**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**COLLEGE OF ART AND BUILT ENVIRONMENT**

**DEPARTMENT OF CONSTRUCTION TECHNOLOGY AND MANAGEMENT**

# THE EFFECT OF LABOUR-INTENSIVE ROAD CONSTRUCTION ON THE SUCCESS OF ROAD WORKS IN GHANA

**A THESIS SUBMITTED TO THE DEPARTMENT OF CONSTRUCTION TECHNOLOGY AND MANAGEMENT, KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE MASTER OF SCIENCE (MSc)**

**BY**

**MAHAMUD SIDI HAMID (PG 5055618)**

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## DECLARATION

I hereby declare that this submission is my own work towards the Master of Science in Construction Management and that, to the best my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

MAHAMUD SIDI HAMID (PG 5055618) …… ……..

(Student) SIGNATURE DATE

Certified by:

Dr. Godwin Acquah …… ……..

**(Supervisor)** SIGNATURE DATE

Certified by:

Professor Bernard K. Baiden …… ……..

**(Head of Department)** 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 effect of labour based road construction on the success of road works in Ghana.

Questionnaires were designed and administered to Clients (technical staff of the Department of Feeder Roads and Highways in Northern Region), Staff of the Construction. The questionnaires sought the views of the respondents on whether labour based construction has desirable effects on success of road works in Ghana. 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 Technical staff. Respondents 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 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.The assessment of the challenges of LBT for road construction, of which Labour management was dominant, is also discussed, which has been a major setback in the road construction sector is the most prevalent challenge.

## ACKNOWLEDGEMENT

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| | |
|---|---|
| LBT | Labour Based Technology |
| HR | Human Resource |
| SPSS | Statistical Packages for Social Science |
| DANIDA | Danish International Development Agency |
| DFR | Department of Feeder Roads |
| MRH | Ministry of Roads and Highways |
| UNDP | United Nations Development Program |
| ILO | International Labour Organization |
| GDP | Gross Domestic Product |
| MRT | Ministry of Roads and Transport |
| GLSS | Ghana Living Standards Survey |
| GoG | Government of Ghana |
| HIPC | Highly Indebted Poor Countries |
| IDA | International Development Association |
| RII | Relative Importance Index |
| DFID | Department for International Development |

# CHAPTER ONE

# GENERAL INTRODUCTION

## 1.1 BACKGROUND OF THE STUDY

Empirical evidence points to the key input the construction industry has on economic development (Giang and Pheng, 2011). Major inputs of the construction industry to the economy come firstly from the connections between the construction sector and the economy as a whole, and the inter-sectorial linkages between construction and other sectors as well. The use of construction investments as a tool for the government to stabilize the economy also shows the industry's key position in a national development strategy.

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.

Poor roads in many third world nations for the most part have unwanted impacts on agrarian produce as well as on the whole financial improvement of the economy (Ipingbemi, 2008).

Burningham and Stankevich (2005) asserted that poor availability in rustic areas regularly hinders the dispersion of new innovations and methods, expands growth and advertising costs, diminishes spatial association and limits access to training and health care facilities. It likewise obliges portability and exasperates separation (Burningham and Stankevich, 2005).

## 1.2 PROBLEM STATEMENT

Occupations and skills creation have turned into a noteworthy concern of African governments and Ghana is no special case. Regardless of steps towards improved financial stability one noteworthy hindrance that appears to evade most governments is joblessness (International Labor Organization, 2012). It is accounted for that joblessness ascended by about 20% between the times of 2005 to 2008 (International Labor Organization, 2008). Boateng (2014) affirms that joblessness involves the poor usage of HR and the noteworthy impact is loss of potential annual duty income to a nation; because of such distinct resources being permitted to squander away.

Labour-based techniques are legitimized socially on the grounds that they would diminish country joblessness by giving jobs on construction sites (Stiedl and David, 2003). Labour-based strategies are along these lines seen as a vital device in tackling

joblessness in third world nations. Studies demonstrate that work completed by labour-based contractors are to average around 30% more affordable in money related terms than the equipment-based technique, and produces six times the work for every dollar spent (Stiedl and David, 2003). Road projects from labour-based system have been shown to be of a similar standard and quality as equipment based techniques. In spite of the points of interest accumulated from labour-based methodologies, this system appears to have rather declined in utilized and even far less famous with both government and most road contractual workers. This study tries to discover what benefits and difficulties present itself to the road contractual workers in the construction of roads utilizing labour-based system.

## 1.3 AIM AND OBJECTIVES

### 1.3.1 AIM

The aim of this study is to identify the effect of in labour intensive road construction on the success of road works in Ghana

### 1.3.2 OBJECTIVES

i. To examine the factors that lead to the choice of a labour-intensive road construction in Ghana

ii. To assess the challenges in a labour-intensive road construction in Ghana,

iii. To evaluate the effect of constructing roads using labour-based technology on the success of the project.

## 1.4 RESEARCH QUESTIONS

What are the factors that lead to the choice of a labour-intensive road construction in Ghana? ii. What are the challenges in a labour intensive road construction in Ghana?

iii. What are the effects of roads construction using labour based technology?

## 1.5 SIGNIFICANCE OF THE RESEARCH

This research by its direction will give down pragmatic comprehension of the chances and difficulties inborn in the adoption of labour-based system for road development. By understanding the deterrents confronted and conditions encompassing these challenges the research will give road construction firms the force to rapidly dodge these issues, improve organization efficiency and be better monetarily stable. Discoveries from the study will in this way empower contractors to all the more likely handle difficulties experienced in the utilization of labour-based system. Research results will likewise help in the advancement of strategy to control in the utilization of labour-based construction in feeder road projects. Lastly, the study will add to the comprehension and learning zone of labour-based construction in Ghanaian road construction.

The Labour based Technology (LBT) 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.

## 1.6 METHODOLOGY

Intuitively, from the philosophical stand of this research, it was overt that both the deductive and inductive research choice should be appropriate for this study. Also, it was inferred that adopting case studies and surveys as the research strategy would help in achieving the objectives of this study (Collis and Hussey, 2013). The mixed methods approach to research (quantitative and qualitative research approach) is also used for this study, because Wilson (2014) is of the view that for a pragmatic research philosophy, the appropriate research approach could either be a qualitative, quantitative or a combination of both as it becomes appropriate in answering the research questions.

The population for this study encompassed the individuals and agencies of the state who have lines of influence on the construction of roads

Data for the study were obtained from primary and secondary sources. Secondary data were gathered from extant literature. The obtained information was trategically grouped according to their relevance and importance. The irrelevant ones were discarded, and the pertinent ones which have informed knowledge of the subject matter understudy were reviewed and noted.

The obtained variables from literature review were strategically compounded into close ended questionnaires and served to the target population in person and electronically. The questionnaires were formulated in such a way as to provide answers to the strategic

objectives of the study after analysis. Chen and Jin (2013) states that questionnaire survey is the most broadly adopted approach in quantitative research.

The primary data retrieved from the study was analysed using several tools of analysis like the Descriptive Statistics (Means, Frequencies and Standard Deviations), and Relative Importance Index. The reliability of the scale and internal consistency of the variables were checked by using the Cronbach's Alpha Coefficient test. Internal and external validity of the study were also attained through content-related validity measurement. Software for the analysis were Nvivo, Statistical Packages for Social Sciences (SPSS), and Ms Excel.

## 1.7 STRUCTURE OF REPORT

This dissertation consists of five main chapters. Under each chapter comes several sub chapters which in context tends to give a clear understanding of what the main chapter proffer. Chapter one talks about the background of the study. Thus, under this chapter comes several sub sections like the general introduction: which gives a brief literature on the topic of the research. It starts broadly and narrow down to what is being researched. Following this sub section is the problem statement: this part helps shows the gap in literature which you want to fill; the main reason why you want to do the research. The aim and objectives of the research follows then the research questions. Following suit is the significance of the research: the importance of this research, and theoretically how academia can benefit from it. Research methodology is next, and it looks at how we would approach the said research; how data would be collected etc. The scope of study follows chronologically, then the limitation of the research, the research organisation, and

a summary for the whole chapter. Chapter two embodies the relevant literature which supports the research topic under consideration. From this chapter, are the important variables necessary for your questionnaires taken. Chapter three encompasses the methodology of the research: how you would go about the research, the approach that would be adopted, the tools for analysis, how you came about your sample size, and the methods which authors of analogous topic used and how they went about it. Chapter four covers the analysis of data collected and the discussion of the findings, and lastly chapter five addresses the conclusions arising from the analysis, recommendation and future research. Below is a conceptual diagram of the research organization.

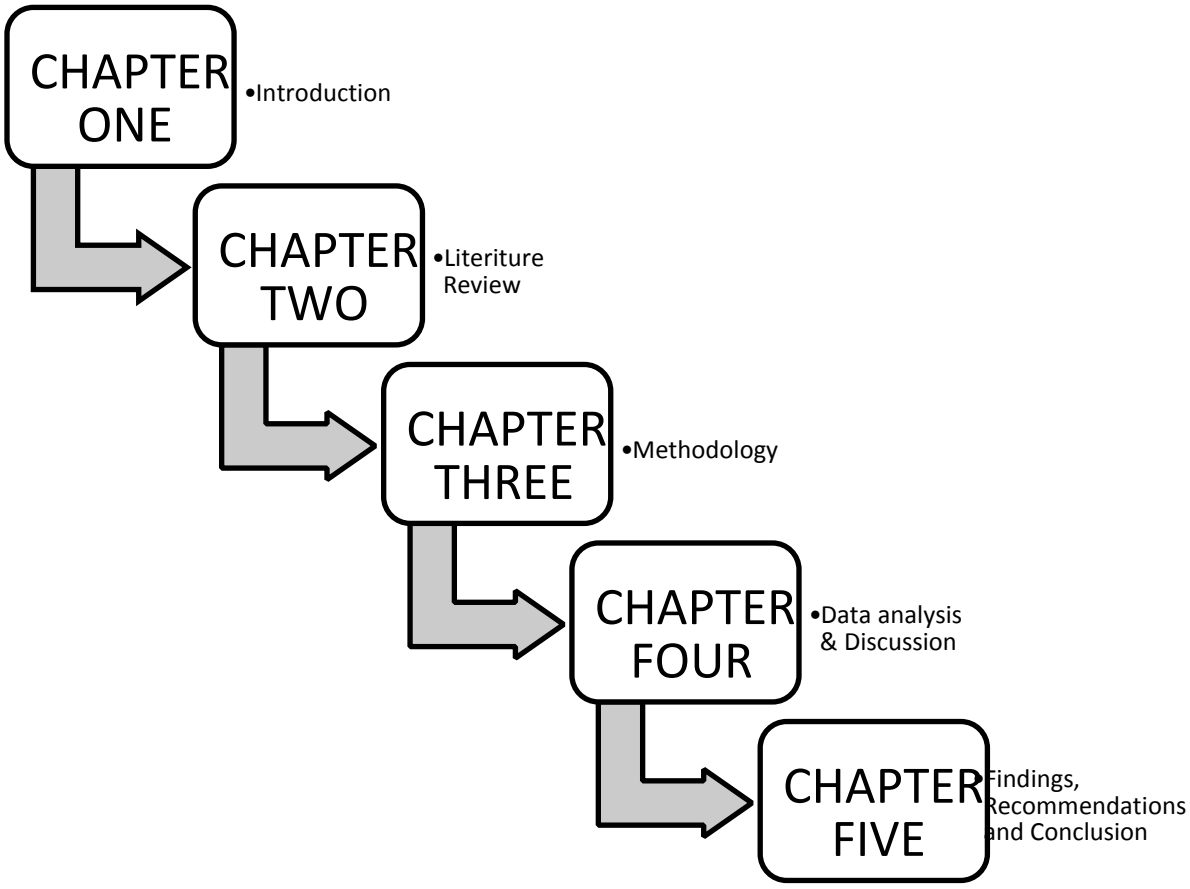


Figure 1.1Research structure

# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 THE ROAD CONSTRUCTION INDUSTRY OF GHANA

The contractor classification exercise goes for appropriately rating contractors into individual classifications and budgetary classes to encourage simple access to contractor by government agencies and corporate associations requiring their services. An association looking to work in Ghana as a contractor should initially acquire an endorsement and appropriate documents from the Registrar General's Department.

