



**AN EVALUATION OF EMPLOYMENT CREATION AND SKILLS TRANSFER
DURING THE DELIVERY OF CAPITAL PROJECTS IN SUB-SAHARAN AFRICA:
A FOCUS ON THREE SELECTED CASE STUDIES**

Bwighane Tusubile Mwamlima

Student number: 674885

Supervisor: Professor Robert J. McCutcheon

A research report submitted in partial fulfilment of
the requirements for
the Degree of Master of Science in Engineering to
the Graduate School of Engineering and the Built Environment of
the Faculty of Engineering and the Built Environment
University of Witwatersrand, Johannesburg

March 2017

DECLARATION

I, **Bwighane Tusubile Mwamlima**, declare that the research report

**“AN EVALUATION OF EMPLOYMENT CREATION AND
SKILLS TRANSFER DURING THE DELIVERY OF
CAPITAL PROJECTS IN SUB-SAHARAN AFRICA:
A FOCUS ON THREE SELECTED CASE STUDIES”**

is my own unaided work. It is being submitted in partial fulfilment of the requirements for the degree of Master of Science in Engineering at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any university.

.....

..... March 2017

Bwighane Tusubile Mwamlima

ABSTRACT

Large-scale strategic ventures to build, add or improve an asset are being delivered in different sectors of industries around the world. These ventures resort to the intensive use of capital and resources and are mostly referred to as “capital projects”.

Because of the large-scale nature of these capital projects, they have profound effects on their host countries, and their impact is larger than simply client and turnover, thereby influencing different areas of surrounding society. The nature and extent of this impact are (i) environmental, (ii) political, (iii) socio-economic and (iv) cultural. Amongst the socio-economic objectives is the capability to provide on-the-job training and create more job opportunities than would otherwise be possible. Recently there has been a surge of these capital projects in sub-Saharan Africa. However, sub-Saharan Africa continues to experience high levels of unemployment and a lack of skillsets. In an attempt to help address these problems, this research project evaluates employment creation and skills transfer during the delivery of capital projects in sub-Saharan Africa. Three case studies (researched between October 2013 and February 2015) were selected to collect data for this research project: (1) Nacala Corridor Railway Project (Malawi), (2) the Medupi Power Project (Republic of South Africa) and (3) the Gautrain Project Phases 1 and 2 (Republic of South Africa). The research findings illustrate clearly that there has been a significant positive shift in the creation of employment and skills transfer on capital projects. However, there are areas of weakness which have been identified even though the three case studies produced different results. In conclusion, the main weaknesses identified in all three projects are the lack of local high-level skilled employees and a clear indication that these capital projects are not being capitalised efficiently to develop skills amongst the locals, which are essential for such projects. Recommendations are provided for the sustainability of skills development and employment creation on capital projects.

Key words:

Capital projects in sub-Saharan Africa

Employment creation on capital projects

Skills development on capital projects

Sustainability of created skills on capital projects

This research report is dedicated to my Dad,
Winston Gwada Mwamlima,
who instilled in me a love for education and a spirit of hard work

and

to my Mother and my family
for their unconditional love and moral support.

“Education is the most powerful weapon which you can use to change the world”

–Nelson Mandela

ACKNOWLEDGEMENTS

The following are acknowledged for their support and assistance during the course of my research:

- God Almighty for giving me the strength to complete this research.
- My supervisor, Professor Robert McCutcheon, for his involvement, unrelenting interest and constant support during the writing of this report.
- Roberto Vidal Ferreira, for his continual support and guidance throughout the entire phase of writing this report.
- The Project Manager, the Head of Logistics, a Site Agent and a Human Resources Manager, and all the relevant personnel on the Nacala Corridor Railway Project who helped supply the necessary information to write this report.
- Mrs Jeannette Menasce for her editorial guidance and input and for assisting to correct this research report.

CONTENTS

DECLARATIONii

ABSTRACT iii

ACKNOWLEDGEMENTS vi

LIST OF FIGURES xi

LIST OF TABLES..... xii

ABBREVIATIONS, ACRONYMS AND GLOSSARY..... xiv

Chapter 1 INTRODUCTION 1

1.1 Background 1

1.2 Problem Statement 4

1.3 Research Question 5

1.4 Objectives of the Study 5

1.5 Significance of the Research..... 6

1.6 Scope of the Research..... 6

1.7 Limitations 6

1.8 Assumptions..... 7

1.9 Research Methodology 8

1.10 Structure of the Document 8

Chapter 2 LITERATURE REVIEW 10

2.1 Capital Projects 10

2.1.1 Socio-economic impacts of capital projects 11

2.1.2	Expansion of capital projects in Africa (sub-Saharan Africa) and the reasons behind it	12
2.1.3	Capital project trends in sub-Saharan Africa.....	14
2.2	Unemployment and Skills Shortages	17
2.2.1	Unemployment in Africa – sub-Saharan Africa	17
2.2.2	Employment creation	20
2.2.3	Skills shortages in Africa with a focus on sub-Saharan Africa.....	23
2.2.4	Skills transfer / Skills development.....	24
2.3	Major Findings from Literature and their Implications.....	25
Chapter 3	RESEARCH METHODOLOGY	27
3.1	Introduction	27
3.2	Research Design.....	28
3.2.1	Literature review	28
3.2.2	Surveys.....	29
3.2.3	Case studies	29
3.2.4	Document analysis.....	30
3.3	Validity of the Research Design	30
3.3.1	Literature review	30
3.3.2	Surveys.....	31
3.3.3	Case studies	32
3.4	Limitations	33
3.5	Ethical Procedure	33
3.6	Chapter Summary	34

Chapter 4	CASE STUDIES	35
4.1	Nacala Corridor Railway Project (Malawi)	35
4.2	Medupi Power Project (South Africa)	36
4.3	Gautrain Project Phases 1 and 2 (South Africa).....	37
4.4	Summary of the Case Studies.....	39
Chapter 5	ANALYSES AND RESEARCH FINDINGS	40
5.1	Employment Creation and Skills Transfer on Nacala Corridor Railway Project	40
5.1.1	Contractual obligations, compliance monitoring measures and audits.....	40
5.1.2	Employment creation	40
5.1.3	Skills transfer and skills development	42
5.2	Employment Creation and Skills Transfer on Medupi Power Project.....	43
5.2.1	Contractual obligations, compliance monitoring measures and audits.....	44
5.2.2	Employment creation	44
5.2.3	Skills transfer and skills development	48
5.3	Employment Creation and Skills Transfer on the Gautrain Project Phases 1 and 2	52
5.3.1	Contractual obligations, compliance monitoring measures and audits.....	52
5.3.2	Employment creation	55
5.3.3	Skills transfer and skills development	57
Chapter 6	DISCUSSION OF THE FINDINGS	60
6.1	Introduction	60

6.1.1	Nacala Corridor Railway Project	60
6.1.2	Medupi Power Project.....	64
6.1.3	Gautrain Project Phases 1 and 2	69
6.2	Summary of Analysis.....	72
Chapter 7	CONCLUSIONS AND RECOMMENDATIONS	73
7.1	Introduction	73
7.2	Conclusions.....	73
7.3	Recommendations	74
7.4	Further Studies.....	76
REFERENCES		77
APPENDIX A: Ethics Procedure		86
APPENDIX B: Questionnaires.....		87
APPENDIX C: Nacala Corridor Railway Project Manpower Records		91
APPENDIX D: Medupi Power Project Skills Development.....		99
APPENDIX E: Gautrain Project Phases 1 and 2 Skills Development		101
APPENDIX F: Nacala Corridor Railway Project Manpower Histogram		102

LIST OF FIGURES

Figure 2-1:	Africa's Economic Output (Source: IMF World Economic Outlook database; EY analysis cited in "Africa by numbers 2013-14," 2013)	12
Figure 4-1:	The Nacala Corridor Railway Project	36
Figure 4-2:	Gautrain Project Phases 1 and 2	38
Figure 4-3:	The contractual framework within which the Gautrain Project Phases 1 and 2 was developed and is operating	39
Figure 5-1:	Medupi Power Project, Kusile and Ingula projected lifetime employment	45
Figure 5-2:	Actual employment on all new-build projects for Eskom.....	46
Figure 5-3:	Local (Lephalale) actual employment statistics as at the end of March 2013	47
Figure 5-4:	Cumulative number of people trained on the skilled programme	51
Figure 5-5:	Gautrain Project Phases 1 and 2 local person-month employment from 2007 to 2012.....	55
Figure 6-1:	Nacala Corridor Railway Project labour force – local vs non-local labour force.....	62
Figure 6-2:	Medupi Power Project actual employment created from 2008 to 2014.....	66
Figure 6-3:	Medupi Power Project accredited skills development.....	68
Figure 6-4:	Gautrain Project Phases 1 and 2 actual employment created	70
Figure 6-5:	Gautrain Project Phase 1 and 2 actual employment created versus targeted employment.....	71
Figure 6-6:	Gautrain Project Phases 1 and 2 accredited training programmes.....	Error! Bookmark not defined.

LIST OF TABLES

Table 2-1:	Examples of three major transport capital projects.....	10
Table 2-2:	Capital projects in the Sub-Saharan region	16
Table 2-3:	Projections of the total unemployment rate, 2007 to 2016 (percentage points) – Sub-Saharan Africa	17
Table 2-4:	Unemployment as a percentage of South Africa's labour force.....	18
Table 2-5:	South African key labour market indicators supplied by Statistics South Africa	18
Table 2-6:	Unemployment rate in Malawi	19
Table 2-7:	Key labour force survey indicators for Malawi	19
Table 3-1:	Strengths and weaknesses of literature reviews.....	31
Table 3-2:	Strengths and weaknesses of surveys	32
Table 3-3:	Strengths and weaknesses of case studies.....	32
Table 5-1:	Nacala Corridor Railway Project estimated employment creation	41
Table 5-2:	Nacala Corridor Railway Project actual employment.....	42
Table 5-3:	Nacala Corridor Railway Project skills development.....	43
Table 5-4:	Medupi Power Project estimated employment to be created in terms of skills levels	45
Table 5-5:	Medupi Power Project actual employment	48
Table 5-6:	Gautrain Project Phases 1 and 2 person-months of actual employment created versus obligated	56
Table 5-7:	Gautrain Project Phases 1 and 2 targeted employment versus actual created employment.....	57

Table C-0-1: Nacala Corridor Railway Project manpower records for the year 2012.....	91
Table C-0-2: Nacala Corridor Railway Project manpower records for the year 2013.....	94
Table C-0-3: Nacala Corridor Railway Project manpower records for the year 2014.....	96
Table C-0-4: Nacala Corridor Railway Project summary of manpower by function 2012	98
Table C-0-5: Nacala Corridor Railway Project summary of manpower by function 2013	98
Table C-0-6: Nacala Corridor Railway Project summary of manpower by function 2014	98
Table D-0-1: Medupi Power Project summary of skills development.....	99
Table F-0-1: Nacala Corridor Railway Project histogram of manpower as at 12 March 2014	102

ABBREVIATIONS, ACRONYMS AND GLOSSARY

AATP	Accelerated Artisan Training Programme
ACTOM	The contracting firm's name after Alstom and Hitachi merged in 2009
AFDB	African Development Bank
ASGISA	Accelerated Shared Growth Initiative South Africa
Aveng	Aveng Limited
BAFO	Best-and-Final Offer
BCJV	Bombela Civils Joint Venture
BEE	Black Empowerment Entities
BMI	Business Monitor International
Bombela	Bombela Concession Company (Pty) Ltd
CEO	Chief Executive Officer
CETA	Construction Education and Training Authority
CIDB	Construction Industry Development Board
CIM	Construction, Installation and Manufacturing
CJV	Civils Joint Venture
Concor	Concor Holdings
E&M	Electrical and Maintenance
EAL	Eskom Academy of Learning
EPCM	Engineering, Procurement, Construction Management
ESETA	Energy Sector Education and Training Authority
FCAW	Flux-cored Arc Welding
FDI	Foreign Direct Investment
FET	Further Education Training
FTE(s)	Full Time Equivalent(s)
GBP	Great Britain Pound(s)
GDP	Gross Domestic Product
HDI(s)	Historically Disadvantaged Individual
HPA	Hitachi Power Africa
IDA	International Development Association

ILO	International Labour Organisation
IMF	International Monetary Fund
ISEM	Independent Socio-Economic Monitor
MERSETA	Manufacturing, Engineering and Related Services Sector Education and Training
MLFS	Malawi Labour Force Survey
MLI	Medupi Leadership Initiative
MLP(s)	Medupi Legacy Programme(s)
MQA	Mining Qualification Authority
Murray & Roberts	Murray & Roberts Holdings Limited
NDP	National Development Plan
Nepad	New Partnership for Africa's Development
NQF	National Qualification Framework
NSDS	National Skills Development Strategy
NSF	National Skills Funding
O&M	Operation and Maintenance
OECD	Organisation for Economic Cooperation and Development
PPP	Public-Private Partnership
QLFS	Quarterly Labour Force Survey (released by Statistics South Africa)
RFP	Request for Proposal
RFQ	Request for Pre-qualification
SAQA	South African Qualifications Authority
SED	Social Economic Development
SMAW	Shielded Metal Arc Welding
SMME	Small, Medium and Micro Enterprise
SSA	Statistics South Africa
TEVET	Technical Entrepreneurial and Vocational Education and Training
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
USD	United States Dollar(s)
ZAR	South African Rand(s)

CHAPTER 1 INTRODUCTION

1.1 Background

Investopedia¹ defines a “capital project” or “mega project” as

A long-term investment made in order to build upon, add or improve on a capital-intensive project. A capital project is any undertaking which requires the use of notable amounts of capital, both financial and labour, to undertake and complete.

The University of Sheffield (n.d) states that a project whose expenditure exceeds GBP 50 million (USD 77 million) including Value-Added Tax can be deemed to be a “capital project”. Furthermore Merrow (2011:15) defines a “mega project” as “any project with a total capital² cost of more than USD 1 billion as measured on January 1, 2003”. One thing that can be deduced from the three definitions is that capital projects require an extensive amount of resources. Therefore, a capital project is a strategic venture in order to build, add or improve an asset (tangible or intangible), resorting to the intensive use of capital and resources. This research focuses on capital projects with an expenditure of USD 1 billion and above.

Capital projects have a huge impact in the countries where they are implemented. The impact of these capital projects is summarised below:

[i]f there is one word that sums up the impact of mega projects, it is probably ‘transformational’. Ask anyone involved in megaproject delivery what their greatest legacy is, and they’ll probably point to a slew of social and economic benefits that they have unleashed through their mega projects. Given the size, scope and impact of most mega projects, this is not entirely surprising. In fact, many observers insist that a modicum of transformation is a critical characteristic that separates a mega project from any other infrastructure investment (KPMG, 2013b:6).

Therefore, with such profound impacts, skillsets and capabilities within the industry also undergo a significant transformation in order to meet the high demands for skilled workers to deliver these projects (KPMG, 2013b:6).

¹www.investopedia.com [Accessed: 13 February 2014].

²By “capital” it means the cost for materials, engineering and construction labour associated with completing the project.

These impacts can be classified as environmental, social, political, cultural as well as economic in nature. While most observers have recognised the diverse impacts of these projects, only a few have been able to quantify these benefits in terms of either economic growth or societal change (KPMG, 2013b). Most often the “selling” of these capital projects is on the grounds of job creation, economic benefits, contributing to better public services and environmental benefits (Flyvberg, Bruzelius & Rothengatter, 2003). For continued success, it is important to understand, quantify and communicate all the benefits with no exception (KPMG, 2013b).

In Africa there has been an expansion in capital projects between 2012 and 2014 and, at that time, Africa was the fastest-growing continent in the world in terms of Gross Domestic Product (GDP) led by the sub-Saharan region (EYGM, 2013). The development of capital projects in Africa promises to unlock vast resource wealth; exponentially increase productivity; open up new markets for trade, and change the quality of life for millions of Africans (KPMG, 2013b). The African Development Bank (AFDB) estimates that the continent will require USD 93 billion in basic infrastructure development every year to meet demand (KPMG, 2013b). There has been a number of exciting capital infrastructure opportunities coming to the market, particularly in sub-Saharan Africa.

Despite all the promising projects in the pipeline, Africa has enormous socio-economic challenges. These include unemployment and a lack of skillsets. The unemployment challenge seems to be the greatest despite Africa’s growth having been strong (Fine *et al.*, 2012). The continent is about to receive a demographic dividend over the coming decades as its labour force grows faster than the population dependent on it (Fine *et al.*, 2012). The population is expected to be the largest in the world by 2035 (Fine *et al.*, 2012:4). This is a clear indication of the amount of human resources the continent will have readily available. Therefore, in order to use these resources to their full potential, Africa needs to speed up the creation of employment (Fine *et al.*, 2012).

