designs Prepared for Labour Intensive Construction?

Yes → Research Requirement → Alternative Designs Created

No → Research Requirement

Separate into Activities

<table>
<thead>
<tr>
<th>Research Requirement</th>
<th>Unknown</th>
</tr>
</thead>
</table>

Is it Physically Possible to Use Labour Intensive Techniques for the Activity?

Yes → Possible Reasons:

- Material Too Hard for Hand Excavation
- Impossible to Compact by Hand

No → Would Labour Intensive Methods Meet the Standard?

No → Rectifiable before the Project Begins?

Unknown → *Develop Improve Labour Intensive Methods

*Improve Admin. Supervision, Management Capacity

*Training

*Increase Amount and Productivity of Labour

*Modify Specifications, Institutions

Yes → Labour Intensive

No → Machine Intensive

Can Completion be Delayed?

No → Passes Socio-economic

Passes Financial

Fails Socio-economic

Passes Financial

Conventional Construction

Specify Degree of Labour-Intensity in Tender

Passes Socio-economic

Fails Financial

Conventional Construction

Specify Degree of Labour-Intensity in Tender

Award of Tender; Project Implementation

Evaluation and Monitoring

Source: From Phillips et al. 1994
12.5 RECOMMENDATIONS

Recommendations as in the conclusions are divided into sections:

Education as the challenge for change, the study's principal messages on education are:

- The local training institutions in Nigeria must seize the initiative in order to provide services to the public in conformity with the local needs, for the purpose of achieving a stable society through the use of local resource techniques.

- The institutions should make an undertaking on self-study that updates their mission statements, and build the internal consensus needed to undertake reform.

- Greater institutional autonomy is essential, particularly in financial administration, in order to encourage a more entrepreneurial approach, to provide the incentives necessary to encourage quality performance and management efficiency.

- More professional management through staff training and development to encourage a greater reliance on local resource technological systems is the best strategy for freeing resources (via improved efficiency) to meet institutional needs.

- Local institutions must invest in themselves in order to remain viable centres of higher learning; this means that they must provide yearly budget allocations for educational materials, library acquisitions, research, staff development, and equipment.

- Managing the social infrastructure services is best achieved by expanding the access to educational system to constitute public and private institutions, with the support from NGOs, and private sectors, to narrow their diverse missions in order to offer students a range of choices relevant to public needs.

- The most useful role for donors is to support the development of long term institution-building strategies. Activities consistent with this approach should include efforts to strengthen and professionalise management, and research on local resource use.

- In settings of acute institutional deterioration, donors should consider contributions towards recurrent costs, particularly for educational inputs, library acquisitions, equipment and efficiency-enhancing operating expenses.
If appropriate economic models and fresh directions for development are to be crafted by Nigerians, attention has to be paid to local resource utilisation through endorsement of locally made tools in our construction works. The challenge to the local institutions is to find ways of accommodating as well as modernising them to effectively suit the academic institutions curriculum.

12.5.1 Institutional Reforms

The study’s principal messages on institutional framework require:

◊ an advisory body comprising representatives of Government agencies involved in rural development, the Nigerian Society of Engineers, the Nigerian institutions of learning and private contractors put in place to deliberate on future development of Nigerian roads and other infrastructural works through local resource use.

◊ the division of these body to have representation at Federal, States, LGCs, and at the Community levels, in order to reflect the project structure.

◊ to have representative centres with a training unit to work closely with the advisory body and the local communities.

In Sokoto State however, a consultative committee is recommended to be established with the following composition:

a) State officers of Ministries of Works, Agriculture and Rural Development.

b) The State Agricultural Development Project (ADP)

c) Agency for Rural Development (ARD)

d) Sokoto River Rima Basin Development Authority (SRRBDA) Engineers

e) Representation from the office of the Secretary to the State Government, and

f) the NDE representative.

12.5.2 Local Government Level Reforms

The Local Government Area (LGA) level will constitute the implementation level. As such, close co-operation of Government agencies staff and local communities’ is of paramount importance for the effective transfer of know-how. Considering this, each LGA is required to have an implementation committee made up of the following officials:

a) Secretary to the Local Government

b) Community Development Officer
c) Planning Officer

d) ADP Representative and
e) the NDE representative

The terms of reference for the committees are as follows:

12.5.2.1 The Advisory Committees

The advisory committees will serve as the policy-making bodies with regard to the implementation of the labour-based/light equipment supported programmes, and the coordination of the implementation of road projects. The advisory committees should devolve responsibilities to involve all stakeholders at various levels of the communities in order to:

* Identify specific areas in which committee members representing various agencies can assist in promoting the effective implementation of the programme and propagating the labour-based/light equipment-supported method of construction.

* Lay down guidelines for the effective involvement and participation of all member agencies of the advisory committees for the smooth propagation of the labour-based/light equipment-supported method of construction.

* Review the progress reports of the Project Management Team and make recommendations to the appropriate Government agencies to effect necessary modifications to their systems and procedures to remove constraints and impediments on the adoption of labour-based/light equipment-supported methods of construction, rehabilitation and maintenance of rural road works.

10.5.2.2 Application in Sokoto State

The State Consultative Committee in Sokoto State will:

* Identify specific areas in which committee members representing various State agencies can assist in promoting the effective implementation of the programme and in the dissemination of the labour-based/light equipment-supported method of construction and lay down guidelines for their compliance.