The Ministry of Roads and Highway is in charge of the enrollment and grouping of contractors who works in the roads sector while the Ministry of Works and Housing is in charge of contractors who works in other civil works like dams and building works (Brentuo, 2009).

Prerequisite for classification as a contractor in the roads division depend on the candidate's equipment, experts and managerial personnel including financial standing together with the satisfaction of tax, social security and labour commitment. Despite the fact that enlistment with the MRH isn't necessary, just contractor so enrolled will be allowed to take part in public road and bridge contracts .

Road contractors are grouped into six technical classifications (A, B, C, S, M and L) and four financial classes (1, 2, 3, and 4). The technical classifications bunch contractors as per the sort of work they can do dependent on their experiences, equipment holding and human assets while the financial classes group them into their monetary capacities.

Table 1: Technical classes and sort of works

| Technical Category | Type of work |
|---|---|
| A | Roads, Airports and related structures |
| B | Bridges, culverts and other related structures |
| C | Labour based road works and mainly for road maintenance and spot improvement |
| S | Construct, rehabilitate and maintain steel bridges and structures |
| M | Maintenance of bituminous or asphaltic pavements |
| L | Construct and maintain road furniture and appurtenances |

Source: Author's Construct (2019)

### 2.0.1 Labor Intensive Road Construction in Ghana

Labour intensive from economics aspect is portrayed as the degree with which labour is utilized in an activity when contrasted and different resources. In the construction business, labour intensive alludes to "the financially effective employment of as incredible an extent of labour as is actually possible to create as high a standard of construction requested by the specification and permitted by the funding available (McCutcheon, 1995). As indicated by the Construction Industry Review report, local construction is all in all vigorously dependent on labour intensive in situ construction techniques whiles advanced construction methods are much of the time utilized on huge development works (Tang, 2001). The labour intensive road construction technique was practiced in Ghana all through the colonial days until the late 1950s where the British authorities disheartened the utilization of unskilled labour for road constructions.

The equipment intensive method was displayed as originally done in Britain. Different sub-Saharan African countries including Ghana recognized the equipment based system while, construction plants was as yet uncommon and would have to be imported (Stock 1996). The labour intensive processes in construction was employed when the government of Ghana and other worldwide bodies wound up stressed of the high pace of joblessness and hardship. As indicated by Stocks (1996), the selection of labour intensive process by 3rd world nations was an activity initiated by both the World Bank and ILO. In 1986 the World Bank, the ILO, the UNDP and the GoG reintroduced the labour intensive road restoration methodology with the goal of diminishing the high joblessness and lessening the destitution rates in the country (Stock 1996, Ampadu 1999).

They considered Ghana as a perfect nation as a result of the availability of well-built up private road construction firms. Up until this point, the labour intensive restoration Technology has quite recently been started by the Department of Feeder Roads (DFR) in their projects and they are the sole office accountable for LBT implementation.

### 2.0.2 Major exercises in LBT

The normal exercises associated with the labour intensive Technology approach incorporate 1) Preparation of site, 2) Earthworks, 3) Reshaping, 4) Construction of ducts and 5) Gravelling. Table 2-4 underneath diagrams the genuine activities, assignments and the light equipment and hand tools used as a part of LBT.

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

| **Main Activities and tasks** | **Light equipment and hand-tools** |
|---|---|
| Preparation of site<br>• Clearing of bush<br>• Grubbing<br>• Removal of top soil<br>• Removal of boulder | Cutlasses, hoes, spades, rakes, Mattocks |
| Earthworks<br>• Excavation and filling for base works<br>• Gullies and potholes filling<br>• Gullies and potholes compaction | Shovels, pickaxes, water bowser, grass slasher, rake/spreader, wheel barrow and hand reamers |
| Reshaping<br>• Excavation of ditch<br>• Excavation of ditch slopes<br>• Ditch back-slope excavation<br>• Soil spreading<br>• Soil Compaction | Shovels, rake/spreader, pickaxes, wheelbarrow, vibrating rollers and watering<br>can |
| Construction of culverts<br>• Collection of sand/stone<br>• Excavation for culvert<br>• Fabrication of forms and reinforcement | Shovels, pickaxes, crowbars, Wheelbarrows, sledge hammers, hand rammers, boning rods, heavy ropes, pickaxes, tapes, levels, cross-cut files, tenon |

| | |
|---|---|
| • Mixing and placing of concrete<br>• Culvert finishes | saws, chisels, steel wedges, head pans |
| Gravelling<br>• Loading, hauling and unloading of gravel<br>• Gravel spreading<br>• Compaction of gravel | Shovels, pickaxes, rakes/spreaders, tractors and trailers, tipper truck, water bowsers and vibrating rollers |

Source: Ampadu et al., 2003

2.0.3 Department of Feeder Roads involvement in labour Based Road Technology

At present, the Department of Feeder Roads (DFR) joins both labour and equipment based methods for the construction of feeder roads. As demonstrated 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) though the International Labor Organization (ILO) likewise gives the technical help. High poverty level is most overwhelming in rural areas (GLSS 2005). The Ghana Living Standards Survey (GLSS, 2000) educated that with adequate provissions made for different fragments of the nation, transport is the essential linkage that has the best impact on poor individuals. The transport area has immediate affects the lives of the poor by enabling access to working places, markets, learning and health institutions (MRT, 2002).

## 2.1 CRITICAL FACTORS LEADING TO THE CHOICE OF LABOUR INTENSIVE CONSTRUCTION

Cost of a project is one of the basic issues of on a fruitful development project. One of the methods for achieving a customer satisfaction on a project is through the value of money. The customer is in charge of the financing of a project thus the rationale behind their undeniably worry for the general profitability of a project and the general accountability of the projects. Cost overruns, in connection with project delays, are habitually recognized as one of the major factors prompting the high cost of construction (Charles and Andrew, 1990). This is on the grounds that labour intensive strategy for construction is deemed to be time involving consequently increasing the cost of production. Moholo (2006) remarked on the labour intensive parts of the time involving construction exercises; expressing that eventhough the basis of work study furnishes us with common output rates for labour (labour constant or time it takes for one laborer to finish a specific activity) and plant (cubic meters of soil that can be uncovered by an excavator in an hour or a day), it stays to apply that data in a reasonable way. On the account that one laborer takes three hours to exhume by hand one cubic meter of soil, it doesn't really imply that 30 cubic meters should be possible in a similar time if 30 laborers are at the same time excavating soil.

On account of the fact that labour intensive system is still at an initial state of advancement, the most regular question presented is its financial feasibility in the long term. Many cost variables of labour intensive construction have made it regularly hard to manage the funds of a project. The following is detailed explanation on the critical cost factors in executing road works.

### 2.1.1 Supervision

Effective supervision of labour intensive projects promotes more noteworthy labour profitability subsequently effective work process. Because of issues of weariness, work strike, site accident related with labour intensive construction. “Under-supervision” on site will influence the workflow or the efficiency of the work. Effectiveness of work process has huge effect on labour productivity on a building site. Even as successful workflow management can improve construction labour productivity (Ballard and Howell, 1998), likewise labour flow on a building site can also improve workflow (Ng et al., 2003). There is a codependency between workflow and labour flow, and every one of them thus affects labour productivity. Ng et al. (2003) established from a study of three construction projects that inefficient workflow management amounted to a labour inefficiency of 51%, and that 58% of the total wasteful work hours were because of inefficient workflow management. Meanwhile, in the manufacturng business, Hadavi and Krizek (1994) express that working conditions at a manufacturing sector are altogether different from a building site and the impact of workflow has not been very much defined in manufacturing. Be that as it may, the provision of supervisors for successful workflow will come as an extra expense to the client.

### 2.1.2 Training and Employment of Labor

In labour intensive project the contractor utilizes labour from local folks, and many a time these individuals have been out of shape for long or been prepared for a specific skill. For this, the government presented the on the job training during the construction project.

As per Coetzer, (2010) the fund generally available for training will be given the Quantity surveyor before the bidding stage and in this way he can incorporate it in the tender document. These training brings about additional cost of construction to the client. The department of water affairs and Forestry (2001) were of the view that, these training and skills that occur can be assumed that various individuals utilized as labourers utilize this opportunity as a stepping stone to develop a career in construction. Conversely, its inconvenience is the likelihood of the contractor not utilizing same workers on new project because of change of location.

### 2.1.3 Weather Conditions

Temperature and moisture in the air have more impact on labor efficiency since it has direct effect on the physical body. In a many month research of productivity in the fixing of structural steel, masonry, and formwork, it was discovered that the perfect temperature was 550F, with relative humidity having peripheral impacts beneath 80%, however diminishing profitability over this level (Yiakoumis, 1986). The impact of temperature and humidity differs a lot by individual and by the kind of work being carried out (Oglesby et al 1989). Hanna (2004) led contextual study on electrical projects demonstrating that work performance diminishes at temperatures above 800F and underneath 400F dependent on a full day's work. The investigation additionally found that: (1) Efficiency of 100% can be accomplished just when the temperature is somewhere in the range of 400F and 700F and the relative humidity is beneath 80%; (2) In very cold conditions, temperature is undeniably more essential than humidity. Despite humidity, an effective temperature of - 200F or lower may lead to work stoppage. It was seen that extended work in hot and cold conditions quickens the impacts of tiredness

(Hanna, 2004). While critical reactions were seen in the two limits, the degree to which they happened was a lot more noteworthy at the higher temperatures than at lower temperatures. In this way, the degree to which productivity is influenced by temperature and humidity relies upon a few factors, including the severity of conditions, the nature of the project, the acclimatization of the people, and training.

## 2.2 CHALLENGES IN A LABOUR INTENSIVE ROAD CONSTRUCTION IN GHANA

### 2.2.1 POLICY

Policy assumes a vital job in giving a favorable situation wherein labour intensive road contractors can intensely work. Policy advice and decisions ought to be the correct way to make an open market economy for such contractors. More research work with different colleges and learning institutions should be on-going to grow information of labour intensive technology. This will give the experimental proof in the formation of the important policies. Studies demonstrate that regardless of the way that job creation is a basic strategy for the Ghanaian government it isn't reflected in policy implementation. The Public Procurement Act, 2002 for instance indicates that most minimal cost isn't the only factor in securing works however financial development issues, like, local investment is counted in. Provisions are likewise included for inclination of domestic contractors. In spite of these there is absence of lucidity on these issues which ought to be assessed and weighted. Patol (2001) purported that road agencies should make an obvious policy indicating the preference of labour intensive approaches any place they are practical and in fact achievable. The absence of the needed policies and help deters the market growth of labour intensive contracting industry

### 2.2.2 LABOR MANAGEMENT

One key part of labour intensive system is the management of the labour force (Anderson, 1995). Studies demonstrated that traditional contractors communicated the sentiment that the huge workforce engaged with labour intensive works made the management of such projects complicated and difficult (Devereux, 2002; McCutcheon, 1995). On the other hand trained contractors in the field had opposing view. The experience from such trained contractors demonstrated that generally scattered sites which were small in nature had lesser issues with labour than machine intensive sites. Reports likewise demonstrated that labour management was not complicated for small and medium firms when contrasted with bigger construction firms (ILO, 2008, Stiedl, 2000).