Political leaders – as well as their counterparts – have made numerous speeches committing to job creation and setting it as one of the priorities in terms of economic growth (Deloitte & Touche, n.d.). For instance, the government of South

Africa plans to allocate ZAR 88.3 billion between 2014 and 2017 to be used in expanded works programmes which will focus on community-based programmes, environmental and social programmes, and maintaining roads and infrastructure and housing and services (Deloitte & Touche, n.d.). There are several countries in sub-Saharan Africa with similar intentions and there is no doubt that there is every intention for the countries to commit to creating employment (Deloitte & Touche, n.d.). These efforts must be applauded, although – in reality – unemployment still remains high and jobs are being lost and not created.

The article “Global employment trends” (2014) by the International Labour Organisation (ILO) indicates that sub-Saharan Africa has the highest rate of vulnerable employment in the world (77.4 % in 2013). And, for this case, the article defines “vulnerable employment” as “unpaid family workers and own-account workers as a percentage of total employment.” It further indicates that, overall, the proportion of the working-age population in paid employment in the region is low, at only 13.7 %. Further, the African Development Bank (2012) indicates that the ratio of youth to adult employment rates in sub-Saharan Africa is 1.9 compared to 2.9 globally. In addition, the World Bank (2009) indicates that the youth make up 36.9 % of the working-age population, but 59.5 % of the total are unemployed, which is much higher than the world’s average for 2005 (43.7 %).

As much as the records indicate that one of the reasons for unemployment is a lack of jobs, they also indicate lack of skills as one of the main bottlenecks (AFDB, OECD, UNDP, UNECA, 2012). In a survey (AFDB, OECD, UNDP, UNECA, 2012:27) on 36 African countries about the major challenges youth face in labour markets as indicated in the “African Economic Outlook Report” “promoting youth employment”, 54 % found a mismatch of skills between what job seekers have to offer and what employers require to be a major obstacle. About 41 % identified a general lack of skills among job seekers as a major obstacle and that opportunities to develop specific skills that match the needs of the job market are limited (AFDB, OECD, UNDP, UNECA, 2012). Clearly from what has been said in the above paragraphs, the state of unemployment and lack of skillsets in Africa is currently one of the biggest problems to focus on and eradicate. Taking into consideration that these capital projects are large-scale in nature and require large amounts of resources should be one of the main areas that should have a profound effect on

the delivery of socio-economic objectives such as creating large numbers of employment and to be used as vehicles for skills development. Therefore, because these projects are expanding in sub-Saharan Africa and unemployment levels and lack of skillset levels continue to rise in the region, this study aims to evaluate employment creation and skills transfer on three key capital projects in sub-Saharan Africa.

1.2 Problem Statement

It was discussed in Section 1.1 that the greatest socio-economic challenge faced in sub-Saharan Africa is high levels of unemployment because of limited jobs, a mismatch of skills between what job seekers have to offer and what employers require, and the general lack of required skills by the employment bodies. The problems are aggravated by the rapid rate of urbanisation and population growth which is, in turn, creating one of the fastest-growing labour sources and contributing to high levels of unemployment. Consequently, most African countries are now keenly focused on fostering economic growth and activity in order to drive down unemployment, raise prosperity and increase national (GDP). With the surge in capital projects between 2012 and 2014, Africa's economic growth has increased. According to the records, there have been studies to monitor the success of these projects. However, they focus only on the cost-related objectives. The findings indicate that 65 % of capital projects with an expenditure of over USD 1 billion fail (Klaver, 2012). This failure is depicted only in terms of projects and investment goals. There is inadequate information to conclude how these projects fare in terms of socio-economic impact. Therefore, the aim of this research is to identify and evaluate the successes and setbacks of employment creation and skills transfer during the delivery of capital projects in sub-Saharan Africa.

The focus is on three selected key capital projects: namely, the Nacala Corridor Railway Project (Malawi), the Medupi Power Project (Republic of South Africa) and the Gautrain Project Phases 1 and 2 (Republic of South Africa).

1.3 Research Question

The research question is:

“To what extent is the delivery of capital projects in sub-Saharan Africa able to achieve the stated and implied impacts it has on employment creation and skills transfer?”

Sub-Questions

In addition to the main research question, there are seven sub-questions:

- What was the impact these projects had with regard to employment creation and skills transfer?
- Were any of these projects under any binding commitment or contractual obligations to create employment or transfer skills through the implementation of the projects?
- Were there any employment creation and skills transfer targets created for the projects?
- What were the details of these targets in the case that there were any?
- Were these targets met?
- Were any compliance monitoring and audits in place to measure if these targets were being met?
- Was the time spent on training sufficient to create sustainable skills?

1.4 Objectives of the Study

The objectives of the study were to:

- Review the performance of capital projects in sub-Saharan Africa in terms of creating employment and development of skills.
- Analyse the impacts of capital projects on employment creation and skills transfer.
- Provide recommendations for the delivery of capital projects with regard to employment creation and skills transfer.

1.5 Significance of the Research

This research will assist government officials, project planners, project managers, senior executives, board members and whole project development teams in decision making and the execution of very large projects with regard to creating more employment and developing skills.

Due to the massive scope and cost of capital projects, there is an opportunity to ensure the benefits for the development of local communities, not only by promoting local content but also local skillsets in a sustainable way. This will result in the strengthening of local societies, both economically and socially, leading to empowerment of the most needy.

1.6 Scope of the Research

The investigation focuses on employment creation and skills transfer on the Nacala Corridor Railway project in Malawi. In order to give a good representation of sub-Saharan Africa, two other capital projects were selected as secondary case studies:

- Medupi Power Project in South Africa, and the
- Gautrain Project Phases 1 and 2 in South Africa.

Further to the scope, the following points should be noted:

- The research focuses only on the direct employment created during the construction phase of these projects.
- It focuses on any employment created, including peak workforce labour, which is not employed over the length of the project.
- “Actual employment” is any job created for the particular capital project regardless of whether the employee was previously unemployed or has been transferred from elsewhere.

1.7 Limitations

Firstly, owing to lack of time and limited financial resources, the researcher proposed to review only three capital projects in sub-Saharan Africa with an expenditure of not less than USD 1 billion as per the definition of capital projects.

Focusing on only three case studies in two countries might be a limitation since sub-Saharan African countries are diverse in terms of economic characteristics. However, the three case studies and the two host countries give a good representation of sub-Saharan Africa and they were strategically chosen on the following basis and criteria at the time of the research:

- All three projects belong to top mega / capital projects according to different articles which have been reviewed in the Literature Review (Chapter 2).
- The list of top mega projects was filtered by the country with the lowest GDP and the country with the largest GDP in sub-Saharan Africa, which are Malawi and South Africa, respectively.
- And, in their host countries, these projects are considered unique and the first of such projects to be implemented in these countries. Nacala Corridor Railway Project is the largest construction project ever undertaken in Malawi. The Medupi Power Project is considered the largest project in terms of any yardstick ever undertaken in South Africa, whilst the Gautrain Project Phases 1 and 2 is considered as South Africa's biggest-ever legacy construction project.
- Because of the unique characteristics of all these projects, the experience and knowledge gained from their execution could and should be applied to the planning and execution of future mega projects.

Secondly, owing to the sensitivity of the information being researched, there was the risk of not obtaining precise, accurate and substantiated data. For the Nacala Corridor Railway Project, the researcher was able to substantiate the information gathered through the provision of detailed daily records on site. However, for the other two projects, the information was sourced through various reports and articles. All the information gathered from the projects' website was substantiated or validated through comparison with information from external websites.

1.8 Assumptions

The research assumes that interviewees had sufficient motivation and language skills to contribute fully and clearly understand the survey and also that the information sourced from the various websites is reliable and accurate.

1.9 Research Methodology

The research is qualitative in nature. It is broad, exploratory, descriptive and explanatory (Hesse-Biber & Leavy, 2010). However, some statistical data are also used to substantiate certain of the research findings.

The following methods were used in order to collect data for the qualitative research:

- A Literature Review of relevant topics (employment creation, skills transfer, capital projects).
- One-to-one in-depth interviews with some of the project participants: namely, a Project Manager (March 2014); the Head of Logistics (August 2014), and a Site Agent (August 2014) were conducted at their Johannesburg Head Office to gather detailed information.
- A telephonic interview (in September 2014) with a Human Resources Manager.
- A document review entailing the analysis of a variety of documents (such as brochures, journals and fact sheets) which were examined and interpreted to gain understanding.

1.10 Structure of the Document

Chapter 1 is the **Introduction**. It provides background information on the delivery of capital projects in the world, with particular focus on sub-Saharan Africa. This is done in relation to employment creation and skills transfer. In addition, the Introduction also provides relevant definitions, outlines the research problem and sets out the objectives of the research.

Chapter 2 contains the **Literature Review**. It broadly reviews relevant literature on capital projects. Focus is given on past capital projects in general and in Africa and their performance. It then highlights the socio-economic impacts and the expansion of capital projects in Africa with specific focus on the sub-Saharan region. Finally, the chapter focuses on employment creation and skills transfer. It offers an understanding of employment and skills development. It further highlights in the two host countries the goals and guidelines of the different frameworks, professional bodies, and institutions which are designed or set aside to cater for employment needs and lack of skills specifically in the construction industry.

Chapter 3 presents the **Methodology**. It outlines the selected research method (qualitative analysis). The research designs used are discussed and their strengths and weaknesses are analysed. It also contains a critique of the overall research method.

Chapter 4 presents the **Case Studies**. It contains an overview of the three case studies: namely, Nacala Corridor Railway Project, the Medupi Power Project, and the Gautrain Project Phases I and 2. It gives background information for the projects and a discussion of the project goals follows.

Chapter 5 presents the **Research Findings** in terms of employment creation and skills transfer. It contains the findings for the Nacala Corridor Railway Project, the Medupi Power Project and the Gautrain Project Phases I and 2.

Chapter 6 presents the **Discussion of the Findings**. It contains an analysis of the research data and evaluates it against the research objectives. A comparison is also drawn with related literature as reviewed in Chapter 2.

Chapter 7 Concludes the research report. It provides **Conclusions** with regard to employment creation and skills transfer when delivering capital projects in sub-Saharan Africa. The chapter also provides **Recommendations** on the research based on the conclusions. **Further Areas of Study** are also suggested.

Chapter 7 is followed by the **References** and **Appendices**.

CHAPTER 2 LITERATURE REVIEW

2.1 Capital Projects

Capital projects are delivered in different sectors (such as, for example, mining, energy, construction and water resources). They all share the same concept of delivery and they can be distinguished from smaller projects by the following characteristics:

- They are incubated and driven by long-term national and corporate strategic vision (Richards, 2012).
- The investment level is high and hence there is a broader range of benefits (tangible and intangible) (Richards, 2012).
- They have a high level of complexity and this, in turn, breeds risk and uncertainty (Richards, 2012).
- They involve multiple stakeholders with different interests and a high demand for communication (Richards, 2012).
- They usually take more than five years to move from design all the way through to operations (KPMG, 2013b).
- They affect a large number of people, at least more than a million (KPMG, 2013b).
- The impacts are transformational in the host nations (KPMG, 2013b).

The world has seen a variety of capital projects. Three major transport projects are presented in Table 2-1.

Table 2-1: Examples of three major transport capital projects

Capital project	Country	Expenditure (USD billion)
The Big Dig	Boston, USA	14.8
Istanbul new airport	Istanbul, Turkey	415
King Shaka International Airport	Durban, South Africa	1
Source: Compiled from (Greiman, 2010:01-02) and Wiki article “List of transportation mega projects”, October 2014		

By nature, “capital projects” are characterised as involving high investment and large amounts of capital. This immediately qualifies them as having significant environmental, social as well as economic impacts on their host countries. Since 1999, the number of capital projects has increased and they have become more complex and keep increasing in size. According to “Global Construction Perspective and Oxford Economics” (2009, cited in “Correcting the course of capital projects,” 2013:2),

the growth in global construction spending will outpace global GDP growth over the next decade with growth in construction forecast to reach USD 12 trillion by 2020.

2.1.1 Socio-economic impacts of capital projects

Capital projects have immeasurable socio-economic impacts. There are many examples that can attest to how big the impact has been. The transformational impact of these projects has been described to have caused a wholesale change in a nation’s power generation, a sudden and dramatic growth of the nation’s economy or even the development of entire cities (KPMG, 2013b:6). The next few paragraphs discuss the impact – which is expected from some large capital projects – on host countries.

The United Kingdom is about to embark on a new nuclear build programme to construct and operate eight nuclear reactors between 2014 and 2034 and this is expected to have a huge impact on the nation’s power generation mix. It is also expected that the project will develop additional skills for the workers (KPMG, 2013b:58).

Rio Tinto’s new mine (called Oyu Tolgoi) is expected to have a significant impact on Mongolia’s economy. The project – which is the largest to be developed in that country – is expected to generate a third of the country’s annual GDP (KPMG, 2013b).

With Mexico’s development of new cities, the projections point to the exponential growth of the income contributed through tourism (KPMG, 2013b:61). This, in turn, will affect the capacity of hotel rooms which is anticipated to increase and hence create jobs. Approximately 200,000 jobs will be created and a nett flow of USD 10 billion is anticipated per year (KPMG, 2013b:61).

2.1.2 Expansion of capital projects in Africa (sub-Saharan Africa) and the reasons behind it

The transition for Africa stepping out of the shadow of colonialism in the 1960s was not smooth and, for the next 40 years, growth failed to materialise and the quality of life deteriorated. There was a lot of civil unrest and plagues of diseases (PwC, 2013). Owing to a combination of all these key reasons and other related factors: for a long time Africa was the slowest-growing continent in the world with sub-Saharan Africa lagging behind.

Nevertheless, between 2009 to 2012, Africa has shown tremendous economic growth as shown in Figure 2-1. Projections indicate Africa's economic output will continue growing until about 2017 (IMF World Economic Outlook database; EYGM analysis cited in "Africa by numbers 2013-14," 2013).

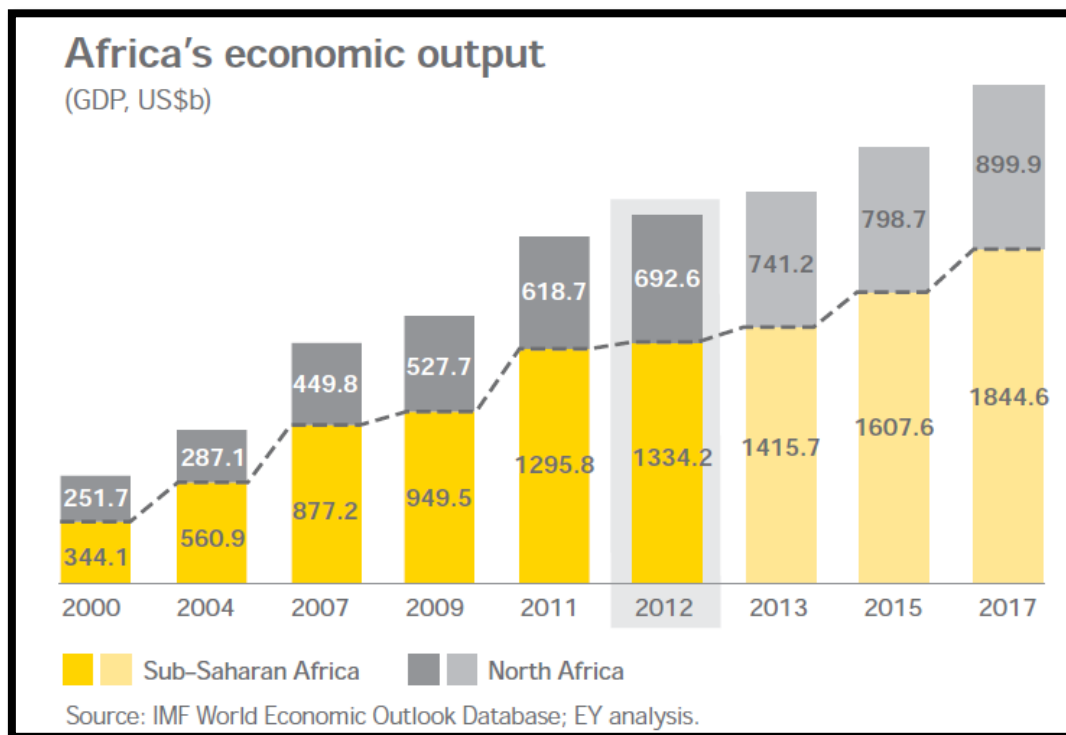


Figure 2-1: Africa's Economic Output (Source: IMF World Economic Outlook database; EYGM analysis cited in "Africa by numbers 2013-14," 2013)

From Figure 2-1, it can be seen that Africa's economy has grown whilst that of sub-Saharan Africa has grown three times from the year 2000. Africa is now the

fastest-growing continent in the world in terms of GDP and the sub-Saharan region is leading in this growth (EYGM, 2013:5).

