KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI, GHANA

Economic Impact of Labour-Based Constructions for Road Works in Ghana: Case study of Asankare and Dampong

by

Isaac Adusei-Agyemang (BSc. Geodetic)

A Dissertation submitted to Department of Building Technology,

College of Art and Built Environment

in partial fulfilment of the requirements for the degree of

MASTER OF SCIENCE

(CONSTRUCTION MANAGEMENT)

November, 2015

CERTIFICATION

I hereby declare that tis dissertation is my own work towards the MSc and that, to the best of my knowledge, it contains no material previously published by another, nor material which has been accepted for the award of award of any other degree of the university, except where due acknowledgment has been made in the text.

Isaac Adusei-Agyemang (PG-9123613)

……..
Signature

……..
Date

Certified by:

Rev. Prof. F.D.K Fugar

……..
Signature

……..

Date

Certified by:

Dr. Bernard Kofi Baiden

……..

Signature

……..

Date

ABSTRACT

The labour based Technology approach in road construction has been in existence since 1986 and responsible for (1) improving rural accessibility, (2) increasing the construction capacity, and (3) Creating rural employment. This method of road construction has faced a lot of challenges over the years.

This research sought to identify the economic impact and the associated challenges of labour based road construction works on the standard of living of the people in Ghana.

Three sets of questionnaires were designed and administered to Clients (technical staff of the Department of Feeder Roads in Ashanti Region), Staff of the Construction Company and members of the beneficiary communities who worked on the project. These questionnaires sought the impact of labour base technology on the Asankare and Dampong communities which were used as case studies. Descriptive statistics and Relative Importance Index were used to analyse and quantify the extent of the identified impacts and challenges of LBT for road construction as perceived by the respective stakeholders.

Stakeholders believed that indeed more human capacity was engaged in the LBT and thereby cost less expensive to adopt this technology in road construction.

The results again showed that all the sixteen identified impacts of LBT in road construction had an effect on the standard of living in the communities. Rural employment generation was the most prevalent identified impacts. According to the stakeholders though generation of rural employment is prevalent it has not been sustainable enough to support the Ghana Poverty Reduction Strategy. The least impact being the sense of local ownership of the road and access to potable drinking water during the project implementation.

Ten (10) factors were also considered in the assessment of the challenges of LBT for road construction , delayed payments, which has been a major setback in the road construction sector is the most prevalent challenge which must be addressed seriously by the road ministry. Lack of efficient tools is the least challenge of LBT for road construction because most of the tools are locally manufactured and they believe it is not a challenge in Ghana.

ACKNOWLEDGEMENT

The uttermost appreciation goes to the Lord God Almighty for His Grace and Mercies throughout the period of study.

To all my lecturers and supervisor, Rev. Prof. Frank Fugar, I say a big thank you for the knowledge imparted in me, it was not easy but it has worth it. I am also grateful to my colleagues in the Construction Management Programme. Many thanks are also due to all the road agencies‟ staff, especially those in Ashanti for their time and contribution in diverse ways.

Finally to my beloved Wife, Mrs Agnes Adusei-Agyemang and my parents for their immense love and support during my study, I am forever grateful.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

BECE	Basic Education Certificate Examination
CBT	Capital Based Technology
CDP	Contractor Development Programme
DANIDA	Danish International Development Agency
DFR	Department of Feeder Roads
DRR	Department of Rural Roads
DUR	Department of Urban Roads
GCE O'Level	General Certificate Examination Ordinary Level
GDP	Gross Domestic Product
GHA	Ghana Highway Authority
GLSS	Ghana Living Standards Survey
GoG	Government of Ghana
HIPC	Highly Indebted Poor Countries
IDA	International Development Association
ILO	International Labour Organization
KFW	Kreditanstalt fur Wiederaufbau
LBT	Labour -based Technology
LCU	Labour Construction Unit
MRP	Minor Roads Programme
MRT	Ministry of Roads and Transports
NCC	National Construction Council
NLIPW	National Labour Intensive Public Works
NORAD	Norwegian Administration for International Development
RARP	Rural Access Roads Programme
RDP	Reconstruction and Development Programme
SIDA	Swedish International Development Cooperation Agency

UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Programme
URRP	Urgent Roads Rehabilitation Programme
USAID	United States Agency for International Development
VLSS	Vietnam Living Standards Survey
WFP	World Food Programme

CHAPTER ONE

INTRODUCTION

1.1 Background

Labour based road rehabilitation project was initiated in Ghana in 1986 as a means of creating more employment and lessening poverty with the help of international organizations (Stock, 1996). Despite the fact that labour based can possibly create more employment than equipment-based, it is viewed as less alluring than the equipment based systems. Labour based is thought to be less attractive, hampered with labour union interruptions and dependent on part-time labourers. As indicated by Bentall et al. (1999), "labour-based methodology" is a methodology where human capital is the prevailing resource for completing work where maximum part of the contract sum spent is spent on labour (normally 25 - 60%). The term "labour – intensive" methodology shows the efficient utilization of human resource in the construction industry, while guaranteeing cost viability and protecting quality. This includes a prudent mix of human, tools and suitable light equipment.

1.2 Problem statement

As observed by Quagraine et al. (2009), if a minimum of 10% of the $174 million used to import earthmoving and construction machinery yearly is put into in the labour-based rehabilitation programs, around 23,000 employments could be created. If half of the machinery costs are put into the labour based technology, an estimated 117,000 employments could be made every year (Quagraine et al. 2009).

In Ghana, the labour based approach has been in existence since 1986 and it has the purposes of;

1. Improving rural accessibility (improvement in transportation of goods and people),
2. Increasing the construction capacity (acquisition of the skills of the local people as well as the local authority involved in the construction and supervision of road works),
3. Creating rural employment (employment creation and improvement in the standard of living of the local people in the area).

The patronage of the labour based approach over the years in the Ghanaian community has suffered a lot of setbacks. Information gathered from the Department of Feeder Roads suggests that the labour based has not really affected the road accessibility and livelihoods of the people in Ghana. This is because there is a presumption that the technology is not being sustained due to funding issues, casual labour usage and labour organizational and management problems. Some contractors do not also going by the standards designed for the labour-based approach.

It is crucial to examine the impacts and challenges of Labour based Technology from the perspective of those who are directly involved with both the construction and maintenance so that some mitigating measures can be identified which the Department of Feeder Roads can employ to help in meeting its mission of providing a safe all-weather accessible road at an optimum cost to the Ghanaian and creation of employment.

1.3 Research questions

The study poses the following research questions:

1. In what ways did LBT approach improve the standard of living of the people?
2. How has the rural accessibility been improved (transportation of goods and people)?

3. What are some of the challenges faced in adopting the labour-based approach for road construction?

1.4 Aims

The aim is to determine the economic impact and the associated challenges of labour based road construction works.

1.5 Objectives

The objectives to be considered are;

1. to identify the impact of labour-based road construction on the standard of living of the people in Ghana.
2. to determine the challenges faced in the labour –based approach of road construction.

1.6 Significance of study

The Labour based Technology in road construction has not been fully exploited by stakeholders as compared to the conventional Capital or Equipment based Technology and has suffered a lot of setbacks as well. Though a number of studies have been carried out on the subject, little has been talked about the impacts and challenges of LBT on our communities. This study will seek to identify impacts and challenges of LBT have on our communities and also give suggestion to mitigate the identified challenges.

1.7 Methodology

The survey methodology was administered of questionnaires and interviews of the different stakeholders. The client is the Ministry of Roads and highways working through supervisory agents (Department Of Feeder Roads), The contractor is the entity whose tender has been accepted by the client to execute the contract, the consultant is the firm that has the expertise and responsibility to carry out design and supervise the

contract (Department Of Feeder Roads) and lastly the people of the communities. Feedback from the interviews and questionnaires will be the key base of this project.

1.8 Scope of study

Konongo is a town located in Ashanti, Ghana and it is the capital of the Asante Akim Central District. As of 2012, Konongo has a population of 41,238 people. Konongo is about 33 miles from Kumasi, the Ashanti capital. Konongo is a mining area known to mine Gold and has a lot of farming activities. The scope of the study has been limited to Asankare and Dampong communities in the Asante Akim district of the Ashanti Region. The road between these communities which is 16.5km apart was rehabilitated through both the equipment base and Labour based technology. The last phase which is 5.1km was constructed with Labour base technology. It is believed that the data obtained from this study will show a true picture of labour base construction in Ghana.

1.9 Structure of report

The report has five (5) chapters. Chapter one(1) is the general introduction of the research which is subdivided to the background of the research, problem statement, aims and objectives, significance of study, methodology, scope of study. The literature review is the main part of chapter two (2). Methods chosen, the critique of method chosen, limitations and ethics are all parts of the research plan are the key parts of the third chapter. Chapter four (4) evaluates and analyse the data collected. Chapter five (5) will comprise of the recommendation and conclusions. The bibliography is the final part of this research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Manual Labour

Manual labour is generally concerned with work done mainly by human. Labour work could also be work done with the use working animals. The history of manual or animal labour has been in existence far back in the olden days. This has been the principal way of working which could involve the utilization of simple or light equipments.

2.2 Definitions of Labour based Technology and Capital based Technology

2.2.1 Definition of Labour based Technology

Majeres and Veen (2002) characterized labour-based methodology as the utilization and management of locally accessible human and material resources for the development of infrastructure. Asfaw (2005) also defined labour - based Technology (LBT) as the method of construction which leverages human capital and utilise light equipment when needed.

Labour based Technology makes use of labour as the foremost resource relative to limited use of mechanization (light equipment) in terms of input. Kyombo and Msengesi(2001) on the other hand defined Labour based technology in road works as an approach whereby major means of productionsor input is labour and simple or intermediate equipment are deployed for the activities that cannot be performed efficiently and effectively by labour. This technology in road construction involves breaking down various components of road construction into simple and small activities like vegetation control(clearing), earthworks(cut and fill),reshaping, culverts construction and graveling activities that are simply carried out by hand and light

equipment(tractors, light trucks and pedestrian rollers). Figure 2-1 below shows typical activities involved in LBT.

Figure 2-1 Intensive labour works with the use of simple tools
***Source**: (In development, Labour based Road Works pp. 18 By John van Rijn)*

2.2.2 Capital-Based Technology (CBT)

Capital-based technology in road works as indicated by different definitions is the utilization of automated systems, machines and computer platforms to impact the improvement of efficiency in production and service delivery. The exact inspirations for utilizing computerization are increased profitability, and/or quality past that conceivable with current human work levels in order to achieve economies of scale. The right use of CBT generates about 3 to 4 times the output of LBT with no increment in labour costs. The day by day life of society has turned out to be more dependent on automated systems to the extent that life does not appear to be significant without these automations (Medida, 2008)

2.3 History of Labour based Technology in Africa

Labour-based Technology in road construction has been a significant part of the strategy to develop rural transport infrastructure in Africa over the years. This method of road construction produces gravel roads of the same quality to those produced using

equipment or capital-based methods. This technology also generates rural employment in an optimal cost. Local resources (manpower and woman power) could be used to develop rural transport infrastructure which is important for increasing incomes, developing strong rural economies, and facilitating access to social services and markets. In the late 1970s and 1980s, pilot projects were introduced in low income waged countries to prove the economic and technical feasibility of this method of construction. They found that there were broader scopes for the practice of labour-based methods in the road sector.

It was assumed previously that LBT method of road construction can deploy sufficient labour to finish a project at the same period as Capital Based Technology (CBT), practically this assumption was not the case. The completion period for using labour-based methods are controlled by; the size of the project, the accessibility of labour, and the readiness of labour to work.

A study done in 1995 demonstrated that labour-based road maintenance projects created an estimated 75 000 full-time employments in Zimbabwe, which constitutes 6.6% of aggregate formal sector employment and 8,271 in Lesotho which was equal to 18% of aggregate formal sector jobs that year (Lennartsson and Stiedl,1995).

All other African nations that adopted LBT has been on rural road constructions with exemption of South Africa, where the experience has been in urban infrastructure (water, roads, and electricity) and building structures with governments as the main financier. Nevertheless, the case of South Africa is similar to other African nations except that the atmosphere for using labour-based technology differs from other countries. LBT project has gotten support from multilateral or bilateral donor organizations such as Department for International Development (UK), Danish

International Development Irish Aid,Kreditanstalt hide Wiederaufbau (KfW), United Nations Development Program (UNDP), Agency (DANIDA), Norwegian Administration for International Development (NORAD), Swedish International Development Cooperation Agency (SIDA), United Nations Capital Development Fund (UNCDF), and World Food Program (WFP), United States Agency for International Development (USAID) (Liimatainen, 2002).

2.4 Examples of Labour Based Technology in some Africa countries

2.4.1 Lesotho

Lesotho is one of the first African countries that experienced labour based technology in its National development plans. Labour Construction Unit (LCU) was established in 1977 which was a sector of the Ministry of Public Works to adopt the application of labour-based method as well as the creation of employment opportunities (Mpayo, 2003). This Unit has been re-structured to form a separate department known as the Department of Rural Roads (DRR).The Lesotho government privatised labour based road works to ensure efficiency, sustainability, more cost effectiveness and reduced government establishment. The ILO was mandated to study the local contraction industry as part of Infrastructure Rehabilitation and Maintenance Project. The study resulted in a document titled Entrepreneurship Development for Labour based Road Maintenance (ILO, 2002).

The ILO was additionally empowered to facilitate the acquisition of machinery, provide training manuals and train twelve (12) contractors in labour-based road construction. A study conducted in Lesotho showed that, Labour-based road works produced roughly 8,271 full-time employments which was proportional to 18% of total formal segment employment in 1995 (Lennartsson and Stiedl, 1995).As portion of the privatization

program, trained contractors were required to purchase privately for their own equipment and tools.