### 2.2.3 LATE PAYMENT

A normal trend in road works for the most part funded by the public fund is delay in payment. Studies have demonstrated that payment certificates could delay by an average of 8 months. Reasons associated to this have been in the past connected with bureaucratic process. This has great impact on the payment of workers. Though equipment intensive contractors might almost certainly renegotiate payments or even defer payments with suppliers, failure to pay labourers on time could prompt catastrophe on site (Taylor and Bekabye, 1999; Stiedl, 2000). Different sources of financing exist yet are to a great extent costly with generally high interest rates when contrasted with financing for equipment (Stiedl, 2000). This is seen as a huge obstacle for utilization of labour intensive technology on Ghanaian building projects (Ampadu, 2011).

### 2.2.4 SPEED OF IMPLEMENTATION

Another challenging issue with the utilization of labour is the speed of implementation. Studies demonstrate that a labour intensive contractor would yield 10 percent of that achieved by an equipment intensive contractor with respect to a regular rehabilitated road for each month (Stiedl, 2000). This has raised worries among DFR staff about reaching yearly goals of the department. A few however have contended that delays are experienced by equipment based contractors in both inception and completion (Stiedl and David, 2003). This point of view raises worries about whether the speed of output could really be more important than the overall completion time of the project.

### 2.2.5 TECHNICAL TRAINING

It is important to take note of that the utilization of labour intensive system requires the need of specific skills that must be obtained through the needed training (International Labor Organization, 2003). Labour intensive works requires skills, for example, management and organisation of labour and engineering techniques which may require some time to be gained through the provided training (McCutcheon, 1995). Some have contended that the requirement for such abilities has resulted in most times being wasted in supported training programs (Subbarao, 1997). Such trainings should be taken before a contractor can even prequalify for a labour intensive contract. Some have contended that this preparation program acts as a disincentive.

### 2.2.6 EQUIPMENT LOANS

Studies demonstrate that capital required for working in equipment based system is less when contrasted with labour intensive systems (Stock, 1996). For most developing nations the less working capital required by equipment based techniques makes them

more appealing than labour intensive strategies (International Labor Organization, 2003). This introduces an barrier to most road contractors.

Devereux (2002) affirm that it is standard for equipment loans (in the order of 150,000US$) to be make available for labour intensive contractors. These loans are planned for the securing of light equipment as a major aspect of the training program. These lights equipment normally tractors/trailers and pedestrian operated rollers are more affordable than the customary set of equipment which is typically comprised of grader, dozer, loader and trucks. These light equipment's are rare on the second hand market in Ghana and most contractors use donor supported projects to gain the said equipment (Stock, 1996). For the loans to be paid, most contractors are given extra work on a continual basis with rates arranged. The aim being to have the option to create more money inflow from these extra works to pay for the equipment. This has both positive and negative impacts. The positive impact is the confirmation of employments being offered regularly for various years under explicit programs. The confirmation of employments has made a dependence on such projects prompting such contractors not bidding for works in the ordinary tendering process. The absence of any started program with direct help for such arrangements makes it hard for such contractors to endure the market.

### 2.2.7 MISCONCEPTION ABOUT LABOR BASED WORKS

One noteworthy obstacle that eased back the implementation of the usage of labour intensive works was the misguided judgment held by most governments and specialists (World Bank, 2002). This groups of individuals had the conception that this technique was a "regressive" innovation and not commendable from their point of view. The

significant universal group pushing for the utilization of labour intensive works, ILO had an alternate way to deal with the utilization of this system. They were of the view that the correct blend of labour and equipment ought to be utilized for road construction and not of the view that ever African road be built with labour only. This methodology encouraged most governments utilizing labour and lighter equipment for most haulage and compaction works.

In spite of this misinterpretations being cleared, a survey of experience in most development nations still demonstrate that labour intensive systems were still repulsed. Different factors still fuelled the opposition by government authorities in this nation. Initially road maintenance works with equipment was quicker than utilizing labour. Anderson (1995) detailed that this was clearly found in maintenance works with equipment being 1.5 times quicker than labour intensive. Adding that the equipment based technique accomplished a higher quality surface vital for heavily traffic roads. Also labour management issues related with labour intensive techniques made them very unpleasant for most government authorities (Edwards 1974; Edmonds and Miles 1984). It is accounted for in Asia that this techniques is immersed with issues of corruption, low supervision and absence of work motivation (Riverson et al., 1991). There was the other issues ofghostnames being added to the payroll exacerbating the already challenging circumstance.

### 2.2.8 CONTRACT DOCUMENTATION

One noteworthy obstacle in the procurement system of labour intensive works is design of explicit contracts for such works. This is to a great extent because of the inadmissibility of standard contracts for labour intensive contractors to bidders. A couple

of models can be drawn from study by Von Braun et al., (1991) in their research, different works including financing from GoG, DANIDA, IDA and DFID were investigated. Key conclusions were; only contracts for DFID financed work were declared in the national press under the open tendering procedures; aside offers being competitive, contractors who have taken equipment loans were given more advantage. Different perceptions incorporate the agreements did not clearly determine the kind of technology type and this was left to the tact of experts accountable of preparing tender documents and technical detail contrasts amongst work and equipment contracts were inadequate. This had the resultant impact of not excluding any unusual technology approach. It becomes glaring clear that contractors are left with little alternative in choosing to utilize capital intensive methodologies in the main part of their works.

### 2.2.9 EXPERIENCE FROM OTHER COUNTRIES

Numerous nations have used labour intensive construction at different levels. Numerous advantages have been gained from this endeavor. Just like many other endeavors the utilization of labour intensive strategies as depicted before has had a considerable amount of challenges and difficulties. This segment talks about some of the encounters from different nations with respect to utilizing the labour intensive technique. It is accounted for that in Kenya for instance, between 1986 and 1993 the Minor Roads Program maintained 3240 km of paved roads and in the financial year 1990 alone, utilized 20,300 casual workers (ILO, 2004). Labour intensive technique has offered an appealing supplement to a heap of development instruments for poverty reduction (Von Braun, 1991). Destitution has decreased in regions, like, Ethiopia where there have been shortage of food and the effect of poverty reduction has been most felt during dry

seasons. Bangladesh also saw a comparative event (Ninno et al., 2009). The macroeconomic model demonstrated that the indirect impacts were much more severe than the direct impacts for each job straightforwardly created another 2 employments somewhere else in the economy through a multiplier effect.

Different regions likewise demonstrate the huge infrastructural advantage collected from the utilization of this system. For instance in Madagascar this methodology has prompted the remaking and maintenance of damaged roads, little dams, bridges and irrigation systems after disasters of natural cause. Teklu, (1999) reports that this system has prompted the quick reaction of providing timeously required infrastructure, like, roads and health facilities for the most part focused at underprivileged rural communities (Ninno et al., 2009). Labour intensive system give training to small scale contractors and transfer of innovation to the rural areas (Weyers, 1999).

## 2.3 THE EFFECTS OF LABOR INTENSIVE ROAD CONSTRUCTION IN GHANA

There are numerous effects for the utilization of labour intensive method for feeder road projects. The World Bank and the ILO dependent on such assumptions moved into structuring programs that will encourage the utilization of labour intensive method in the public sector projects (McCord, 2005). The attention was on the government projects chiefly because of financial implications including mutilation of factor costs which had the negative impact of making equipment based techniques less expensive for contractors than labour intensive strategies.

Likewise, numerous African nations were still in the growing phase of developing their indigenous private sector capacity for contracting road works. The World Bank and ILO contended that these systems had both social and monetary advantages (International Labor Association, 2008). Below are some of the opportunities presented by the utilization of labour intensive method.

### 2.3.1 COST EFFECTIVE

One of the most significant contemplations in the decision of either labour intensive or equipment based method for executing a given road improvement project is the overall cost of the project as executed by the two methods (Stock and de Veen, 1996). Studies have officially declared the cost adequacy of labour intensive method over capital intensive ones (World Bank, 2002; Devereux and Solomon, 2006; Stiedl and David, 2003). Eventually, the cost of road works by labour intensive and equipment based techniques can be compared either through the unit cost analysis of the various exercises or through the historical data analysis of finished projects.

An investigation by Ampadu (2001) compared the relative cost of the various items between labour intensive and equipment based method for a road construction project. This paper provided details regarding information gathered as on an exploration work at the Kwame Nkrumah university of Science and Technology (KNUST) which looked to produce cost data information for equipment based and for labour intensive feeder road projects and to distinguish the variables that influence their relative costs. The paper likewise displayed a first endeavor at a prescient model for evaluating the preliminary cost of paved road maintenance dependent on the technical content of the project.

In light of the results of 12 labour intensive and 10 equipment based projects built somewhere in the range of 1996 and 1998 in an ecological zone in Ghana, and the following preliminary observations were made concerning the relative costs of maintaining feeder roads in Ghana.

1. At the construction stage, the mean unit cost of clearing, reshaping and gravelling by equipment based method are lower than by labour intensive techniques, however for culvert construction, and earthworks labour intensive techniques are less expensive than equipment based strategies.

2. The primary distinction in technical content between equipment based projects and labour intensive projects lies in earthworks and haulage. The normal earthworks content on an equipment based project of around 820 m3/km is about 3.8 times that of a labour intensive project. Likewise the average haulage content of 1270m3-km/km of equipment based projects is about 1.5 times that of the labour intensive project.

3. Distinctive linear regression models making up the cost per kilometer of projects as reliant parameters and the Clearing (X1), Reshaping (X2), Earthworks (X3), Gravelling (X4), Culverts (X5) and Haulage (X6) components as autonomous parameters might be developed for labour intensive and for equipment based projects and predicts closely well the total cost per kilometer of projects:

- For maintenance works including just clearing, reshaping and gravelling, equipment based projects are about 7% less expensive than the comparable labour intensive projects.

- For ordinary culvert, earthworks and haulage components, labour intensive projects are about 5% less expensive than equipment based projects.
- For typical culvert high earthworks and haulage components, equipment based activities are about 12% less expensive than labour intensive projects.

This research verifies the contention that labour intensive innovation is considerably more practical in terms of cost.

### 2.3.2 EMPLOYMENT

One of the social significance of labour intensive systems pivoted on the basis that they lead to decrease of people been denied of occupations giving chances to employment on road construction projects (World Bank, 2002). There has consistently been the need to address joblessness in rural areas yet this was underscored more during the periods somewhere between 1960s and 1970s (International Labor Organization, 2008). Edwards (1994) reports that absence of jobs in the rural areas forced people to search for the work in the urban communities and their eagerness to find work had prompted societal distress and breed other social vices. This is backed up by the fact that rural regions are less appealing than urban communities primarily because of many infrastructural advancement in the urban communities. The utilization of labour intensive innovation meets two thriving issues; first the making available of jobs which solves the rural joblessness and also secondly decreasing the urban predisposition in infrastructure project (Edwards, 1994).

This system creates labour markets in regions where these were immature or non-existent and further creates job for a great percentage of local people (most particularly the rural folks). Also, since the majority of the rurual occupants remain inside their regions the

wages earned will be spent in their networks, which will bring about a significant catalyst for the local economy just as resultant multiplier effects for the whole economy (Stiedl and David, 2003).

The International Labor Organization (2003) noted in Mozambique that the utilization of labour intensive methodology prompted the production of 8 million laborer-days employment in the nation from 1994 to 2000.