There are several reasons for Africa's economic growth as indicated in the article by Deloitte & Touche (2013:5):

- The growing middle class, which brings with it increased consumer spending power and rapid urbanisation;
- The continent's deepening financial sector;
- Resurgence of emerging world partnerships, and
- The strengthened democracy, accountability and governance.

However, the most significant one of them all is the attraction of foreign investors. What attracts foreign investors most is the allure of Africa's large share of unexplored minerals, which includes 25 % of bauxite, over 60 % of diamonds, 50 % of cobalt, 80 % of phosphate and more than 90 % of platinum group metals (Deloitte & Touche, 2013).

Clearly foreign countries are interested in these minerals. However, the transportation infrastructure and services in Africa are poor. Private investors are, therefore, willing to help build the infrastructure needed to access these minerals (PwC, 2013). This has been one of the major contributions of private investors to the growing economy. These companies are also helping to build other infrastructure. These constructions make it easier for them to operate in Africa (PwC, 2013).

With the opportunity that Africa is offering, it is no surprise that investor interest is growing. The 2013 "Africa Attractiveness Report" indicates that Foreign Direct Investment (FDI) projects in sub-Saharan Africa grew at a compound rate of 22.3 % between 2007 and 2012 (EYGM, 2013:3). At that time, the case for investing in Africa was strong. Owing to the reasons mentioned above, both domestic and private investors and the emerging partners recognised the infrastructure gap as an opportunity and they scaled up their investments in Africa (Brixiova *et al.*, 2011).

The main task in Africa in 2014 / 2015 is to attract FDI because Africa has more growth potential than any other continent. The African Union Commission, in

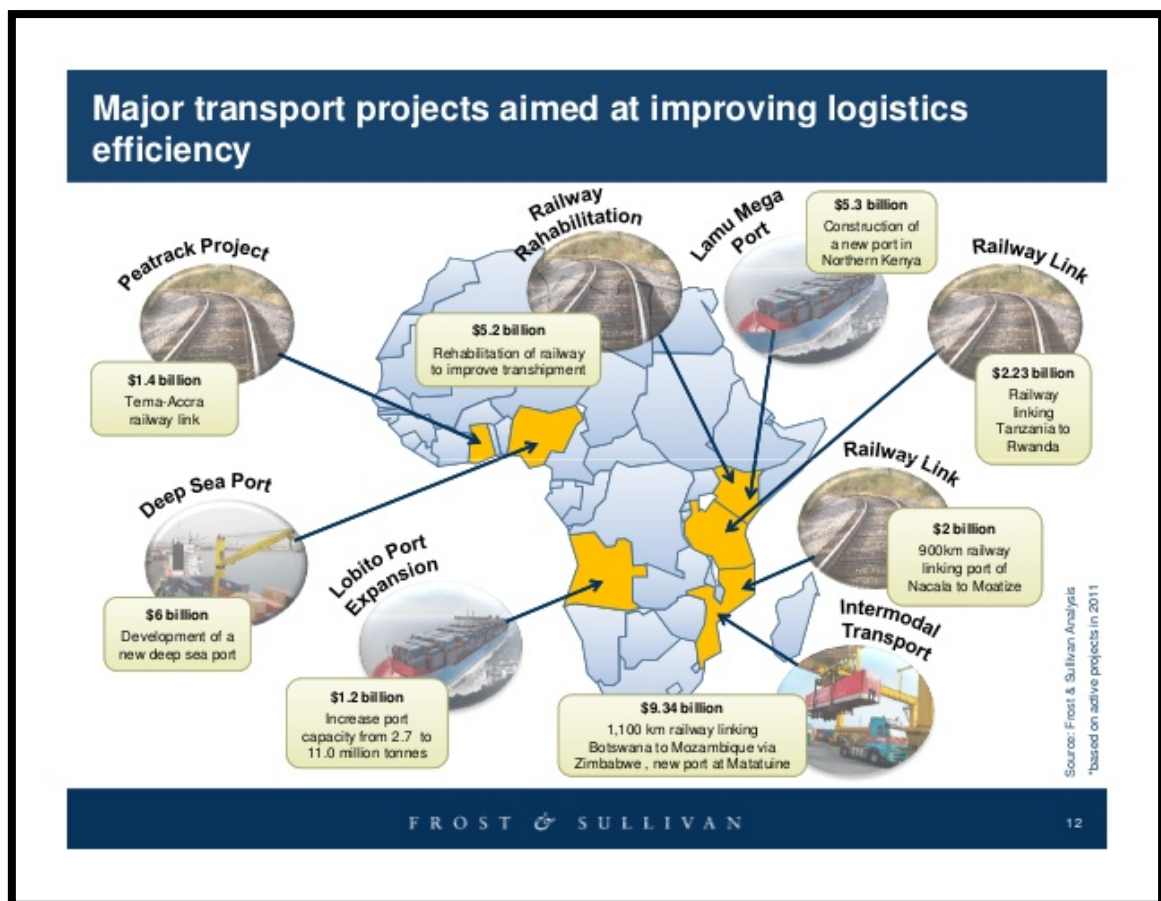
partnership with the United Nations Economic Commission for Africa (UNECA), the African Development Bank (AFDB), and the Planning and Coordinating Agency of the New Partnership for Africa's Development (Nepad) came up with a methodology intended to accelerate private-sector involvement in infrastructure in Africa and they have provided a model that can be replicated and scaled up across the continent (Gerbert, Emmert & Ermias, 2013). Such strategies will accelerate new investors' interest in investing in Africa. This is an indication that the market for capital projects in Africa is likely to expand at a higher rate.

2.1.3 Capital project trends in sub-Saharan Africa

Southern Africa boasts the three largest infrastructure development projects under construction (ranked by value) on the continent (Deloitte & Touche, n.d.-b). Included in the projects is: the Medupi Power Project which is receiving USD 10.8 billion in funding. The Medupi Power Project is listed as one of the key ongoing capital projects in the African continent as a whole (Kudzanayi, 2013). It is one of the supporting case studies in this research.

Figure 2-2, shows a few more current capital projects being implemented in sub-Saharan Africa. According to Hannon (2013), power generation is the most important infrastructure in sub-Saharan Africa, followed by transportation infrastructure.

From Figure 2-2, it can be deduced that these projects are referred to as “mega projects” because they are large-scale projects with an expenditure of more than USD 1 billion. Another case study – the main one in this research – is also indicated on the map in Figure 2-2, the Nacala Corridor Railway Project which is a USD 2 billion project consisting of the construction of a railway line linking the port of Nacala to Moatize mine.



Source: "Mega Trends Driving Transport and Logistics in sub-Saharan Africa" (O'Caroll, 2012:12)³

Figure 2-2: Major transport projects in sub-Saharan Africa

Most sub-Saharan countries have created a wealth fund for infrastructure development. Table 2-2 lists some of the new projects which have been delivered, are currently being delivered, and will be delivered:

³ O'Caroll, S. (2012) "Mega Trends Driving Transport and Logistics in sub-Saharan Africa". Powerpoint presentation, 2012, Frost and Sullivan.

Table 2-2: Capital projects in the sub-Saharan region

PROJECT NAME /AREA	NOTES
Lamu Port Project (Kenya)	The project is estimated to take about 20 years to complete and will require USD 25 billion in project funding, which represents more than 80 % of Kenya's GDP (KPMG, 2013b).
South Sudan	The country has several initiatives to improve overland connections and also to build new pipeline routes (KPMG, 2013b).
Zimbabwe	The country's state utility company is seeking funding and capable developers in order to add an additional 900 MW to its installed capacity in the next five years. The project will require more than USD 2 billion to deliver (KPMG, 2013b).
Mozambique	Rio Tinto plans to develop a 500 km rail link along the Tete-Beira corridor and expand the Beira port as well as develop the Zambezi Valley Integrated Transport Corridor (KPMG, 2013b)
Expansion of the Gautrain Project (South Africa)	The Gautrain Project is considered as South Africa's biggest-ever legacy construction project with an expenditure of USD 2.3 billion. However, there are currently expansion plans for this project. The expansion plan is a 140 km one, linking the existing Gautrain Park Station with Westgate. There will also be a link from the existing Gautrain Rhodesfield Station to Boksburg; a link from the existing Gautrain Sandton Station to Randburg and Honeydew, and a link from Naledi (in Soweto), to Mamelodi, via a proposed Gautrain Samrand Station, or existing Gautrain Midrand Station (Tancott, 2014).
Nacala Corridor Railway Project (Malawi)	Vale, a major investor in Mozambique, is funding the development of a new 912 km rail line which would lead (through part of Malawi) to an existing port at Nacala with an expenditure of USD 1 billion. The project is being implemented in three phases and the first phase was completed in 2014 (KPMG, 2013a).
Medupi Power Project (South Africa)	The South African Government is implementing the Medupi Power Project with an expenditure of USD 11.72 billion as part of the South Africa National Infrastructure plan. The project is currently still in progress (Deloitte & Touche, 2013).

2.2 Unemployment and Skills Shortages

2.2.1 Unemployment in Africa – sub-Saharan Africa

The high levels of unemployment in Africa are staggering, according to the article “Global Employment Trends” by the (International Labour Office, 2014). As shown in Table 2-3, the unemployment rate has remained stable for the past few years with a slight increase of 0.1 % in 2012. The projections further indicate that the rate will remain constant with a slight decrease of 0.1 % in 2015.

Table 2-3: Projections of the total unemployment rate, 2007 to 2016 (percentage points) – sub-Saharan Africa

2007	2012	2013	2014	2015*	2016*
%	%	%	%	%	%
7.5	7.6	7.6	7.6	7.5	7.5
*Projected unemployment rate Source: International Labour Office (2014).					

The constant state might give immediate relief. This relief, however, is not long lasting because the records indicate that by 2035 the labour force in Africa will be larger than China’s (PwC, 2013:7). Africa’s population is growing faster than the continent is creating jobs (PwC, 2013:7). Youth make up 36.9 % of the working-age population, but 59.5 % of that total are unemployed, which is much higher than the world’s average for 2005 (43.7 %) (World Bank, 2009). It is expected that, by 2020, more than half of sub-Saharan Africa’s population will be below the age of 25 (International Monetary Fund, 2014). In the article “Promoting Youth Employment” (AFDB, OECD, UNDP, UNECA, 2012) it states that the number of youth will have doubled by the year 2045. This rapid growth in labour force is an indication that the rate of unemployment is expected to increase unless the region finds a way to expand the availability and productivity of employment opportunities.

The growth rate of the working-age population (15 to 64 years) increased by 25 % between 2000 and 2009 and, if this trend continues, the continent’s labour force will double to 1 billion by 2014, making Africa’s potential labour force the fastest growing in the world (McKinsey Global Institute, 2010 cited in AFDB, OECD, UNDP, UNECA, 2012). The ILO (2014, cited in Sy, 2014) reports that the average

regional youth unemployment rate decreased from almost 13.4 % in 1991 to 2000 to only 12.3 % during 2001 to 2012 (Sy, 2014).

South Africa has one of the highest unemployment rates in the world. According to Business Monitor International (BMI) Data (2014), as indicated in Table 2-4, for the past seven years, the unemployment rate has been increasing each year. The unemployment rate increased from 22.8 % in 2008 to 25.1 % in 2014.

Table 2-4: Unemployment as a percentage of South Africa's labour force

2008	2009	2010	2011	2012	2013	2014	2015*	2016*
%	%	%	%	%	%	%	%	%
22.8	23.9	24.9	24.9	25.1	24.9	25.1	24.2	23.9
*Forecast unemployment percent of the labour force in South Africa Source: Business Monitor International (2014).								

Statistics South Africa (SSA) releases the Quarterly Labour Force Survey (QLFS) every quarter. This document contains detailed information regarding employment creation. It covers labour market activities of individuals aged 15 to 65 years. Table 2-5 provides the key labour market indicators from Statistics South Africa.

Table 2-5: South African key labour market indicators supplied by Statistics South Africa

	Oct-Dec 2013	Jul-Sep 2014	Oct-Dec 2014	Qtr-to-qtr change	Year-on- year change	Qtr-to-qtr change	Year-on- year change
	Thousand					Per cent	
Population aged 15–64 yrs	35 022	35 489	35 643	155	622	0,4	1,8
Labour force	20 007	20 268	20 228	-39	221	-0,2	1,1
Employed	15 177	15 117	15 320	203	143	1,3	0,9
Formal sector (non-agricultural)	10 773	10 843	10 911	68	138	0,6	1,3
Informal sector (non-agricultural)	2 446	2 407	2 448	41	2	1,7	0,1
Agriculture	713	686	742	56	28	8,2	4,0
Private households	1 244	1 180	1 219	38	-26	3,2	-2,1
Unemployed	4 830	5 151	4 909	-242	79	-4,7	1,6
Not economically active	15 015	15 221	15 415	194	400	1,3	2,7
Discouraged job-seekers	2 200	2 514	2 403	-111	203	-4,4	9,2
Other (not economically active)	12 815	12 707	13 012	305	198	2,4	1,5
Rates (%)							
Unemployment rate	24,1	25,4	24,3	-1,1	0,2		
Employment/population ratio (absorption rate)	43,3	42,6	43,0	0,4	-0,3		
Labour force participation rate	57,1	57,1	56,8	-0,3	-0,3		

Source: Extracted from the Statistics SA "Quarterly Labour Force Survey, Quarter 4, 2014" (2015:v)

Table 2-5 shows that out of a total population of 35,643,000 people, aged between 15 to 64 years in the last quarter of 2014, 4,909,000 are unemployed and 15,015,000 are not economically active.

In Malawi the unemployment rate has been stable at 7.5 % from 2008 to 2010 as indicated in Table 2-6. It increased by 0.1 % in 2011 and has remained at 7.6 % since then. Projections indicate that it will remain at 7.6 % for 2015 and 2016.

Table 2-6: Unemployment rate in Malawi

2007	2008	2009	2010	2011	2012	2013	2014*	2015*	2016*
%	%	%	%	%	%	%	%	%	%
7.6	7.5	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6
*Projections of the unemployment rate in Malawi Source: Business Monitor International (2014).									

The “Malawi Labour Force Survey (MLFS) 2013” report has a more detailed outline regarding unemployment. The main objective of the 2013 MLFS was to generate reliable information on the employment and unemployment situation and other labour force characteristics of the population aged 15 to 64 years. Table 2-7 has been extracted from the survey. As indicated in Table 2-7, out of a total 15.4 million population in Malawi, 1.4 million are unemployed and a total of 0.8 million are inactive persons. The survey report further states that 27 % of the employed population in Malawi is underemployed (National Statistics Office, 2014).

Table 2-7: Key labour force survey indicators for Malawi

Population characteristics					
No.	Indicator	Description	Value (Million)		
			Total	Male	Female
1	Total Population	Number of persons enumerated (million)	15.4	7.5	7.9
2	Working population	Number of persons age 15 – 64 years	7.8	3.6	4.2
3	Employed persons	Number of persons age 15 – 64 years who, during the reference period categories: paid employment or self-employment or were temporarily absent from a job in which they had a formal attachment	5.5	2.8	2.7
4	Unemployed persons	Number of persons age 15 – 64 years who, during the reference period were “without” work, “and “currently available to work” – relaxed definition used in the report	1.4	0.5	0.9
5	Inactive persons	Number of persons who, during the reference period, were neither employed or unemployed	0.8	0.3	0.5
6	Labour force	Number of person age 15 – 65 who are currently employed and unemployed	7.0	3.3	3.7

Source: Extracted from the National Statistics Office “Malawi Labour Force Survey 2013” (2014:7).

All this information on employment leads to the hypothesis that unemployment rates are going to continue soaring and one of the ways to defeat this problem is to generate more employment. One way of doing this is to recognise where jobs are being created and not ignore the best job generators (Deloitte & Touche, n.d.:2). Delivery of capital projects is one of the best job generators.

Infrastructure spending is one of the main catalysts of economic growth and can be regarded as a mechanism for creating employment for all types of labour, skilled, semi-skilled and unskilled (KPMG, 2013c).

2.2.2 Employment creation

Bacon & Kojima (2011:18) state that:

A job is usually defined in terms of the number of job-years attached to the employment. This depends on how much time each year a job is paid for, and for how many years the job exists. Part-time jobs are converted to full-time equivalents (FTEs) and then scaled by the number of years for which that particular job is required – construction for a few years, maintenance for several years.

And “Department of Public Works” (2012) defines “full-time equivalents” as follows:

FTE refers to one person-year of employment. One person-year is equivalent to 230 person-days of work. Person-years of employment = total number of person-days of employment created for targeted labour during the year divided by 230. For task-rated workers, tasks completed should be used as a proxy for 8 hours of work per day.

All types of employment can be classified under four main categories as stated by Bacon & Kojima (2011). The **first** classification is the direct employment which is generated by the direct construction and operations of the project after its construction. The **second** is the indirect employment, which is generated by the chain of suppliers of goods and services to the project. The **third** classification is induced employment which is generated by the employees and created by the direct and indirect employment. **Fourthly** it is the catalytic employment generated by the operations of the project as a driver of productivity growth after construction is completed (Bacon & Kojima, 2011).