* Identify constraints in the propagation of the labour-based/light equipment-supported method of construction in the State and make recommendations to the Secretary to the
State Government and members of the advisory committee on measures for the removal of the constraints.

* Monitor the impact of the implementation of the programme in the State and make reports and recommendations to the Secretary to the State Government and the members of the advisory committee as appropriate.

* Receive reports and recommendations from the Local Government Implementation Committee of the programme and take necessary action to implement recommendations as appropriate.

12.5.2.3  Local Government Implementation Committee (LGIC)

The LGIC will be responsible for the implementation of the programme and will:

* Lay down the order of implementation of the projects under the programme.

* Monitor the progress of the implementation of the infrastructure sub-projects from time to time and evaluate the level of success achieved both in physical and socio-economic terms and report to the appropriate committee.

* Identify constraints and impediments in the process of implementation and explore ways and means of removing same for smooth expeditious implementation of the project.

Make reports and recommendations to the LGC and the SCC as appropriate in respect of dissemination of experience to other LGAs in the State.
LIST OF REFERENCES


Ashong, E.N.K., 1995. The Labour based programme in Ghana; Facts and figures as at December, by the national co-ordinator, Accra - Ghana.


Author, 1995. Field work study, a physical interview with the Engineer in charge of rural road’s development, SADP, Sokoto State - Nigeria.


Infrastructure works - held at the Gateway Hotel, Ijebu-Ode, Ogun state on 6th May, by National Directorate of Employment - Lagos, Nigeria.


Enock, M., 1990. Third World Engineer's Dilemma. Technology transfer or technology development, by University of Dar-Es-Salaam, Tanzania.


249


ILO/UNDP, and NDE, 1992. The development of effective management capacity in the implementation of labour-based projects in both the public and the private sectors, a sponsored meeting by National Directorate of Employment, Lagos - Nigeria.


Loughborough University 1994. Author’s Msc Lecture notes WEDC, Loughborough University, UK.

Loughborough University 1995. Author’s Literature Review, Loughborough University, UK.

Loughborough University 1995. Lectures and guides on how to carry out research studies for newly registered Ph.D students.


252


Ministry of Works and Transport, 1997. Civil Engineering Department, Road Maintenance Unit, Sokoto state - Nigeria.


WB, 1997. World Development Indicators; The World Bank, U.S.A


Welbank, M., 1987. Perspective on Knowledge Acquisition, proceeding of SERC workshop on knowledge acquisition for engineering application.


Appendices

This section contains the appendices, which includes questionnaires used in the survey (appendices 1, 2 and 3), the research proposal for the establishment of a sustainable routine maintenance system on rural roads in Sokoto State (appendix 4), and the collaborative agreement system between the government, Communities and the Local Contractors. The proposals were drawn from the research findings of some specific problems in the practices of road maintenance, and the study has since suggested areas that need to be improved. The main way of collecting this information is by asking you (local people) questions, and your answers to these questions may constitute the data to be analysed. Remember, this is a chance for you to be heard, your problems will be known and possibly attends to. Survey is the only way to measure your concern and worries in this regard and only a good survey research can provide adequate data, therefore think carefully before answering the questions.

In the cause of collecting the data, different questions were asked by the researcher and his team mates to (respondents) residents of the area. The respondents include the government and non-government agencies and the beneficiary communities etc. As the majority of the population in this region are illiterates, questions in the language they understands were asked.

Interviews were also conducted considering that, many found it easier and convenient instead of self administered questionnaires. Among those respondents to questionnaires and also interviewed include the following:-

- Clients or Client's project managers
- Contractors or their representatives
- Engineers or Clerks of work
- Labourers, Drivers and the Local communities
- Road users or general public
- Passengers, Bus owners and their managers
- Governments owned mass transit services
- Private owned transport organisations
- Farmers and Trade enterprises
QUESTIONNAIRE AND INTERVIEW SURVEYS

The following texts and tables are the samples of the questions asked during the cause of the research survey (appendices 1, 2 and 3).

Dear fellow citizens,

We are currently investigating various factors affecting road maintenance (particularly rural) in this region. Your co-operation in answering this questionnaire will be of great help to the research findings.

Please write your name and type of profession or employment in the space below:-

<table>
<thead>
<tr>
<th>NAME:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PROFESSION:</td>
<td></td>
</tr>
<tr>
<td>AGE:</td>
<td></td>
</tr>
<tr>
<td>QUALIFICATION:</td>
<td></td>
</tr>
<tr>
<td>ORGANISATION: OR LOCAL GOVT. AREA:</td>
<td></td>
</tr>
</tbody>
</table>

Thank you
Appendix 1

Questionnaire to determine the extent to which discussions on choice of technology and local resource utilisation are reflected in academic curricula of civil engineering departments of Universities and Polytechnics in Nigeria.

1. Name of Institution .................................

2. Name of Respondent .................................

3. Designation of Respondent ..........................

4. Academic Staff Strength .............................

5. Student Population in Civil Engineering Department ....

6. Briefly describe the process of introducing new topics into the existing academic curricula of your department (attach separate sheet if necessary) ..........................

7(a) Is your department aware of the new National Construction Policy approved by the Federal Government in 1991? Yes/No

(b) If yes:
   (i) Do you consider it relevant to introduce the document to your students by incorporating its study into any of your existing courses? Yes/No
   (ii) What is being done to reflect the new National Construction Policy in the academic curriculum?

8(a) Do you have any course(s) on construction technology? Yes/No

(b) If yes, please give some details on its content (use separate sheet(s) if necessary) .................................................................................................................................