### 2.3.3 INDIRECT EMPLOYMENT

Labour intensive technique exploits assets at the locality and accordingly encourages democratic involvement (Thwala, 2001). Also, it can likewise bring about the indirect employment for a lot of local folks. If certain level of the wages earned is kept as "fund", such funds can be utilized for meaningful projects in the locality, like, poultry keeping, local shops, buying of animals and so on. This will bring about extra indirect employment inside the community. For example, Contreras and Cartier (2004) saw in Peru that the Micro-businesses utilized Social funds to support community exercises, for example, cleaning works, painting of schools and the establishment of potable drinking water. The people also helped the small scale enterprises in certain road maintenance exercises through communal efforts. The Fund can likewise fill in as an emergency reserve to cover for late payment of wages/compensation and also used as a kind of medical support fund. The exchange of funds has numerous multiplier effects on the local economy during financial recessions. It gives money to use by poor families for utilization and consistency in employment (Ravallion, 1990; Ninno et al., 2009).

### 2.3.4 ASSET CREATION

The greater part of the roads infrastructures developed or maintained using equipment are not feasible on the grounds that it estranged the recipients from effectively taking part in such system, thus their failure (International Labor Organization 2008). Nonetheless, labour intensive methodology is more affordable strategy for creating reliable road resources that are lasting, effecient and of good quality (International Labor Organization, 2008). This is on the grounds that the recipients of the development projects are permitted to effectively partake in the identification, prioritization and execution of road infrastructure resource that tends to the transport needs of individuals from the rural commuinty (Stiedl and David, 2008). Likewise, the contribution of rural individuals in this kind of program advances neighborhood cooperation; create the feeling of proprietorship just as capacity building and local empowerment through transfer of skill (Stiedl and David, 2008). It will likewise improve their technical capacities and entrepreneurial aptitudes and empower them to start different profitable projects. This is basic for maintaining and using the resource for the future.

An additional significance this road assets made is that it makes key markets and public services including medical facilities readily available (World Bank, 2002). This has a resultant effect on decreasing both transportation cost and time. The availability of public transport services will likewise become high. Nevertheless, the overall advantages are rural roads efficiency and poverty reduction in the rural areas.

### 2.3.5 FINANCING CONSTRUCTION WORKS

The World Bank (2002) reported that labour intensive systems are more affordable than equipment based systems. They demonstrate that in direct budgetary terms, full

maintenance of feeder roads are 18% more affordable and half less expensive for spot maintenance. Adding financial figures to these two noteworthy methods it is demonstrated that labour intensive techniques are still progressively favorable: 38% less expensive for full maintenance and 60% for spot maintenance. Studies likewise demonstrated that measuring the financial significance regarding employment impact is higher. Study reports that the extent of cost spent on salaries, for the most part for the labour, ran somewhere in the range of 44% and 60%, against 3% and 8% in equipment based works. An investment of US$23 million in feeder roads maintenance would create 107,000 occupations (both directly and indirectly) when done with labour as against 36,000 employments when done with equipment (Transport UK, 2002).

### 2.3.6 MACRO-ECONOMIC EFFECTS

The advantages of labour intensive way to deal with the rural economy are many, nonetheless, just a few of them will be considered here. In a similar vein, where practicable and financially advisable, the use of labour intensive way to deal with rural road rehabilitation results in

a significant savings funds in foreign and an expansion in the use of local resources which in turns animates the l economy; since it won't be important to import machine, material or work force from abroad (Devereux and Solomon, 2006).

Putting US$23 million in feeder roads restoration would deliver 107,000 employments (straightforwardly and in a roundabout way) as against 36,000 occupations with equipment (Stock and de Veen, 1996).

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.1 INTRODUCTION

This chapter is dedicated to reporting on the research methodology or framework adopted for this study. It broadly considers the various philosophical underpinnings and approaches used in conducting research, and why specific ones were employed in steering the study to achieving its specific objectives. The chapter broadly, likes the research onion formulated by Saunders and Lewis, firstly presents on the research philosophy (where the various philosophies were discussed) and a concession made on the philosophy which would be adopted for the study. Following chronologically in similar vein of discussing theories, and determining what was adopted for the study are presentations made on: the research approach used (either deductive or inductive); the research strategies to be implemented (whether experiment, survey, case study etc.); the time horizons which the study was conducted (longitudinal or crosssectional); and the data collection methods employed (interviews, questionnaires, observations etc.). Also, the chapter presents on the population and sampling frame of the study.

## 3.2 RESEARCH PHILOSOPHY

The research philosophy deals with the nature of knowledge, and how that knowledge would be developed. Hence, it contains assumptions of the way in which one views the world, and this affects or influences one's research strategy and methods (Saunders et al., 2009). Creswell (1994) is of the view that for research philosophy, four main areas are very important, thus, ontology, epistemology, axiology and methodology. Guba and Lincoln (1994) also suggested four different research paradigms which are post

positivism, critical theory, positivism and constructivism. In order to situate you study in the proper research philosophy, one must discuss the several overreaching approaches and know how best to place your research in the continuum of what has been identified.

Generally, an action should be guided by some sets of belief, and this is what Guba (1990) defines as a research paradigm. Denzin and Lincoln (1998) assayed that a paradigm has three main parts: epistemology, ontology and methodology. Notwithstanding, Creswell (1994) and Collis and Hussey (2013) decided to keep their philosophical cognitive on four main assumptions, namely, ontological, epistemological, axiological and methodological. In explicating further, works by Thurairajah et al. (2006) threw more light on the stance of the various research paradigms. According to their study, language and process of the research deals with rhetorical and methodological assumptions while the philosophical stance of a research is more concerned with ontology, epistemology and axiological assumptions. These various paradigms appear to be very critical and requires intent identification because it influences the research instruments which would be chosen (Christou et al., 2008).

**Ontology** is more concerned with how the researcher views the world (natural reality). Thus, .whether it is seen in the strategic lens that reality is independent and outside the influence of the researcher, or dependent on some parameters which can only be checked when some human behaviours and ideas are examined and analysed (Collis and Hussey, 2013; Thurairajah et al., 2006).

**Epistemology** positions to inquire about how knowledge was acquired, the processes of acquisition and the validation of the knowledge thereof (Gall et al., 2003). This

philosophy creates a room for us to know and understand which knowledge is to be accepted in a field of study (Saunders et al., 2009).

**Axiology** deals with how much value or less value the researcher places on the whole investigation, thus, considering it as a matter of value or fact (Bossé, 2006). Saunders et al. (2009) asserted that axiological positioning considers that the researcher has values and that these values affects how the study is conducted and the results interpreted. Thus, the axiological positioning affects the credibility of the research.

### 3.2.1 Pragmatism (Research Philosophy Adopted)

Saunders et al. (2009) opined that pragmatism follows the philosophy that there is no single approach which can encapsulate and explain a subject matter, and thus, there may be multiple realities, hence adopting only one particular stance would appear inadequate and inappropriate. Experienced researchers tend to follow through with a mixed approach between the two extreme ends of research paradigms (Positivist and Interpretivist) which is modified and adapted and called the pragmatic research philosophy (Collis and Hussey, 2013).

## 3.3 RESEARCH APPROACHES

Research approach is concerned with the stepwise procedures and action plans adopted for a research from one stage (general assumption) up to the interpretation of data (Creswell, 2013). The philosophical stance of the study affects the type of approach adopted for any study (Creswell, 2009). Kwofie (2015) was of the view that the research approach provides an avenue to propose a general view of the research problem while providing answers to the research questions. Research approach consists of two key

areas, deductive and inductive approach. Easterby-Smith et al. (2008) formulated three main reasons which will influence a researcher to choose a particular approach. Firstly, the research design to be used will cause one researcher to choose one approach over the other. Secondly, the research strategies and choices also influence the decision and lastly knowledge in the different research conducts.

### 3.3.1 Deductive

This approach deals with existing theories that have widely been accepted or ideas about a subject by identifying the theory and testing through observations to confirm the theory (Ofori-Kuragu, 2013). The deductive approach mostly consists of a top-down initiative in the creation of the theory and testing of hypothesis while maintaining the independence of the researcher.

### 3.3.2 Inductive

Inductive approach is used mainly in formulating theories, and it begins with the study of specific instances of societal issues, through the identification and development of patterns from the analysis of data gathered (Ofori-Kuragu, 2013).

### 3.3.3 The Research Approach Adopted

In considering the research approach adopted for this study, preference favoured the use of the deductive research approach as it is more appropriate and suiting to the use of pragmatist research philosophy. The deductive research approach is objective in nature, and in assessing the effect of labour intensive road construction on the success of road works in Ghana, it was imperative to allow for experts' views collection through primary data by using structured research questionnaires.

## 3.4 RESEARCH STRATEGIES

The research strategy plays a very prominent information role in all paradigms (Pathirage et al., 2005). Guba and Lincoln (1994) are of the assertion that research strategy mainly involves two key areas (quantitative and qualitative approaches). Notwithstanding, Baiden (2006) expressed that research strategy consists of three distinct areas rather, which are quantitative, qualitative and triangulation. The decision to use any of these three broad areas depends on number of factors like; the purpose of the study, the research questions and the type and ease of getting the needed information (Naoum, 2012).

### 3.4.1 Qualitative

Qualitative research mostly takes place in a naturalistic setting. Thus, it tends to consider the quotidian activities of people and groups of communities. Mostly useful for educational settings and processes. Denzin and Lincoln (2003) assayed that the qualitative research involves a naturalistic approach, understanding the subject matter; looking at interpreting or making sense of issues, by considering the meaning which people attach to them. Qualitative research can be viewed as a form of social interaction in which the researchers learns and converses with the subject being studied (Jean, 1992). Alternatively, Crotty (1998) explicated further that the qualitative research is a research process which involves forming meaning of reality.

### 3.4.2 Quantitative

Quantitative research approach is the approach that enables in the investigation of quantitative properties and their relationships systematically (Wadsworth, 1997). Creswell (1994) opined that the quantitative research approach considers past actions,

words, or records with a statistical significance, and measures the findings of these observations. Wadsworth (1997) in an effort to explaining the quantitative research approach simply said that this approach would enable you to know how many, to what extent or how much of the parts is found in the data analysis and counting.

### 3.4.3 Mixed or Triangulated

The mixed method or triangulated approach is a mixture or the use of both quantitative and qualitative approaches to undertake an observation for generalization of phenomenon on the assumption that there is an increased understanding of such phenomenon through the collection and analysis of copious data (Creswell, 2013). In following the philosophical view of pragmatism, the mixed method approach enables the collection of data either simultaneously, or sequentially commencing with a survey of generalization and later with an interview for the detailed view form respondents (Creswell, 2009). The mixed approach has also been used as a tool for coming out with diverse context often with an emphasis on the purpose of bringing different acumen rather than the simplicity of the qualitative and quantitative approach (Agbodjah, 2008). Irrespective of the benefit of combining both approaches, the mixed approach has been tagged as an expensive and time-consuming approach.

## 3.5 RESEARCH PROCESS DESIGN

In research, there are some sets of decisions concerning the topic or problem one is studying, this is what is referred to as research design (Creswell, 2013). It appears to be one of the most important areas on academic research, because it shows how the study will be carried out, so as to achieve the objectives of the research. Burns and Grove

(2003) expressed their views that research design presents the scheme in which the study would be conducted, controlling variables as they could hinder the reliability of the findings. Thus, to arrive at a reliable and valid finding, one must use the best research design available to solving the particular research problem.