It has been noted that the multiplier effects are usually large in construction projects. The indirect employment multiplier often exceeds two, showing that the combined level of indirect and induced employment for a mega project is likely to be larger than the direct employment itself (Bacon & Kojima, 2011).

Other than the above classification of employment there is another distinction in terms of employment for construction, installation and manufacturing (CIM) and employment for operation and maintenance (O&M). According to Bacon and Kojima (2011:18), these two classifications are defined as follows:

Construction, installation and manufacturing effect: the employment created by the design, manufacturing, construction, delivery, and installation of the plant required to meet the final demand or policy. This is defined for the number of years required to enable a newly ordered plant to be up and running.

And

Operations and maintenance effect: the employment required to operate and maintain an energy investment once the plant or equipment is installed, calculated for the duration of the life of the plant or the equipment.

a. Direct construction employment

With the focus of this research being on direct employment during the construction phase there are a few important points that need to be noted and learned, as stated in the “Workforce NT Report” by the Northern Territory Government (2014:355-359) with regard to direct construction employment (Northern Territory Government, Department of Employment, Education and Training, 2014). Direct employment created on construction projects can be grouped into off-site and on-site employment. There is usually a trade-off choice between duration of construction and number of employees in the construction work force and the average construction work-force size can be as low as two-thirds of the peak work force as a result of the “ramp-up” and “wind-down” period. The peak work force number is generally not employed over the length of the project. Usually, when the peak work force is graphed for construction works, it produces an “S” curve and the result from peak to average can be as much as 50 %. There are times when the number of people employed can be equal to the peak work force but usually this cannot be sustained for a long time. A longer project than anticipated will have a lower peak; a shorter project will have a higher peak. Most of the projects have

had their duration rounded to a yearly period. Therefore, the exact labour demand may vary.

The reason the labour demand can vary so much is that construction projects are usually run for a short period of time. Hence, all – or rather most – of the jobs created are not for long periods of time. Construction activity on capital projects is generally over a period of one to three years (Northern Territory Government, Department of Employment, Education and Training, 2014).

There are four categories of employment within the peak and average work force: namely, highly skilled, skilled, semi-skilled, and unskilled. “Paycheck.in” (2016) in the article “Definition of Unskilled, Semi-skilled, Skilled & Highly Skilled workers” defines the four categories as follows: the **first** one is “highly skilled workers” which are deemed professionals, the ones who are capable of working efficiently and supervise efficiently, such as doctors, lawyers and engineers. The **second** one is “skilled labour” which refers to workers who have specialised training and have obtained exemption for their field of work through higher education. These can be electricians, technicians, administrators and computer operators. The **third** type is “semi-skilled workers” who require some skills because their tasks are more complex than those that can be performed by an unskilled labourer though they do not require highly specialised skills. Examples include truck drivers and typists. They generally require no more than a high school diploma. The **fourth** is “unskilled labour” which does not require workers to have any special training or skills. Most of the jobs that require unskilled labour are continually shrinking because of technology changes. Examples are construction labourers and general cleaners (“Paycheck.in”, 2016; Mahuron, 2015).

It was observed by the researcher and verified through one of the interviews that within most construction projects and any other projects, there is local employment and foreign employment also known as “expatriate employment”. However, in order to reduce unemployment levels there is an emphasis to hire a local labour force where possible (Macfarlane, 2000).

2.2.3 Skills shortages in Africa with a focus on sub-Saharan Africa

Overall Africa suffers from a severe lack of skills. According to Page (2012), despite the fact that there has been an increase in enrolments in schools in most sub-Saharan African countries, especially at primary level, the out-of-school population has very low educational attainment. Further Page (2012) indicates that 36 % of the 15 to 24-year olds in sub-Saharan Africa have never attended school. Only 28 % have completed primary school and only 8 % have completed secondary school (Page, 2012). About two-thirds of all young workers in the labour market (which is about 95 million young people) lack the basic skills needed to be competitive (Page, 2012). Africa has particularly underdeveloped vocational programmes, and this may constrain growth in sectors that require technically skilled workers, from plumbers and electricians to welders, bricklayers, and automotive mechanics (Fine *et al.*, 2012:63).

The absence of skills, as indicated above, is a huge problem in sub-Saharan Africa but a mismatch of skills is another problem. In a survey among experts on 36 African countries about the major challenges youth face in labour markets, 54 % found a mismatch of skills – between what job seekers have to offer and what employers require – to be a major obstacle (AFDB, OECD, UNDP, UNECA, 2012). A general lack of skills among job seekers was identified by 41 % as a major obstacle to employment (AFDB, OECD, UNDP, UNECA, 2012). According to Grant Thornton's "2009 International Business Report" (cited in "Skills shortage SA's 'biggest constraint'," 2009), 41 % of South Africa's privately held businesses cite the non-availability of a skilled work force as the biggest constraint to business growth.

In Malawi, just like several other sub-Saharan African countries, there is a limited supply of vocational and technical skills. Available data confirm that at 35 Technical, Entrepreneurial and Vocational Education and Training (TEVET) students per 100,000 inhabitants, Malawi has the lowest number of technical and vocational students relative to comparator countries. This is reflected in the high proportion of unskilled workers in sectors such as manufacturing and others (Deraniyagala & Kaluwa, 2011).

2.2.4 Skills transfer / Skills development

The objective of skills development is to create a work force empowered with the necessary and continually upgraded skills, knowledge, and internationally recognised qualification to gain access to decent employment and ensure competitiveness in the dynamic global market (Sylph Education Solutions, n.d.). According to the International Labour Office (2008), skills development is of key importance in stimulating a sustainable development process and can make a contribution in facilitating the transition from an informal to a formal economy (International Labour Conference, 2008).

Most sub-Saharan African countries have created frameworks as part of their institutions which address the problem of skills shortages. From about 2013 there have been several initiatives in African countries to focus on skills transfer. Focusing on the two host countries in this research, for example, the World Bank has approved support for Malawi's Skills Development Initiative (World Bank, 2014). The skills project – which is supported by a USD 46 million credit from the International Development Association (IDA) – is aimed to work with universities and governments on specific programmes catering for high priority sectors (Word Bank, 2014). Amongst the institutions that will receive grants under this project is the TEVET Authority (Word Bank, 2014). TEVET has been singled out specifically because it facilitates the implementation of on-the-job training through co-operation with partner organisations. TEVET is a regulatory body that is aimed at promoting and regulating sustainable provision of quality technical, entrepreneurship and vocational education for the Malawian labour force⁴. Amongst some of the programmes provided are: the Public and Private Sector Training Programme, the Formal Apprenticeship Programme and the Informal Sector Skills Development Programme.

In South Africa there are several skills and empowerment programmes. The Construction Industry Development Board (CIDB) has come up with a framework for developing skills which promotes on-the-job training (CIDB, 2013). This framework provides for the dedication of a portion of the total construction cost of the project for the workplace training and upskilling of company employees in

⁴<http://www.tevetamw.com/index.php/about-us/about-teveta> [Accessed: 27 March 2015].

programmes that result in nationally accredited outcomes (such as apprentices, learnerships, accredited skills programmes and internships for professional candidacy) (CIDB, 2013).

Both Malawi and South Africa have similar initiatives with regard to skills development. Therefore, this research will evaluate the skills based on these frameworks and the most important point to note is the provision of ongoing sustainable, nationally accredited training programmes.

The changing nature of the construction market in Africa, combined with increasing demand for capital projects, means that a skilled work force will be required for the construction sector's future performance and competitiveness. Not only does sub-Saharan Africa have a general lack of skills but there is also a mismatch of skills between what is learnt in the education systems and what employment bodies require. There are several ways of combating this problem. One of them is to change the education curriculum in sub-Saharan Africa to match the scarce skills requirements. However, the immediate action that has to be made is to take advantage of every opportunity that can be used to develop accredited skills (such as during the implementation of capital projects). These large projects bring with them a need for different expertise for different skills. This gives the need to review employment creation and skills transfer on capital projects in sub-Saharan Africa. It questions whether these capital projects are able to deliver the socio-economic objectives that they are intended to.

2.3 Major Findings from Literature and their Implications

The following are the major findings from the literature review:

1. Capital projects involve high amounts of capital and high investments.
2. They have significant social impacts on the host countries.
3. The growing economy in Africa indicates that the market for capital projects in Africa is likely to expand, with sub-Saharan Africa leading in both. This is further backed by the fact that sub-Saharan Africa is currently (in 2013/2014) delivering some of the largest infrastructure development projects.

4. There are high levels of unemployment in sub-Saharan Africa in general and both the unemployment records in the two host countries for the case studies do not only approve of this fact but also indicate a forecast of soaring unemployment rates.
5. Not only does sub-Saharan Africa suffer from a severe lack of skills but also a mismatch of skills between what job seekers have to offer and what employers have to offer.
6. It seems like employment creation and skills development is at the top of the priorities for most countries in sub-Saharan Africa with all different kinds of initiatives. However, there seem to be no records to indicate how these initiatives are faring.

CHAPTER 3 RESEARCH METHODOLOGY

This chapter outlines the research designs used and their validity. It also discusses the limitations of the research as well as ethics procedures. It describes the rationale for the techniques used to identify, select and analyse the information which was collected for this research project. In so doing it allows the reader to critically evaluate the reliability of the study.

3.1 Introduction

This research used a qualitative approach to review employment creation and skills transfer on capital projects in sub-Saharan Africa. This approach is being used in the evaluation of all the relevant information collected from the research participants, various reports, literature review and all the findings. The research is considered “qualitative” because it is broad, exploratory, descriptive and explanatory (Hesse-Biber & Leavy, 2010). There was also the use of descriptive statistics to provide simple summaries for the large amounts of data.

As stated by Hoepfl (1997) and Thomas (2006), the reasons a qualitative inductive approach has been chosen for this research are:

- *It uses inductive data analysis; which has been chosen in order to (a) condense raw textual data into a brief, summary format; (b) establish clear links between the evaluation of research objectives and the summary findings derived from the raw data; and (c) develop a framework of the underlying structure of experiences or processes that are evident in the raw data. (Thomas, 2006:237)*
- *It has an emergent (as opposed to predetermined) design, and researchers focus on this emerging process as well as the outcomes or product of the research (Hoepfl, 1997:49).*
- *It pays attention to the idiosyncratic as well as the pervasive, seeking the uniqueness of each case (Hoepfl, 1997:49).*
- *It provides a simple, straightforward approach for deriving findings in the context of focused evaluation questions (Thomas, 2006:237).*

3.2 Research Design

The following approaches have been used to collect and combine data for the evaluation of employment creation and skills transfer when delivering capital projects in sub-Saharan Africa:

- The Literature Review (Chapter 2) gave the basis for which this study is necessary and also provided an understanding of all the relevant information and definitions in relation to capital projects, employment creation and skills transfer.
- Three one-to-one in-depth interviews (one in March 2014 and two in August 2014) provided detailed information pertaining to certain subjects which needed understanding and clarification.
- A telephonic interview (in September 2014) which allowed access to an interviewee who was not available for a personal interview.
- Three case studies (researched between October 2013 and February 2015) – which allowed for an in-depth study of the research topic – as they were a direct representation of the topic in some way and thereby contributed to a better understanding of employment creation and skills transfer on capital projects in sub-Saharan Africa.
- Analysis of a variety of documents (between October 2013 and February 2015) (such as brochures, journals and fact sheets (including daily site records)) which were examined and interpreted to gain understanding.

3.2.1 Literature review

So many articles have been written regarding the plight of unemployment and shortage of skills in sub-Saharan Africa. “Youth unemployment” (Filmer & Fox, 2014), “Promoting youth employment” (AFDB, 2012), “Youth, Jobs, and Structural Change: Confronting Africa’s ‘Employment Problem’” (AFDB, 2012) and “The reality of employment” (Deloitte & Touche, n.d). Furthermore, there have been various initiatives for most of sub-Saharan Africa with regard to employment creation and skills transfer. In Malawi and South Africa, like most of sub-Saharan Africa, governments have created frameworks and guidelines to deal with skills transfer. And, therefore, this research incorporates broad national documents regarding these guidelines to provide a basis to measure the research findings. This research is used in the Literature Review (Chapter 2) as a guide for compiling the research questions and for the analysis of the data. It helped provide background information on which to base the questions that need to be answered.

3.2.2 Surveys

The two survey tools (Appendix B) used in this research were administered in accordance with the Human Research Ethics Clearance Committee requirements (Section 3.5) and are described below. Because the sample size was so small, the questionnaire was not pilot tested before it was administered.

One-to-one In-depth Interviews

The researcher gained consent to interview the relevant personnel on the Nacala Corridor Railway Project. The questions were structured strategically to obtain specific details relevant to the research through probing the interviewee. These questions (Appendix B) were aimed at exploring and understanding the impacts of these projects with regard to skills transfer and employment creation as well as to obtain their professional opinion. The interviews were held at scheduled times and dates with the Project Manager (March 2014), the Head of Logistics (August 2014) and a Site Agent (August 2014) at their Head Office in Johannesburg.

No-one on the Medupi Power Project or on the Gautrain Project Phases 1 and 2 was interviewed (either in a one-to-one interview or telephonically). The appropriate members of staff from these two companies declined to be interviewed as they said that these projects were strategic in nature and the information requested was too sensitive to be released.

Telephonic Interview

This was used to interview a Human Resources Manager (September 2014) on the Nacala Corridor Railway Project who was not available for a personal interview. At the same time, it was used as an opportunity to clarify and validate (confirm) some of the findings obtained during the personal interviews.

This interviewee was responsive and willing to provide the information the researcher required.

3.2.3 Case studies

The case study approach allows in-depth, multi-faceted explorations of complex issues in their real-life settings (Crowe *et al.*, 2011). There was a need to obtain in-

depth analysis of the research topic in a real-life context. The case studies were also included to provide additional insight which might otherwise be overlooked.

Three case studies (Nacala Corridor Railway Project in Malawi; Medupi Power Project in South Africa, and Gautrain Project Phases 1 and 2 in South Africa) were researched between October 2013 and February 2015.

3.2.4 Document analysis

Bowen (2009:1) asserts

Document analysis is a systematic procedure for reviewing or evaluating documents – both printed and electronic (computer-based and Internet-transmitted) material.

The interviewees for the Nacala Corridor Railway Project provided the researcher with verbal and written information. The researcher then analysed the information she had been given. This information was examined carefully and interpreted in order to draw meaning, gain understanding, and develop verifiable knowledge.

For the two South African case studies – the Medupi Power Project and the Gautrain Project Phases 1 and 2 – the data collected were sourced from a review of documents, both printed and electronic (from websites, for example). The data were collected from fact sheets, annual reports, and press releases, for example. As with the Nacala case study, the information was examined carefully and interpreted in order to draw meaning, gain understanding, and develop verifiable knowledge.

3.3 Validity of the Research Design

3.3.1 Literature review

The strengths and weaknesses of literature reviews – as stated by Marrelli (2005) – are shown in Table 3-1:

Table 3-1: Strengths and weaknesses of literature reviews

Strengths	Weaknesses
• They can be conducted for almost any topic and can provide information either at the overview level or in-depth. • Literature reviews are relatively inexpensive and efficient. • No scheduling or coordination is involved. • The only resources needed are a good library or online database and a competent reviewer.	• An effective literature review requires a high level of skill in identifying resources, analysing the sources to identify relevant information, and writing a meaningful summary. • Literature reviews are limited to collecting information about what has happened in the past, and usually within organisations other than the researcher's own workplace. • They cannot provide data about current actual behaviour.
Source: Marrelli (2005:43)	

A literature review acts as a basis for the research. There are many articles that can be reviewed for a particular topic that is being researched and they can either agree or disagree but it is up to the researcher to draw his / her own conclusions through an analysis of the findings.

In this case the researcher had the skills to identify useful information and write a useful summary. And to deal with the other two weaknesses the researcher had to use other means of data collection such as one-to-one interviews and company reports.

3.3.2 Surveys

As indicated by (Szolnoki & Hoffmann, 2013) the survey research method has the following strengths and weaknesses:

Table 3-2: Strengths and weaknesses of surveys

Strengths	Weaknesses
One-to-One Interviews • Clearly structured, flexible and adaptable. • Provides in-depth information. • Stimuli can be used. • Capability to observe the interviewee. Telephonic Interviews • Quick turn-around. • Less expensive than face-to-face interviews. • Good geographical coverage.	• More costly and time consuming. • Perceived anonymity by interviewees low. • Measures in need of validation. • Interviewer biased. • Geographical limitations. • There is no direct contact to observe the person being interviewed. • Lower response rate. • Interviewer bias.
Source: Szolnoki & Hoffmann (2013:60)	

In order to deal with the weaknesses addressed above, the researcher made sure there were repeated questions for each person to establish some validity.