2.4.2 Tanzania

Results from different research have shown that, adoption of labour-based Technology in road maintenance and rehabilitation is a feasible alternative in Tanzania where there is an abundant human resource (labour) which is under- utilized. The rising unemployment and poverty problems also explain the significance of using labour-based Technology which can create employment and inject direct cash into local communities

About 12.5 million people live in complete poverty in rural communities who spends an average of 0.5 USD or less a day. In October 1992, the Labour-based Road Contractor Training Project was introduced which forms part of the Integrated Road Project. The programme is financed by the UNDP, IDA, USAID and the Government of Tanzania. National Construction Council (NCC) is the Government implementing agency with training assistance provided by the ILO.

Most of maintenance and rehabilitation works in the road sector are executed with labour, but lacks the required modern methods that makes labour-based technology not efficient and effective. Almost all the donor-aided projects on rural roads are requesting labour-based methods to be introduced to maximise the impact on the general development realization as well as sustainable arrangements.

Currently there are efforts towards poverty reduction strategy under the Highly Indebted Poor Countries (HIPC) initiative programme whereby in Tanzania about 2,326 km of regional roads will be rehabilitated (being part of 9,768 km proposed under Urgent Roads

Rehabilitation Programme (URRP), dated June 2000 for five years) and 6,290 Km of district roads will be rehabilitated or improved to all weather roads.

Demand of labour-based technology is also found in other sectors of the economy, such as building construction, agricultural sector, mining and quarrying, water and sanitation, and urban infrastructure.

2.4.3 Kenya

The Rural Access Roads Program (RARP) was framed in 1974 and was responsible for maintaining, rehabilitation and construction feeder roads in the rural areas. The Minor Roads Program (MRP) of the Ministry of Public Works and Housing of Kenya succeeded the RARP in 1987. As at 1995, both projects had rehabilitated, maintained and constructed around 11,000km of roads with labour-based Technology method of construction (Twumasi-boakye, 1996). Contractors workers were then again, connected with two pull gravel over long kilometers in the project. MRP received funding from the Swedish International Development Authority (SIDA) with the aims of establishing guidelines for the selecting, training and supervising small and local contractors in labour-based gravelling processes in 1991.

2.4.4 South Africa

South Africa is the most economically advanced nations in sub-Saharan Africa. It has advanced agro-sector, mineral extraction and manufacturing industries. The country‟s population is around 44.4 million and her per capita income is around $11,900, according to the World Factbook (2005). Despite its economic growth, there are also high rates of unemployment and poverty in South Africa. Her economy depended mostly on foreign investments and high technology while the unemployment rate was as high as 45% (World Factbook 1993). Only a couple of the general population enjoyed the normal living standards.

As an effect of these past socio-political inequalities, the construction and building sectors are principally owned and controlled by the white segment of the populace. The construction industry therefore needs to be reformed to create and develop small scale contractor participation to address this imbalance. The construction industry introduced Community-based construction to cater for these huge differences with the aim of maximising the funds retained in the communities and transferring skills and competencies into the communities (Twumasi-boakye, 1996).

2.4.5 Ghana

The labour-based road construction method was practiced in Ghana throughout the colonial days until the late 1950s where the British authorities discouraged the use of unskilled labour for road constructions. The equipment-intensive system was presented as officially done in Britain. Various sub-Saharan African nations including Ghana acknowledged the equipment-based system meanwhile, construction machinery were still rare and needed to be imported (Stock 1996).The Government of Ghana (GoG) sponsored the importation of equipment like numerous sub-Saharan African nations. This made the equipment-based system appear to be more attractive than the labour-intensive technique which depended largely on manual labour. The capital-based technology accordingly turned into the routing strategy for both the rehabilitation and construction of roads in Ghana (Stock 1996).The Ghanaian government and other global organizations were tremendously worried with the high rate of unemployment and poverty. In 1986 the World Bank, the ILO, the UNDP and the GoG reintroduced the labour-based road rehabilitation strategy with the aim of decreasing the high unemployment and reducing the poverty rates in the nation (Stock 1996, Osei-Bonsu 1992, Ampadu 1999). They considered Ghana as an ideal country because of the presence of established private road contracting firms.

So far, the labour-based rehabilitation Technology has just been initiated by the Department of Feeder Roads (DFR) in their projects and they are the sole agency in charge of LBT implementation.

2.4.5.1 Department of Feeder Roads involvement in labour Based Road Technology

At present, the Department of Feeder Roads (DFR) combines both labour and technology-based techniques for the rehabilitation and construction of feeder roads. As indicated by Ampadu and Danso (2003), the program is financed by the United Nations Development Program (UNDP), the International Development Association (IDA), and the Ghana Government (GoG) whereas the International Labour Organization (ILO) also gives the technical assistance

High poverty level is most per predominant in rural areas (GLSS 2005). The Ghana Living Standards Survey (GLSS, 2000) informed that with sufficient provisions made for other segments of the country, transport is the primary linkage that has the best effect on poor people. The transport sector has an immediate impact on the lives of the poor by empowering access to workplaces, markets, educational and health centres (MRT, 2002).

2.5 Socio-economic Impact of Labour Based Technology

Ghana, like other African nations is burdened with unemployment (20% of the populace), poverty (40% of the populace) and trade imbalance ($0.7 billion for every year) (Quagraine, 2007). The job creation programs devised by the government to control unemployment are not able to keep up with the 2.8% yearly growth rate (Boateng and Ofori-Sarpong, 2002).

The implementation of the LBT strategy for road construction has the capability of enhancing the economy and improving the expectations for living conditions of numerous Ghanaians as well. The LBT method enables; 1) creation of employment and reduction in poverty, 2) decrease in imports and the preservation of foreign exchange, 3) enhancement in the road infrastructure, 4) development of local resources, and 5) less environmental impact.

2.5.1 Creation of employment and reduction in poverty

When work creation ideas are additionally considered on the premise of the average expense of feeder roads in Ghana, the LBT idea had the potential to create about 232,000 employments annually if the GoG contributes the whole $174 million of the importation of earth moving and heavy equipments in the labour- based road rehabilitation program (Quagraine, 2007).

According to Ampadu (2001), the every contractor employs an estimated 63 temporal workers, 3 supervisors and 1 site foreman to rehabilitate 1.33km of feeder roads in 20 workdays every month at the expense of $13,374 per kilometer and also engages around 8 skilled workers as operators of light equipment, drivers, accountants, timekeepers and storekeepers. Ghana cannot suddenly halt the importation of earth moving and heavy machinery and put the $174million into the labour-based road construction projects. A progressive reduction of 10% of the $174million will create employments utilizing the LBT idea until half of the $174million is invested. Gradual investment of 10% of the equipment cost can create around 23,000 employment the first year, cumulating to around 116,000 employments at the fifth year (Quagraine, 2007).

2.5.2 Decrease in imports and the preservation of foreign exchange

The LBT concept in road construction drew in more workforces into the feeder road rehabilitation project to reduce the utilization of the normal capital-intensive strategy

that depends on the scarce foreign currency for the importation of heavy equipment (Larcher and Miles 2000). The economy of Ghana experiences financial multiplier leakages as a consequence of relying upon the importation of heavy equipment for its construction and earth moving activities. A decrease in the economic multiplier effect of the construction sector is because of over reliance on the importation of earth moving and heavy equipment. About $174 million foreign currency that could have been contributed to enhance the domestic economy leaks out to other nations from which machineries are imported. The use of the LBT idea helps in Ghana's over dependence on importation and preserve of foreign currency for economic advancement.

2.5.3 Enhancement in the road infrastructure

The road systems in Ghana are the channels of the national economy. They represent 95% of all cargo and 97% of all traffic movement (Ampadu 2001). Enhancements in the states of the feeder roads are of extraordinary advantages to Ghana‟s economy.

A good feeder road would enable quickly transport of perishable farm products from the rural areas with no storage facility to market centres and ports.

2.5.4 Development of local resources

The adoption of the LBT makes a pool of talented managerial and technical workforce in Ghana. As workers share in the consistent training sessions, they would build different skills for technical, administrative and communication duties. These enhanced abilities can be utilized as a part of other labour-based areas where farming and building industries cannot be ruled out.

2.5.5 Less environmental impact

The labour-intensive construction model has a less damaging effect on the environment as compared with the equipment-based technique for road construction and

rehabilitation. The heavy machineries used in CBT have a tendency to crush more vegetation as it moves to excavate soil materials for road construction. The borrow pits burrowed by the heavy machinery develops to soil disintegration. Labour based systems have a tendency to wreck less vegetation and avoiding soil erosion (Ampadu et al 2003). Similarly, labour based techniques have a tendency to depend less on non-renewable resources like fuel used by the heavy equipment which pollutes the atmosphere (Larcher and Miles, 2000).

2.6 Macroeconomic impact of Labour Based Technology

Experts in financial development and improvement recommend that, the best system that will have the capacity to check poverty is the utilization of Labour intensive Technology which directly relates monetary development to employment. The need emerges to apply this methodology in the construction sector which is the ideal industry where labour-intensive programs can be carried out and its effect well felt (Gaude and Watzlawich 1992).

The poor condition of Africa's infrastructure is a major limitation in its developmental goals (Collier and Gunning, 1999). Ghana's quest for socio-economic advancement is being approached from industrialisation and automation perspectives, neglecting the development and improvement of labour skills. This creates an imbalance of the nation's GDP and other macroeconomic indicators.

2.7 The Requirement for labour-based road contraction

All road construction firms (both foreign and local) in Ghana are required to be accredited by the Ministry of Road and Transport (MRT). Only licenced companies are qualified to carry out road contracts by the Ministry of Roads and Transport (MRT 2005b).

Labour- based road contractors are required to;

a) accomplish the training prerequisites of the DFR and the MRT (Danso, 1996)
b) acquire the standard set of the hand tools and light equipment (Ampadu et al 2003), and
c) abide by the feeder road engineering standards in Ghana before contracts can be awarded to them (Ampadu 2005).

2.7.1 Requirements of the training program

MRT and DFR organise training programs subsidized by GoG to both supervisors and contractors who participate in Labour-based road construction. It is mandatory for these supervisors and contractors go through this training program before their companies can licensed. Four supervisors of each labour-based road construction firm are required to partake in a 20 week training session (Danso, 1996). The training system includes 6 weeks of classroom work and 14 weeks of model road rehabilitation training.

The participants concentrate on enhancing their supervisory and managerial abilities. The training emphasizes on the mathematics of road construction, fundamental standards of road engineering and maintenance, tools and labour management, and budgetary management (Osei-Bonsu, 1992). External resource persons normally from financial institutions are invited to offer one week managerial training to labour-based road contractors. The DFR additionally trains engineers and foremen from its own area of expertise to manage and bolster contractual workers (Ashong, 1996). The temporal nature of the labour-based workforce makes it difficult to offer them training to boost productivity.

The basic academic qualification of prospective supervisors to enrol in the training program is a successful completion of General Certificate Examination; Ordinary Level (GCE O' Level) (Danso 1996 and Ashong, 1996) equivalent to Basic Education Certificate Examination (BECE) in the current reformed educational system in Ghana. Table 2-1 lists the prerequisites for supervisory positions in the LBT road development.

Table 2-1: Qualifications required for supervisory positions in the LBT

Supervisory personnel	**The qualification required by LBT method**
Foremen	N/A
Supervisors	BECE/ GCE O‟Level
Site managers	BECE/ GCE O‟Level
Constructors	BECE/ GCE O‟ Level

(Data Source: Ampadu et al 2003)

2.7.2 Light equipment and hand tools requirements

Each Labour-based contractor is loaned with the standard set of light equipment and hand tools set by the DFR at a cost of about US$150,000.The trained contractors were assured of contracts for the first forty- eight months to be able to pay for the equipment loan. (Twumasi- boakye, 1996) .The loans advance are reimbursed by deductions from certificates of payment of the contractor on completed works (Ampadu, 1999). Table 2-2 below demonstrates the standard hand tools and light equipment credited to the work based contractual works.

Table 2-2: Standard set of the standard hand tools and light equipment required of labour-based contractors in Ghana

Light equipment	**Quantity**
Towed water tanker (2250litre)	1
Tipper truck (5m^3)	1
Tractor heads (60-65 hp)	3
Trailers (3m^3)	6
Pedestrian rollers	2

Water pump	1
Pick-up truck	1
A set of hand tools; pick axes ,shovel, cutlass, mattock, rakes etc.	N/A

(Data Source: Ampadu et al, 2003)

2.7.3 Feeder road engineering requirements

The Table 2-3 below is a summary of the basic engineering standards used by DFR in Ghana for the maintenance and rehabilitation of feeder roads.

Table 2-3: Standards set by engineers for feeder roads in Ghana

Width of road	6m
Gravel base thickness	100mm
Design speed	50km/h
Compaction level (Modified. AASHTO)	95% MDD for sub-grade 98% MDD for sub-base
Maximum gradient	Normally 9% (12% in mountainous areas)

(Data Source: Ampadu et al, 2003)

The pavement structure is made up of a layer of sub-grade material (sub base) and a top layer of gravel material (base). The thickness of the base material is between 100mm and 200 mm. The gravelled layer also functions as the running surface of the road and the designed camber (cross slope) is between 5% and 8%.The shape of the drains of equipment-intensive methods are V-shaped while that of labour-based methods is trapezoidal because of the tools used in the drains construction (Ampadu 2005). The shape if the drain is the only difference between roads constructed using equipment-intensive and that of labour-based methods.