With the aim of the study in mind, one can easily identify the type of research design which needs to be adopted for the purpose of the study. Research designs have been grouped into three main broad areas: descriptive, exploratory and explanatory (Bourne, 2005; Kelly, 2009). Descriptive research design is mostly adopted to collect information about the current state of an occurrence; looking at variables in a particular event and applying an appropriate approach to it (Sekaran, 2003). Bourne (2005) explicates that, the exploratory study is usually done with the aim of finding understanding about a mind-blogging development or to increase in knowledge a contemporary thought in form of suggestion that present itself for further discussion. Explanatory research is used when one wants to explicate the research problems and create hypothesis. Hypothesis testing is used when it is vital to identify the link that exists between variables, thus, whether they correlate or varies (Sekram, 2003). This study adopted both explanatory and descriptive research design because it could be identified that the purpose of this study falls within the parameters of these two designs as explained by researchers above.

### 3.5.1 Unit of Analysis

To enable the researcher to easily identify or come up with the best data collection method or a good representation of the population (best-fit sample size), the researcher must firstly identify the unit of analysis (Sekram, 2003). Sekram (2003) stated that unit of analysis are grouped into five main types: individual, dyads, groups, organisation and

culture. Considering the purpose of this study, the organisation unit of analysis was chosen. Notwithstanding, it must be reiterated that primary data were obtained from individuals in these organisations who are experts and representatives of the organisations considered for the study. The focus was to obtain the expertise of these various organisation in relation to assess the effect of labour intensive road construction on the success of road works in Ghana with the view of identifying the positive impacts on the Ghanaian construction industry.

## 3.6 DATA COLLECTION METHODS

After going through the philosophical stance of the study, the research approach, research strategies, research choices and time horizons, and making decisions on which option to use for the study and reasons for choosing one over the other; the next step is to identify the techniques and procedures which would be used to collect data. The data collection methods adopted for a study is very important as it influences the attainment of the research objectives and purpose of the study. Tongoco (2007) was highly concerned about the fact that in data collection no amount of analysis (no matter how careful it is done) can make up for a poor data which does not reflect the population intents. Hence, collection of data must be taken very seriously with all aptness.

### 3.6.1 Sources of Data

Data sources are mainly either primary or secondary. This study resorted to the use of primary data by adopting the quantitative research approach which mostly employs the use of survey questionnaires as the data collection tool. Secondary information for this study was obtained from undertaking an in-depth desk literature review and identifying pertinent variables which helps in identifying the effects of internal audit on financial

performance. The variables obtained were strategically compounded into close-ended questionnaires which were distributed to the target population to solicit their matchless expertise in meeting the objectives of this study.

Secondary data was not used for this study. However, secondary data are those data sources which could be obtained from the database of an institution or company, or the data collected by an independent body, or the data used by another person in their study

### 3.6.2 Questionnaires Development

In adopting quantitative research approach, most researchers tends to favour the use of survey questionnaires as their data collection tool (Sarantakos, 2005). Survey questionnaires, mostly used in social sciences researches are adopted in collecting all sorts of data (Creswell, 2005). Questionnaires are mostly in two forms: either open-ended or close-ended questionnaires (Sarantakos, 2005). The questionnaires were formed in such a way that they help in answering the research objectives of this study (Oppenheim, 1996). A good questionnaire would be unique, and contribute to generating several kinds of information form the respondents (Gall et al., 2003). It should be clear, concise, precise, and straight to the point; not requiring further enquiry or deliberations in case of a close-ended type. Sarantakos (2005) opined that survey questionnaires should follow these four main criteria: good categorisation, easily comprehended wording, generally acceptable and easy to code variables. In the questionnaire format, one key thing is to explain to your respondents the direction or research being studied (Salant and Dillman, 1994). A good questionnaire will lead to the attainment of a valid and reliable primary data (Fowler and Floyd, 1995).

### 3.8.3 Data Collection Method Adopted

Pragmatic research philosophy gives the freedom to the researcher to choose between either quantitative or qualitative research methods, or the combination of both for the study. Hence, it is of the view that the researcher should choose the method that best fit in answering the problem at hand (Tashakkori and Teddlie, 1998). Therefore, this study adopted the use of structured survey questionnaires as the primary data collection tool to obtain the expert views of respondents on the effect of labour intensive road construction on the success of road works in Ghana. The mixed method approach provides a more robust set of results as it combines both the quantitative and qualitative research approaches, which ensures that the study has an in-depth and wider research scope. The questionnaire was divided into two main parts: part A and part B. The part A covered the background questions which need to be identified to validate the respondents of the study. The part B was divided into three main sections, with each section targeting the objectives of the study.

## 3.7 POPULATION AND SAMPLE FRAME

Naoum (2012) is of the view that the population of the study consists of all the various individuals or groups which fall under the study and can, or are supposed to give or needs to be assessed to help in achieving the purpose of the study. The population of the study encompasses several agencies of state who have direct influences on the quality management of our construction projects. Hence, considering the Tamale Metropolis, and looking at the effect of labour intensive road construction on the success of road works in Ghana, it becomes evident that this survey is to be answered by various professionals who have experience in labour-based construction in Ghana.

Hence, considering the agglomeration of several areas or facets which makes up the population, identifying a finite population becomes very difficult. Hence, leading the study to tag its population as infinite. When the situation turns this way, the best point estimate is the population's sample mean (Cochran, 1977). The sample frame consists of the targeted population from the lot which this study considered. Hence, it can be said to be operational definition of the population (Passer, 2014). Kothari (2004) defined a sample frame to consist of a list of items from which the sample is to be taken.

### 3.8 SAMPLING TECHNIQUE AND SAMPLE SIZE

After identifying the population and sample frame of the study, the next step is to determine how the population would be targeted and the sample size which will be used to represent the entire population (so as to obtain an accurate assessment of the whole population). A total of **72 respondents** representing the sample size were used for the study. This next stage of research methodology is presented in the sub-sections below.

#### 3.8.1 Sampling Techniques

In research, collection of data from the entire population appears as costly and time wasting. Therefore, several measures have been formulated to enable us to target a part of the population in a careful but impressive manner which will still represent characteristics of the entire population. Saunders et al. (2009) defines these approaches as the sampling technique. Sampling techniques have been grouped into two main broad areas, namely: the probability sampling technique and the non-probability sampling techniques.

**Probability** sampling techniques are those cases whereby each individual in the population has an equal chance or likelihood of being selected. It is mostly used when the

population is known. Probability sampling technique gives us the opportunity to calculate for confidence interval and margin of errors (Bryman, 2004).

**Non-probability** sampling techniques are those cases whereby it is impossible for each individual in the population to be selected by chance. Non-probability sampling technique does not give us the opportunity to calculate confidence interval and margin of errors, but this approach is seen as very easy and cost-effective (Bryman, 2004). Example of nonprobability sampling techniques is: quota sampling, convenience sampling, purposive sampling, self-selection sampling and snowball sampling.

### 3.8.2 Purposive Sampling Technique (Sampling Technique Used for this Study)

Purposive sampling technique relies on the judgement of the researcher in selecting the group, class or organisation which is to be studied. Hence, it can be referred to as the selective, subjective or judgemental sampling technique (Saunders et al., 2009). This study adopted purposive sampling technique because it based its reasons on the statement of Babbie (2013) who purported that purposive sampling techniques should be used when it is almost impossible to list the actual number of the population, though one can easily identify several clusters or organisations who could give him the necessary data. In purposive sampling technique, based on the specific goal of the researcher and the purpose in mind, we can have several examples like expert sampling, case sampling, total population sampling, homogenous sampling etc (Saunders et al., 2009). Nonetheless, one can select or use any of the several types based on the objective of the study or the criteria imposed by the researcher. This study adopted purposive sampling technique because of the nature of the study which is contemporary with few experts having

informed knowledge on it. Hence, to enable us obtain real-value data, the purposive sampling technique was deemed as the best approach to use for a study of this kind.

## 3.9 DATA PROCESSING AND ANALYSIS

Data analysis is mainly done to see whether the data is able to provide answers to the research question set out in achieving the purpose of the study (Saunders et al., 2009). Kwofie (2015) opined that this process generally refers to how data are organised, examined, categorized, tabulated, interpreted and tested. There are several ways in which data is tested statistically. The decision to use one method over the other depends on the type of analysis, accuracy of work and the kind of information which the researcher want to get from the primary data. The various methods are also influenced by the research design, data distribution and type of variable. Mostly, normally distributed data uses the parametric tests while the non-normally distributed data adopts the non-parametric tests (Saunders et al., 2009). The next sections below provide information on the stools which was used in analysing the primary data which obtained from the survey.

### 3.9.1 Relative Importance Index (RII)

The RII helps in identifying the relative importance of variables, and informing the researcher in making a choice one out of the several variables which best explains or is critical to achieving the objective at hand (Carpio et al., 2007). RII was proposed by Soofi et al. (2000) as a tool for determining the relative significance of quantities through the formulation of indexes from which the various characteristics are ranked (hence, understanding the contribution of each variable to a response variable). Kapadia-Kundu and Dyalchand (2007) opined that adopting a five-point Likert scale is very good in

measuring statement which would be solved using the RII tool. Hence, this study adopted a similar approach in its questionnaire formation.

RII has been used by several scientists in their analysis in variant factions (for example see Johnson, 2000; Jeyamathan and Rameezdeen, 2006; Antwi-Afari et al., 2018; OwusuManu et al., 2018 etc.). Therefore, adopting the use of RII for this study proves worthy because it has been used and adopted in identifying the relative significance of variables in works as shown in the citations above. One more reason for adopting RII in on the avowal of Capiro et al. (2007) who said that RII is best for group of variables, and the questionnaires of this study was formulated as such (see Appendix). In Summary, Relative Importance Index was adopted to identifying the effect of in labour intensive road construction on the success of road works in Ghana.

RII was calculated based on this formula; RII = $\frac{\sum W}{A*N}$ where $\boldsymbol{W}$ is the weight given to each factor by respondent ranging from 1 – 5, $\boldsymbol{N}$ is the total number of respondents, and $\boldsymbol{A}$ is the highest response integer (5 in this case).

3.9.2 Internal and External Validity

Validity simply means, achieving what the study intends to attain. Proposed by Kelley (1927), validity is used in evaluating the importance of a research study or the procedures used. Generally, we have two main types of validity; internal and external validity. Internal validity considers how the dependent variable(s) is/are well explained by the independent variable(s). Hence, there should be no confounding variables between the independent variables in enabling the correct prediction of the dependent variables (Gay and Airasian, 2000). Internal validity is affected by eight main threats as proposed by

Campbell and Stanley (1963). These variables are history, testing, selection preconception, experimental mortality, statistical regression, development (maturing or improving from one state to the other), instrumentation and research reactivity (ibid).

External validity on the other hand looks at how the research can be generalised to reflect the entire population. Hence, one could ask, does the same thing happens in variant settings other than this one? Smith and Glass (1987) also came out with some threats to external validity which includes; validity affecting the population of the study; ecological validity, and external validity of operations. By recapitulation, one must note that a study with internal validity, does not automatically confirms that the study will also have an external validity (Onwuegbuzie, 2000).

### 3.10 ETHICAL ISSUES

Ethical issues are very important in research now, because ethical standards eschew falsification of data and promotes the formulation of real value facts and truth in promoting knowledge (Riddell and Burgess, 1989). Ethical issues also provide good grounds for collaborative research because it spills out the rules and duties of each member, and it enables the easy formation of co-authorship, copyright guidelines and confidentiality of each member (Dich et al., 2013). Moreover, in order to increase the integrity of research, ethical issues are harnessed in that regards and also for increasing confidence of the public in research. Thus, does the study protects human right, ensures animal welfare, safeguard the environment, complies to the laws, safety and available standards (Riddell and Burgess, 1989). Examples of ethical issues considered in research includes but not limited to the following:

***Beneficence*** – Thus, the study must be of immense benefit to the world or the scientific domain without having any harm whatsoever on the population of the study or the world (Beauchamp and Childres, 2001).