3.3.3 Case studies

As indicated by (Zainal, 2007) Table 3-3 shows the strengths and weaknesses of case studies.

Table 3-3: Strengths and weaknesses of case studies

Strengths	Weaknesses
• Examination of the data is most often conducted within the context of its use. • It helps to explain the complexities of real-life situations which may not be captured through experimental or survey research.	• Time consuming. • Accused of lack of rigour. • They provide very little basis for scientific generalisation since they use a small number of subjects. • Labelled as being too long, difficult to conduct and produce a massive amount of documentation.
Source: Zainal (2007:4)	

To deal with the weaknesses in this section, the researcher had to strategically choose the best representation of projects to be used as case studies as explained in Chapter 1.

The methods were chosen specifically to address the objectives of the research. All the findings were captured, recorded and tabulated where necessary. Microsoft Excel 2013⁵ was used to tabulate all the data collected which involved large volumes of numerical data, in order to make the information readable and organised. In this way the primary data were converted into statistical data. The statistical data, together with all in-depth content data, have been analysed in terms of the concerns which were mentioned in the Literature Review (Chapter 2). The researcher analysed all the information separately and came up with individual conclusions based on the data collected and the Literature Review.

3.4 Limitations

The evaluation of the research topic is based on the perspectives of the challenges faced on the three selected case studies. The researcher did not have sufficient time or financial resources to analyse more than three case studies. However, it is the researcher's view that, because the three case studies were chosen strategically, their combined findings can represent general sub-Saharan Africa in terms of employment creation and skills transfer.

Secondly, the research does not provide an in-depth exploration of the views of other stakeholders (such as auditors, financiers and training providers) in relation to the case studies. However, it is the researcher's view that, although the additional exploration into the other stakeholders might give more insight into the topic being researched, in essence all the information collected from the case studies is central to the evaluation of the research.

3.5 Ethical Procedure

The researcher read the guidelines for the Human Research Ethics Clearance Application (non-medical) of the University of the Witwatersrand and it was required that the research – because it involves gathering data from people

⁵ Microsoft Excel 2013 (15.0.4787.1002) MSO (15.0.4787.1002) 64-bit.

(human participants) – treats the participants respectfully and meets the ethical standard.

The researcher submitted ethics clearance application documents to the Human Research Ethics Committee and she was given an unconditional clearance certificate to be used until 2015. It has been attached as **Appendix A** of this research report.

3.6 Chapter Summary

In summary, this chapter gives a thorough description of the methodology in order to affirm the validity of the data collection methods and also to establish that these were the best methods to use in order to obtain the necessary information for this research. The discussion in this chapter dispels any doubts about the study through the analysis of the limitations.

CHAPTER 4 CASE STUDIES

This chapter offers an overview of the three case studies. The case studies embody the definitions of a capital project as mentioned in this report. They have almost all the distinguishable characteristics of a “capital project” which were stated in Section 2.1.

4.1 Nacala Corridor Railway Project (Malawi)

The implementation of the Nacala Corridor Railway Project (the **first case study** in this research) is expected to boost the economic growth of Malawi, through its implementation and the benefits afterwards. Malawi is listed as the first country of the top ten poorest countries in Africa with a GDP per caput of USD 250⁶. The project is a 906 km railway line linking Moatize mine and Nacala-a-Velha deep-water port (Vale, 2012). However, the case study focuses on the section between the Malawi border of Mwanza to Nkaya Junction in Balaka⁷. The main contractor on the project is Mota-Engil, a Portuguese-based company with a branch in Malawi.

Through the interviews (which took place in 2014) during the data collection period, it was indicated by the Project Manager of Mota-Engil that the section of the project to be completed by Mota-Engil covers a stretch of 138.5 km for an estimated value of USD 800 million and that the project is an Engineering, Procurement, Construction Management (EPCM) contract. He further indicated that the project is fully funded by Vale, a Brazilian company whose major business is mining and that the initial duration of the project was supposed to be two years but, because of changes in design, it was extended. The construction works of the project started on 06 December 2011 and were expected to be completed by November 2014. At the time that the data were being collected, the project was

⁶<http://statisticstimes.com/> (2015) [Accessed: 7 February 2015]

⁷ One-to-one interview with the Head of Logistics (August, 2014)

still in progress. However, by the time of submission of the research report (in February 2016), the project had been completed.

A map of the location of the Nacala Corridor Railway Project is provided in Figure 4-1.



Source: Logistica: Railroads (Vale, n.d.)

Figure 4-1: The Nacala Corridor Railway Project

4.2 Medupi Power Project (South Africa)

The **second case study** in this research is the Medupi Power Project, which is the fourth dry-cooled, base-load project in Africa in 20 years (Eskom, 2013d). It has an estimated cost of USD 11.72⁸ billion and it is being developed by Eskom which generates 90 % of southern Africa's power (Scheepers & Marais, 2012). Medupi Power Project is considered the largest project in terms of any yardstick ever undertaken in South Africa (Eskom, 2010).

The project, a greenfield coal-fired power plant, is located west of Lephalale, Limpopo Province in South Africa (Brochure: Medupi Power Station Project, 2013). The power station will be the fourth-largest coal-fired plant in the world and will be the biggest dry-cooled power plant in the world (Eskom, 2013d). The boiler and turbine contracts for Medupi Power Project are the largest contracts that Eskom has ever signed in its 90-year history (Eskom, 2013d). The planned

⁸On 9 June 2014, USD 1 = approximately ZAR 10.6188 per the Reserve Bank of South Africa (2014).

operational life of the station is 50 years (Eskom, 2013d). The Medupi Power Project is being built in phases; the first phase was the construction of the three units and it started in 2007 (Scheepers & Marais, 2012).

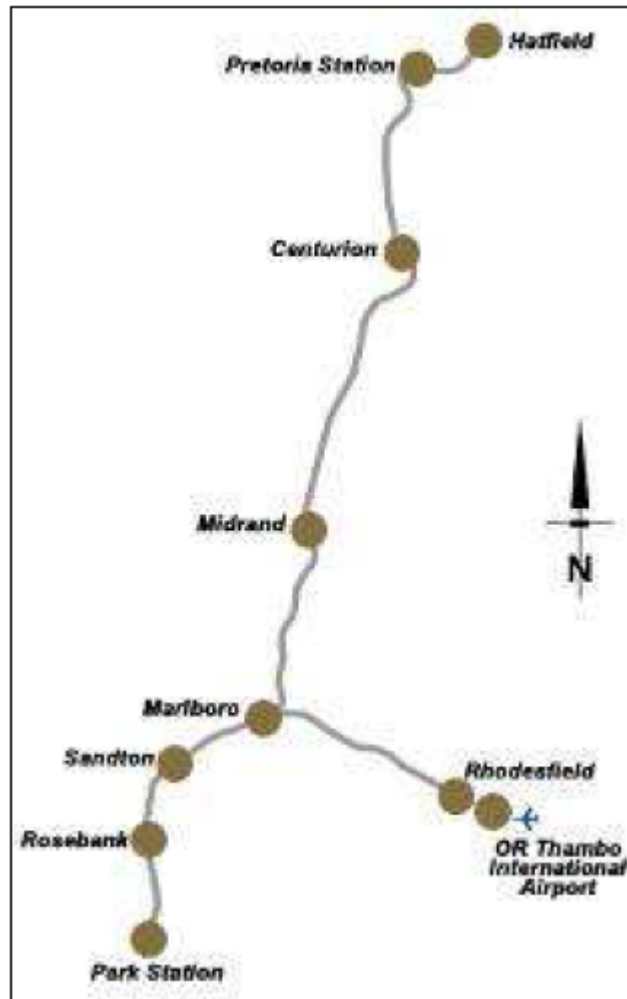
Scheepers and Marais (2012), in their article “Constructing the Medupi Power Station”, state some important points to note about the Medupi Power Project. Medupi is an Eskom contract and was partly financed by the African Development Bank and the World Bank. Two of the main project contracts, the boiler and turbine contracts, were awarded to Hitachi and Alstom and the two companies were renamed ACTOM Limited (ACTOM) in 2009. The contract with ACTOM included a turbine island, comprising steam turbines, generators, associated air-cooled condensers, related turbine island auxiliary equipment and feed-water heating plants, including a turnkey supply for the turbine hall. The boiler contracts (worth ZAR 33.6 billion) were awarded to Hitachi Power Africa (HPA) and its joint venture partner, Hitachi Power Europe, and were the largest commercial contracts awarded in Eskom's 90-year history.

Owing to the massive scale of the Medupi Power Project as well as the highly specialised civil engineering required for different sections of Medupi's construction, three companies joined forces to undertake the task: Murray & Roberts Holdings Limited (Murray & Roberts), Aveng Limited (Aveng) and Concor Holdings (Concor).

Implementation of the Medupi Power Project (Eskom, 2013) is expected to boost the economy of South Africa. It is expected to have a significant impact on the economy of the small community in Lephalale as houses and social infrastructure are going to be developed to serve the thousands of contractors working on site (Medupi Power Station, 2013). Lephalale's GDP is expected to increase by approximately 95 % a year as a result of the power station construction activities (City Press, 2014).

4.3 Gautrain Project Phases 1 and 2 (South Africa)

The **third case study** in this research, is the Gautrain Project Phases 1 and 2 (Figure 4-2) and comprised the design, construction and operation of a 77 km rapid



Source: Annual Environmental Report (Gautrain, n.d-k:9)

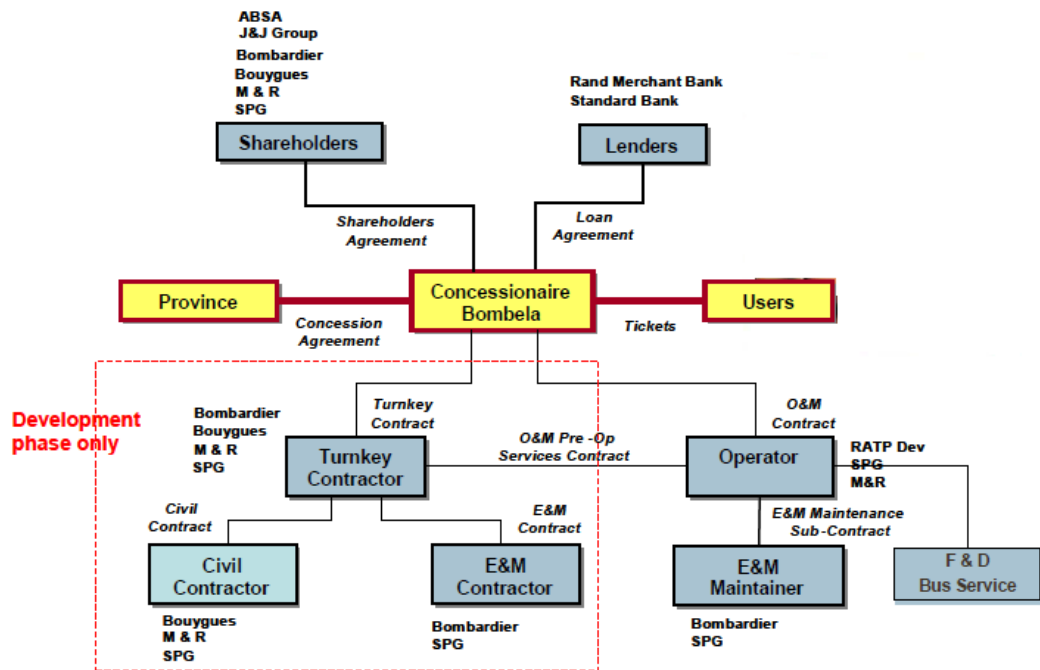
Figure 4-2: Gautrain Project Phases 1 and 2

rail link in Gauteng in South Africa which was structured as a Public-Private Partnership (PPP) between the Gauteng Provincial Government and Bombela Concession Company (Pty) Ltd (Bombela) (Andrew & Thoms, 2012). Phase 1 of the project, which included the network between the OR Tambo International Airport and Sandton started in 2006 and it was opened on 08 June, 2010 (Andrew & Thoms, 2012). Phase 2, which comprised the link between Rosebank and Pretoria, was opened in August 2011 (Creamer Media's Engineering News, 2015). This study focuses on both Phase 1 and Phase 2 of the project which was awarded to Bombela at an approximate value of ZAR 25 billion (USD 2.3 billion⁹)

⁹1 ZAR=0.09377 USD (Xe.com, 2014)

(Andrew & Thoms, 2012). The agreement was for Bombela to design, build, and commission as well partly finance, operate and maintain the Gautrain system for 15 years (Andrew & Thoms, 2012).

Figure 4-3 is the contractual framework within which the Gautrain Project Phases 1 and 2 was developed and is operating.



Source: Annual Environmental Report 2010 (Gautrain, n.d-k:10)

Figure 4-3: The contractual framework within which the Gautrain Project Phases 1 and 2 was developed and is operating

4.4 Summary of the Case Studies

This chapter described the three case studies, with the relevant information, which are noteworthy for the purpose of the research. It highlighted the details that include the estimated cost of the project, listed the relevant stakeholders and gave a brief description of what the project entailed. It put more perspective into the reasons the three case studies were chosen.

CHAPTER 5 ANALYSES AND RESEARCH FINDINGS

This chapter analyses employment creation and skills transfer on the three case studies in relation to the research question and the seven sub-questions. It gives a detailed layout of the main topics of this research such as contractual obligations, employment targets, and a description of the various skills created in the three projects.

5.1 Employment Creation and Skills Transfer on Nacala Corridor Railway Project

The information for this project was collected through the in-depth one-to-one interviews with the relevant personnel on site, detailed site record sheets, and spreadsheets with actual daily resources (labour) recordings. To validate the information which was given, site record sheets for the requested information were provided.

5.1.1 Contractual obligations, compliance monitoring measures and audits

According to the Site Agent on the Nacala Corridor Railway Project, the project had no contractual obligations with regard to skills development or employment creation. However, he stressed that, despite this, as one of the largest contractors in the Malawi, they are still committed to supporting skills development in local communities and using locally sourced labour.

Hence, with no contractual obligations, there were no measures in place to monitor and audit compliance in terms of achieving socio-economic objectives.

5.1.2 Employment creation

a. Average estimated (targeted) employment

Although there were no contractual obligations with regard to employment creation, according to a Mota-Engil publication (2012), the article indicates that the

project was expected to create 3,500 jobs during its peak time¹⁰. This was further confirmed through Vale Company News (2012) which gave a breakdown of 82 % of the positions to be filled by Malawians and 18 % by expatriates (Vale, 2013). Vale Company is the investor in the project. These figures are quantified in Table 5-1.

Table 5-1: Nacala Corridor Railway Project estimated employment creation

Nacala Corridor Railway Project Employment Targets		
	Number of people	%
Local	2,870	82
Non-Local	630	18
Total	3,500	100
Source: Vale (2013)		

b. Actual employment created

Actual employment created was filled by local people within the immediate villages and nationwide, and it was also advertised internationally. Detailed records of the total actual employment on this project in terms of monthly and yearly average numbers of employed personnel on site for three years are provided in **Appendix C**. The information attached in **Appendix C** is categorised in terms of skills level and in terms of local versus expatriate employment. This information was sourced from the daily and monthly dashboards on the project as it was being implemented. These figures have been summarised in Table 5-2.

It can be seen from Table 5-2 that the total actual employment which was created by the time the information was collected was 3,757 jobs, of which the total number of locals employed was 3,212 whilst 545 expatriates were employed.

¹⁰<http://www.mota-engil.pt/NewsDetail.aspx?contentId=2494&parentContentId=187&year=2014&month=-2147483648&Language=2>

Table 5-2: Nacala Corridor Railway Project actual employment

Nacala Corridor Railway Project (Created)		
	Non-Local (number of people)	Local (number of people)
Engineer / Technician	122	125
Foreman	177	67
Team Leader	63	41
Skilled Labour	93	1,852
Operator / Driver	90	633
Unskilled Labour	–	494
Subtotal	545	3,212
Total	3,757	
Source: Nacala Corridor Railway Project weekly dashboard reports 2012 to 2014 (2014)		

5.1.3 Skills transfer and skills development

a. Targets

As indicated in Section 5.1.1, there were no contractual obligations with regard to skills development. However, in the interview with the Human Resources Manager, he indicated that they provided on-site training. This was taken into consideration when drafting the project delivery schedule. However, no specific targets had been put in place in terms of the number and type of skills to be created. He mentioned that they usually provide courses on safety as well as technical work (such as brick laying and steel fixing). He further mentioned that these training courses were delivered only for periods of one week to a maximum of three weeks and are not accredited. He mentioned that they also provide internship programmes.