2.8 Major activities in LBT

The regular activities involved in the labour based Technology system include 1) Preparation of site, 2) Earthworks, 3) Reshaping, 4) Construction of culverts and 5) Gravelling.

Table 2-4 beneath outlines the real exercises, assignments and the light gear and handapparatuses utilized as a part of LBT.

Table 2-4: Activities, tasks and light equipment and hand-tools used in labourbased road works in Ghana

Main Activities and tasks	Light equipment and hand-tools
Preparation of site ➢ Clearing of bush ➢ Grubbing ➢ Removal of top soil ➢ Removal of boulder	Cutlasses, hoes, spades, rakes, Mattocks
Earthworks ➢ Excavation and filling for base works ➢ Gullies and potholes filling ➢ Gullies and potholes compaction	Shovels, pickaxes, water bowser, grass slasher, rake/spreader, wheel barrow and hand reamers
Reshaping ➢ Excavation of ditch ➢ Excavation of ditch slopes ➢ Ditch back-slope excavation ➢ Soil spreading ➢ Soil Compaction	Shovels, rake/spreader, pickaxes, wheelbarrow, vibrating rollers and watering can
Construction of culverts ➢ Collection of sand/stone ➢ Excavation for culvert ➢ Fabrication of forms and reinforcement ➢ Mixing and placing of concrete ➢ Culvert finishes	Shovels, pickaxes, crowbars, Wheelbarrows, sledge hammers, hand rammers, boning rods, heavy ropes, pickaxes, tapes, levels, cross-cut files, tenon saws, chisels, steel wedges, head pans
Gravelling ➢ Loading, hauling and unloading of gravel ➢ Gravel spreading ➢ Compaction of gravel	Shovels, pickaxes, rakes/spreaders, tractors and trailers, tipper truck, water bowsers and vibrating rollers

(Data Source: Ampadu et al, 2003)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This study collected primary data using questionnaire administration to the various groups of stakeholders (Department of Feeder Roads‟ technical staff, staff of the Construction Company and rural folk along the study corridor). The use of this approach aided extensively in gathering primary data. The questionnaire was designed

according to the objectives of research by reviewing literature dealing with labour based technology in road construction and other relevant topics.

3.2 Study Area

The study focused on the Asankare - Dampong Feeder Road in the Ashanti Region of Ghana. The road length is about 16. 50 km rehabilitated through the equipment base and Labour based technology. The last phase, which is 5.1km was constructed with Labour base technology.

3.3 Study population and sample

The research information was targeted at the following categories of people from which the sampling was prepared.

1. The professional staff of the Department of Feeder Roads in Ashanti Region who have gone through the Labour based Training programme.
2. The staff of the contractor who have managed both capital and labour based contracts
3. Members of the beneficiary communities

The Perception data were gathered from the ten technical staff in the Ashanti Region, ten labour based staff of the contractor and fifty-five people from the communities along the study corridor who worked on the road. The table below shows the number of questionnaires to be administered.

Table 3-1: Number of population for questionnaires

POPULATION	NUMBER
Staff of DFR	10
Contractors	10
Community	55

3.4 Survey instrument

The nature of the information required the use of qualitative research strategies for effective search of information from the target population through questionnaires and interviews. Interviews and questionnaires were designed and administered to seventyfive respondents consisting of DFR professional staff, Contractor‟s staff and the beneficiary Community. A pilot survey was conducted using another labour base community as a case study. The objective was to test the completeness and clarity of the questionnaires.

The questionnaires were administered using purposive sampling. It is a useful sampling method which involves getting information from a sample of the population that one thinks knows most about the subject matter. The questionnaires sought information on the respondents‟ profile, stakeholders‟ experience about labour based projects and its challenges. The perception of the stakeholders were sought to know the effects of labour base constructed roads on the economic life of people and the road network as well. The questionnaire considered the impact of labour based road construction on its communities in terms of capacity building, income distribution, access to good roads at optimum cost. Stakeholders‟ levels of agreement were sought on some identified challenges of labour base road construction and measures to curb these challenges were suggested. Appendices 1, 2 and 3 displays samples of the questionnaires administered to the stakeholders.

3.5 Data entry and analysis

The answered scripts from the respondents, were sorted in accordance with research question they sought to address. The tools used by the student for analysing the data from the questionnaires are descriptive statistics and relative importance index. The

responses were coded and loaded onto the Microsoft excel to draw out details. These details were drawn from the descriptive analysis with the Ms excel software.

3.6 The Likert Scale and Relative Importance index

The statistical software used in analysing responses from the questionnaire was the Microsoft excel. The Likert scale was used to analyse the variables of some perceived impacts/challenges of labour base technology. The variables were ranked per level of agreement by the respondents on a five point Likert scale of 1-5 based on a mean score obtained for each statement as indicated in Table 3-2 below.

Table 3-2: Likert scale

1	2	3	4	5
Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree

In analysing individual items in the Likert scale, mean scores of 2.60 and above suggested "agreement" and mean scores of 2.4 and below suggested "disagreement". Mean scores between 2.41 and 2.59 indicated "not sure". Relative Importance Index used the obtained mean scores to calculate indices for further analysis. The nearer the index of the identified factor is to one (1), the more suitable the factor and the more important its impact/ challenge on labour base road construction. The importance indices obtained were ranked to ascertain the most frequent impact and challenge. The

Relative importance index (R.I.I) was calculated using the formula, RII = $\frac{\sum W}{(AN)}$,

Where, A = the highest weight (i.e. 5 in this study), N = the sample size (i.e. 10, 10 and 50 in the study), W= weighted score.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Perception Survey results

4.1.1 Response rate

Altogether 75 respondents comprising 10 DFR staff, 9 staff of the construction firm and 55 members of Dampong and its surrounding communities were surveyed. Table 4-1 presents the response rates for the various targeted groups surveyed.

Table 4-1: Questionnaire response rate

Stakeholders	Sample Space	No. of Respondents	Response Rate (%)
DFR professional staff	10	10	100
Staff of Construction firm	10	9	90
Community	55	50	90.9
Total	75	69	92.0

4.2 Profile of respondents

4.2.1 Client's profile

In this discussion, Client refers to the professional staff of Department of Feeder Roads who are the government employees that manage the feeder roads (including LBT roads) for public use.

4.2.1.1 Area of specialization

Engineers, Quantity Surveyor, Land Surveyor and all others in the department play various roles during the planning, programming, operations and implementation of all Feeder roads maintenance or rehabilitation programme. Table 4-2 represents the area of specialization of the client.

Table 4-2: Area of Specialization

Rank	No. of Client respondent	Response Rate (%)
Engineers	6	60
Quantity Surveyor	3	30
Land surveyor	1	10
Others	0	0
Total	10	100

4.2.1.2 Years of experience in the road construction industry

The study sought to know the work experience of the staff of the client. The information on the respondents' profile in terms of their experience are summarised in Tables 4-3.

Table 4-3: Years of experience in the road construction industry

Years of experience	No. of Client Respondents	Response Rate (%)
0-5 years	1	10
6-10 years	5	50
11-20 years	4	40
20 years and above	0	0
Total	10	100

4.2.1.3 Frequency of labour base technology for Feeder road rehabilitation from the Clients perspective

The research also sought to have an idea about the frequency at which the DFR incorporates the application of LBT in the design and execution of their road maintenance and rehabilitation projects. This question was targeted to only DFR technical staff in Ashanti Region because they are the sole department that incorporate the technology in Ghana and can give the tangible answer to the question. The labour base technology has been used as the method of construction for the rehabilitation of a number of roads in the Ghana.

According to DFR respondents, the approach was used very often in the 1980"s and 1990"s when most of its funding was from international donors. The frequency changed when the Government of Ghana became the major source of funding. The effect of delayed payment played a very serious role in the use of labour base technology in road construction.

The respondents were asked to rank frequency of the use of labour-based on feeder road projects under "very often", "often", "quite often" and "not at all". The outcomes from the table below revealed that the number of 10 individuals who reacted to this question, just 1 (10%) demonstrated that the DFR use LBT frequently. 6 (60%) of the respondents conceded that the DFR uses LBT quite often. 3 (30%) also expressed that the Department uses LBT often.

The information on the Frequency of the use of labour base technology are summarised in Tables 4-4.

Table 4-4: Frequency of the use of labour base technology

Frequency	**No. of Client respondent**	**Response Rate (%)**
Very often	1	10
Quite often	6	60
Often	3	30
Not at all	0	0
Total	10	100

4.2.2 Staff of the Construction Company Profile

The company uses both LBT and CBT in its operation and all the staff have gone through the labour based training.

4.2.2.1 Area of Specialization

The construction company has various workers that play various roles in the execution of all activities in road construction. Table 4-5 represents the area of specialization of the staff of the construction company.

Table 4-5: Area of Specialization

Profession	No. of Client respondent	Response rate (%)
MD	1	11.1
Site Engineer	1	11.1
Supervisor	3	33.3
Forman	2	22.2
Artisan	2	22.2
Total	9	100

4.2.2.1 Years of experience in road construction industry

The results showed that 4 of the staff of the construction company representing 44.4% have been in the construction industry between 11 to 20 years. 5 of them representing 55.6% had over 20years experience in the road construction.

Table 4-6: Years of experience in the construction industry

Years of experience	No. of Respondents	Response Rate (%)
0-5 years	0	0
6-10 years	0	0
11-20years	4	44.4
Above 20 years	5	55.6
Total	9	100

4.2.2.2 First experience on LBT road works

Table 4.7 provides the summarised data on the background of the respondents in terms on the experience of labour base technology in road construction. The below table makes it clear that out of the 9 staff of the construction company respondents, 5 of them

experienced their first LBT roadworks between 1991-1996 representing 55.6%, 3 of them representing about 33.33% experienced their first LBT between 1997-2002 whereas 1 experienced LBT between 1985 and 1990.

According to the staff of the construction company, they are given training on labour base technology periodically. This training is given to update them on new techniques that have been discovered over the years. This training gives opportunity for upcoming contractors to learn this method of road construction aside the traditional equipment (capital) based.

Table 4-7: First experience on LBT in the road construction industry

Years	No. of Respondents	Response Rate (%)
1985-1990	1	11.1
1991-1996	5	55.6
1997-2002	3	33.3
2003-Above	0	0
Total	9	100

i. The relative importance of projects rehabilitated with the labour base technology

The experience of the staff of the construction company on labour base technology is shown in Table 4-8 where the percent range of projects is tabulated against the frequency of their response.

Table 4-8: Projects with Labour base technology

Percent range of projects with labour base technology	Frequency	
	Frequency	Percentage
<20	2	22.2
20-40	1	11.1
40-60	4	44.4
60-80	0	0
80-100	2	22.2
Sum	9	100

The results may be analysed further by representing a given percentage range of projects by the mean value of that percentage range and analysing using the relative importance approach in Table 4-9 below.

The results from the perception of the various stakeholders show that, an average of 48% of projects was done with labour based technology as compared with the equipment based. The relative importance index of these projects was 0.53.

Table 4-9: Experience of Projects with Labour base technology

Frequency	Percent of Projects (%)					Sum	Weighted Sum	Mean (%)	RII
	10	30	50	70	90				
Contractor Perception	<20	20-40	40-60	60-80	80-100				
Projects with Labour base technology	2	1	4	0	2	9	430	48	0.53

4.2.3 Community

The research targeted members of the communities who in one way or the other worked on the LBT road construction

4.2.3.1 Profile of People in the community

21 members of these representing 42% of the people are labourers who do not have any defined skill. 17 members representing 34% were farmers while 5 of them were masons. Only 4 of them were carpenters which represents 8%. They are employed in any available menial work that is available, for example, they are employed by the landowners who are mainly farmers during the farming season. The use of the labour base technology gave a platform to train these labourers (unskilled) to acquire some form of skills. The contractor employed almost all village folks who worked on the road as labourers, even though some already had their profession like masons, carpenters and steel benders.

Table 4-10: Profile of People in the community who worked on the road

Skill	No. of Respondents	Response Rate (%)
Carpenter	4	8
Mason	5	10
Labourer	21	42
Farmer	17	34
Total	50	100

4.2.3.2 Experience with labour base technology for road rehabilitation.

The road between Asankare – Dampong is one of the connectors from Ashanti Region to the Eastern Region. The construction of this road over the years has been done with the equipment based approach. The labour base technology was introduced in a section of the road (5.10km). The study sought to know the experience of the community on labour based works and the Table 4-11 below indicates that 7 of the respondents had about to 5 months experience in LBT road works which represents 14%. 11 of them noted LBT involvement of between 6 to 10 months, which is proportional to 22%. 32 of them had their experience between 11 to 20 months with percentage of 64%.

Table 4-11: Experience with labour base technology road construction.

Months of experience	No. of Respondents	Response Rate (%)
0-5 months	7	14
6-10 months	11	22
11-20 months	32	64
Above 20 months	0	0
Total	50	100

4.2.3.3 Sex of the respondents of the communities

According to the survey, 36 people equivalent to 72% of the people employed from the community were males whiles 14 people representing 28% of them were females. This

ratio of males and female satisfy the conditions set by the LBT training programme. Table 4-12 below indicates the sex of the respondents of the communities.

Table 4-12: Ratios of males and females employees

Communities' responses	No. of respondents	Response rate (%)
Males	36	72
Females	14	28
Total	50	100

4.2.3.4 Educational background

28 of the total respondents representing 56% had their education at the basic level. 5 of them got a formal education up to secondary school level which indicated approximately 10% of the total respondents. Interestingly, 17 respondents representing 34% had no education. Table 4-13 below show the educational background of the communities.