***Informed Consent*** – this is when the respondent without any reservations whatsoever gives his/her consent to conduct the study or provide information to the questions being asked in the data collection tool (Armiger, 1997).

***Respect for confidentiality and anonymity*** – the type of research method adopted would mostly influence the choice between anonymity and confidentiality. However, if the researcher is unable to provide anonymity (in case of a qualitative research), then at least the confidentiality of the respondent should be kept (Levine, 1976).

***Respect for privacy*** – Levine (1976) opined that privacy is when an individual decides when to share, distribute, discuss or withheld his/her private information from others. When the researcher shares the private information of a respondent without informed consent, there is a breach of privacy (Kelman, 1977).

***Protecting the vulnerable in the society*** – vulnerable group are those who do not have what it takes to protect their rights and welfare, for example the poor, children, the sick, pregnant women, aged, lunatics, very ill or dying people etc. (Fisher, 1993). Therefore, studies relating to these people should have a highly informed ethical consideration.

## 3.13 CHAPTER SUMMARY

The chapter presented in details the several methods available for use in research methods as well as reasons to choose one method over the other. This chapter in a

nutshell provides the research structures or background to which the entire study lingers on. Hence, it is one of the main aspects which cannot be overemphasised in ensuring that a good and novel study is conducted. From this chapter, it can be deduced that the study will use the pragmatic research philosophy which favours the use of both deductive and inductive research approaches, and either qualitative or quantitative or both research strategies. Though this research is a case study, close-ended questionnaires were used as the data collection tool. The study was also conducted within a short time frame (cross-sectional). Moreover, the purposive sampling technique was adopted invoking the use of non-parametric test for analysis of the study.

# CHAPTER FOUR

# DATA ANALYSIS AND DISCUSSION OF RESULTS

## 4.1 INTRODUCTION

This chapter discusses the results obtained from the field survey. The data were obtained by adopting close-ended questionnaires as the data collection tool. In this section, firstly, the respondents' profiles were discussed. The factors that lead to the choice of a labour-intensive road construction is also discussed. In addition, the challenges in a labour-intensive road construction in Ghana are also presented in this chapter. Out of the 72 questionnaires which were distributed, 35 were successfully retrieved which represents 46.67% response rate. The software used for the analysis are the Microsoft Excel 16 and SPSS version 23.

## 4.2 RESPONDENTS DEMOGRAPHIC PROFILE

The respondent's demographic profile is essential to ensure the validity of the analysis. This is to help us to ascertain that only professionals and those who have in-depth understanding of the study being conducted were approached to answer the questionnaires.

### 4.2.1 Profession of Respondents

The respondents were asked to indicate their profession. This will help us know the perspective from which each respondent responds to the survey. The responses are summarized in Table 4.1.

From table 4.1 on the next page, it can be deduced that majority of the respondents were project managers representing 48.6% of the total questionnaire received while 28.6%

were contractors, the second highly ranked profession. 14.3% of the respondents were Quantity surveyors whiles three respondents representing 8.6% were into other professions. Since this study is about labour intensive construction, it turns out that majority of the respondents were project managers/engineers who have in-depth knowledge in this area.

**Table 4.1: Profession of Respondents**

| | **Frequency** | **Percent** | **Cumulative Percent** |
|---|---|---|---|
| Project Engineer/manager | 17 | 48.6 | 48.6 |
| Quantity Surveyor | 5 | 14.3 | 62.9 |
| Contractor | 10 | 28.6 | 91.4 |
| Others | 3 | 8.6 | 100.0 |
| **Total** | **35** | **100.0** | |

Source: Field Survey, (2019)

### 4.2.2 Years of practicing profession

Experience they say is the best teacher. Experience in labour intensive construction and understanding of how it operates is very crucial if this study is to make any remarkable contribution to knowledge. Therefore, in order to ensure quality of data collected, the respondents were asked to indicate how long they have been into the profession. The results are summarized in table 4.2.

**Table 4.2 Years of practicing profession**

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Less than 5 years | 6 | 17.1 | 17.1 |
| 5 – 10 years | 25 | 71.4 | 88.6 |
| Above 10 Years | 4 | 11.4 | 100.0 |
| **Total** | **35** | **100.0** | |

Source: Field survey, (2019)

The results of the survey indicate that 71.4% of the respondents have 5 – 10 years of working experience whiles 17.1% have less than 5 years of experience with 11.4% also having more than 10 years working experience. From the table above, it can be deduced that majority of the respondents cumulatively 88.6% have working experience less than 11 years. This shows that the majority of the respondents are current workforce who have in-depth knowledge in labour intensive construction. However, we cannot override the 11.4% valued experience in labour intensive construction which they also contribute to this study.

### 4.2.3 Age of Firm

In order to ensure quality of data collected, the respondents were asked to indicate how long their firm has been in operation. The results are summarized in table 4.3.

**Table 4.3 Age of Firm**

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| 0 - 3 years | 6 | 17.1 | 17.1 |
| 4 – 5 years | 25 | 11.4 | 88.6 |
| 6 Years or more | 4 | 71.4 | 100.0 |
| **Total** | **35** | **100.0** | |

Source: Field survey, (2019)

The results of the survey indicate that 71.4% of the firms have being in operation for over 6 years whiles 17.1% have being in operation for 0 - 3 years with 11.4% also having being in operation for 4 - 5 years. This shows that the majority of the firms are experienced firms who have in-depth knowledge in labour intensive construction.

### 4.2.4 Does your organization have quality labour management policy/plan?

The respondents were asked whether their organization have quality labour management policy/plan. They were required to answer yes or no and the results are summarized in Table 4.4 below.

**Table 4.4: quality labour management policy/plan**

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Yes | 34 | 97.1 | 97.1 |
| No | 1 | 2.9 | 100.0 |
| **Total** | **35** | **100.0** | |

Source: Field survey (2019)

The results from table 4.4 above shows that majority of the respondents representing 97.1% have quality labour management policy/plan whilst a few of them representing 2.9% said no they have no quality labour management policy/plan.

## 4.3 FACTORS THAT LEAD TO THE CHOICE OF A LABOUR-INTENSIVE ROAD CONSTRUCTION

In other to achieve this objective, various variables identified from literature to be some of the factors that lead to the choice of a labour-intensive road construction were used in the questionnaire. The respondents were asked to rank these variables on a scale of 1 – 5, with 1 – Disagree 2 – Slightly disagree 3 – Moderate 4 – Agree 5 – Strongly agree (See Appendix A). The RII has been preferred over the mean and standard deviation as they are not credible and reliable tools for examining the overall ranking of the nature of key attributes (Chan and Kumaraswamy, 1997). The mean, standard deviation, and RII for each variable is shown below in Table 4.5.

From table 4.5 below, it can be deduced that Training and Employment of Labour was ranked first with an RII of 0.930, mean of 4.63 and standard deviation of 0.490. The second ranked variable which the respondents agree to be a factor that lead to the choice of a labour-intensive road construction is Weather Conditions. This variable came second with an RII of 0.890, mean of 4.460 and standard deviation of 0.502. The third ranked variable which is Supervision came third with an RII of 0.89, mean of 4.46 and standard deviation of 0.505. Though it has the same mean and RII as the second ranked variable, it is ranked third because of differences in standard deviations. With an RII of 0.790, mean

of 3.97 and standard deviation of 0.857, Size of project was ranked fourth. Scope of work was the 5th ranked variable by the respondents as a factor leading to the choice of labour based construction. The 7th ranked variable by the respondents was the Cost which came on with a mean of 3.800, standard deviation of 0.797 and RII of 0.760. From the first to the 9th variable, all of them had a mean greater than 3.500 hence, showing a high significance of these variables.

### 4.5.1 Discussions on First three ranked variables

#### 4.5.1.1 Training and Employment of Labour

In labour intensive project the contractor utilizes labour from local folks, and many a time these individuals have been out of shape for long or been prepared for a specific skill. For this, the government presented the on the job training during the construction project.

As per Coetzer, (2010) the fund generally available for training will be given the Quantity surveyor before the bidding stage and in this way he can incorporate it in the tender document. These training brings about additional cost of construction to the client. The department of water affairs and Forestry (2001) were of the view that, these training and skills that occur can be assumed that various individuals utilized as labourers utilize this opportunity as a stepping stone to develop a career in construction.

#### 4.5.1.2 Weather Conditions

Temperature and moisture in the air have more impact on labor efficiency since it has direct effect on the physical body. In a many month research of productivity in the fixing of structural steel, masonry, and formwork, it was discovered that the perfect temperature was 550F, with relative humidity having peripheral impacts beneath 80%, however

diminishing profitability over this level (Yiakoumis, 1986). The impact of temperature and humidity differs a lot by individual and by the kind of work being carried out (Oglesby, Parker, and Howell, 1989). Hanna (2004) led contextual study on electrical projects demonstrating that work performance diminishes at temperatures above 800F and underneath 400F dependent on a full day's work. The investigation additionally found that: (1) Efficiency of 100% can be accomplished just when the temperature is somewhere in the range of 400F and 700F and the relative humidity is beneath 80%; (2) In very cold conditions, temperature is undeniably more essential than humidity. Despite humidity, an effective temperature of - 200F or lower may lead to work stoppage. It was seen that extended work in hot and cold conditions quickens the impacts of tiredness (Hanna, 2004).

#### 4.5.1.3 Supervision

Effective supervision of labour intensive projects promotes more noteworthy labour profitability subsequently effective work process. Because of issues of weariness, work strike, site accident related with labour intensive construction. “Under-supervision” on site will influence the workflow or the efficiency of the work. Effectiveness of work process has huge effect on labour productivity on a building site. Even as successful workflow management can improve construction labour productivity (Ballard and Howell, 1998), likewise labour flow on a building site can also improve workflow (Ng et al., 2003). There is a codependency between workflow and labour flow, and every one of them thus affects labour productivity. Ng et al. (2003) established from a study of three construction projects that inefficient workflow management amounted to a labour

inefficiency of 51%, and that 58% of the total wasteful work hours were because of inefficient workflow management.

### 4.5.2 General Discussion of ranked variables

One of the methods for achieving a customer satisfaction on a project is through the value of money. The customer is in charge of the financing of a project thus the rationale behind their undeniably worry for the general profitability of a project and the general accountability of the projects. Cost overruns, in connection with project delays, are habitually recognized as one of the major factors prompting the high cost of construction (Charles and Andrew, 1990). This is on the grounds that labour intensive strategy for construction is deemed to be time involving consequently increasing the cost of production. Moholo (2006) remarked on the labour intensive parts of the time involving construction exercises; expressing that eventhough the basis of work study furnishes us with common output rates for labour (labour constant or time it takes for one laborer to finish a specific activity) and plant (cubic meters of soil that can be uncovered by an excavator in an hour or a day), it stays to apply that data in a reasonable way. On the account that one labourer takes three hours to exhume by hand one cubic meter of soil, it doesn't really imply that 30 cubic meters should be possible in a similar time if 30 labourers are at the same time excavating soil.