These training courses are mostly introduced to improve the labour skills of the employees, and the decisions to deliver these projects are made during project implementation. There were no compliance measures to monitor if the project was able to achieve its objectives. However, it stands to reason that there is no need

for monitoring as there were no obligated objectives with regard to skills development.

b. Skills developed

Table 5-3 contains a summary of the different training courses which were provided on the project, as disclosed in the interviews:

Table 5-3: Nacala Corridor Railway Project skills development

Training	Length of training	Complete (number of people)	In-training (number of people)	Total (number of people)	Accredited
Internship	6 months	3	None	3	No
Brick laying	1 week	1,004	None	1,004	No
Carpentry	2 weeks	704	None	704	No
Welding	2 weeks	655	None	655	No
Steel fixing	2 weeks	345	None	235	No
Total				2,711	

From Table 5-3, five types of training were provided. There was a total number of 2,711 trainees on the project undergoing various training courses. None of these courses was accredited. There were three interns who were trained for six months each. The rest of the training programmes took one to two weeks each.

5.2 Employment Creation and Skills Transfer on Medupi Power Project

Most of the information collected for Medupi Power Project was sourced from the Eskom website as Medupi is one of Eskom's projects. The website contains some of the following information: Fact sheets; progress reports; brochures and integrated reports. The documents on this site are continually updated. However, in cases where the Eskom website did not contain the required data, other external sources were used. The external sources were also used to validate the data which were sourced from the Eskom website. At the time the information was collected, the project was ongoing. As mentioned in Chapter 4 of this document, there are several contractors involved in the delivery of the Medupi Power Project and, therefore, the information collected and gathered on employment creation

and skills transfer includes all the participants involved in the construction phase of the project.

5.2.1 Contractual obligations, compliance monitoring measures and audits

The Medupi Power Project is bound by contractual obligations – Accelerated Shared Growth Initiatives for South Africa (ASGISA) – as part of the contract conditions (Eskom, 2010). ASGISA is South Africa's growth initiatives strategy and its main obligations are to maximise local content and to boost the local boiler manufacturing industry, to procure goods and services from Black Empowerment Enterprises, Black Women-Owned companies and Small and Medium Enterprises and to train and to qualify 700 artisans in various trades (Eskom, 2010:2). All the contractors on this project were under these obligations. From the information which has been collected on Medupi, there are no specific records to indicate if there has been any compliance monitoring or audits to measure the success of these contractual obligations.

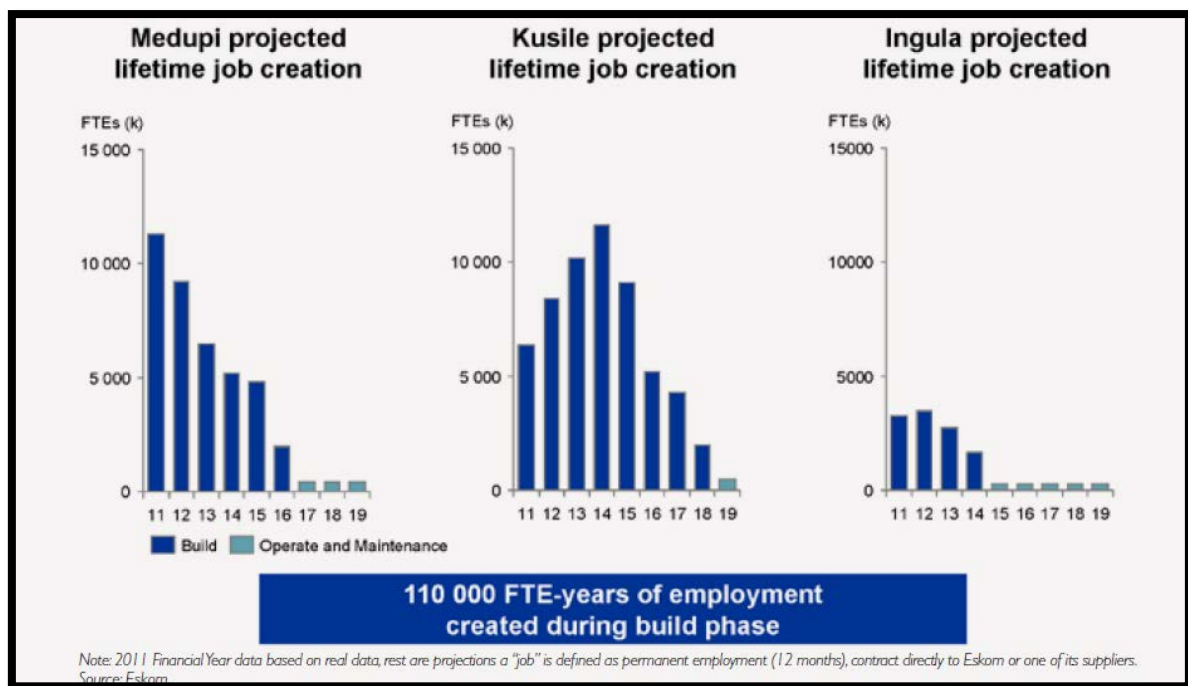
5.2.2 Employment creation

a. Estimated targeted employment

According to African Development Bank's (AFDB) "Medupi Power Project appraisal" (2009), it was estimated that the project would employ a total of 8,000 construction workers, with 60 % being sourced locally within the Lephalale township and its surrounding areas. It was indicated that 1,000 unskilled workers would be employed (African Development Bank, 2009). It was also estimated that – during the peak years – the project would employ close to 11,000 people (Eskom, 2011).

It was pointed out before construction of the project started that it was likely that sourcing of construction workers from the local labour pool would be limited because of the highly technical nature of the work to be undertaken (African Development Bank, 2009).

Figure 5-1 shows the projected life time job creation for three of Eskom's build projects: Medupi Power Project, Kusile and Ingula.



Source: Eskom (2011:3)

Figure 5-1: Medupi Power Project, Kusile and Ingula projected lifetime employment

For Medupi Power Project – which is the focus of the research – Figure 5-1 shows the projected employment to be created from the year 2011 to 2019. During the construction / build phase of the project it shows a projected 12,000 FTE years (defined in Section 2.2.2) of employment in 2011. The projections decrease every year until 2016 (which is the scheduled completion construction phase) with a projection of 2,000 FTE years.

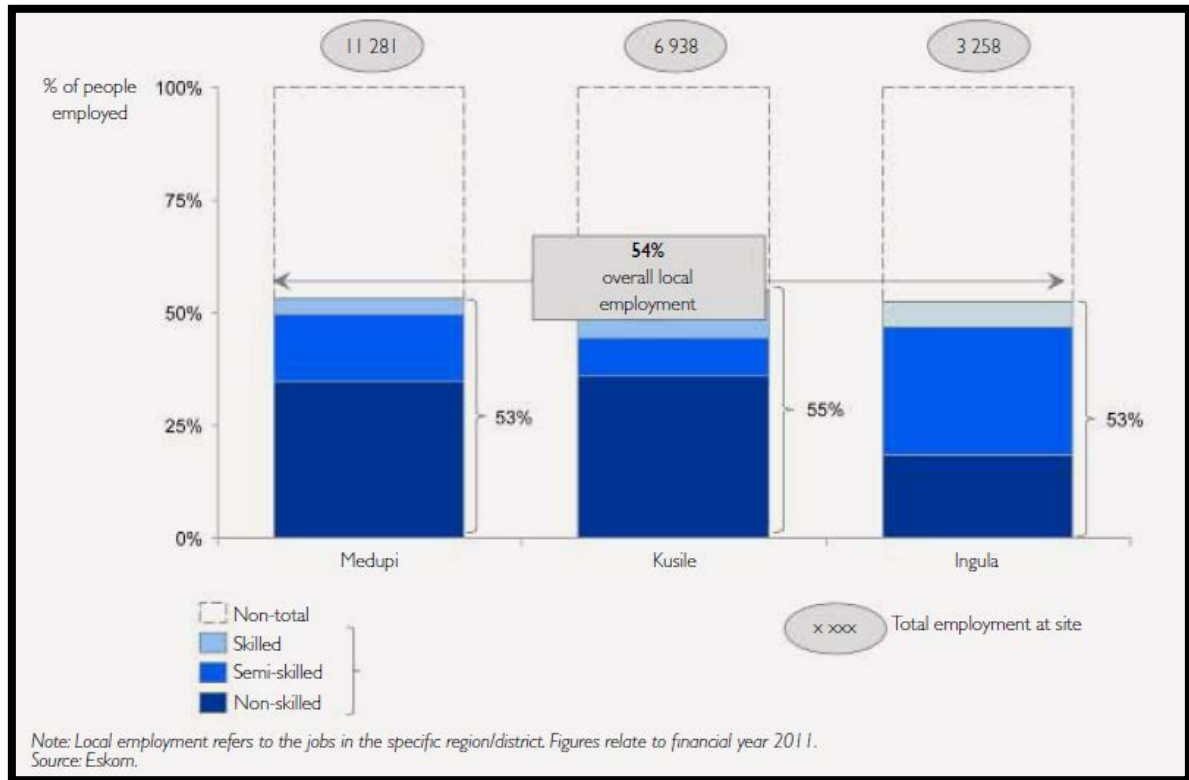
The Medupi Power Project brochure (2013:2) points out that the estimated employment was broken down into different skills: 200 engineers, 2,400 artisans, 2,750 semi-skilled workers and 1,000 unskilled workers (Eskom, 2013b). This breakdown in employment figures is tabulated in Table 5-4.

Table 5-4: Medupi Power Project estimated employment to be created in terms of skills levels

Highly skilled (number of people)	Skilled (number of people)	Semi-skilled (number of people)	Unskilled (number of people)
200	2,400	2,750	1,000
Source: Eskom (2013b).			

b. Actual employment created

At the end of 2008, there were 1,500 employees on site (Scheepers & Marais, 2012). By the year 2010 there were 8,000 employees on site. Figure 5-2 gives an indication of the actual employment which was created for the Medupi Power Project by the year 2011.



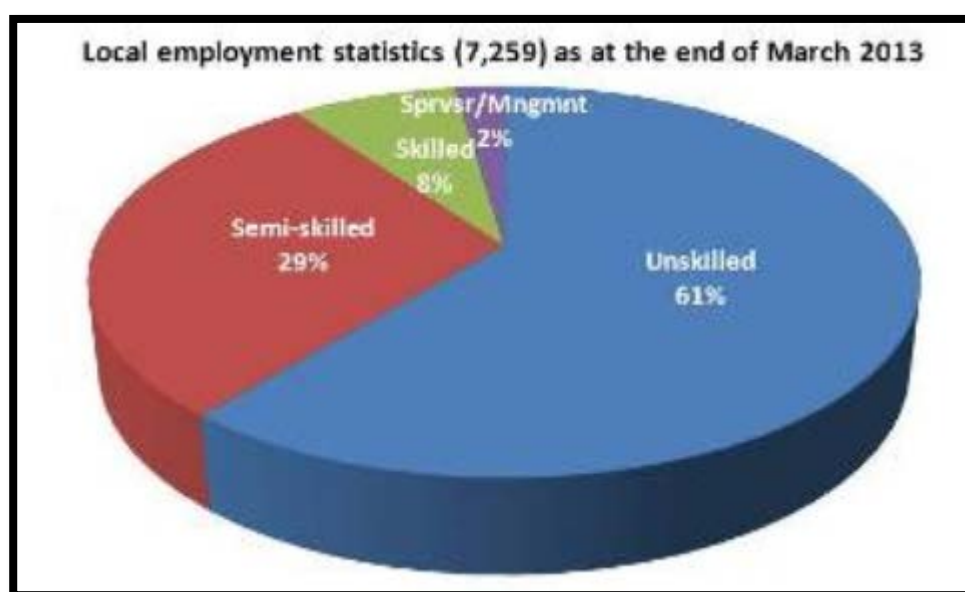
Source: Eskom (2011:40)

Figure 5-2: Actual employment on all new-build projects for Eskom

Figure 5-2 shows actual employment created on all of Eskom's new-build projects (Medupi Power Project, Kusile and Ingula) with a breakdown of employment in terms of skills levels. These are 2011 records for the Medupi Power Project which is the focus of this research and was still within the construction phase of the project. As shown in Figure 5-2, the total actual employment created for Medupi by the year 2011 was 11,281 jobs. This number includes all the parties involved in the project, including Eskom. Eskom alone created 53 % of this total employment. Of this figure, 3 % were in the skilled category, 20 % were in the semi-skilled

category and 30 % in the unskilled category. By 2012 the project had created employment for a total of 17,000 employees (Eskom, 2011).

By the end of March 2013, the project had a total labour force of 16,800 employees (Eskom, 2013c). Lephalale residents made up 7,259 (43.2 %) of the work force, with 71.5 % (6,830 of 9,550) of the unskilled and semi-skilled category coming from within Limpopo Province (Eskom, 2013a). There were 24 % non-locals / expatriates and 76 % locals (Eskom, 2013a). Figure 5-3 shows that out of the total number of 7,259 local jobs created by the end of March 2013, 61 % were in the unskilled category, 29 % were semi-skilled, 8 % were skilled and 2 % were highly skilled (that is, supervisors or management).



Source: Eskom (2013a:1)

Figure 5-3: Local (Lephalale) actual employment statistics as at the end of March 2013

By 2014 the overall estimated number of employees on the project was close to 17,000 people, of whom more than 40 % were from the local area (City Press, 2014). The records for the number of jobs created are stated in several different documents and these records kept changing as they had to be updated continually. Collecting from different sources as described above, the total employment created has been averaged and summarised in Table 5-5:

Table 5-5: Medupi Power Project actual employment

Year	Average Employment Created (number of people)
2008	1,500
2010	8,000
2011	11,281
2012	17,000
2013	16,800
Local	15,960
Non-Local	4,032
2014	17,086

On another note, in relation to the project's objectives, it was observed that there were some challenges in the productivity and supply of skilled welding and non-destructive testing specialists. As written in the article "Electricity Infrastructure Programmes" (2013), it was expected that the project would require up to 2,000 specialist welders until 2015 for Medupi Power Project and Kusile (another one of Eskom's projects) but they had to rely on foreign welders since the industry was not able to train local welders fast enough to do the job reliably. Out of the 161 A-Class welders working on Medupi boiler 6, only 14.13 % were South African welders. With regard to B-Class welders, there were 181 qualified welders ("The Skills Portal", 2013). This implies that South African industry is able to train enough B-Class welders but very few A-Class welders ("The Skills Portal", 2013).

5.2.3 Skills transfer and skills development

As mentioned in Section 5.2.1, the Medupi Power Project has contractual obligations with regard to skills development. At the time of data collection for this research there were several skills development training programmes on this project which are described in Section 5.2.3 c under "Skills transfer" and summarised in Table 5-7.

a. Targets

The Medupi Power Project was required to impart skills to the local community. The data obtained for this project show that the main focus of these skills was to expand the boiler industry (Eskom, 2010). Therefore, in an effort to revive the boiler industry in South Africa, Hitachi (in partnership with its sub-contractor Murray & Roberts) was expected to train 1,400 artisans in the categories of pipefitters, general fitters, welders, boilermakers, riggers, steel erectors, quality control inspectors, technicians, brick work, concreters among others (Molekoa, 2011). It was expected that there would be six intakes over the duration of the project (Molekoa, 2011).

b. Measures

In terms of the Accelerated Artisan Training Programme (AATP), a special log-book, designed in collaboration with the construction managers, is kept on site and all tasks performed are documented and signed off by mentors (Molekoa, 2011).

c. Skills developed

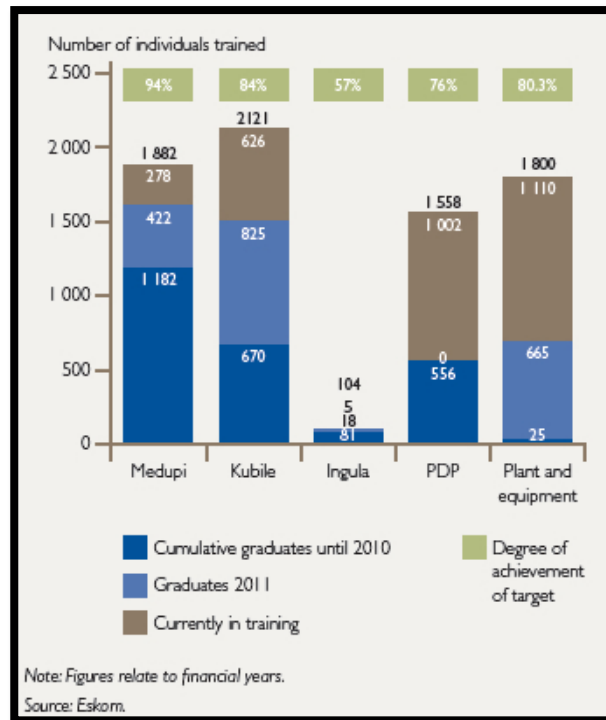
The project had a lot of skills development training programmes as indicated in Section 5.2.1. Most of the records were sourced from the Eskom website. However, there were some records that were missing from the Eskom website and they had to be sourced from other external sources. It was important to gather as much data through other websites in order to validate Eskom's information.