Table 4-13: Educational background of the communities

Educational level	No. of Respondents	Response Rate (%)
No education	17	34
MSLC/JSS	28	56
O‟ level/SSS	5	10
Tertiary	0	0
Total	50	100

4.3 Stakeholders' perception on the number of workers needed to carry out these identified road construction activities using labour base as compared with equipment base.

The views of the respondents were seeking to know the number of workers needed to execute each of the selected activities performed under LBT in relation to CBT in terms of being „extremely high‟, „very high‟, „High‟, or „low‟.

The results of the data on the questionnaires are recorded in Table 4.14 below.

The four (4) road construction activities are given codes A1-A4 for simplicity of analysis.

A1-per meter length of ditch cleaning

A2-Clearing of vegetation

A3-per meter cube of excavation and filling

A4-Mixing, placing and compaction of a cubic meter of concrete

Table 4-14: Summary of stakeholders' perception on the number of workers needed to carry out these identified road construction activities using labour base as compared with equipment base.

	Perception	**A1**		**A2**		**A3**		**A4**	
			%		**%**		**%**		**%**
Client	Extremely high	3	30	4	40	4	40	3	30
	Very high	6	60	6	60	6	60	6	60
	High	1	10					1	10
	Low								
	TOTAL	10	100	10	100	10	100	10	100
Staff of the construction company	Extremely high	6	66.7	4	44.4	5	55.6	3	33.3
	Very high	3	33.3	5	55.6	4	44.4	6	66.7
	High								
	Low								
	TOTAL	9	100	9	100	9	100	9	100

Community	Extremely high	36	72	43	86	33	66	31	62
	Very high	14	28	7	14	17	34	19	38
	High								
	Low								
	TOTAL	50	100	50	100	50	100	50	100

4.3.1 Number of workers needed on a per meter length of ditch cleaning

Ditch Cleaning is the removal of silt and debris from existing side drains, turnouts and channels solely by hand. This activity is carried out in both LBT and CBT. The stakeholders are to compare the technology which involves more people in carrying out ditch cleaning.

4.3.1.1 Clients perception

It became clear from the Table 4-14 that, 3 people representing 30 percent of the respondents saw the number of workers needed in cleaning per meter length of a ditch through the use of LBT to be comparatively extremely high in relation to the use of machines. 6 professional indicating 60 percent saw the number of workers this being very high, whereas the 1 person taking 10 percent of the total respondents indicated that the number of workers to be high. The results are shown clearly in figure 4.1 below.

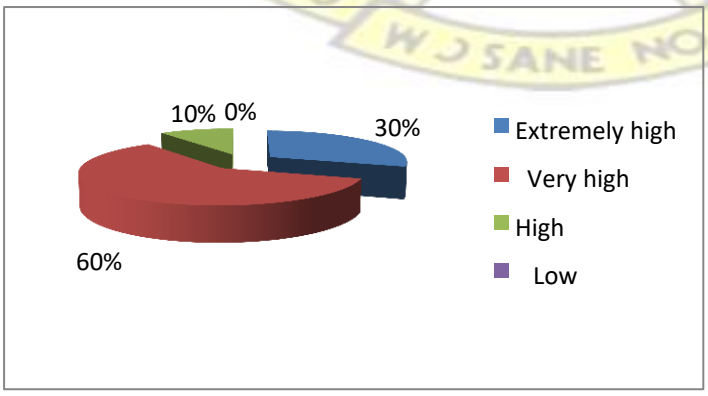

Figure 4-1: Clients perception

4.3.1.2 Staff of the construction company perception

6 of the 9 respondents representing 66.7 percent from the staff of the contractor saw the number of workers needed to execute a per meter length ditch cleaning to be extremely high. 14. 3 out the total 9 people indicating 33.3% saw the number of workers needed to execute a per meter length ditch cleaning to be very high in relation to capital. The result is shown clearly in figure 4.2 below.

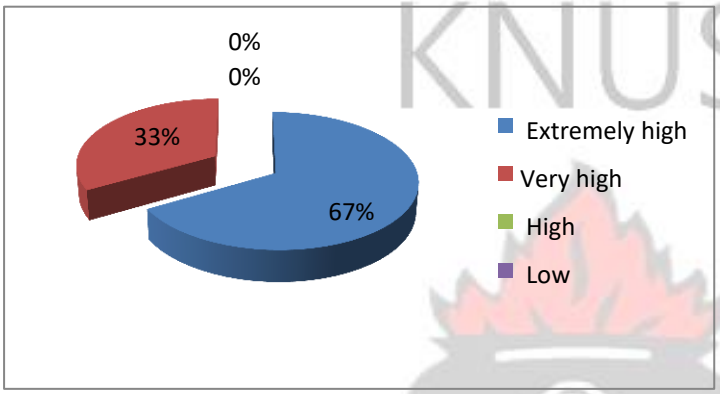

Figure 4-2: Staff of the construction company perception

4.3.1.3 Community's perception

The results depicted that 36 of the 50 measuring 72% of the respondents saw the number of workers needed to execute a per meter length ditch cleaning to be extremely high. 14 people representing 28% indicated that the number of workers needed to execute a per meter length ditch cleaning to be very high. The results are shown clearly in figure 4.3 below.

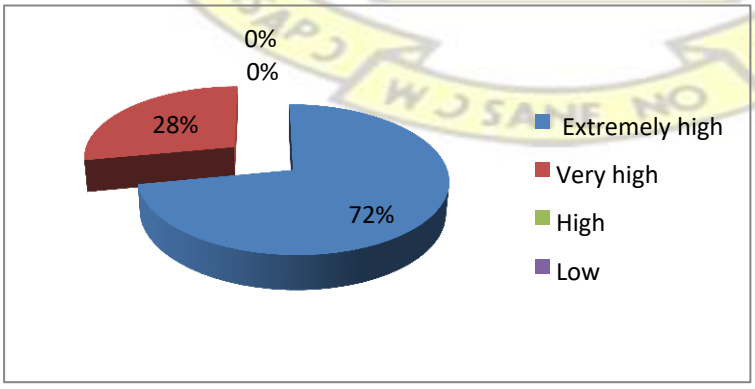

Figure 4-3: Community's perception

4.3.2 Number of workers needed on a per meter length of clearing.

Clearing involves the general site clearance, grubbing, topsoil stripping, removal of trees and stumps. General site clearance is the removal of any objectionable materials above ground level that encroach upon or obstruct the works which shall include all trees, bushes, other vegetation, anthills, boulders with a volume up to $0.1m^3$,rubbish and any other material such as tree stumps. Grubbing involves the removal of plants underground root system and any other underground objects like anthills, termite mounds, foundations and the like to a depth 600mm below formation level and the backfilling of all associated voids with suitable material compacted to a density not less than that of the surrounding ground. Topsoil stripping is the removal of topsoil and roots from bushes and trees. All these activities are carried out with the hand using the necessary hand tools in LBT. This activity is carried out in both LBT and CBT. The stakeholders are to compare the technology which involves more people in carrying out site clearing.

4.3.2.1 Clients' perception

It became clear from the Table 4-14 that, 4 people representing 40 percent of the respondents saw the number of workers needed in per meter length of a clearing through the use of LBT to be comparatively extremely high in relation to the use of machines. 4 professional indicating 40 percent saw the number of workers needed to be very high. The result is shown clearly in figure 4.4 below.

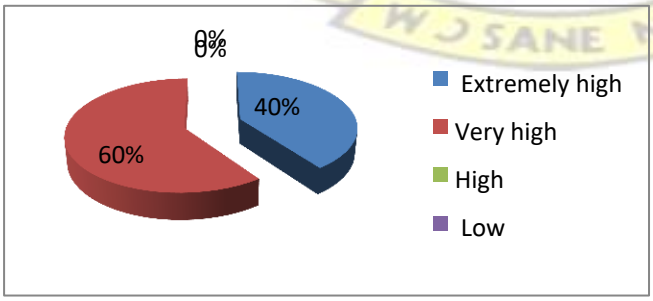

Figure 4-4: Clients' perception

4.3.2.2 Staff of the construction company perception

4 of the 9 respondents representing 44.4% from the contractors‟ side saw the number of workers needed to execute per meter length of a clearing to be extremely high. 5 out the total 9 people indicating 55.6% saw the number of workers needed to be very high in relation to capital. The results are shown clearly in figure 4.5 below.

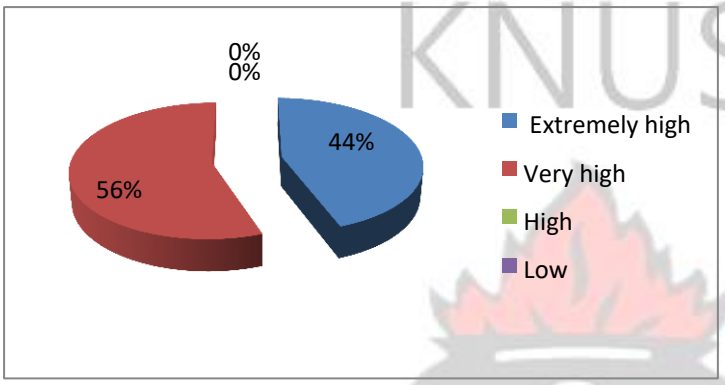

Figure 4-5: Staff of the construction company perception

4.3.2.3 Communities' perception

The results depicted that 43 out of the 50 measuring 86% of the respondents saw the number of workers needed to execute per meter length of a clearing to be extremely high. 7 people representing 14% indicated that the number of workers needed to execute per meter length of a clearing to be very high. The results are shown clearly in figure 4.6 below.

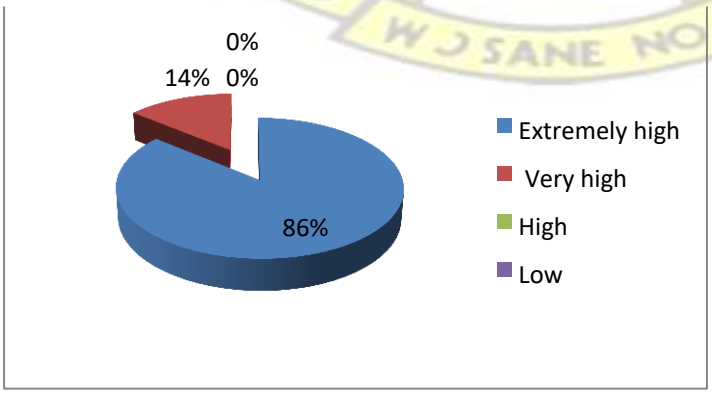

Figure 4-6: Communities' perception

4.3.3 Number of workers needed on a per meter cube of excavation and filling

Excavation works include drainage excavations (excavation of open side drains, excavation of turnouts, excavation of open channels) and the general earthwork excavation (excavation of borrow materials, excavation for cutting).

Filling works also involve filling to repair ruts and gullies in the roadbed as well as the general fill layer during construction. These activities are carried out in both LBT and CBT. The stakeholders are to compare the technology which involves more people in carrying out excavation and filling.

4.3.3.1 Clients perception

It became clear from the Table 4-14 that, 4 people representing 40 percent of the respondents saw the number of workers needed in executing per meter cube of excavation and filling through the use of LBT to be comparatively extremely high in relation to the use of machines. 6 of them indicating 60 percent saw the number of workers needed in executing per meter cube of excavation and filling to be very high. The result is shown clearly in figure 4.7 below.

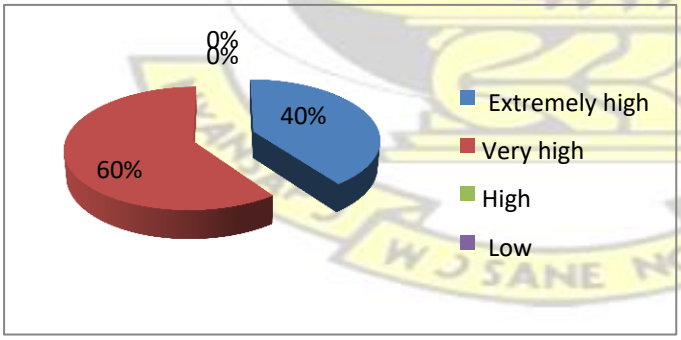

Figure 4-7: Clients perception

4.3.3.2 Staff of the construction company

5 of the 9 respondents representing 55.6% from the contractors‟ side saw the number of workers needed to execute per meter cube of excavation and filling to be extremely

high. 4 out the total 9 people indicating 44.4% saw the number of workers needed to be very high in relation to capital. The result is shown clearly in figure 4.8 below.

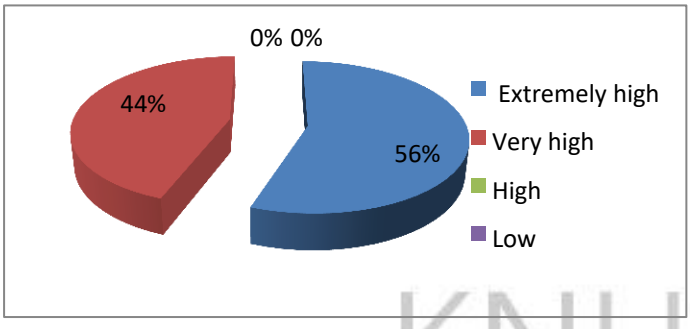

Figure 4-8: Staff of the construction company

4.3.3.3 Communities' perception

The results show that 33 out of the 50 measuring 66% of the respondents saw the number of workers needed to execute per meter cube of excavation and filling to be extremely high. 17 people representing 34% indicated that the number of workers needed to execute per meter cube of excavation and filling to be very high. The result is shown clearly in figure 4-9 below.