9(a) Do you have any course(s) on local resource utilisation? Yes/No

(b) If yes, please give details........................................................................................................

10. Which other departments do you cooperate with in teaching students of civil engineering department? ..........................................................................................
## Appendix 2

Aim at:

### NEED (in km)

<table>
<thead>
<tr>
<th>DISTRICT/LOCAL UNIT</th>
<th>CONDITION</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GOOD</td>
<td>FAIR</td>
<td>POOR</td>
<td>TOTAL</td>
</tr>
<tr>
<td>PAVED</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRAVEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EARTH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAVED</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRAVEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EARTH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAVED</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRAVEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EARTH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CAPACITY

<table>
<thead>
<tr>
<th></th>
<th>DIRECT LABOUR</th>
<th>CONTRACTORS (LOCAL)</th>
<th>COMMUNITY</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUMAN RESOURCES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technicians</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foremen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charge Hands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casual (range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQUIPMENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other mechanical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tipplers/trucks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pick-ups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand tools</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shovels</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diggers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rakes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutlass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Require separate forms for each Local Government Unit within each District in Sokoto State:

a) For Direct Labour
b) For local contractors - To be interviewed separately based on their other related business activities, so as to know how they would view road maintenance in connection to their speciality.
C) Community - To include questions on willingness to:
   (1) pay for road services and
   (2) contribute work by local labour, or by other means possible.

QUESTIONNAIRE FOR ENGINEERS

1) Please fill in the type and years of Engineering or technical experience you have had, if any:-

<table>
<thead>
<tr>
<th>a) Field of experience</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Years of experience</td>
<td></td>
</tr>
<tr>
<td>c) Organisation</td>
<td></td>
</tr>
<tr>
<td>d) position</td>
<td></td>
</tr>
</tbody>
</table>

2) What is the total length of road network under the responsibility of your Road authority? ......................KM.
Of these, how many kilometres are bitumenised? .............................................KM
And how many kilometres are Earth / gravel? ................................. KM

3) What is the approximate length of road network under the responsibility of other road authorities (e.g. Local Community, Local Government, State and Federal Governments) within your boundary?

a) Local Community ....................... KM
b) Local Government ...................... KM
c) State Government ...................... KM
d) Federal Government ................... KM
4) What are the minimum standards (geometric design) in terms of Width, Gradient (slope), and Alignment of the two categories of roads under your road Authority?

a) Bituminous or Paved road

b) Rural or Feeder roads (Earth roads)

You have the option to choose out of the following approximation made below and if none of them correspond to your practices, please give your own figure:

a) BITUMINISED:-

<table>
<thead>
<tr>
<th>PAVED ROAD WIDTH (approx.)</th>
<th>GRADIENT or SLOPE (paved)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12m, 7.2m, 6.4m, 4m or 3.4m</td>
<td>12% = 12m in every 100m</td>
</tr>
<tr>
<td></td>
<td>08% = 8m in every 100m</td>
</tr>
<tr>
<td></td>
<td>06% = 6m in every 100m</td>
</tr>
<tr>
<td></td>
<td>None of the above,</td>
</tr>
<tr>
<td></td>
<td>but we use ..................</td>
</tr>
</tbody>
</table>

b) RURAL / FEEDER (Earth):-

<table>
<thead>
<tr>
<th>RURAL or EARTH ROADS (width)</th>
<th>GRADIENT / SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2m, 5m, 3.2m, 2.5m</td>
<td>Heavy gradient</td>
</tr>
<tr>
<td></td>
<td>Light gradient</td>
</tr>
<tr>
<td></td>
<td>4% or 1 in 25</td>
</tr>
<tr>
<td></td>
<td>6.7% or 1 in 15</td>
</tr>
<tr>
<td></td>
<td>None of the above,</td>
</tr>
<tr>
<td></td>
<td>but we use .......</td>
</tr>
</tbody>
</table>

5) What are the size (in total) of the rural roads under your organisation?

Bituminous ........................................... KM

All whether access / Feeder roads ..................... KM
6) What is the range of minimum number of families in the rural Villages to be served by these feeder roads connections to the main network?

A  B  C  D  E
20-30 30-50 50-80 80-100 100 & Above

7) What length of kilometres or how long will it be from the existing network of State or Federal highways passing near by?

A  B  C  D  E
5-10 km 10-15 km 15-30 km 30-40 km 50 & Above

8) How would you rate the condition (between the two categories) of these roads?

For Paved / Bituminised;

a) Excellent means newly constructed Paved roads age between 1-5 years.
b) Very Good means roads within the First initial phase of their life cycle.
c) Good means Second phase of their life cycle.
d) Fair means roads within the last phase of their life cycle.
e) Poor are roads outside the life cycle phase (phase of increasing deterioration).