**Table 4.5: The factors that lead to the choice of a labour-intensive road construction**

| | N | Mean | Std. Deviation | RII | RANKING |
|---|---|---|---|---|---|
| Training and Employment of Labour | 35 | 4.63 | .490 | 0.93 | 1st |
| Weather Conditions | 35 | 4.43 | .502 | 0.89 | 2nd |
| Supervision | 35 | 4.46 | .505 | 0.89 | 3rd |
| Size of project | 35 | 3.97 | .857 | 0.79 | 4th |
| Scope of work | 35 | 3.89 | .832 | 0.78 | 5th |
| Conditions of contract | 35 | 3.86 | .355 | 0.77 | 6th |
| Cost | 35 | 3.80 | .797 | 0.76 | 7th |
| Flexibility in project delivery time | 35 | 3.80 | .833 | 0.76 | 8th |
| Project risk | 35 | 3.74 | .443 | 0.75 | 9th |

Source: Field survey (2019

## 4.4 IDENTIFIED CHALLENGES IN A LABOUR-INTENSIVE ROAD CONSTRUCTION IN GHANA

In order to achieve this objective, various variables identified from literature to be some of the challenges in a labour-intensive road construction were used in the questionnaire. The respondents were asked to rank these variables on a scale of 1 – 5, with **1 – Not Important 2 – Less Important 3 – Moderately Important 4 – Important 5 – Very Important** (See Appendix A). The RII has been preferred over the mean and standard deviation as they are not credible and reliable tools for examining the overall ranking of the nature of key attributes (Chan and Kumaraswamy, 1997). The mean, standard deviation, and RII for each variable is shown below in Table 4.6

**Table 4.6: challenges in a labour-intensive road construction**

| | N | Mean | Std. Deviation | RII | Ranking |
|---|---|---|---|---|---|
| Labour Management | 35 | 4.74 | .561 | 0.950 | 1st |
| Technical Training | 35 | 4.54 | .505 | 0.910 | 2nd |
| Late Payment | 35 | 4.51 | .507 | 0.900 | 3rd |
| Speed Of Implementation | 35 | 4.40 | .492 | 0.880 | 4th |
| Equipment Loans | 35 | 4.40 | .497 | 0.880 | 5th |
| Misconception About Labour Based Works | 35 | 4.00 | .594 | 0.800 | 6th |
| Contract Documentation | 35 | 3.71 | .667 | 0.740 | 7th |
| Policy | 35 | 3.60 | .812 | 0.720 | 8th |
| Experience From Other Countries | 35 | 3.54 | .505 | 0.710 | 9th |

Source: Field survey (2019)

From table 4.6 above, it can be seen that the various challenges in a labour-intensive road construction are all important variables since they all have a mean above 3.50 except the last ranked variable of lack of incentives which had a mean of 3.43. Hence this shows a high level of significance of the variable as what sustainable construction tends to imply. Individually, Labour Management was ranked first by the respondents with a mean of 4.74 and an RII of 0.950 with a standard deviation of 0.561 Technical Training and Late Payment came second and third with an RII of 0.910 and 0.900 respectively. They also have means of 4.54 and 4.51 with standard deviations of 0.505 and 0.507 respectively. With an RII of 0.880, standard deviation of 0.492 and a mean of 4.40, Speed Of Implementation ranked $4^{th}$ among the variables assessed by the respondents. Interestingly, Equipment Loans had the same mean and RII as Speed Of Implementation but it was ranked $5^{th}$ because of the standard deviation which was more than that of Cultural barriers. Hence, following what Ahadzie (2007) purported that when two or more variable has the same mean, the one with the lowest standard deviation is ranked first. Misconception About Labour Based Works came $6^{th}$ after the respondents have ranked the challenges in a labour-intensive road construction with an RII of 0.800, mean of 4.00, and standard deviation of 0.594. Experience From Other Countries was the last ranked variables by the respondents with an RII of 0.710 with a mean of 3.54 and standard deviation of 0.505. It is interesting to mention that all the standard deviation of the variables was less than 1.00 which shows a high consistency in the variables ranked by the respondents.

### 4.4.1 Discussions of First three ranked variables

#### 4.4.1.1 LABOR MANAGEMENT

One key part of labour intensive system is the management of the labour force (Anderson, 1995). Studies demonstrated that traditional contractors communicated the sentiment that the huge workforce engaged with labour intensive works made the management of such projects complicated and difficult (Devereux, 2002; McCutcheon, 1995). On the other hand trained contractors in the field had opposing view. The experience from such trained contractors demonstrated that generally scattered sites which were small in nature had lesser issues with labour than machine intensive sites. Reports likewise demonstrated that labour management was not complicated for small and medium firms when contrasted with bigger construction firms (ILO, 2008, Stiedl, 2000).

#### 4.4.1.2 TECHNICAL TRAINING

It is important to take note of that the utilization of labour intensive system requires the need of specific skills that must be obtained through the needed training (International Labor Organization, 2003). Labour intensive works requires skills, for example, management and organisation of labour and engineering techniques which may require some time to be gained through the provided training (McCutcheon, 1995). Some have contended that the requirement for such abilities has resulted in most times being wasted in supported training programs (Subbarao, 1997). Such trainings should be taken before a contractor can even prequalify for a labour intensive contract. Some have contended that this preparation program acts as a disincentive.

#### 4.4.1.3 LATE PAYMENT

A normal trend in road works for the most part funded by the public fund is delay in payment. Studies have demonstrated that payment certificates could delay by an average of 8 months. Reasons associated to this have been in the past connected with bureaucratic process. This has great impact on the payment of workers. Though equipment intensive contractors might almost certainly renegotiate payments or even defer payments with suppliers, failure to pay labourers on time could prompt catastrophe on site (Taylor and Bekabye, 1999; Stiedl, 2000). Different sources of financing exist yet are to a great extent costly with generally high interest rates when contrasted with financing for equipment (Stiedl, 2000). This is seen as a huge obstacle for utilization of labour intensive technology on Ghanaian building projects (Ampadu, 2011).

### 4.4.2 General Discussion of ranked variables

Another challenging issue with the utilization of labour is the speed of implementation. Studies demonstrate that a labour intensive contractor would yield 10 percent of that achieved by an equipment intensive contractor with respect to a regular rehabilitated road for each month (Stiedl, 2000). Studies demonstrate that capital required for working in equipment based system is less when contrasted with labour intensive systems (Stock, 1996). For most developing nations the less working capital required by equipment based techniques makes them more appealing than labour intensive strategies (International Labor Organization, 2003). This introduces an barrier to most road contractors. One noteworthy obstacle that eased back the implementation of the usage of labour intensive works was the misguided judgment held by most governments and specialists (World Bank, 2002). This groups of individuals had the conception that this technique was a

"regressive" innovation and not commendable from their point of view. The significant universal group pushing for the utilization of labour intensive works, ILO had an alternate way to deal with the utilization of this system. They were of the view that the correct blend of labour and equipment ought to be utilized for road construction and not of the view that ever African road be built with labour only. This methodology encouraged most governments utilizing labour and lighter equipment for most haulage and compaction works.

## 4.5 IDENTIFIED EFFECT OF CONSTRUCTION ROADS USING LABOUR-BASED TECHNOLOGY ON THE SUCCESS OF THE PROJECT

In order to achieve this objective, various variables identified from literature to be some of the effect of construction roads using labour-based technology on the success of the project were used in the questionnaire. The respondents were asked to rank these variables on a scale of 1 – 5, with 1 – Strongly Disagree 2 – Disagree 3 – Neutral 4 – Agree 5 – Strongly Agree (See Appendix A). The RII has been preferred over the mean and standard deviation as they are not credible and reliable tools for examining the overall ranking of the nature of key attributes (Chan and Kumaraswamy, 1997). The mean, standard deviation, and RII for each variable is shown below in Table 4.7.

From table 4.7, it can be deduced that respondents ranked the various effect of construction roads using labour-based technology on the success of the project and after analysis **Employment** was ranked first with an RII of 0.900, mean of 4.51 and standard deviation of 0.507. Indirect Employment was the second ranked variable with an RII of

0.900, mean of 4.49 and standard deviation of 0.507. Though this variable has the same RII and standard deviation as the first ranked variable, the mean was different, hence ranking it as the second variable. Asset Creation was ranked third with an RII of 0.89, mean of 4.46 and standard deviation of 0.505. The fourth ranked variable from table 4.11 is Cost Effective, which came fourth with an RII of 0.880, mena of 4.400 and standard deviation of 0.497. With 0.820 RII, 0.758 standard deviation and 4.11 mean, Financing Construction Works came 5$^{th}$ on the effects. Financing Construction Works was the 6$^{th}$ ranked variable on the effect of construction roads using labour-based technology on the success of the project. It came 6$^{th}$ with an RII of 0.790, mean of 3.97 and standard deviation of 0.747.

Affected by weather conditions and Labour regulations were the last ranked variables respectively. From the table is can be deduced that they all have a mean less than 3.5, the formulated mean which shows the significance of a variable to be considered. With an RII of 0.71and 0.63, standard deviation of 0.664 and 0.648 and means of 3.17 and 3.14 the last three variables were ranked respectively. However, it is noteworthy to mention that the entire variables had a standard deviation less than 1.00 which shows a high level of significance among the variables.

**Table 4.7: effect of construction roads using labour-based technology on the success of the project**

| | N | Mean | Std. Deviation | RII | RANKING |
|---|---|---|---|---|---|
| Employment | 35 | 4.51 | .507 | 0.90 | 1st |
| Indirect Employment | 35 | 4.49 | .507 | 0.90 | 2nd |
| Asset Creation | 35 | 4.46 | .505 | 0.89 | 3rd |
| Cost Effective | 35 | 4.40 | .497 | 0.88 | 4th |
| Financing Construction Works | 35 | 4.11 | .758 | 0.82 | 5th |
| Macro-Economic Effects | 35 | 3.97 | .747 | 0.79 | 6th |
| Affected by weather conditions | 35 | 3.17 | .664 | 0.71 | 7th |
| Labour regulations | 35 | 3.14 | .648 | 0.63 | 8th |

Source: Field survey (2019)

### 4.4.1 Discussions

**EMPLOYMENT**

One of the social significance of labour intensive systems pivoted on the basis that they lead to decrease of people been denied of occupations giving chances to employment on road construction projects (World Bank, 2002). There has consistently been the need to address joblessness in rural areas yet this was underscored more during the periods somewhere between 1960s and 1970s (International Labor Organization, 2008). Edwards (1994) reports that absence of jobs in the rural areas forced people to search for the work in the urban communities and their eagerness to find work had prompted societal distress and breed other social vices. This is backed up by the fact that rural regions are less appealing than urban communities primarily because of many infrastructural

advancement in the urban communities. The utilization of labour intensive innovation meets two thriving issues; first the making available of jobs which solves the rural joblessness and also secondly decreasing the urban predisposition in infrastructure project (Edwards, 1994).

**INDIRECT EMPLOYMENT**

Labour intensive technique exploits assets at the locality and accordingly encourages democratic involvement (Thwala, 2001). Also, it can likewise bring about the indirect employment for a lot of local folks. If certain level of the wages earned is kept as "fund", such funds can be utilized for meaningful projects in the locality, like, poultry keeping, local shops, buying of animals and so on. This will bring about extra indirect employment inside the community. For example, Contreras and Cartier (2004) saw in Peru that the Micro-businesses utilized Social funds to support community exercises, for example, cleaning works, painting of schools and the establishment of potable drinking water.

**ASSET CREATION**

The greater part of the roads infrastructures developed or maintained using equipment are not feasible on the grounds that it estranged the recipients from effectively taking part in such system, thus their failure (International Labor Organization 2008). Nonetheless, labour intensive methodology is more affordable strategy for creating reliable road resources that are lasting, effecient and of good quality (International Labor Organization, 2008). This is on the grounds that the recipients of the development projects are permitted to effectively partake in the identification, prioritization and execution of road infrastructure resource that tends to the transport needs of individuals

from the rural commuinty (Stiedl and David, 2008). Likewise, the contribution of rural individuals in this kind of program advances neighborhood cooperation; create the feeling of proprietorship just as capacity building and local empowerment through transfer of skill (Stiedl and David, 2008).