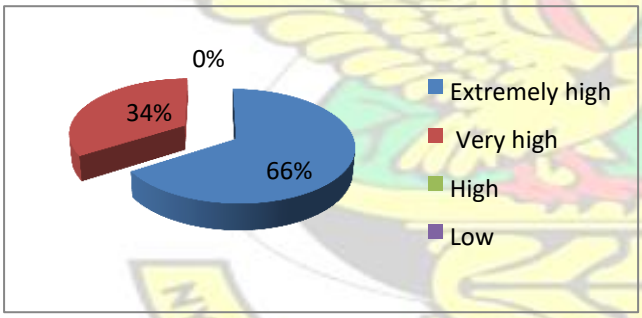

Figure 4-9: Communities' perception

4.3.4 Nnumber of workers needed on the mixing, placing and compacting of concrete

Mixing of concrete ingredients (fine aggregate, coarse aggregate, cement and water) are carried out using the mechanical concrete mixer which is capable of producing a uniform distribution of ingredients, the project manager sometimes approves hand

mixing for non-structural concrete in which case the concrete is made on a flat watertight platform or suitable area.

Placing of concrete is done under strict supervision of an experienced concrete supervisor. The concrete is transferred from the mixing place to the final deposit as rapidly as practicable and in a manner that will prevent segregation and ensure completion of placing and compaction before the onset of initial set.

Concrete is fully compacted after placing. This is done with a mechanical vibrator (approved design) or hand ramming .Hand ramming is allowed if the project manager is satisfied that it will produce the required result, but this method is not to be used on box culverts of spans exceeding 2m. These activities are also carried out in both LBT and CBT. The stakeholders are to compare the technology which involves more people in carrying out excavation and filling.

4.3.4.1 Clients perspective

It became clear from the Table 4-14 that, 3 people representing 30 percent of the respondents saw the number of workers needed during mixing and placing a cubic meter of concrete through the use of LBT to be comparatively extremely high in relation to the use of machines. 6 professional indicating 60 percent saw the number of workers needed during mixing and placing a cubic meter of concrete to be very high, whereas the 1 person taking 10 percent of the total respondents indicated that the number of workers to be high. The results are shown clearly in figure 4.10 below

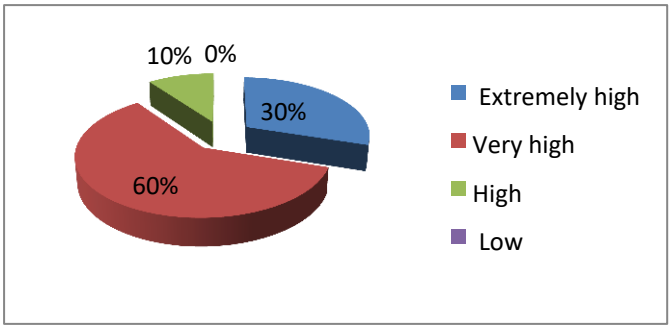

Figure 4-10: Clients perspective

4.3.4.2 Staff of the construction company perception

3 of the 9 respondents representing 33.3% from the contractors‟ side saw the number of workers needed during mixing and placing a cubic meter of concrete to be extremely high. 6 out the total 9 people indicating 66.7% saw the number of workers needed to be very high in relation to capital. The result is shown clearly in figure 4.11 below.

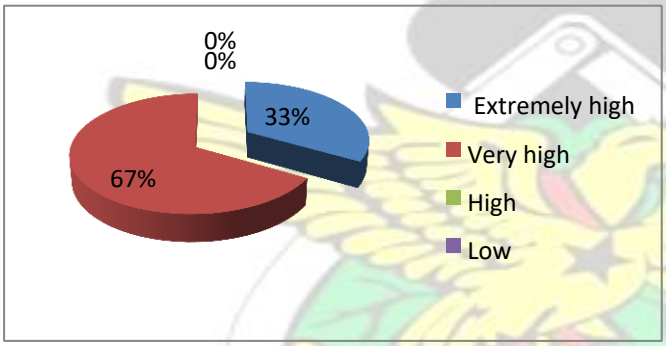

Figure 4-11: Staff of the construction company perception

4.3.4.3 Communities' perception

The results depicted that 31 out of the 50 measuring 62% of the respondents saw the number of workers needed in mixing and placing a cubic meter of concrete to be extremely high. 19 people representing 38% indicated that the number of workers needed in mixing and placing a cubic meter of concrete to be very high. The result is shown clearly in figure 4.12 below.

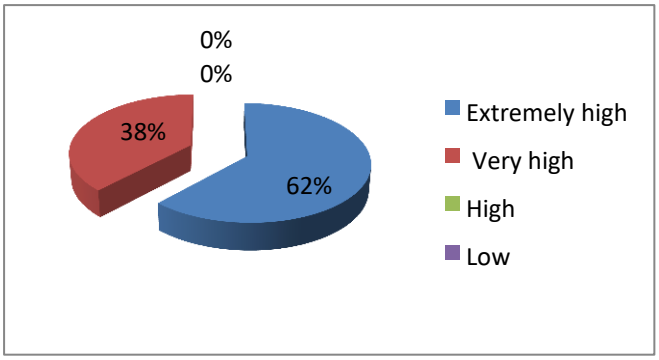

Figure 4-12: Communities' perception

4.4 Impact of labour-base technology

4.4.1 Clients perspective

Table 4-15 gives the Means Scores and Relative Importance Index, RII, values for the various identified impact variables form the clients perspective. The mean score values are all above 2.60 implying that clients agree that the factors enumerated are the impacts of labour base technology. The highest mean score of 4.70 was obtained for rural employment creation. The contractor employed 55 labourers on the project from the communities. The main means of livelihood is farming and it is normal in the rainy seasons with a seasonal source of income. Extra income could be generated during the dry seasons where there is little or no activity on the farm. The labourers received various forms of training in other segments of construction. The lives of the people in the community see drastic change whilst construction goes on.

Imparting knowledge in the local resources and fair income distribution both ranked second with as a mean score of 4.40. It is a requirement that all workers on labour based projects will undergo a series of trainings. They develop various skills, including interpersonal, managerial and technical skills. The money used to purchase earth moving equipment, maintaining and buying of fuel indirectly be invested in the local resources is the form of wages, salaries and skills development.

Job security and reduction in mortality both ranked fourteenth with a mean score of 3.70. The clients believe that impact of job security is on LBT road works is minimal because the flow of work is not very consistent. This is as a result of delayed payment issues.

Again, the impact of reduction in mortality rate is also minimal with a mean score of 3.70 because the clients believe this impact is not directly felt. Availability of health care is will directly reduce the mortality rate instead.

The results also show that access to potable water during project period has the lowest mean value of 3.5. This suggests that Clients believe that access to potable water is only in the circle of the workers on the project site and not to the whole community populace.

Table 4

-15: Impact of labour base road construction, the Clients' perspective

Variables	Rating					Total	∑W	Mean	RII	Rank
	1	2	3	4	5					
Generate rural employment opportunities (job creation)	0	0	0	3	7	10	47	4.70	0.94	1st
Imparting knowledge in the local resources (employees) including skills developments and locally manufactured hand tools	0	0	0	6	4	10	44	4.40	0.88	2nd
Fair income distribution to a wider section of the communities to reduce poverty	0	0	0	6	4	10	44	4.40	0.88	2nd
Less impact on the environmental degradation and pollution emission into the atmosphere.	0	0	0	7	3	10	43	4.30	0.86	4th
Job security is assured during the entire project period.	0	1	3	4	2	10	37	3.70	0.74	14th
Considerations of the local cultural norms since workers are from the same communities. Eg. Not working on some particular days of the week.	0	1	2	5	2	10	38	3.80	0.76	12th
Less litigation issue since employees are part of the community and work is more focused	0	1	2	5	2	10	38	3.80	0.76	12th
Reduction of imports and conservation of foreign exchange	0	1	0	6	3	10	41	4.10	0.82	8th
Improves the commercial activities in the communities (food vending and other petty trading)	0	0	0	7	3	10	43	4.30	0.86	4th
Improves the condition of the road (Comfort of travelling) and reducing of travelling time	0	0	0	7	3	10	43	4.30	0.86	4th
Access to potable water during project period	0	1	3	6	0	10	35	3.50	0.70	16th
Reduction in mortality rate among pregnant women	0	1	2	6	1	10	37	3.70	0.74	14th
Communities" involvement in the management of the project	0	1	0	5	4	10	42	4.20	0.84	7th
Local feeling of project ownership	0	1	1	4	4	10	41	4.10	0.82	9th

Table 4

Injecting maximum amount of direct cash the project in the local communities	0	1	0	7	2	10	40	4.00	0.80	10th
Access to health care delivery	0	0	2	6	2	10	40	4.00	0.80	10th

4.4.2 Staff of the Construction Company perspective

Similarly, Table 4-16 gives the Means Scores and Relative Importance, RII, values for the identified impact variables according to the contractors‟ perspective. The mean score values are above 2.60 signifying that the staff of the construction company agree that the identified variables are the impacts of labour base technology. The highest mean score of 4.890 was obtained generating rural employment opportunities (job creation).LBT concept could be used to facilitate the sustainability of their jobs.

Improving in the condition of road, fair income distribution, reduction of imports and injecting maximum amount of direct cash of the project in the local communities ranked second and attained a mean score of 4.78. The lives of the general population in the community see rapid change whilst development goes on. A significant portion of the contract sum is utilized to pay wages and salaries of the workforce. Improvements in the conditions of the feeder roads are of unbelievable advantages to Ghana's economy. The labour-based Technology in road construction rehabilitate and maintained more roads of the equal or less cost as compared equipment-based methodology. A good feeder road would improve transportation of perishable farm products and other produce from the rural area where storerooms are rare to the business sectors and ports.

The economy of Ghana experiences monetary multiplier spillage as a consequence of relying upon the importation of heavy equipment for its development and earth moving ventures.

The $174 million foreign currency that could have been contributed to enhance the local economy leaks out to other nations' economies from which the machinery are purchased.

Local feeling of the project ownership has the lowest mean value of 3.89, so they believe those workers on the project site to do not work with the passion of the asset ownership but are more interested in their wages and salaries.

Table 4

-16: Impact of labour base road construction, the Staff of the construction company perspective

Variables	Rating					Total	∑W	Mean	RII	Rank
	1	2	3	4	5					
Generate rural employment opportunities (job creation)	0	0	0	1	8	9	44	4.89	0.98	1st
Imparting knowledge in the local resources (employees) including skills developments and locally manufactured hand tools	0	0	0	6	3	9	39	4.33	0.87	6th
Fair income distribution to a wider section of the communities to reduce poverty	0	0	0	2	7	9	43	4.78	0.96	2nd
Less impact on the environmental degradation and pollution emission into the atmosphere.	0	0	0	3	6	9	42	4.67	0.93	6th
Job security is assured during the entire project period.	0	0	0	7	2	9	38	4.22	0.84	14th
Considerations of the local cultural norms since workers are from the same communities. eg. Not working on some particular days of the week.	0	0	0	7	2	9	38	4.22	0.84	14th
Less litigation issue since employees are part of the community and work is more focused	0	0	0	5	4	9	40	4.44	0.89	12th
Reduction of imports and conservation of foreign exchange	0	0	0	6	3	9	39	4.33	0.87	2nd
Improves the commercial activities at the communities(food vending and other petty trading)	0	0	0	4	5	9	41	4.56	0.91	10th
Improves the condition of the road (Comfort of travelling) and reducing of travelling time	0	0	0	2	7	9	43	4.78	0.96	2nd
Access to portable water during project period	0	0	0	4	5	9	41	4.56	0.91	10th
Reduction in mortality rate among pregnant women	0	0	0	6	3	9	39	4.33	0.87	13th
Communities involvement in the management of the project	0	0	0	3	6	9	42	4.67	0.93	6th
Local feeling of project ownership	0	2	0	4	3	9	35	3.89	0.78	16th
Injecting maximum amount of direct cash the project in the local communities	0	0	0	2	7	9	43	4.78	0.96	2nd
Access to health care delivery	0	0	0	3	6	9	42	4.67	0.93	6th

4.4.3 Communitys' perspective

Table 4-17 also gives the Means Scores and Relative Importance, RII, values for the identified impact variables according to the community‟s perspective. The mean score values are above 2.60 signifying that communities agree that the identified variables are the impacts of labour base technology. The highest mean score of 4.580 was obtained for generating rural employment opportunities (job creation) was ranked first. The contractor who adopted the LBT employed 55 casual labourers whiles the CBT employed only 12 casual labourers from the communities on that same road. More jobs will be created and poverty eliminated if the government invests more money in the LBT.

Improving the condition of the road ranked second with a mean score of 4.44. The labourbased Technology in road construction facilitates the rehabilitation of more roads of the same or less cost as compared to that of the conventional equipment-intensive method. Feeder roads in good conditions would not only facilitate safe movements of traffic, but would also make it easier to rapidly transport perishable farm goods and other produce from the poor rural areas where storage facilities are scarce to the markets and ports.

Improvement in the commercial activities ranked third with a mean score of 4.36. Improvement in the commercial activities directly increases fair income distribution since salaries and wages are used in exchange of goods and services.

Though the local feeling of the project ownership has the lowest mean value of 3.70 its impact cannot be overlooked. The communities are more particular about their wages and salary. They believe the government owns the road and it is his responsibility to manage and maintain the road. Sense of patriotism is lost, gone are the days when communities organised communal labours to maintain roads in their facilities.