And for Gravel / Feeder roads;

a) Very good are roads built quite recently 
b) Good are roads where minimal work of vegetation and drainage clearing is carried out regularly. 
c) Fair are roads where regravelling is required but are still in fair condition. 
d) Poor are the roads where all maintenance activities are neglected.
9) What activities are carried out as maintenance?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regular &amp; frequent</td>
<td>Occasionally</td>
<td>Rarely</td>
<td>Not at all</td>
<td>Not provided.</td>
</tr>
<tr>
<td>Regravelling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert repair</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drainage clearing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10) What method or techniques do you apply in maintenance procedures? Please list equipment used.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Heavy equipment</td>
<td>Light or labour based</td>
<td>Community participation</td>
<td>A mix of ... and ...</td>
<td>None of them</td>
</tr>
</tbody>
</table>

11) How do you manage the road maintenance work?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct labour operation</td>
<td>Contracting</td>
<td>Community participation</td>
<td>A mix of ....and...</td>
<td>None of them</td>
</tr>
</tbody>
</table>
12) How active are women in road maintenance programme based on the following roles?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Decision making level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Engineering and Supervision work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Small / large scale Contractor group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Direct labour (physical participation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Community mobilisation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13) In order to find out the availability of labour in this region, what number of people do you think could possibly be raised for the maintenance activities if at any time required?

a) 10 people  

b) 50 people  

c) 100 people  

d) 150 people  

e) 200 people  

e) over 200 people

14) What time of the year is best for programmes such as, , or and why?

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainy season</td>
<td>Dry season</td>
<td>Cold season</td>
<td>All year Round</td>
<td>None of the seasons</td>
</tr>
</tbody>
</table>

Culvert work
Regravelling/
Resurfacing
Reconstruction

A: because.....
B: because.....
C: because.....
D: because.....
E: because.....
15) In your opinion, to what extent is labour-based infrastructure construction or maintenance (e.g. roads) methods appropriate for this region? with regards to:

a) Employment generation
b) Beneficiary participation
c) Encouraging Small Scale Contracts
d) Cost of labour, equipment, operation and maintenance
e) Benefit to the general public and your organisation in particular.

A  B  C  D  E
100% 75% 50% 25% 0%

QUESTIONNAIRES FOR AREAS WHERE LABOUR BASED TECHNIQUES HAD ALREADY BEEN INTRODUCED.

1) How far has the concept of labour based methods for rural road programme been appreciated by government and public (beneficiaries)? In terms of:
   - Cost saving to government
   - General benefit to public
   - Benefit to road users/passengers
   - Benefit to transport owners
   - Vehicle operating cost.

A  B  C  D  E
Very well  Good  fairly  Not appreciated  Don't know

2) Tell me whether you agree or disagree with the following statements:
   a) The government policy on rural road programme is showing great concern towards the use of local resource for its implementation.

X
b) Government is assisting the community with equipment and technical manpower, while the community carry out the work themselves.

c) Government or Agency carry out the work themselves, with out consulting the beneficiary community, therefore the community cannot maintain the road.

d) The community are helping themselves, therefore maintenance is there responsibility.

e) The whole programme was financed and administered by donor agency, and now the problem lies with the maintenance.

3) To what extent is labour based methods appropriate in your area? With regards to:

- Availability of local resources
- Availability of technical manpower
- People's attitude and acceptance of the programme
- Employment generation
- Local economy upgrading

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>75%</td>
<td>50%</td>
<td>25%</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

4) What are their potential role for progressing in the region?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfect</td>
<td>Viable</td>
<td>Not quite applicable</td>
<td>Not applicable</td>
<td>Don't know</td>
<td></td>
</tr>
</tbody>
</table>

5) What are the main obstacle for reaching their potential(constraints)?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional</td>
<td>Financial</td>
<td>Technical</td>
<td>Environmental</td>
<td>Attitude</td>
<td>All of them</td>
<td></td>
</tr>
</tbody>
</table>
6) How can this obstacle/s be eliminated or at least be neutralised?

A   B   C   D   E   F
Management Financial Educating Community Public Others
courses support personnel participation awareness
e.g. Policy makers should be aware of the problems, Financial commitment to the programme, Educating both technical staff and community on the importance of the programme.

PERFORMANCE:

7) The choice of technology is:

A   B   C   D   E
Quite Appropriate Less appropriate Not appropriate at all Don't appropriate
know

8) The workers and Supervisors are motivated in providing their expected inputs.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well motivated</td>
<td>Motivated</td>
<td>Less</td>
<td>Not motivated</td>
<td>Don't know</td>
</tr>
<tr>
<td></td>
<td></td>
<td>motivated</td>
<td>at all</td>
<td></td>
</tr>
</tbody>
</table>

9) The project has not managed to reach its planned production targets due to:
A :- Lack of management responsibility.
B :- Lack of Technical Man power.
C :- Lack of Funds.
D :- Contractors fault.
E :- None of the above.
F :- Suggestion/ Don't know
10) The maintenance of Rural roads by Local Governments is difficult due to the following failures.

A: Lack of resources
B: Weakness of its organisations/lack of appropriate works authorities.
C: Lacking in sense of project "ownership"
D: Inadequate co-ordination of efforts between different tiers of Government.
E: Inadequate Financial support.
F: Suggestion/Don't know.

ASSESSMENT OF THE PROJECT

Please rate the following aspects of the project giving a score from '1' (low) to '5' (high);

1). Overall opinion about the labour based programme  ..................

If you have scored less than '3' please answer yes or no to the following questions:

Was your low score because of;

a) Difficulties in understanding the programme? .....................
b) Not enough time for making decision? .....................
c) Not satisfied with the questionnaire's briefing and introduction .....................
d) Did not appreciate the relevance of the labour based method? .....................
e) Other reasons please specify .................................................................

VALUATION OF LABOUR-BASED METHOD AS A SUSTAINABLE MEANS FOR RURAL ROAD INFRASTRUCTURE:

How many programs in terms of labour based are currently operating in your region?

What are or is their priority of execution?