Each of the contractors and other parties involved on the Medupi Power Project was mandated to implement the South African government's ASGISA. By September 2009, Eskom had invested in the establishment of a 6,000 m² training centre next to Lephalale FET college for the training of apprentices in terms of the Accelerated Artisan Training Programme (Eskom, 2010). The training centre, called "Tlhahlong Training Centre", has full accreditation as a training centre by the Manufacturing, Engineering and Related Services Sector Education and Training (MERSETA) in AATP. The requirements for candidacy selection is a completed matriculation or the equivalent of a National Qualification Framework (NQF) 3 qualification with two trade-related subjects supported by Mathematics

and Science, and the candidate is supposed to do well in interviews (Molekoa, 2011). The training involves six months institutional training and an additional 54 weeks of on-the-job training under the guidance of a mentor and a training manager (Molekoa, 2011). As of September 2009, two intakes organised by HPA (comprising 224 apprentices) were already in training and a further 255 apprentices belonging to HPA's other sub-contractors were also being trained (Molekoa, 2011).

By 2010, more than 300 apprentices were in training and, in addition to the AATP training, it was also stated in the Eskom and Hitachi Joint Media release (2010) that 30 specialists in various fields of engineering were in South Africa to transfer manufacturing and erection knowledge in the interest of sustainability and competitiveness (Eskom, 2010).

By March 2011, 414 artisans were in training, either on the project site or within the training facility (Murray & Roberts, 2011). In addition to the AATP training – which is a joint effort by several subcontractors on site to deliver the ASGISA objectives – Eskom is also committed separately to training its employees through the Eskom Academy of Learning (EAL) (Eskom, 2011). Figure 5-4 indicates the number of individuals trained on several of Eskom's projects. For Medupi Power Project, which is a focus area for the research, it shows 1,182 cumulative graduates by the year 2010. It also shows 422 graduates in the year 2011 alone and 278 still in training.



Source: Eskom (2011:37)

Figure 5-4: Cumulative number of people trained on the skills programme

In addition to the ASGISA initiatives and Eskom's commitment to training its employees through the EAL, Eskom launched the Medupi Leadership Initiative (MLI) in 2013 with all the project contractors, local government and traditional leaders with the aim to extend the benefit of employment beyond the project and to avoid community destabilisation following the project's completion (ESI Africa, 2013). The MLI initiative comprises job-enabling opportunities as follows (ESI Africa, 2013:3):

- Financial Literacy course (ability to manage personal finances)
- Drive Your Life course (take control of own lives; understand options post-project)
- Further Education and Training courses
- Small, Medium and Micro Enterprise skills (SMME skills development and expansion of hub to provide incubation office space to entrepreneurs) (ESI Africa, 2013:3).

The MLI also comprises job opportunity initiatives including:

- Dry lands (that is, jobs in environment restoration; rhino-poaching prevention)
- Corporate and social investment (construction / refurbishment of community facilities)
- Lephalale Local Municipality projects (ESI Africa, 2013:3).

By October 2013, there were 402 employees who had completed the Financial Literacy course and 162 who had completed the Drive Your Life course (ESI Africa, 2013:4). By 2014 there were 171 graduates for FET and 34 in training (Eskom, 2014).

Overall, in estimation by 2014, the project had achieved a total of 2,416 complete formal skills developed and 360 employees in training (Eskom, 2014).

Several websites had a lot of information to provide in terms of skills development. **Appendix D** is a compilation of all the skills training programmes collected from several sources which were gathered for this project up to the time of data collection for this research. As already mentioned, it is important to note that, at the time these records were gathered, the project was still in progress.

5.3 Employment Creation and Skills Transfer on the Gautrain Project Phases 1 and 2

Similarly to the Medupi Power Project, most of the information for the Gautrain Project Phases 1 and 2 was sourced from the Gautrain website. However, external sources were also used to collect data to validate the information collected from the Gautrain website.

5.3.1 Contractual obligations, compliance monitoring measures and audits

The Gautrain Project Phases 1 and 2 was bound by contractual obligations and the project was committed to defined specific socio-economic objectives during its design, construction, and even in its commissioning phases (van der Merwe *et al.*, 2012). The Gautrain Project was committed to a set of measurable Social Economic Development (SED) obligations. There were 21 elements to the

development as stated in the article “Gautrain delivers on job creation promises to fight poverty” (Gautrain, n.d.-b) which were grouped into the following clusters:

- equity participation of black persons and black women in the entities created for the project;
- participation of Black Empowerment Entities (BEEs) and Small, Medium and Micro Enterprises (SMMEs) in procurement and sub-contracting;
- social investment programme;
- enhancing local content;
- participation by Historically Disadvantaged Individuals (HDIs) and women in management;
- contribution to employment equity; and
- training.

In line with the objectives of this research, the chapter focuses on the Gautrain Project Phases 1 and 2's contribution to employment objectives and training, which includes the expenditure on human resource development programmes and focused women learnerships and mentorships (Gautrain, n.d.-b). In terms of enhancing local content, for employment creation, it was indicated that preference should be given to employing local people in the following order: Citizens of South Africa who are residents of Gauteng; citizens of South Africa who are residents of other provinces, and citizens of other SADC countries.

The SED's obligations were incorporated as part of the bidding process and, according to van der Merwe *et al.* (2012), in order to solicit commitment for the SED obligations from the bidders, the procurement process was used in the following manner:

- Targets were set for expected total achievements for each SED element. During the Request for Pre-qualification (RFQ) phase an initial commitment was secured from the Bidders in view of these targets (van der Merwe *et al.*, 2012).
- The Request for Proposal (RFP) phase and Best-and-Final Offer (BAFO) phase were used to secure a more firm commitment from the bidders (van der Merwe *et al.*, 2012).

- Finally, total and monthly contractual SED obligations were agreed upon during negotiations with the Preferred Bidder for each of the business units of the Concessionaire, for each of the respective SED elements (van der Merwe *et al.*, 2012).

In addition, as indicated in the Gautrain SED delivery section (Gautrain, n.d.-b), these bidders were requested to demonstrate their commitment to respective SED elements at the following stages.

- a) The commencement of the development period;
- b) At the end of the development period;
- c) At the commencement of operations; and
- d) At the end of the fifth contract year (Gautrain, n.d.-b:4).

There was a penalty-and-reward regime which was developed to penalise the concessionaire in the case that it failed to meet its SED obligations within a specific quarter. Should they have exceeded their obligations, the “credit” could be used as an offset for under-performance for future quarters (van der Merwe *et al.*, 2012).

The Gautrain Project Phases 1 and 2 was embedded with monitoring measures. As part of the monitoring measures, Bombela had to submit monthly SED reports to the province and the Independent Socio-Economic Monitor (ISEM) within 45 days after the end of each contract month (Gautrain, n.d.-b). The ISEM was appointed jointly by the Gautrain Project and Bombela in 2007, to validate compliance with the SED obligations (Gautrain, n.d.-b). The ISEM would verify the achievements by Bombela and submit monthly ISEM reports on its findings after five weeks (Gautrain, n.d.-h). The ISEM was also tasked with reviewing the relevant processes, procedures and systems, monitoring of programmes and reporting on monthly findings (Gautrain, n.d.-h). These measures are related to all the socio-economic objectives on the project and, for this study, skills development and employment creation.

Therefore, the findings in this chapter for the Gautrain Project Phases 1 and 2 are those which were indicated on the Gautrain website as being verified by the ISEM. Where necessary, additional findings were collected from other external sources

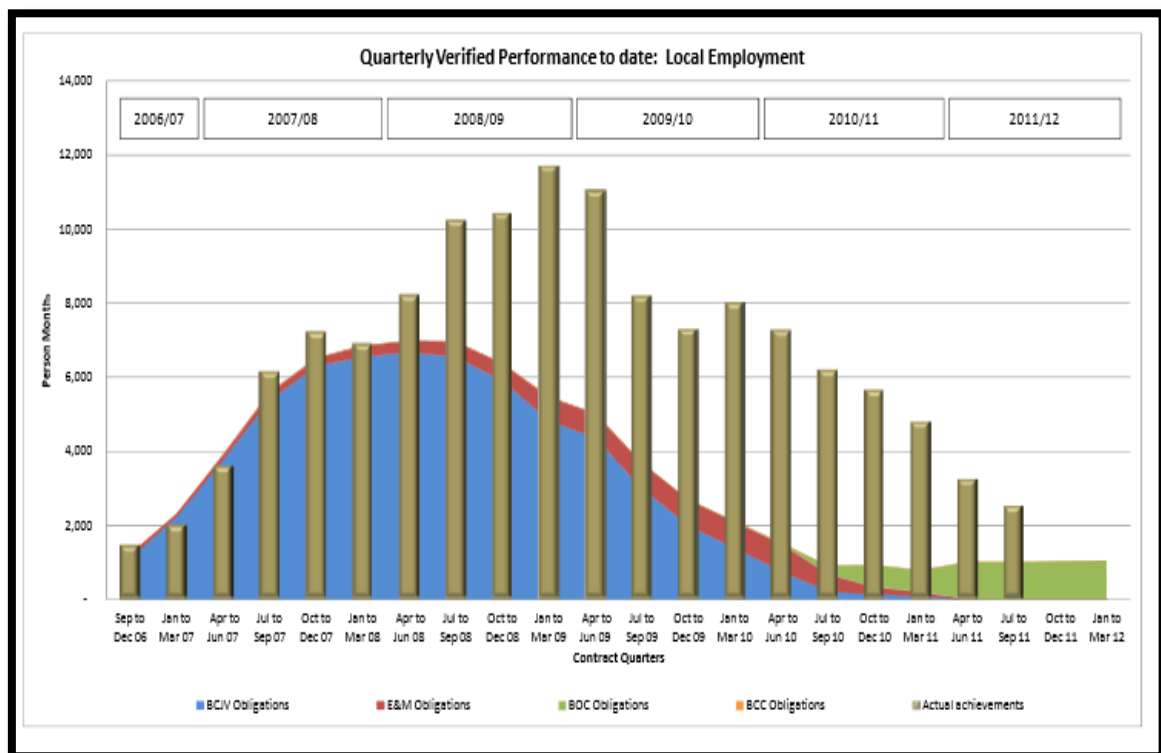
used for contrasts and comparisons and, in so doing, also auditing and verifying the information.

5.3.2 Employment creation

a. Estimated/Targeted employment and actual created employment

According to van der Merwe *et al.* (2012) the contract had detailed records with regard to the number of jobs to be created. The records were broken down according to the number of employees to be created for locals and for expatriates. It was estimated that the project would employ approximately 7,000 people during its construction peak time (Railways Africa, 2009).

According to van der Merwe *et al.* (2012), Bombela had exceeded its obligations substantially. Figure 5-5 is a graph extracted from the “Gautrain: successful implementation of socio-economic objectives” (van der Merwe *et al.*, 2012), indicating the extent of person-months of actual local employment created by 2012 against obligated numbers, which was the time that the construction phase of the project had ended.



Source: van der Merwe *et al.* (2012:652)

Figure 5-5: Gautrain Project Phases 1 and 2 local person-month employment from 2007 to 2012

Figure 5-5 has been summarised and tabulated in Table 5-6 in terms of person-months.

Table 5-6: Gautrain Project Phases 1 and 2 person-months of actual employment created versus obligated

Gautrain Project Phases 1 and 2		
Period	Peak (person-months)	Target (person-months)
Sept 2006 to Dec 2006	1,500	1,500
Jan 2007 to Mar 2007	2,000	2,000
Apr 2007 to June 2007	3,600	4,000
Jul 2007 to Sept 2007	6,100	5,000
Oct 2007 to Dec 2007	7,200	6,400
Jan 2008 to Mar 2008	6,800	6,800
Mar 2008	7,380	
Apr 2008 to Jun 2008	8,200	6,800
June 2008	9,501	
July 2008 to Sep 2008	10,200	6,400
Oct 2008 to Dec 2008	10,400	5,800
Jan 2009 to Mar 2009	11,800	5,000
Apr 2009 to Jun 2009	11,200	4,600
Jul 2009 to Sept 2009	8,200	3,600
Oct 2009 to Dec 2009	7,400	2,400
Jan 2010 to Mar 2010	8,000	1,600
Apr 2010 to Jun 2010	7,400	1,000
Jul 2010 to Sept 2010	6,200	200
Oct 2010 to Dec 2010	5,600	200
Jan 2011 to Mar 2011	4,800	100
Apr 2011 to Jun 2011	3,400	1,500
Jul 2011 to Sept 2011	2,600	2,000

Table 5-7 shows actual employment created in terms of the local and non-local labour force from 2008 to 2009.

Table 5-7: Gautrain Project Phases 1 and 2 targeted employment versus actual created employment

Period	Local created (number of people)	Obligated local (number of people)	Non local created (number of people)	Total created (number of people)
Mar 2008	6,612	N/A	768	7,380
Jun 2008	8,865	N/A	636	9,501
Jul 2008	10,839	8,736	1,778	12,617
Sep 2008	9,940	6,772	1,061	11,001
Apr 2009	10,310	5,046	955	11,265
Source: Compiled from Gautrain (n.d.-h:2; n.d.-b:7; n.d.-d:1-2; n.d.-f:1; n.d.-g:2)				

5.3.3 Skills transfer and skills development

a. Targets / estimated

As part of the Gautrain Concession Agreement, Bombela CJV – the contractor for the project – was committed to providing skills development and women’s learnership and mentorship (Gautrain, 2008). The Gautrain Project Phases 1 and 2 was granted ZAR 23 million in National Skills Funding in 2007 for the purpose of training persons to fill scarce and critical skills needed for the project (Gautrain, n.d.-e). There was more opportunity for skills development in the area of technical equipment usage as some machinery on the project was complicated to operate (Gautrain, 2008).

b. Measures

As indicated in Section 5.3.1, Bombela has been submitting monthly SED reports within 45 days after the end of each contract month.

c. Skills developed

The National Skills Fund (NSF) allocation was used to train persons in mining competency, plant operation, and different functions around the tunnel-boring machine, safety and concrete (Gautrain, n.d.-d). As a result, the Bombela Concession Company had several initiatives to grow skills in the technical and

engineering fields. The Bombela Civils Joint Venture (BCJV) provided the following training: learnerships in road construction, trade, operator training and experiential learning (Gautrain, n.d.-c). The BCJV also gave bursaries to 90 women learners from various FET and academic institutions (Gautrain, n.d.-c). Bombela Electrical and Maintenance (E&M) in comparison, also provided learnerships in wiring, contract administration as well as finance and procurement and gave 25 people bursaries (Gautrain, n.d.-c). These learnerships were offered in co-ordination with SETA and the Mining Qualification Authority (MQA) and, at the end of their 16-month long learnership, the participants received a recognised qualification registered by NQF and endorsed by South African Qualifications Authority (SAQA) ("Gautrain provides skills for women in construction," 2008). Learnerships form part of the government's National Skills Development Strategy (NSDS) ("Gautrain provides skills for women in construction," 2008).

In addition to the above learnerships, there have also been three learnership intakes in Business Administration and Electrical. The **first learnership** intake was completed on the 18 September 2008, with 39 of the 45 women qualifying for their Business Administration NQF level 2 learnership (Gautrain, n.d.-a). The **second learnership** intake was completed on 1 April 2009, with 39 of the 43 women qualifying. There were eleven learners who completed an Electrical NQF level 2 learnership and 28 learners who completed their Business Administration NQF level 2 learnership (Gautrain, n.d.-a). The **third and final intake** of trainees graduated on the 13 August 2010 ("Gautrain provides skills for women in construction," 2008). There were 48 learners who started this programme and 43 of them completed the learnership (Gautrain, n.d.-a). There were 15 learners who did Business Administration NQF level 3, 22 learners who did Business Administration NQF level 2, and six learners who did Electrical NQF level 3 (Gautrain, n.d.-a). Their document stated that, during the construction phase of the project, it had offered 136 learnerships. Of these, 121 learnerships were completed and the overall average percentage of employment on completion of the learnerships was 86.77 % (Gautrain, n.d.-a).

In addition to these three intakes there were another 40 learners who undertook courses in Construction and Civil Engineering at FET colleges. These learners

acquired critical and scarce skills training in construction and construction vehicle operation (City of Johannesburg, 2014).

The learner selection was structured so that the programme was advertised and the candidates were tested. A database was then compiled and applicants were interviewed by companies taking part in this initiative on the project (Gautrain, n.d.-a).

Other than the above learnerships there were several additional training opportunities on site. Overall it was reported by Bombela that, up to the end of September 2011, the project spent more than ZAR 130 million on Human Resource development (van der Merwe *et al.*, 2012).

Since the beginning of the Gautrain Project, approximately 1,600 workers have completed training in various construction-related skills (Gautrain, n.d.-j).

Unskilled staff and semi-skilled staff attended more than 16,480 courses to improve their skills levels (van der Merwe *et al.*, 2012). Management staff attended more than 3,420 training courses (van der Merwe *et al.*, 2012). **Appendix E** contains a summary of all the skills development mentioned above on the Gautrain Project Phases 1 and 2.