Table 4

-17: Impact of labour base road construction, the Communities' perspective

Variables	Rating					Total	∑W	Mean	RII	Rank
	1	2	3	4	5					
Generate rural employment opportunities (job creation)	0	0	0	21	29	50	229	4.58	0.92	1st
Imparting knowledge in the local resources (employees) including skills developments and locally manufactured hand tools	0	0	0	35	15	50	215	4.30	0.86	4th
Fair income distribution to a wider section of the communities to reduce poverty	0	0	6	27	17	50	211	4.22	0.84	5th
Considerations of the local cultural norms since workers are from the same communities. eg. Not working on some particular days of the week.		3	4	29	14	50	204	4.08	0.82	9th
Less impact on the environmental degradation and pollution emission into the atmosphere.	0	4	4	22	20	50	208	4.16	0.83	8th
Job security is assured during the entire project period.	0	12	0	20	18	50	194	3.88	0.78	12th
Less litigation issue since employees are part of the community and work is more focused	0	3	0	39	8	50	202	4.04	0.81	10th
Reduction of imports and conservation of foreign exchange	0	0	13	28	9	50	196	3.92	0.78	12th
Improves the commercial activities at the communities(food vending and other petty trading)	0	0	0	32	18	50	218	4.36	0.87	3rd
Improves the condition of the road (Comfort of travelling) and reducing of travelling time	0	0	0	28	22	50	222	4.44	0.89	2nd
Access to portable water during project period	0	9	0	31	10	50	192	3.84	0.77	14th
Reduction in mortality rate among pregnant women	0	0	3	33	14	50	211	4.22	0.84	5th
Communities involvement in the management of the project	0	2	7	29	12	50	201	4.02	0.80	11th
Local feeling of project ownership	0	9	0	38	3	50	185	3.70	0.74	16th
Injecting maximum amount of direct cash of the project in the local communities	0	0	18	22	10	50	192	3.84	0.77	14th
Access to health care delivery	0	0	4	32	14	50	210	4.20	0.84	5th

4.5 Challenges of Labour based road construction

4.5.1 Clients' perspective

Table 4-18 gives the Means Scores and Relative Importance Index, RII, values for the various identified challenges variables from the client's perspective. Delayed payment had a mean score of 4.7 and ranked first as the most prevalent challenge of the labour base technology in road construction. Recently most of these labour based road constructions are being funded by the Government of Ghana. Funds for these projects are not readily available and for that matter becomes very difficult to pay the contractors. Delayed payment was identified to be the most prevalent of the identified challenges of LBT. Delayed payment may lead to serious cost overrun implications on the GOG projects.

Lack of labourers during farming seasons ranked second with a mean score of 4.40. Since most of the members of the communities are farmer, it is very difficult to get labourers as most prefer to do work like farming and in most cases galamsey because they earn better in those areas than on the construction site and are paid immediately after each day"s work. Therefore, most people may not readily leave the farming or galamsey to be trained in this field leading to unavailability of well-trained and skilled labourers.

Inclement weather ranked third with a mean score of 4.30. Ghana has two weather seasons, namely raining and dry seasons. Inclement weather like excessive rainfalls affect most of the activities involved in LBT road construction. This may retard the progress works in LBT of construction because most of the activities are done by humans.

Lack of efficient tools was the least prevalent challenge. It was ranked the lowest with a mean score of 2.10 signifying that clients disagree that lack of efficient tools is actually a challenge to labour base road construction since most of the tools are manufactured locally. The locally manufactured tools are readily available on the Ghanaian market and are much less costly to be purchased as compared to the heavy duty equipment for capital intensive contracts.

Table 4-18 shows the clients‟ perspective of the challenges of labour base road.

Table 4-18: Challenges of labour base road construction, the Clients' perspective

Variables	Rating					Total	∑W	Mean	RII	Rank
	1	2	3	4	5					
Lack of supervision of welltrained personnel	0	4	1	4	1	10	32	3.20	0.64	8th
Delayed payments	0	1	0	0	9	10	47	4.70	0.94	1st
Lack of efficient tools	1	8	0	1	0	10	21	2.10	0.42	10th
Lack of motivation of workers	0	2	3	3	2	10	35	3.50	0.70	6th
Lack of labourers during farming seasons	0	0	0	6	4	10	44	4.40	0.88	2nd
Conflicts among employees	0	2	3	5	0	10	33	3.30	0.66	7th
Lack of communication to the management	0	4	3	3	0	10	29	2.90	0.58	9th
Cost of food stuff increased because of abandoned farming activities	0	1	1	5	3	10	40	4.00	0.80	5th
High illiteracy rate retards the training and construction processes	0	1	0	6	3	10	41	4.10	0.82	4th
Inclement weather	0	0	0	7	3	10	43	4.30	0.86	3rd

4.5.2 Staff of the Construction Company perspective

In Table 4-19, Staff of the construction company again agree that delayed payment which had a mean score of 5.00 and RII of 1.00ranked first as the most prevalent challenge of the labour base technology in road construction. Government of Ghana (GOG) in recent time fund labour based road construction. People are not willing to be trained in the field of construction alone because it is not a sustainable source of job creation. The capacity for skilled labour in the road construction is being undermined because people are freshly trained all the time on construction sites. A contractor cannot

sustain his staff capacity all year round because he cannot afford their salaries on time because contract payments are unpredictable.

Lack of labourers during farming seasons ranked second with a mean score of 4.89 and RII of 0.98. Unustainability of construction jobs compels labourers in our villages to opt for farming and the likes which readily brings income to sustain their livelihoods.

Inclement weather again ranked third with a mean score of 4.56 and RII of 0.91. The period for procurement of LBT contracts should be done in conformity with the rainfall pattern in that particular year. Contracts may be procured before rainfall starts. Though there are instances of force majeure, the situation can be minimised.

Likewise, lack of efficient tools was again the least prevalent challenge. It was ranked the lowest with a mean score of 2.22 and RII of 0.44 meaning they disagree that the lack of efficient tools is actually a challenge to labour base road construction.

Table 4-19: Challenges of labour base road construction, the Contractors' perspective

Variables	Rating					Total	∑W	Mean	RII	Rank
	1	2	3	4	5					
Lack of supervision of well-trained personnel	0	6	0	3	0	9	24	2.67	0.53	9th
Delayed payments	0	0	0	0	9	9	45	5.00	1.00	1st
Lack of efficient tools	0	8	0	1	0	9	20	2.22	0.44	10th
Lack of motivation of workers	0	2	3	3	2	9	35	3.89	0.78	7th
Lack of labourers during farming seasons	0	0	0	1	8	9	44	4.89	0.98	2nd
Conflicts among employees	0	1	0	6	2	9	36	4.00	0.80	6th
Lack of communication to the management	0	4	0	4	1	9	29	3.22	0.64	8th
Cost of food stuff increased because of abandoned farming activities	0	0	0	5	4	9	40	4.44	0.89	4th
High illiteracy rate retards the training and construction processes	0	0	0	6	3	9	39	4.33	0.87	5th
Inclement weather	0	0	0	4	5	9	41	4.56	0.91	3rd

4.5.3 Communities' perspective

In Table 4-20, the members of the communities again agree that delayed payment which had a mean score of 4.50 and RII of 0.90 ranked first as the most prevalent challenge of the labour base technology in road construction. The government of Ghana (GOG) objective for using labour base technology for project implementation to help alleviate poverty in the respective communities is not being met. The women who were employed used their salaries to feed their children and their families instead of saving for another vocation after the close of the project because poor in cash flow.

Lack of labourers during the farming season ranked second with a mean score of 4.22 and RII of 0.84. Most of labourers shifted to their farms during farming seasons because they believe farming is more sustainable.

Inclement weather ranked third with a mean score of 4.12 and RII of 0.82. Though communities agree rainfall retards progress of LBT project, it is favourable for bumper harvests. The community still had their farms for a better livelihood.

Likewise, lack of efficient tools was again the least prevalent challenge. It was ranked the lowest with a mean score of 2.06 and RII of 0.41, meaning it is not a challenge of LBT. The communities were acclimatised with most of locally manufactured tools because they already use the same or similar tools in their farming activities.

Table 4-20: Challenges of labour base road construction, the Community's perspective

Variables	Rating					Total	∑W	Mean	RII	Rank
	1	2	3	4	5					
Lack of supervision of well-trained personnel	7	31	12	0	0	50	105	2.10	0.42	9th
Delayed payments	0	0	0	25	25	50	225	4.50	0.90	1st
Lack of efficient tools	9	30	10	1	0	50	103	2.06	0.41	10th
Lack of motivation of workers	0	18	15	15	2	50	151	3.02	0.60	7th

Lack of labourers during farming seasons	0	5	0	24	21	50	211	4.22	0.84	2nd
Conflicts among employees	0	0	30	10	10	50	180	3.60	0.72	5th
Lack of communication to the management	1	32	8	2	7	50	132	2.64	0.53	8th
Cost of food stuff increased because of abandoned farming activities	3	9	2	24	12	50	183	3.66	0.73	4th
High illiteracy rate retards the training and construction processes	9	0	13	13	15	50	175	3.50	0.70	6th
Inclement weather	0	2	10	18	20	50	206	4.12	0.82	3rd

4.6 Work progress in labour base road works

The progress of work according to 60% of clients is quite constant comparing it with the flow of work when using heavy equipments. There is the need for strict supervision of labourers to complete work on time and also attain specified standards. 44.4% and 22.2% of the staff of the construction company believe the flow of work is „very constant" and „constant" respectively because there are no equipment breakdowns. Equipment breakdown can cause unanticipated delays. Delays caused by a labourer on sites can quickly be remedied by replacing with another labourer especially in instance where they cannot work due to bad health or other human related issues. 62% of community respondents say work progress is quite constant and depends mainly on the wages they are paid and motivations as well. Low wages are normally paid to the labourers on these construction sites. Labourers would prefer a higher paid work if any. In areas where there are, for example illegal mining „galamsey" it is a great challenge to get labours from the community to execute work.

Table 4-21 summarises the constant nature of LBT relative to CBT.

Table 4-21: Work progress in labour base road works

Responses	Clients	Contractors	Communities

		%		%		%
Very constant	0	0	2	22.2	3	6
Constant	2	20	4	44.4	9	18
Quiet Constant	6	60	2	22.2	31	62
Not constant	2	20	1	11.1	7	14
Total	10	100	9	100	50	100

4.7 Cost of using labour base method as compared to equipment base method The majority of the stakeholders believe that it is cheaper to use the Labour base technology for road construction as compared to equipment base technology as illustrated in the Table 4-22 below. They also believe equipment or capital based technology has indirect cost like importation of heavy equipment and their fuel which affects foreign exchange. This also affects the government‟s foreign cash reserves negatively. Additionally, the government gets indirect costs and tax returns from the huge labour force as well.

Table 4-22: Cost of using labour base method as compared to equipment base method

Responses	**Clients**		**Contractors**		**Communities**	
		%		**%**		**%**
Strongly agree	3	30	3	33.3	3	6
Agree	5	50	4	44.4	31	62
Partially agree	2	20	2	22.2	9	18
Don’t agree	1	10	0	0	7	14
Total	10	100	9	100	50	100

4.8 Labour base road technology and Ghana poverty reduction strategy

The Ghana poverty reduction strategy represents comprehensive policies, strategies, programmes, and projects to support growth and poverty reduction over a period. Using labour base technology for road construction is also a programme supporting growth and reducing poverty in their respective areas. A higher percentage of the stakeholders „strongly recommends" and „recommend" labour base technology as a tool for the implementation of Ghana poverty reduction strategy as summarised in Table 4-23 below.

The Government of Ghana means to create wealth by changing the way of the economy to accomplish the development, accelerated growth and the insurance of the defenseless inside of a decentralized and law based environment by direct backing for human advancement and the procurement of essential amenities.

The Ghana poverty reduction strategy additionally concentrates on giving the empowering environment that enables all Ghanaians to take an interest in wealth creation and to share in the riches made. It likewise guarantees that all Ghanaians independent of their financial status or where they live have admittance to fundamental social administrations, for example, medical services, quality training, consumable drinking water, fair lodging, security from wrongdoing and roughness, and the capacity to take an interest in choices that influence their own lives

The earning of income through labour based road construction creates a means of access to some of these social services.

Table 4-23: Labour base road technology and Ghana poverty reduction strategy

Responses	Clients		Contractors		Communities	
		%		%		%

Strongly recommended	6	60	7	77.7	25	50
Recommended	3	30	2	22.2	19	38
Quietly Recommended	0	0	0	0	4	8
Not Recommended	1	10	0	0	2	4
Total	10	100	9	100	50	100

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1Conclusions

5.1.1 Number of workers needed to carry out some identified construction activities

On the average the respondents saw that more workers are needed to carry out all identified activities in road construction.

5.1.2 Impacts of LBT road construction on the communities

Sixteen (16) variables were considered in the assessment of the impact of LBT road construction on the communities. The mean scores of these factors are more than 2.60 meaning the stakeholders (clients, Staff of the Construction Company and communities) agree that all the mentions factors are positive impacts of LBT road construction.

1. **Generating rural employment opportunities (Job Creation)**

The results from the study indicated that, job creation is the most prevalent impact. Although jobs are created they are not sustainable so cannot achieve the long term goal of poverty alleviation.

2. **Improving in the condition of roads**

The road was improved after it suffered some delays in payments before completion and was improved at a higher cost and time. This variable ranked second.