**General Discussion of ranked variables**

The advantages of labour intensive way to deal with the rural economy are many, nonetheless, just a few of them will be considered here. In a similar vein, where practicable and financially advisable, the use of labour intensive way to deal with rural road rehabilitation results in a significant savings funds in foreign and an expansion in the use of local resources which in turns animates the l economy; since it won't be important to import machine, material or work force from abroad (Devereux and Solomon, 2006). One of the most significant contemplations in the decision of either labour intensive or equipment based method for executing a given road improvement project is the overall cost of the project as executed by the two methods (Stock and de Veen, 1996). Studies have officially declared the cost adequacy of labour intensive method over capital intensive ones (World Bank, 2002; Devereux and Solomon, 2006; Stiedl and David, 2003). Eventually, the cost of road works by labour intensive and equipment based techniques can be compared either through the unit cost analysis of the various exercises or through the historical data analysis of finished projects.

# CHAPTER FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATION

## 5.1 INTRODUCTION

This section of the chapter discusses the recommendations and conclusions of the work. The study was conducted to assess the effect of in labour intensive road construction on the success of road works in Ghana. The study was strategically divided into five independent and interrelated chapters to enable the study to be well presented in a chronological and ethical manner. The first chapter of the study talked about the general introduction of the study. Here, the researcher took time to give the general background surrounding sustainable construction their implementations and how it has evolved in literature. The problem from literature was also identified to give a strategic purpose for this study. The research questions emanating from the study was also identified and well presented in chapter one. The aim and objectives of the study were also stated in chapter one. The methodology which was adopted for the study was also stipulated in this chapter long before it was implemented in chapter three and chapter four. The significance of the study was also stated in this chapter to show how important this study is to be conducted to add knowledge to the field of effects of in labour intensive road construction on the success of road works in Ghana. The scope of the study was also stated. Lastly, how this whole thesis was organised was also stated in the chapter one. The chapter which follows directly after chapter one is chapter two (Literature Review). Here, the literature surrounding the studies were identified from extant literature and reviewed. The literature review of this study encompass the factors that lead to the choice of a labour-intensive

road construction, the challenges in a labour-intensive road construction and the effect of construction roads using labour-based technology on the success of the project.

Successively, chapter three (Research Methodology) of the study talks about the methods which was adopted to attain the objectives of the study. Hence, the research paradigm, research strategy, the approach adopted for the study, the research design, the population of the study, sample size and sampling techniques, as well as data analysis were all discussed in this chapter. The chapter four of the study discussed the data obtain from the field and analysis of the obtained data. The discussions surrounding the study were also presented in this chapter. The last chapter of this research is the chapter five which considers the summary, conclusions and recommendations of this study. In this chapter, a summary of the study is presented, while the conclusions of the study are also shown. A précis of how the various objectives were obtained is also stipulated in this chapter. The study completes with the recommendation and directions for future research based on the limitations and conclusions of the study.

## 5.2 CONCLUSIONS

The main objective of the study was to identify the effect of in labour intensive road construction on the success of road works in Ghana. To obtain this important aim of the study, three imperative research objectives were developed to address the aim of the study.

### 5.2.1 OBJECTIVE ONE

**To identify the factors that lead to the choice of a labour-intensive road construction in Ghana**

In order to achieve this objective which will strategically lead us to fulfilling the aim of this study, a lot of important and detailed literatures were obtained and reviewed to understand what is being discussed in literature concerning the factors that lead to the choice of a labour-intensive road construction in Ghana. To achieve this objective, respondents were asked to rank the importance of some variables in describing sustainable construction practices. With 1 – Disagree to 5 – Strongly agree, the questionnaires were answered by the respondents. By adopting Relative Importance Indices and descriptive statistics, the identified variables from literature were analysed. After analysis it was identified that the most significant factors that lead to the choice of a labour-intensive road construction in Ghana are Training and Employment of Labour, Weather Conditions and Supervision.

### 5.2.2 OBJECTIVE TWO

**To identify the challenges in a labour-intensive road construction in Ghana**

The second objective for the study was to examine the challenges in a labour-intensive road construction in Ghana. To achieve the objective of this study, pertinent literature was reviewed. The identified variables were strategically compounded into a close ended questionnaire and sent to the targeted population. The literature was obtained by looking for challenges in a labour-intensive road construction in Emerald, KnustSpace and Google Scholar. With the questionnaire, the researcher required the respondents to rank the identified variables on a Likert scale of 1 to 5. With 1 – Not Important 2 – Less

Important 3 – Moderately Important 4 – Important 5 – Very Important, the identified variables were answered by the respondents. After obtaining 35 responses out of 72 questionnaires distributed, it was seen that **Labour Management** was the topmost challenges in a labour-intensive road construction in Ghana. **Technical Training** was the next detrimental barrier identified after the first ranked variable. **Late Payment** was the third ranked variable in the challenges in a labour-intensive road construction in Ghana.

### 5.2.3 OBJECTIVE THREE

**To identify the effect of construction roads using labour-based technology on the success of the project**

For the third objective to be achieved, the researcher explored the effect of construction roads using labour-based technology on the success of the project. The study began with a review of extant literature. The review focused on relevant issues on the effect of construction roads using labour-based technology on the success of the project. The variables obtained from literature were strategically compounded into close-ended questionnaires. The respondents were entreated to answer the questionnaire by ranking the variables on a Likert Scale of 1 – 5 where 1 – Strongly Disagree 2 – Disagree 3 – Neutral 4 – Agree 5 – Strongly Agree. After the survey, Employment, Indirect Employment and Asset Creation were identified to be the most important effects of constructing roads using labour-based technology on the success of the project.

## 5.3 Recommendation

The research has provided a clerical insight into effect of in labour intensive road construction on the success of road works in Ghana. The factors that lead to the choice of a labour-intensive road construction in Ghana, the challenges in a labour-intensive road construction in Ghana and effect of constructing roads using labour-based technology on the success of the project. After considering all these, I will recommend that:

1. Careful labour regulation and monitoring procedures should be put in place to help ensure sustainable construction practices achieve ultimate project success.

2. Government should engage more into labour intensive practices in other to take advantage of the benefits such as job creation.

## 5.4 Limitations of the study

Every study has its own limitations. The limitations of this study could be seen in the collection of data from the respondents. It was difficult obtaining data from the respondents since most of them were busy and unable to get time to answer the questionnaires. Moreover, the study used only Tamale, hence over generalisation of this study could be detrimental as conditions might change from one district to another, a region to another.

Lastly, Labour based road construction is on a downward trend and might be faced out in the near future and therefore further studies in the subject is not recommended.

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## APPENDIX

**Kwame Nkrumah University of Science and Technology**

**Department of Construction Technology and Management**

**Kumasi.**

**QUESTIONNAIRE**

**RESEARCH TOPIC: The effect of in labour intensive road construction on the success of road works in Ghana**

Dear Sir/Madam,

I am currently conducting a survey on Tamale to determine the effect of in labour intensive road construction on the success of road works in Ghana. This survey is a continuum of a research I am currently undertaking as part of the fulfilment of requirement of award of MSc Construction Management at Kwame Nkrumah University of Science and Technology, Ghana.

Some key objectives which this study strives to achieve are:

1. To identify the factors that lead to the choice of a labour-intensive road construction in Ghana.
2. To identify the challenges in a labour-intensive road construction in Ghana.
3. To identify the effect of construction roads using labour-based technology on the success of the project.

I will enthusiastically appreciate your contribution to this research, by answering this questionnaire, by falling on your nonpareil experience the labour-based construction.

Please, you can rest-assure that data collected from this survey would be used for academic purposes only, and as such **your confidentiality and discretion is highly guaranteed.**

From the pilot study, answering of this questionnaire **should not take more than 20 minutes** of your precious valued time. Therefore, with immense appreciation of your time, and anticipation of your contribution, I would be extremely grateful if I get feedback of this questionnaire **not more than 7 working days** from day of receipt.

Notwithstanding, if you wish to know the findings, recommendations or policy implementations of this study, kindly leave your email here…….……., or alternatively send further enquiries to the contact below.

Thank you so much for your unflinching support, contribution and assistance.

Yours Faithfully,

Mr. Sidi Hamid

Email: sidi_hamid@yahoo.com Tel: 0243509950

Department of Construction Technology and Management (KNUST- KSI, GHANA)

Dr. Godwin Acquah (Project Supervisor)

**PART A: BACKGROUND INFORMATION**

Q1. What is your profession?

a. Project Engineer/manager

b. QS

c. Contractor

d. Others (Specify)……

Q2. How long have you been practicing your profession?

a. Less than 5 years

b. 5 – 10 years

c. Above 10 Years

Q3. How many years old is your firm?

a. 0 – 3 years [ ]

b. 4 – 5 years [ ]

c. 6 years or more [ ]

Q4. Does your organization have quality labour management policy/plan?

A. Yes [ ]

B. B. No [ ]

**PART B: FACTORS THAT LEAD TO THE CHOICE OF A LABOUR-INTENSIVE ROAD CONSTRUCTION**

As a validation for this study, it is important to first, identify the factors that lead to the choice of a labour-intensive road construction in Ghana. Therefore, with your unrivalled personal experience and observations, please kindly rate these variables, by ticking where appropriately [√].

**1 – Disagree 2 – Slightly disagree 3 – Moderate 4 – Agree 5 – Strongly agree**

| **SN.** | **FACTORS** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|---|
| | | | | | | |
| 1 | Supervision | | | | | |
| 2 | Training and Employment of Labour | | | | | |
| 3 | Weather Conditions | | | | | |
| 4 | Cost | | | | | |
| 5 | Flexibility in project delivery time | | | | | |
| 6 | Project risk | | | | | |
| 7 | Size of project | | | | | |
| 8 | Scope of work | | | | | |
| 9 | Conditions of contract | | | | | |
| | ***Any Other, Please State and Rank*** | | | | | |
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**PART C: THE CHALLENGES IN A LABOUR-INTENSIVE ROAD CONSTRUCTION IN GHANA**

The key the challenges in a labour-intensive road construction are those factors which were determined from literature.

Therefore, falling on your matchless experience, kindly rank these variables by ticking where appropriately [√].

**1 – Not Important 2 – Less Important 3 – Moderately Important 4 – Important 5 – Very Important**

| **SN.** | **CHALLENGES** | **Level of Importance** | | | | |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 1. | Labour Management | | | | | |
| 2. | Late Payment | | | | | |
| 3. | Speed Of Implementation | | | | | |
| 4. | Technical Training | | | | | |
| 5. | Policy | | | | | |
| 6. | Equipment Loans | | | | | |
| 7. | Misconception About Labour Based Works | | | | | |
| 8. | Contract Documentation | | | | | |
| 9. | Experience From Other Countries | | | | | |
| | | | | | | |
| | ***Any Other, Please State and Rank*** | | | | | |

**PART D: THE EFFECT OF CONSTRUCTION ROADS USING LABOUR-BASED TECHNOLOGY ON THE SUCCESS OF THE PROJECT**

Kindly rank these variables in accordance to how they affect the construction roads using labour-based technology, by ticking where appropriately [√].

**1 – Strongly Disagree** **2 – Disagree** **3 – Neutral** **4 – Agree**

**5 – Strongly Agree**

| SN. | **EFEECTS** | **Level of Agreement** | | | | |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 1. | Cost Effective | | | | | |
| 2. | Employment | | | | | |
| 3. | Indirect Employment | | | | | |
| 4. | Asset Creation | | | | | |
| 5. | Financing Construction Works | | | | | |
| 6. | Macro-Economic Effects | | | | | |
| 7. | Affected by weather conditions | | | | | |
| 8. | Labour regulations | | | | | |
| | ***Any Other, Please State and Rank*** | | | | | |
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| | | | | | | |

Any further comments? Please, kindly indicate below

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**THANK YOU!**