1) Is it training of contractors?
2) Is it training of local people?
3) Is it training of staff?
4) Is it construction or maintenance?

5) Say your comments

Please give a score from (1 to 5) to the following:

1) Value of labour based method of road maintenance as a sustainable resource ......

2) Value of the programme as employment generating source ......

3) Value of the programme as to encouraging team work ......

4) Value of the programme to promote the interests of Government / Donor agency and the community. ......

Please give a score to any areas that you think need improvement;

1) Organisation/Management

2) Technical aspect

3) Financial management.

4) Community behaviour.

5) Suggest any other area not mentioned

3). RELEVANCE OF LABOUR BASED PROGRAMME;

Please answer 'yes' or 'no' to the following:

a) Do you feel that labour based method has improved the environmental aspect of road maintenance?

If yes, please explain how, briefly

b) Which area of decision making did you find was most appropriate to handle road maintenance and why?

XIV
TO BE ANSWERED BY THE TARGET BENEFICIARY.

(communities in rural areas especially).

1) Do you hold any traditional title or belongs to any social club in the community? If yes, what is the title or the name of your social club?

2) Have you been to school? If yes, What level of education have you reached?

   A    B    C    D    E
   University    Advance Level    Secondary    Primary    None

3) Do you have a formal / informal job?

   Yes    No

4) What period of the year are you likely to get job?

   A    B    C    D    E
   Rainy season    Dry season    Cold season    Any time    None

5) What kind of job is commonly available?

   Office work (prominent)    Physical labour (temporal)

6) Who is / are responsible for the maintenance of roads in your area.

   A    B    C    D    E    F
   Federal    State Govt.    Local Govt.    Local    Nobody    Don't know
   Government    Community

7) What makes roads difficult or impassable in your area? Is it:

   XV
a) Culverts  b) Weather  c) Total neglect  d) Poor construction

8) How could you contribute on your own in a community managed programme?
   Is it by:
   
a) Food  b) Transport  c) Money  d) Drinks  e) Tools  f) Physical participation

9) Is there availability of light equipment in the area? Such as Tractors, Trucks, Pickups, Roller, Grader, Trailers, e.t.c

   A   B   C   D   E
   Quite    Moderately    Very scarce    Not available at all    Don't know available

10) What is the potential for local manufacture of local tools? Such as Hoes, Shovels, Rakes, Wheel barrows, Digger, Hammer and Axes e.t.c.

   A   B   C   D   E
   Quite high    Moderate    Fairly    Low    Very low

11) What can you say about the approach by the policy makers at the Federal / State and Local Government levels in rural development programme?

   A   B   C   D   E
   Perfect    Adequate    Less adequate    Not adequate    Very poor
GENERAL INTERVIEW COULD BE FORMAL OR INFORMAL.

1) Do you think labour based method of construction and road maintenance has any relevance in this region and can possibly exist?
   YES          NO
   Why Yes?      Why not?

2) Looking at the prospect of labour based system of road maintenance in this region but your organisation in particular, what do you think should be management policy towards its implementation?

3) What role do you think road maintenance can play towards communication and integration of communities in this region?

4) What can you say about the relevance and implications of labour based method of road maintenance with regards to promoting or demoting small scale industry and its impact on the society?

5) What is your reaction to the present move by the government to encouraging self-reliance through the use of local resource and labour based methods of construction?

6) In other words, do you think a local government is capable of handling the responsibilities of maintaining the roads under its jurisdiction?

7) In the light of what you have told me, how can we work towards achieving self-reliance, community participation etc. in this region in general and in your organisation in particular?
8) Judging from the organisations which had implemented the labour based methods in your area or else where, what could be the retrospect and prospect of labour based in this region?

9) What can you suggest to be the best approach toward sustainable development of road maintenance?
   a) Road charging system
   b) Provide funding and allow local community to handle through local monitoring.
   c) Encourage local participation through public awareness
   d) Government and donors should give priority to maintenance
   e) Give your own suggestion

10) For a successful implementation of contracts to benefit the rural population, there must be an option between Direct labour, Contract out to contracting and Community contract etc., for up-grading of roads and small enterprises development; Selecting out of the above options, what procedures in your opinion will be adapted in order to deliver the services?

   You may consider awareness, Negotiations, Training, Powers and laws in community or any organisation, Payment procedures or disbursement of funds, to help answer the question, but you can have your own views.

11) The kind of education and training that engineers receive certainly has a critical bearing on their attitude to the choice and development of technologies they will induce and operate; What can you say about the present system of universities and technical institutions in Nigeria concerning their training aspect?.

   To employers:
   a) Do you think they come out with the knowledge you need?
   b) Do you spend money in training them again?
   c) If I may ask in what range please?
   d) What is the general problem you encounter with them?
To staff and students of higher institutions:

a) What can you say about labour base method of road maintenance?

b) How does it fit in your modules or subjects?

c) Are their up to date training materials for the subject?

d) What are the problems in this regard

e) Give your own comments

12) From your experience in this area and the complaints you might have heard from the transport operators and the local people with regard to the vehicle operating cost, cost to road users, vehicle life, and the economic effect to the region, what can you say about the neglect of road maintenance? Can you possibly suggest any way this could be overcome?

13) Identifying who is responsible for the maintenance of rural roads between Federal, State and Local Governments in most regions in Nigeria have been a matter of serious concern. Your suggestion for an idea of how to bring all the authorities into compliance with an agreed schedule of responsibility would be of great help to the research and development of this area as well.