3. A fair income distribution

Wages and salaries were not paid on a consistent basis, even though their impacts were felt in the communities. Consistent cash flow could enhance saving towards vocations such dressmaking, hairdressing, carpentry, craft making ,etc. for a long term poverty reduction strategy.

4. Local feeling of the project ownership

Local feeling of the project ownership had the lowest mean value of 3.70. The local community has lost sense of patriotism for communal labour to help in the maintenance of the road network.

5.1.3 Challenges of LBT road construction

Ten (10) factors were considered in the assessment of the challenges of LBT road construction on the communities.

The mean scores of 9 factors are more than 2.60 with the exception of lack of efficient tools which had less than 2.60 mean scores from all the stakeholders. According to the stakeholders, the case of Ghana is different. They disagree that lack of efficient tools is a challenge of LBT road construction. They are in agreement that the other 9 factors are the challenges of LBT. The most ranked first three challenges were as below;

1. Delayed Payment

The challenge has the most prevalent in the road construction now. This led to cost and time overruns of the project.

2. Lack of labourers during farming Seasons

Rural folks pay more attention to the agricultural activities in their communities which are also labour based. This is because they are receive their wages and salaries consistently and motivated as well.

3. Inclement Weather

Inclement weather has been an excuse for delay in project completion, though there are instances of force majeure which is minimal.

4. Lack of efficient tools

The least challenge was the lack of efficient tools. They believe the lack of efficient tools is not a challenge since they use similar tools on their farms.

5.1.4 The cost of using the labour base method as compared to equipment base

The majority of the stakeholders agree that the cost of using LBT in road construction is cheaper as compared to CBT. According to the clients and the staff of the construction company, labour- based technology is the most cost effective method of rural infrastructure development when the right conditions are present.

5.1.5 Labour base road technology and Ghana poverty reduction strategy A higher percentage of the stakeholders strongly recommend labour base technology as a tool for the implementation of Ghana poverty reduction strategy.

5.2 Recommendations

The recommended measures from this analysis to address the challenges facing labour based technology in road construction are as follows:

1. Funding

Funding of labour based projects should be given some priority during payments to avoid cost and time overrun. Late payments should be discouraged by Government because this leads to most of the identified challenges. Donor funds are needed to help promote this technology in road construction.

2. Salary/Wages/ Incentives

Workers on these projects should be paid in accordance with the Labour law. They should be motivated in all areas so that projects will not be abandoned for a higher paid job. Good wages, salaries and motivation encourages local ownership of the project.

3. Capacity Building For LBT

The DFR is evaluated to be doing well in the execution and administration of Labourbased Technology road contracts. The department ought to be urged to present more LBT contracts by being bolstered with the required logistics through capacity building for the aims of LBT to be sustained.

4. LBT as a Discipline in Academic Institutions

Studies of LBT as a discipline ought to be encouraged for advancement in the educational module in Universities, Polytechnics and other Technical Institutions for Ghana's Engineers and Technicians to acknowledge and oversee Labour based Technology as a means of construction and poverty reduction strategy**.** The technology can be applied in other sector of construction like building construction works, irrigation, sanitation, water supply, forestry and soil conservation.

REFERENCES

Amoatey, C.T. (2007).User financed road infrastructure in Ghana: Opportunities of road concessions

Ampadu, S.K. (1999). How slow is Labor-based Technology compared with equipment-intensive technology? The case of Feeder Road Construction in Ghana - Urban Forum Volume 10 No. 1

Ampadu, S.K. (2001). The cost of Feeder Road Rehabilitation- A case study from Ghana. Proceedings of First International Conference on Employment Creation in Development, University of Witwatersrand, Johannesburg RSA, April 2001.

Ampadu, S.K. (2005). A Statistical Model for Predicting the Cost of Unpaved Feeder Road Maintenance Intervention- The case of Ghana. Journal of the Ghana Institution of Engineers ISSN 0855-0843, Vol. 3 No. 2 Dec. pp. 59-68.

Ampadu, S.K., Mensa H.M., Ashong, E.N.K. and Danso, H. (2003). Labor-based technology in feeder road rehabilitation and poverty reduction- The Ghana Experience. The tenth regional seminar papers of Labor-based Technology; A Review of Current Practice, Volume 2.

Asfaw, K. (2005). The labour-based method for road construction. Kenya Engineer, 26(3), 28-30.

Ashong, E.N.K. (1996). The Labour-based program in Ghana: Facts and figures as at December, 1995.Department of Feeder Roads, Ghana.

Belser, P. (1999), Vietnam: On the Road to Labour-Intensive Growth? Background paper for Vietnam Development Report 2000: Attacking Poverty, Joint Report of the Government of Vietnam- Donor-NGO Poverty Working Group, Washington D.C

Bentall,P., Andreas, B., Veen.de J.(1999). Employment-Intensive Infrastructure

Programmes: Capacity Building for Contracting in the Construction Sector. Geneva: International Labour Organisation

Boateng, K. and Ofori-Sarpong, E. (2002).An Analytical Study of the Labor Market for Tertiary Graduates in Ghana. A World Bank/ National Council for Tertiary Education & TheNational Accreditation Board Project, Accra.

Canagarajah, S., Mazumdar, D. and Ye, X., (1998). The Structure and Determinants of Inequality and Poverty Reduction in Ghana, 1988-92. Poverty Reduction and Social Development Division Working Paper 33, World Bank, Washington DC.

Center for Business and Economic Research (CBER) (1997). The Magical Multiplier: Fact and Fiction. Research Brief Archives, the University of Alabama. http://cber.cba.ua.edu/rbriefs/ab_nov97.html(Accessed: 9/04/14)

Collier, P. and Gunning, J.W. (1999) *"*Explaining African Economic Performance" Journal of Economic Literature, 37: 64-111.

Danso H (1996). Factors influencing the output of labor-based contractors in Ghana. International Labor Organization/Advisory Support, Information Service and Training (ILO/ASIST) Regional Seminar papers.

Gaude, J. and Watzlawich H., (1992) "Employment creation and poverty alleviation through Labour-intensive public works in least developed countries*"* International Labour Review,131(1).

Ghana Living Standard Survey (GLSS) (2000) the Report of the fourth round (GLSS 4), Ghana Statistical Service (GSS).http://www.worldbank.org/ html/prdph/lsms/country/gh/docs/G4report.pdf(Accessed: 3/06/14).

Ghana Poverty Reduction Strategy 2003-2005: Analysis and Policy Statement. http:// www. Participatory Development Associates Ltd_.htm poverty reduction.htm (16/06/14)

Kropotkin, P. (1890) Brain Work and Manual Work."The Nineteenth Century, March,1890, pp. 456-475.

KyomboL.M and Msengesi.U.L(2001) Labour based technology in road construction and maintenance- experience, opportunities and challenges in Tanzania

Larcher, P. and Miles, D.s (2000). Roads and Realities: How to promote road contracting in developing countries. Institute of Development Engineering, Loughborough University, Leicestershire UK, pp. 7-14.

Lennartsson, M. and Stiedl, D. (1995) Technology Choice: man or machine, including case studies from Lesotho and Zinbabwe. Employment Promotion Seminar, ILO

Liimatainen,M.-R. (2002). Training and skills Acquisition in the Informal Sector: A literature Review. IFP/ Skills- Informal Economy Series,ILO, Geneva.

International Trade Administration, US Department of Commerce (ITA; USDOC) (2002) Country Commercial Guides (CCG) FY 2002. Ghana.

Majeres,J. and Veen, de J.(2002).Labour based works methodology. Rural Transport Knowledge Base. Rural Travel and Transport Program 2001

Mahuri M.,Thevadasan,D. and Zukulu, R. (2005) “Community-based labourIntensive Road Construction: findings of an impact study of the Amadiba Road”. Proceedings of the 24th Southern African Transport Conference (SATC 2005). Vol. 11

Medida, S. (2008). Pocket guide on industrial automation for Engineers and Technicians. First Edition, Volume 6 pp.7

Ministry of Roads and Transport (MRT) Ghana (2005b).Guidelines for the Classification of Contractors for Road and Bridge Works.

Mpayo.K, (2003). Community involvement in Labour-Based Urban Upgrading, experience from Maseru, Lesotho

Osei-Bonsu, K.D. (1992). Labor-Based Roads Rehabilitation: The Use of Private Contractors. ILO/Advisory Support, Information Service and Training (ILO/ASIST) Regional Seminar papers.

Quagraine, V.K.(2007). New strategies to improve the management capacity of contractors for labor-based methods in road rehabilitation in Ghana (Doctoral dissertation, Virginia Polytechnic Institute and State University)

Quagraine, V.K., Brandenburg S.G, and BeliveauY. J, (2009). Improving Labor-Based Road Rehabilitation in Ghana, Journal of Management Engineering.

Stock, E.A. (1996). The problems facing labor-based road programs and what to do about them. International Labor Organization/Advisory Support, Information Service and Training (ILO/ASIST) Regional Seminar papers.

Stock, E.A. and Veen,de J. (1996). Expanding Labor-based Methods for Road Works in Africa. World Bank Technical Paper No. 347, World Bank, Washington.

Taylor, G., Bekabye,M. (1999), An Opportunity for Employment Creation, Labourbased Technology in Roadworks: The Macro-Economic Dimension Paragraph one of executive summary. pp ii, June 1999

Thwala, W.D. (2005) Employment Creation through the provision of Low cost housing in South Africa. In Proceedings of the XXXIII IAHS World Congress on Housing: Transforming Housing Environments through Design.

Twumasi-Boakye, A. (1996). A study of labour–based contracting commissioned by the ILO

World Factbook (Central Intelligence Agency) (2005). Imaging & Publishing Support. USA.

APPENDICES

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF BUILDING TECHNOLOGY

(MSC. CONSTRUCTION MANAGEMENT)

Thank you for agreeing to participate in this survey. This questionnaire is designed to solicit views to help student to carry out a research on impact of labour based technology in Ghana and it is strictly for academics purposes.

Please you can contact the address and telephone numbers at the last end of the survey sheet of any questions regarding the survey.

Confidentiality of the questionnaire is fully assured.

QUESTIONNAIRES FOR STAFF OF THE DEPARTMENT OF FEEDER ROADS Please, thick the appropriate response box ☐

SECTION A

1. What is your current profession in the department?

Engineer	☐
Quantity Surveyor	☐
Land surveyor	☐
Others, please specify	☐

2. How long have you been with the department?

0-5 years	6-10 years	11-20years	Above 20 years
☐	☐	☐	☐

SECTION B

Objective of the study is to identify the impact of labour based road construction in Ghanaian communities.

3. How would you assess the frequency at which the Department of Feeder Roads (DFR) incorporate labour- based technology in its road construction and maintenance projects?

(a) Very often ☐

(b) Quite often ☐

(c) Often ☐

(d) Not at all ☐

What is your view about the number of workers needed to carry out each of the following activities under road works using labour based as compared to equipment based?

4. Per meter length of ditch cleaning
   (a) Extremely High ☐
   (b) Very High ☐
   (c) High ☐
   (d) Low ☐

5. Clearing of light bush on both sides of a road
   (a) Extremely High ☐
   (b) Very High ☐
   (c) High ☐
   (d) Low ☐

6. Per meter cube of excavation and filling
   (a) Extremely High ☐
   (b) Very High ☐
   (c) High ☐
   (d) Low ☐

7. Mixing, placing and compaction of a cubic meter of concrete
   (a) Extremely High ☐
   (b) Very High ☐
   (c) High ☐
   (d) Low ☐

8. The table below is a list of some impacts of labour based road construction on the standard of living on our communities. Please rank on a Likert scale of 1-5, how you would scale these challenges in order of significance by ticking the appropriate boxes

1	2	3	4	5
Strongly Disagree	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**

Items	Impact of labour based road construction	1	2	3	4	5
1	Generate rural employment opportunities (job creation)	☐	☐	☐	☐	☐
2	Imparting knowledge in the local resources (employees) including skills developments and locally manufactured hand tools	☐	☐	☐	☐	☐
3	Fair income distribution to a wider section of the communities to reduce poverty	☐	☐	☐	☐	☐
4	Less impact on the environmental degradation and pollution emission into the atmosphere.	☐	☐	☐	☐	☐
5	Job security is assured during the entire project period.	☐	☐	☐	☐	☐
6	Considerations of the local cultural norms since workers are from the same communities. eg. Not working on some particular days of the week.	☐	☐	☐	☐	☐
7	Less litigation issue since employees are part of the community and work is more focused	☐	☐	☐	☐	☐
8	Reduction of imports and conservation of foreign exchange	☐	☐	☐	☐	☐
9	Improves the commercial activities at the communities(food vending and other petty trading)	☐	☐	☐	☐	☐
10	Reduction in mortality rate among pregnant women	☐	☐	☐	☐	☐
11	Improves the condition of the road (Comfort of travelling) and reducing of travelling time	☐	☐	☐	☐	☐

Items	Impact of labour based road construction	1	2	3	4	5
13	Communities involvement in the management of the project	☐	☐	☐	☐	☐
14	Local feeling of project ownership	☐	☐	☐	☐	☐

15	Injecting maximum amount of direct cash the project in the local communities	☐	☐	☐	☐	☐
16	Access to health care delivery	☐	☐	☐	☐	☐
17	Others, Please specify	☐	☐	☐	☐	☐
18		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐

Please give reasons of your impacts you have identified on the list (if applicable) above.