14) The objectives of this study is to come out with the best applicable means of sustaining the rural road maintenance, introduce labour based method of maintaining the roads and encourage small scale contractors in the region, What do you think are the foreseeable problems and possible solutions to achieving the objectives?
APPENDIX 4

PROPOSAL FOR THE ESTABLISHMENT OF A SUSTAINABLE ROUTINE MAINTENANCE SYSTEM ON RURAL STATE ROADS

The foregoing problem context associated with the maintenance of rural roads necessitates the drawing up of a framework for the establishment of a sustainable routine road maintenance system. Such a system should spell out suitable strategies and procedures that will take into account the necessary institutional arrangements for effective organisation of maintenance works as well as the financial and technical aspects, including training requirement of such procedures.

(1) **Strategy**: The maintenance activities should be simple tasks that can be carried out at relatively low cost and with hand tools/light equipment. The main strategy involves:

(i) generating five year historical records on the maintenance of rural roads. This action is necessary because of the dearth of information on the level of funding, the type and quality of maintenance carried out. This back-up information will greatly assist in the evolvement of a sustainable and suitable maintenance strategy for rural roads.

(ii) developing an operational framework for effectively executing routine road maintenance.

(iii) setting up sustainable demonstration projects on routine road maintenance and spot improvement in selected rural roads in LGAs.

(iv) establishing work plans based on field experiment and experiences gained on the demonstration projects to facilitate replicating the maintenance system in other rural roads in the LGAs.

(v) documenting the experiences gained and disseminating same through seminars.

(2) **Methodology**: In developing a sustainable system for routine road maintenance on rural roads, the methodology to be adopted should ensure that the routine maintenance and spot improvement activities are carried out periodically based on needs, availability of resources and prioritisation of the spots to be improved. This approach should involve the
application of labour-based methods. Against this background, the methods to adopt will include the following;

(i) **Historical Five Year Record on Road Maintenance:**
In generating the historical five year records on maintenance of rural roads, a questionnaire will be developed. The questionnaire will be used to collect the relevant information from the LGAs, ADPs, and State Ministry of Works. The data to be generated will include information on the volume and conditions of existing rural roads (paved or unpaved), level of budgetary allocations for maintenance, actual maintenance funds released and the proportion utilised over the past five years. Other relevant information to be collected include maintenance methods employed and equipment/tools available.

(ii) **Developing an Operational Framework for Routine Road Maintenance:**
The execution of routine maintenance on rural State roads by contracting will be explored. For this, an operational framework which defines the roles of the Local and State Government and the Contractor will be prepared. This contract agreement will also provide technical specifications to be followed in executing routine maintenance activities on rural roads.

(iii) **Establishing a Routine Road Maintenance Demonstration Project:**
In establishing the demonstration project, the feasibility of executing road maintenance activities by contracting will be examined. For this, one rural road within the LGA will be selected. A road register will be established. The capacities of the beneficiary communities within the area of the road will be examined in terms of their organisational capacity, availability of surplus labour and willingness to take responsibility of undertaking maintenance contract on certain sections of the road. Also the use of individual contractors, sourced from the local communities will be examined.

(iv) **Dissemination:**
The experiences gained from the field demonstration project will be documented and analysed. Recommendations will be made to strengthen the capacities of the individual or community contractors to effectively handle routine maintenance of the rural roads. The dissemination can be achieved through seminars and consultations with LGAs, the State Governments and the Community/Individual Contractors.
(3) PRELIMINARY SUPPORT ACTION FOR IMPLEMENTATION

To effectively implement this project as proposed, some documents need to be prepared. This documentation will facilitate the implementation of the project. The documents required are as follows:

(i) questionnaire for collecting the five year technical records on the maintenance of rural road in the LGAs.

(ii) a draft contract agreement between the agency involved Local or State Government and the Individual / or Community Contractors.

(iii) detailed guidelines for establishing routine road maintenance demonstration project in the LGAs.

With these documents in place, the proposal for establishing sustainable maintenance system on rural state roads can be readily implemented.

Appendix A

WORK PLAN FOR SUSTAINABLE ROAD ROUTINE MAINTENANCE SYSTEM

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aug</td>
<td>Sept</td>
<td>Oct</td>
</tr>
<tr>
<td>(1) Preparatory Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Operational Framework</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Questionnaire for historical records</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Collection of Historical Maintenance Records</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Consultaions with LGC and Communities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Training of Grassroot Representatives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Maintenance Demonstration Project</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) Information Dissemination:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Consultation with Community Leaders and LGC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Seminars</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

XXII
COLLABORATIVE AGREEMENT FOR ROUTINE ROAD MAINTENANCE

(Between Local Government Council and Community)

A memorandum of understanding made this ..................... day of ............... 19...... between the .................................. Local Government Council (hereinafter called LGC) and the............................. Community situated in the ......................... LGC and within the vicinity of ....................... road.

Whereby it is agreed as follows:

A) GENERAL

1. The LGC engages the Community to undertake routine maintenance of .......... km of ...................... road from....................... to.......................... 19....

2. This agreement shall be revalidated on a monthly basis for the duration aforementioned subject to the provisions as agreed.

B. SCOPE OF MAINTENANCE WORK

1. The community shall carry out the following tasks
   i. removal of obstruction and debris from the road
   ii. patching of potholes
   iii. repairing small corrugations on the carriageway
   iv. repairing and reshaping of the carriageway
   v. repairing erosion gullies in Drains
   vi. cleaning drains (ditches), culverts, mitre drains, catchwater drains etc.
   vii. cleaning/repairing of drift bed, inlets and outlets
   viii. controlling vegetation on the shoulder and drains; and removal of fallen
branches, trees and placement out of the right of way.