9. The table below is a list of some challenges affecting labour based road construction in our communities. Please rank on a Likert scale of 1-5, how you would scale these challenges in order of significance by ticking the appropriate boxes

1	2	3	4	5
Strongly Disagree	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**

Items	Challenges of labour based road construction	1	2	3	4	5
1	Lack of supervision by well-trained personnel	☐	☐	☐	☐	☐
2	Delayed payments	☐	☐	☐	☐	☐
3	Lack of efficient tools	☐	☐	☐	☐	☐
4	Lack of motivation of workers	☐	☐	☐	☐	☐
5	Lack of labourers during farming seasons	☐	☐	☐	☐	☐
6	Conflicts among employees.	☐	☐	☐	☐	☐
7	Lack of communication to the management	☐	☐	☐	☐	☐
8	Cost of food stuff increased because of abandon of farm activities	☐	☐	☐	☐	☐
9	High illiteracy rate retards the training and construction processes	☐	☐	☐	☐	☐
10	Inclement Weather	☐	☐	☐	☐	☐
11	Other, Please specify	☐	☐	☐	☐	☐
12		☐	☐	☐	☐	☐
13		☐	☐	☐	☐	☐
14		☐	☐	☐	☐	☐
15		☐	☐	☐	☐	☐

10. Please give reasons of your challenges you have identified on the list (if applicable) above.

11. How constant do you see the flow of work in Labour Based road works as compared to machines that can experience occasional break downs. (a) Very constant ☐

(b) Constant ☐

(c) Quite constant ☐

(d) Not constant ☐

12. The cost of using labour based method for road works is cheaper than that of equipment intensive .How do you agrees to this statement? (a) Strongly agree ☐

(b) Agree ☐

(c) Partially agree ☐

(d) Don"t agree ☐

13. How strongly would you recommend Labour-based Technology road works on the implementation of Ghana Poverty Reduction Strategy? (a) Strongly recommended ☐

(b) Recommended ☐

(c) Quietly Recommended ☐

(d) Not Recommended ☐

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF BUILDING TECHNOLOGY

(MSC. CONSTRUCTION MANAGEMENT)

Thank you for agreeing to participate in this survey. This questionnaire is designed to solicit views to help student to carry out a research on impact of labour based technology in Ghana and it is strictly for academics purposes.

Please you can contact the address and telephone numbers at the last end of the survey sheet of any questions regarding the survey.

Confidentiality of the questionnaire is fully assured.

QUESTIONNAIRES FOR SOME INDIVIDUALS FROM THE BENEFICIARY COMMUNITIES OF LABOUR BASED ROAD PROJECTS

Please, thick the appropriate response box ☐

SECTION A

1. What is your current profession?

Carpenter	☐
Mason	☐
Labour	☐
Others, please specify	☐

2. How long have you experienced Labour based Technology Road construction in your profession?

0-5 months	6-10 months	11-20 months	Above 20 months
☐	☐	☐	☐

3. What is your sex?

Male	☐
Female	☐

4.

5. What is your level of education?

No education	☐
MSLC/JSS	☐
O"level/SSS	☐
Tertiary	☐

SECTION B

Objective of the study is to identify the impact of labour based road construction in Ghanaian communities.

What is your view about the number of workers needed to carry out each of the following activities under road works using labour based as compared to equipment based?

6. Per meter length of ditch cleaning

(a) Extremely High ☐

(b) Very High ☐

(c) High ☐

(d) Low ☐

7. Clearing of light bush on both sides of a road

(a) Extremely High ☐

(b) Very High ☐

(c) High ☐

(d) Low ☐

8. Per meter cube of excavation and filling

(a) Extremely High ☐

(b) Very High ☐

(c) High ☐

(d) Low ☐

9. Mixing, placing and compaction of a cubic meter of concrete

(a) Extremely High ☐

(b) Very High ☐

(c) High ☐

(d) Low ☐

10. The table below is a list of some impacts of labour based road construction on the standard of living on our communities. Please rank on a Likert scale of 1-5, how you would scale these challenges in order of significance by ticking the appropriate boxes

1	2	3	4	5
Strongly Disagree	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**

Items	**Impact of labour based road construction**	**1**	**2**	**3**	**4**	**5**
1	Generate rural employment opportunities (job creation)	☐	☐	☐	☐	☐
2	Imparting knowledge in the local resources (employees) including skills developments and locally manufactured hand tools	☐	☐	☐	☐	☐
3	Fair income distribution to a wider section of the communities to reduce poverty	☐	☐	☐	☐	☐
4	Less impact on the environmental degradation and pollution emission into the atmosphere.	☐	☐	☐	☐	☐
5	Job security is assured during the entire project period.	☐	☐	☐	☐	☐
6	Considerations of the local cultural norms since workers are from the same communities. eg. Not working on some particular days of the week.	☐	☐	☐	☐	☐
7	Less litigation issue since employees are part of the community and work is more focused	☐	☐	☐	☐	☐
8	Reduction of imports and conservation of foreign exchange	☐	☐	☐	☐	☐
9	Improves the commercial activities at the communities(food vending and other petty trading)	☐	☐	☐	☐	☐

Items	**Impact of labour based road construction**	**1**	**2**	**3**	**4**	**5**
10	Reduction in mortality rate among pregnant women	☐	☐	☐	☐	☐
11	Improves the condition of the road (Comfort of travelling) and reducing of travelling time	☐	☐	☐	☐	☐
12	Access to portable water during project period	☐	☐	☐	☐	☐

13	Communities involvement in the management of the project	☐	☐	☐	☐	☐
14	Local feeling of project ownership	☐	☐	☐	☐	☐
15	Injecting maximum amount of direct cash the project in the local communities	☐	☐	☐	☐	☐
16	Access to health care delivery	☐	☐	☐	☐	☐
17	Others, Please specify	☐	☐	☐	☐	☐
18		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐

Please give reasons of your impacts you have identified on the list (if applicable) above.

11. The table below is a list of some challenges affecting labour based road construction in our communities. Please rank on a Likert scale of 1-5, how you would scale these challenges in order of significance by ticking the appropriate boxes

1	2	3	4	5
Strongly Disagree	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**

Items	**Challenges of labour based road construction**	**1**	**2**	**3**	**4**	**5**

1	Lack of supervision by well-trained personnel	☐	☐	☐	☐	☐
2	Delayed payments	☐	☐	☐	☐	☐
3	Lack of efficient tools	☐	☐	☐	☐	☐
4	Lack of motivation of workers	☐	☐	☐	☐	☐
5	Lack of labourers during farming seasons	☐	☐	☐	☐	☐
6	Conflicts among employees.	☐	☐	☐	☐	☐
7	Lack of communication to the management	☐	☐	☐	☐	☐
8	Cost of food stuff increased because of abandon of farm activities	☐	☐	☐	☐	☐
9	High illiteracy rate retards the training and construction processes	☐	☐	☐	☐	☐
10	Inclement weather	☐	☐	☐	☐	☐
11	Other, Please specify	☐	☐	☐	☐	☐
12		☐	☐	☐	☐	☐
13		☐	☐	☐	☐	☐
14		☐	☐	☐	☐	☐
15		☐	☐	☐	☐	☐

12. Please give reasons of your challenges you have identified on the list (if applicable) above.

12. How constant do you see the flow of work in Labour Based road works as compared to machines that can experience occasional break downs. (a) Very constant ☐

(b) Constant ☐

(c) Quite constant ☐

(d) Not constant ☐

13. The cost of using labour based method for road works is cheaper than that of equipment intensive .How do you agrees to this statement?

(a) Strongly agree ☐

(b) Agree ☐

(c) Partially agree ☐

(d) Don"t agree ☐

14. How strongly would you recommend Labour-based Technology road works on the implementation of Ghana Poverty Reduction Strategy (GPRS)? (a) Strongly recommended ☐

(b) Recommended ☐

(c) Quietly Recommended ☐

(d) Not Recommended ☐

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF BUILDING TECHNOLOGY

(MSC. CONSTRUCTION MANAGEMENT)

Thank you for agreeing to participate in this survey. This questionnaire is designed to solicit views to help student to carry out a research on impact of labour based technology in Ghana and it is strictly for academics purposes.

Please you can contact the address and telephone numbers at the last end of the survey sheet of any questions regarding the survey. Confidentiality of the questionnaire is fully assured.

QUESTIONNAIRES FOR ON STAFF OF THE CONSTRUCTION COMPANY

Please, thick the appropriate response box ☐

SECTION A

1. What is your profession?

Site Engineer	☐
Project Manager	☐
Contractor	☐
Others, please specify ……	☐

2. How long have you been in the construction industry?

0-5 years	6-10 years	11-20years	Above 20 years
☐	☐	☐	☐

SECTION B

Objective of the study is to identify the impact of labour based road construction in Ghanaian communities.

3. Can you recall which year did you do your first labour based Road technology project?

1985-1990	1991-1996	1997-2002	2003above
☐	☐	☐	☐

4. What percentage of your projects executed was done with labour based technology as compared to equipment based?

<20%	20-40%	40-60%	60-80%	80-100%
☐	☐	☐	☐	☐

5.

6. What is the percentage of female employees in labour base technology project?

<30%	31-40%	41-60%	61-80%	81-100%
☐	☐	☐	☐	☐

What is your view about the number of workers needed to carry out each of the following activities under road works using labour based as compared to equipment based?

7. Per meter length of ditch cleaning
   (a) Extremely High ☐
   (b) Very High ☐
   (c) High ☐
   (d) Low ☐
8. Clearing of light bush on both sides of a road
   (a) Extremely High ☐
   (b) Very High ☐
   (c) High ☐
   (d) Low ☐
9. Per meter cube of excavation and filling

(a) Extremely High ☐

(b) Very High ☐

(c) High ☐

(d) Low ☐

10. Mixing, placing and compaction of a cubic meter of concrete

(a) Extremely High ☐

(b) Very High ☐

(c) High ☐

(d) Low ☐

11. The table below is a list of some impacts of labour based road construction on the standard of living on our communities. Please rank on a Likert scale of 1-5, how you would scale these challenges in order of significance by ticking the appropriate boxes

1	2	3	4	5
Strongly Disagree	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**

Items	Impact of labour based road construction	1	2	3	4	5
1	Generate rural employment opportunities (job creation)	☐	☐	☐	☐	☐
2	Imparting knowledge in the local resources (employees) including skills developments and locally manufactured hand tools	☐	☐	☐	☐	☐
3	Fair income distribution to a wider section of the communities to reduce poverty	☐	☐	☐	☐	☐
4	Less impact on the environmental degradation and pollution emission into the atmosphere.	☐	☐	☐	☐	☐

Items	Impact of labour based road construction	1	2	3	4	5
5	Job security is assured during the entire project period.	☐	☐	☐	☐	☐

6	Considerations of the local cultural norms since workers are from the same communities. eg. Not working on some particular days of the week.	☐	☐	☐	☐	☐
7	Less litigation issue since employees are part of the community and work is more focused	☐	☐	☐	☐	☐
8	Reduction of imports and conservation of foreign exchange	☐	☐	☐	☐	☐
9	Improves the commercial activities at the communities(food vending and other petty trading)	☐	☐	☐	☐	☐
10	Reduction on mortality rate among pregnant women	☐	☐	☐	☐	☐
11	Improves the condition of the road (Comfort of travelling) and reducing of travelling time	☐	☐	☐	☐	☐
12	Access to portable water during project period	☐	☐	☐	☐	☐
13	Communities involvement in the management of the project	☐	☐	☐	☐	☐
14	Local feeling of project ownership	☐	☐	☐	☐	☐
15	Injecting maximum amount of direct cash the project in the local communities	☐	☐	☐	☐	☐
16	Access to health care delivery	☐	☐	☐	☐	☐
17	Others, Please specify	☐	☐	☐	☐	☐
18		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐

Please give reasons of your impacts you have identified on the list (if applicable) above.

12. The table below is a list of some challenges affecting labour based road construction in our communities. Please rank on a Likert scale of 1-5, how you would scale these challenges in order of significance by ticking the appropriate boxes

1	2	3	4	5
Strongly Disagree	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**

Items	**Challenges of labour based road construction**	**1**	**2**	**3**	**4**	**5**
1	Lack of supervision by well-trained personnel	☐	☐	☐	☐	☐
2	Delayed payments	☐	☐	☐	☐	☐
3	Lack of efficient tools	☐	☐	☐	☐	☐
4	Lack of motivation of workers	☐	☐	☐	☐	☐
5	Lack of labourers during farming seasons	☐	☐	☐	☐	☐
6	Conflicts among employees.	☐	☐	☐	☐	☐
7	Lack of communication to the management	☐	☐	☐	☐	☐
8	Cost of food stuff increased because of abandon of farm activities	☐	☐	☐	☐	☐
9	High illiteracy rate retards the training and construction processes	☐	☐	☐	☐	☐
10	Inclement weather	☐	☐	☐	☐	☐
11	Other, Please specify	☐	☐	☐	☐	☐
12		☐	☐	☐	☐	☐
13		☐	☐	☐	☐	☐
14		☐	☐	☐	☐	☐
15		☐	☐	☐	☐	☐

13. Please give reasons of your challenges you have identified on the list (if applicable) above.

15. How constant do you see the flow of work in Labour Based road works as compared to machines that can experience occasional break downs. (a) Very constant ☐

(b) Constant ☐

(c) Quite constant ☐

(d) Not constant ☐

14. The cost of using labour based method for road works is cheaper than that of equipment intensive .How do you agrees to this statement? (a) Strongly agree ☐

(b) Agree ☐

(c) Partially agree ☐

(d) Don‟t agree ☐

15. How strongly would you recommend Labour-based Technology road works on the implementation of Ghana Poverty Reduction Strategy (GPRS)? (a) Strongly recommended ☐

(b) Recommended ☐

(c) Quietly Recommended ☐

(d) Not Recommended ☐