2. The tasks shall be carried out by the community in line with the attached technical specifications in the appendices.

3. The community shall arrange its task force to be headed by a community representative who should be trained.

4. The work plans and tasks to be achieved will be given by the LGC through an appointed supervisor to the community on a monthly basis.

5. The community agrees to conduct maintenance activities at the frequency indicated in the appendix.

C. **TOOLS/IMPLEMENTES**

1. (a) The following tools shall be provided by the Community as its contribution to the maintenance programme.

   i. ........................................................................

   ii. ........................................................................

   iii. ........................................................................

   iv. ........................................................................

1(b) The LGC shall supply the following tools

   i. ........................................................................

   ii. ........................................................................

   iii. ........................................................................

   iv. ........................................................................

   v. ........................................................................

2. Any repairs due on the tools shall be the responsibility of the community

3. The tools from the LGC shall be supplied at the beginning of the project.

D. **SUPERVISION**

1. The LGC shall appoint a supervisor to supervise the Community
2. The supervisor shall determine the tasks to be performed by the Community on a monthly basis.

3. The supervisor shall visit and inspect the work done by the Community at least once a week and the measured work shall be compiled at the end of the month on a prepared format.

4. The community shall comply with the instructions and directions from the supervisor.

E. PAYMENT

1. Where the labour participation on the part of the Contractor is not voluntary, the LGC shall pay the contractor for the work done at the rate of N. per km per month after inspection. This will be based on measured rates as indicated in Annex 1.

2. Payment will only be effected if measured work done on weekly/monthly basis is satisfactory and compares favourably with work plan for the period and as determined by the supervisor.

3. If work is not carried out according to specification, or the community works behind schedule, payment shall be withheld until such a time that the LGC is satisfied that the work has been properly carried out.

F. TERMINATION

1. This agreement shall be reviewed monthly for the whole duration. Every month, the LGC shall give the Community the instruction to progress on the work.
2. In the event of serious misconduct by the community such as persistently working behind schedule, non observance of conditions set herein, refusal or failure to carry out duties herein assigned, or indulgence in any act of dishonesty, the LGC shall terminate this agreement without notice and without any payment in lieu of notice.

3. On termination, all tools and properties belonging to the LGC shall be duly returned. Where the tools are lost or stolen, the community shall reimburse the LGC. For this, the following life span of the tools shall apply.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Life Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel barrows</td>
<td>6 months</td>
</tr>
<tr>
<td>Shovels, axe</td>
<td>1 year</td>
</tr>
<tr>
<td>Machete</td>
<td>6 months</td>
</tr>
</tbody>
</table>

G. OTHERS

1. Any damage to the road or areas requiring spot improvement should be reported to the LGC.

2. The Foreman shall be trained by the LGC on routine road maintenance

IN WITNESS THEREOF THE PARTIES HERETO APPEND THEIR HANDS

Signed, sealed and delivered by:

__________________________
(Name) LGC Chairman

__________________________
Signature/Date & Official Stamp

In the presence of:

__________________________
Witness Name

__________________________
Signature and Date
Signed, sealed and delivered by:

______________________________
Name of Local Community
Representative

Signature/Date and Official Seal

OR:

Signed, sealed and delivered by:

______________________________
Name of Contractor

Signature/Date and Official Seal

In the presence of

______________________________
Witness Name

Signature and Date
This questionnaire has been devised to enable the future training needs and support to be assessed for the labour and tractor based (L-B) roadworks sector on an international basis. In particular, it is necessary to establish the requirements for training government and contractor's staff to implement construction/rehabilitation/maintenance works using the domestic private sector. Guidelines on contract management are also being developed. Your cooperation in completing this questionnaire is much appreciated, and will enable future training needs and support for your Road Authority to be determined.

Please return this questionnaire as soon as possible to:
Claes Andersson, ILO (POL/DEV), CH 1211 GENEVA 22, SWITZERLAND

If there is insufficient room for your reply to any question, please respond on separate sheets.

1. AUTHORITY, Please provide the full title and international address of the Road Authority:

   
   COUNTRY
   
   TELEPHONE FAX

2. CORRESPONDENT, Name and title of person completing questionnaire and to whom all correspondence should be addressed:

3. ROAD NETWORK

3.1 What is the total length of road network under the responsibility of your Road Authority? ................... KM. Of these, how many km are bitumenised? ............... KM

3.2 What is the approximate length of road network under the responsibility of other road authorities (e.g. Local authorities, municipalities, game parks) in the country?

   KM

4. TECHNOLOGY

4.1 Labour based technology employs people living alongside the road on a casual or contract basis. The labour may be supported by intermediate equipment such as tractors and trailers for haulage. How many roads have been constructed or rehabilitated by your Authority using these techniques?

   KM

4.2 How many roads are being maintained by labour based techniques?

   By lengthmen? ............. KM. By contractors/other labour methods? ........... KM

4.3 In your estimation, how many KM of the national road network could potentially be maintained by labour based methods

   KM
5. POLICY & PLANS

5.1 Does your Government or Road Authority have a statement of policy or commitment concerning the use of labour based roadworks? ............ (Delete as appropriate) YES / NO
If YES please attach a photocopy of the statement(s).

5.2 Does your Road Authority have, or plan, a specific programme of labour based roadworks (Delete as appropriate) YES / NO
If YES please attach brief details to the questionnaire.

6. ROAD AUTHORITY PERSONNEL

6.1 How many national engineers of graduate level or above are employed by your Road Authority?

6.2 How many foreign engineers of graduate level or above are employed by or assigned to your Road Authority?

6.3 How many other technical staff (superintendents/inspectors/foremen/overseers, etc) are employed by your Road Authority?

7. DOMESTIC CONTRACTORS

7.1 Does your Road Authority have a policy of employing or encouraging the use of domestic small scale contractors using labour/intermediate equipment, wherever possible for:
(a) Construction/rehabilitation works? YES/NO
(b) Spot improvement or maintenance works? YES/NO

7.2 How many small scale contractors are registered with your Road Authority under the following categories:
(a) Labour only ................. (b) Owning some equipment ..............

7.3 Are hire companies or organisations existing from which small scale contractors can hire equipment? (If available please give details of hire charges on a separate sheet).
For
(a) Tractors and trailers ........ No of organisations
(b) Tipper trucks ................. No of organisations
(c) Flat bed trucks ............... No of organisations

7.4 Does your Road Authority have any measures specifically for the support of small scale domestic contractors:
e.g. (a) Access of contractors to loan or credit facilities? YES/NO
(b) Contractor Training programmes? YES/NO
(c) Guaranteed (or proportion of) workload or other measures to provide an ongoing supply of work to small scale contractors? YES/NO
(d) Efficient payment arrangements to ensure timely payment of valid payment certificates (within 1 month of submission)? YES/NO
(e) Road Authority contract managers specifically trained in the supervision of small scale contractors? YES/NO
(f) Contract documentation specifically designed for use by small scale contractors with limited academic attainment? YES/NO
(g) What other measures? .................
8. DOMESTIC CONSULTANTS

8.1 Does your Road Authority have a policy of employing or encouraging the use of domestic consultants for managing labour based roadworks wherever possible for:
(a) Construction/rehabilitation works? YES/NO
(b) Spot improvement or maintenance works? YES/NO

8.2 How many domestic consultants are registered with your Road Authority with capability to provide management and technical expertise for labour based roadworks?

------------------------------------------------------------------------------------------------------------------------

9. EDUCATIONAL ARRANGEMENTS

9.1 At how many educational establishments in your country is it possible to study for:
(a) a B.Sc. Level Degree? ........
   How many include labour based roadworks as a subject or module in the courses? ........
(b) a Masters Level Degree? ........
   How many include labour based roadworks as a subject or module in the courses? ........
(c) a Diploma or Higher Certificate? ........
   How many include labour based roadworks as a subject or module in the courses? ........
Please provide the addresses of these establishments on a separate sheet.

10. TRAINING ARRANGEMENTS

10.1 Does the Road Authority have a Training Department or School YES/NO

10.2 Is training provided in any of the following subjects relating to labour based roadworks?:
(a) labour based road construction - for Engineers? YES/NO, for Others? YES/NO
(b) labour based road rehabilitation - for Engineers? YES/NO, for Others? YES/NO
(c) labour based road maintenance - for Engineers? YES/NO, for Others? YES/NO
(d) labour based contractors? YES/NO
(e) supervision and management of labour based contractors? YES/NO
(f) training of labour based trainers? YES/NO

10.3 Is training material developed for all of the current courses? YES/NO

10.4 For which course(s) is new/further training material required

------------------------------------------------------------------------------------------------------------------------

10.5 Which of the following training material does the Training Department/School use?:
(a) Guide to the training of supervisors for labour based road construction and maintenance, L S Karlsson and J J de Veen, ILO, 1981? YES/NO
(b) International course for engineers and managers of labour based road construction and maintenance programmes; course notes, Vol I, II, III, A Beusch, ILO, 1991? YES/NO
(c) IYCB .............. ? YES/NO
(d) ROMAR .............. ? YES/NO
(e) Others? Please provide details

------------------------------------------------------------------------------------------------------------------------
11. LANGUAGE
What language is normally used to teach the following cadres of personnel:

(a) Engineers .........................................................
(b) Senior Supervisors ............................................
(c) Field Supervisors ..............................................
(d) Administration Staff ...........................................
(e) Small scale contractors ....................................... 

12. INSTITUTIONAL CHANGES/SUPPORT
Is your Road Authority planning or taking any organisational or institutional initiatives (either internally or with other government departments) to improve the way in which labour based roadworks could be carried out? If so please describe briefly or on a separate sheet? ........................................

13. DONOR SUPPORT
Which international donor/lending agencies are currently financially supporting the use of labour/tractor based roadworks in your Road Authority?

(a) for road construction .............................................
(b) for road rehabilitation ....................................... 
(c) for road maintenance ........................................
(d) for training, education or manpower development ..............
(e) for assisting with institutional/organisational changes ...........

14. ACCESS TO L-B ASSISTANCE & ADVICE
Does your Road Authority have satisfactory access to information, expertise or training for labour based roadworks? YES/NO. If NO, how could this be improved? ........................................

Do you have any further comments to add regarding training for L-B roadworks or contracting, or how your Road Authority could be assisted in the introduction or establishment of these techniques? ....

........................................................................

Please enclose a copy of all standard contract documentation used for small scale contractor roadworks plus any additional relevant information and return the completed questionnaire to Claes Andersson at the ILO (Address on page 1).