With regard to the women's learnerships and mentorships, as at the end of August 2010, the ISEM verified the delivered obligations (Gautrain, n.d.-i) and the following conclusions were drawn:

- (a) Bombela claimed a total of more than 5,260 person-months (as at the end of August 2010) of women participating in the Women Training and Mentorship Programme, compared with a verified number of more than 4,990 person-months.
- (b) Bombela claimed a total of more than 3,970 person-months (as at the end of August 2010) of Women Learners Employed and Mentored, compared with a verified number of more than 3,640 person-months.
- (c) In certain employment-equity elements, the ISEM verified achievements in excess of the initial claims submitted by Bombela (Gautrain, n.d.-i).

CHAPTER 6 DISCUSSION OF THE FINDINGS

6.1 Introduction

This chapter contains a discussion of the findings which have been outlined in previous chapters. Each of the projects showed different results but they also had similarities.

Capital projects offer opportunities to create more employment and skills transfer than would usually be the case. They mark the point where massive transition is experienced within the area that is being implemented. Therefore, it is in light of this, that the researcher has chosen to evaluate employment creation and skills transfer on capital projects. Sub-Saharan Africa has high levels of unemployment and shortages of skills. The surge of capital projects in sub-Saharan Africa and the massive socio-economic impacts of capital projects promotes room for the evaluation of employment creation and skills transfer in this region. As there is not much improvement of unemployment levels and skills shortages it becomes even more relevant to evaluate this topic.

The data captured for analysis have been extracted from the one-to-one interviews with project personnel and document reviews. The evaluation of employment creation and skills transfer does not aim to give an exhaustive analysis of the programme but rather to offer the reader a valuable contribution on benefits that capital projects can offer.

6.1.1 Nacala Corridor Railway Project

a. Contractual obligations compliance monitoring measures

The fact that the Nacala Corridor Railway Project was not bound by any contractual obligations and hence had no compliance monitoring measures in place is a clear reflection that this project was not prioritised in terms of socio-economic objectives. In a situation like this, the parties involved on the project might not feel obligated to deliver any of these objectives and it is not guaranteed

that the contractor would be committed to deliver socio-economic objectives. Without compliance monitoring, the true measure of success in terms of delivering these socio-economic objectives cannot be determined.

b. Targets

As indicated, the Nacala Corridor Railway Project had no contractual targets or compliance measures in place to monitor the delivery of socio-economic objectives. As much as there were some rough estimates, there was no detailed information on the contract indicating the types of jobs or skills to be created, in terms of the categories and specific numbers. This means that the estimates could be in any category. For instance, they could all fall under the “unskilled labour” category. It is important to understand at an early stage of the development of a project, the skill requirements and labour demand for both the construction and operational phases. Without these detailed numbers and types of skills and employment estimates and forecasts, it is difficult to assess if the capacity of the created labour force and skills developed has been able to meet the forecast demand. Without having detailed estimates there is a chance that the project might not deliver on the critical skills that are actually needed. In the worst case, the entire project could be at risk of failure.

c. Job creation

The findings indicate that the actual jobs that were created were more than were estimated. The project was estimated to employ at least 3,500 people during its implementation but, on average, the total number of jobs created was 3,750. This affirms the information gathered in the Literature Review (Chapter 2) that capital projects do create more job opportunities than would be the case otherwise.

Appendix F is the manpower histogram which has been created from the information gathered in the findings according to **Appendix C**, showing the types of jobs created, number per skills category and the person-months for each category from 2012 to 2014 during almost the entire duration of the project. It provides a thorough understanding of the types of jobs that were created throughout the duration of the project. It is noticeable that, in the beginning of the project, there were few employees. In March 2012, which was the first month of

the project, 53 people were employed in the “highly skilled” category (engineers, team leaders and managing staff). There were 72 employees in the “skilled” category (technicians, supervisors and foremen). The “semi-skilled” category (including operators and drivers) had a total of 108 employees and the “unskilled” category had a total of eight employees. From June 2013 to March 2014, which were the peak months of the project, there was an increase in the number of employees: there was an average of 70 highly skilled, 500 skilled, 2,500 semi-skilled and 400 unskilled employees. Overall, most of the jobs were created during the second year because that is when there was a peak demand. This affirms that most of the jobs created on a construction project are only temporary, they do not last the duration of the project and the numbers employed vary throughout the duration of the project.

Figure 6-1 is a bar chart created from the information gathered from the findings as shown in Table 5-2. Figure 6-1 shows the average total numbers of actual employment created per skills category for the local and non-local labour force.

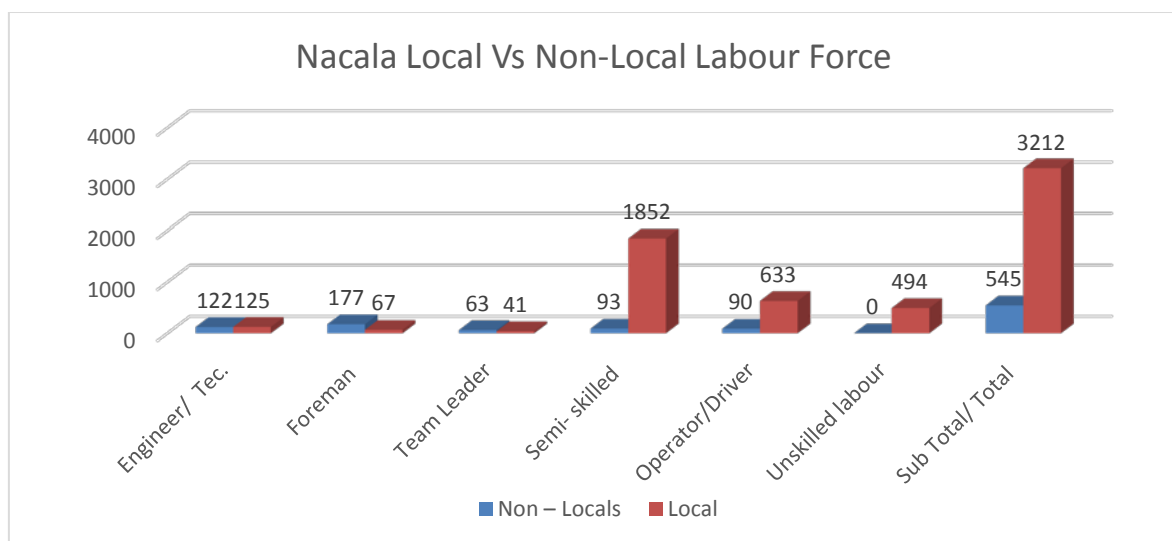


Figure 6-1: Nacala Corridor Railway Project labour force – local vs non-local labour force

One of the objectives of the research is to review the employment created. Therefore, the chart in Figure 6-1 shows that more than three-quarters of the total labour force was employed in the unskilled and semi-skilled categories which are low skill levels and which is the trend in most construction projects. Usually, the

number of highly skilled and skilled people in a labour force is less than the number of semi-skilled and unskilled categories on a construction project (Tabassi & Abu Bakar, 2009). However, the point to note is that more than 50 % of the highly skilled (engineers and team leaders) and skilled (technicians and foremen) levels are filled by non-locals (expatriates). As can be seen from the graph, the number of engineers almost ties between the locals and expatriates, having 125 versus 122, respectively, for each. The project has more expatriate foremen (177 compared with 67 local foremen). In the highly skilled category there are 63 expatriate team leaders compared with 41 local team leaders. The locals dominate in the unskilled and semi-skilled category. From the information gathered, the reason given behind this lack of local skilled and semi-skilled employees on the project is scarcity of skills. Hence, during recruitment, they could not find sufficient locals to fill these positions. This point affirms the already known fact that there is a scarcity of skills in sub-Saharan Africa (Filmer & Fox, 2014). More importantly, the fact that they had to recruit expatriates reinforces the fact that these capital projects provide a requirement for various skills that are not readily available amongst locals. Thus, there is an opportunity for local skillsets and capabilities to be transformed and upgraded through on-the-job learning and this opportunity needs to be utilised. There some short courses for semi-skilled occupations (for example, welders, labourers, trades assistants and steel fixers), which can be learned on capital projects ("Workforce NT Report", 2004).

d. Skills development / skills transfer

The various special skills development opportunities that capital projects present brings up the need to evaluate the skills which were transferred to the locals to determine if they are sustainable and if the trainees were equipped with marketable skills to be employed elsewhere once the project has been completed. As shown in the findings section, in Table 5-3, the project indeed had several training programmes that took place on site. The table also shows the skills that were being developed – regardless of whether or not they were specialised skills – were not sustainable mainly because they were not accredited and also because the duration of training was too short to impart sustainable skills. One or two weeks teaches nothing of any value in the domain of artisan skills such as

bricklaying and carpentry. The courses and programmes offered cannot be considered to be sustainable because:

- i) The time spent on the training programmes was inadequate, even though the programmes seemed to be well constructed.
- ii) The firms did not have a sustainable exit strategy. After the contract ended, the workers did not receive any accreditation to enable them to use these new skills elsewhere.
- iii) These training programmes were beneficial only to the current project.

e. Nacala Corridor Railway Project summary

In summary, the Nacala Corridor Railway Project managed to employ more people than was expected. Construction works started on 06 December 2011 and the project was expected to take 27 months to completion (Mota-Engil, 2012). Final completion was in 2015. This delay was not big enough to be accounted for to have had an impact on employment creation. The researcher was unable to acquire the information on the final cost of the project to determine if it had any impact on employment. Although there were no contractual obligations on the part of the contractor, they made a considerable effort to provide on-the-job courses and training programmes even though they were not sustainable. Despite this effort it is clear that the project offered a series of opportunities to transfer sustainable skills to the local community and within the country, and yet the project did not fully utilise it. It is the opinion of the researcher that this lack of foresight is the problem of project developers, that is, Government and Client bodies (such as local authorities). With the massive opportunities that these projects bring, it is their responsibility to make sure that these projects are embedded with socio-economic obligations as part of the contract and ensure that compliance measures are in place to ensure that these goals are being met.

6.1.2 Medupi Power Project

a. Contractual obligations compliance monitoring measures

As indicated in the findings, the Medupi Power Project had contractual obligations set for it at the onset of the project which were bound by ASGISA. As a result, there were certain expectations that the project was supposed to abide by.

However, based on the information which was gathered for this project through Eskom reports, fact sheets and other independent external documents or sources, there was no indication that any compliance monitoring measures were in place to assess whether or not these ASGISA objectives were being delivered. Although there were compliance monitoring measures, at the time this research was carried out, they were not in the public domain. Indeed, even a visit to the Medupi Midrand offices failed to give the researcher access to their more detailed documents. Having contractual obligations is a significant step towards ensuring that these objectives will be delivered, and this will enforce commitment from contractors to deliver. However, if the project does not have any form of monitoring measures it would be a drawback as there would be no way of monitoring whether or not these objectives are being met. It is imperative to have a compliance programme on such capital projects which have contractual obligations, and it has to be monitored regularly. This monitoring should be a continual process so that issues are easily identified and solved.

b. Targets

Targets were provided in terms of employment to be created as well as the skills to be transferred. For instance, it was estimated that the Medupi Power Project would create 8,000 jobs and 60 % of them would be local employees. It was also projected that the contract would train and qualify 700 artisans in different trades. By having these targets specified and broken down into actual figures (as in the case of Medupi Power Project) – as part of the contractual obligations – is a significant step towards what is necessary to be done on projects which have contractual obligations. This would give a platform to measure against, in order to determine if these projects are able to deliver on the benefits that are expected of them. This will ensure continual improvement and success in the delivery of socio-economic objectives in the long run.

c. Job creation

In terms of employment creation, the Medupi Power Project created more employment than was estimated. There were records to indicate these figures. As much as there were records of employment there were no indications that these

measurements were being monitored. As outlined in the findings, it was estimated that the project would create 8,000 jobs but, by the time of data collection in 2014, the project had already created an average of 17,086 direct employees during its peak period. Figure 6-2, created from the information gathered in the findings in Table 5-5, indicates the actual number of jobs created from 2008 to 2014.

Just as with the Nacala Corridor Railway Project, it shows that, at the beginning of the project, there were only about 1,500 employees but, as it reached its third year, the project had close to 11,281 employees, affirming that (as in the previous project) most of the jobs on construction projects do not cover the entire duration of the project and also that the number of jobs created varies throughout the lifetime of the project.

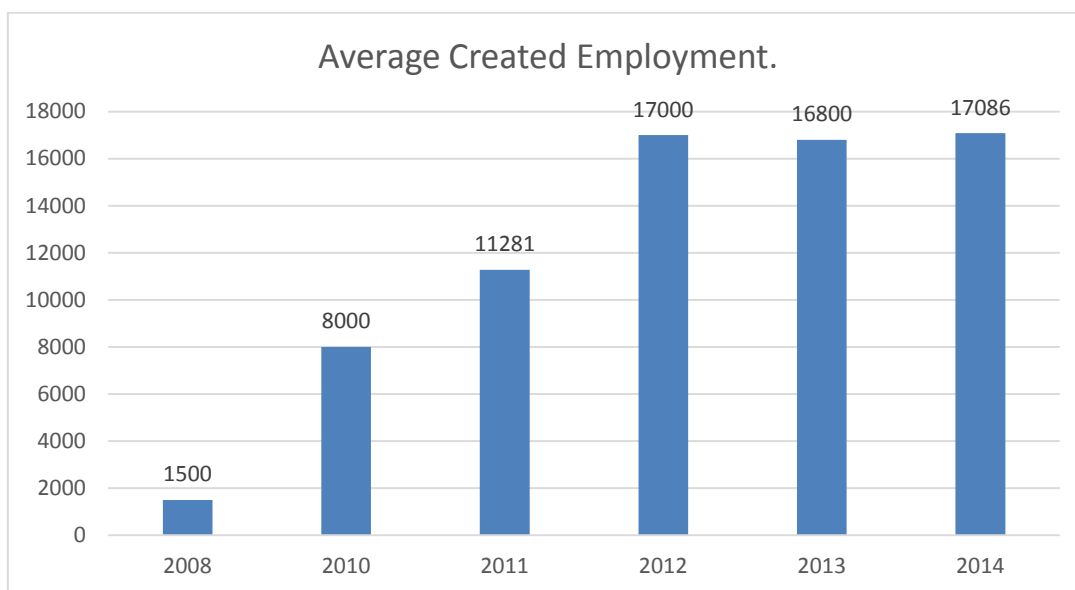


Figure 6-2: Medupi Power Project actual employment created from 2008 to 2014

Due to the sensitive nature of the information, Eskom / Medupi would not divulge their detailed records regarding the actual employment created in terms of skills categories distinguishing locals from non-locals. Because of the lack of available data, it was not possible to make a comparison between the jobs created for the locals and non-locals in the skilled and semi-skilled category. However, even though it was not possible to collect all the actual figures and numbers, it is clear

that the skill level of employment created for the locals is mostly unskilled and semi-skilled labour. For instance, as indicated in the findings, out of the 161 A-Class welders working on Medupi boiler 6, only 14.3 % were South African welders and, at the same time, there were 181 structural steel or B-class welders qualified to weld FCAW and 24 SMAW welders working on Medupi boiler 6. All of these B-class welders are South African. The fact that there are so many B-class South African welders but only a few South African A-class welders is an indication that the South African welding industry is unable to train enough A-class welders. Even though this does not give a general opinion for the project, there is an indication of a lack of critical skills amongst the locals and it confirms that capital projects bring with them opportunities that would otherwise not be there. The fact that they had to bring in expatriate welders shows the need for A-class welders. Therefore, the government should use such information and projects to introduce appropriate training programmes for these skills in order to prepare for similar future projects.

d. Skills development

As already indicated, Medupi Power Project had skills development as part of the ASGISA objectives. As part of these obligations, the main contractors on site with their partners had requirements to train employees. Since its inception, there have been initiatives set aside to create sustainable skills. Other than the creation of the Tlhalong AATP Centre and the Eskom Academy of Learning, the project established the Medupi Leadership Initiative (MLI) and the Medupi Legacy Programmes (MLPs) aimed at helping local unskilled and semi-skilled workers find employment after completion of the power station project. Through these initiatives, there are several accredited programmes provided by national accrediting agencies such as the Manufacturing, Engineering and Related Services SETA (MERSETA), Energy Sector Education and Training Authority (ESETA) (two of the 23 SETAs) and the Construction Education and Training Authority (CETA). Figure 6-3 is a graph created from the table in **Appendix D**, showing the accredited training programmes on the project. It is possible that there are more training modules to date since the information was collected in 2014 and it was not possible to validate the findings. As can be seen, some of the training programmes were still in progress and there is an indication of the number

of training modules that are complete and have been accredited. Clearly this has been a significant step in creating sustainable skills on the Medupi Power Project.

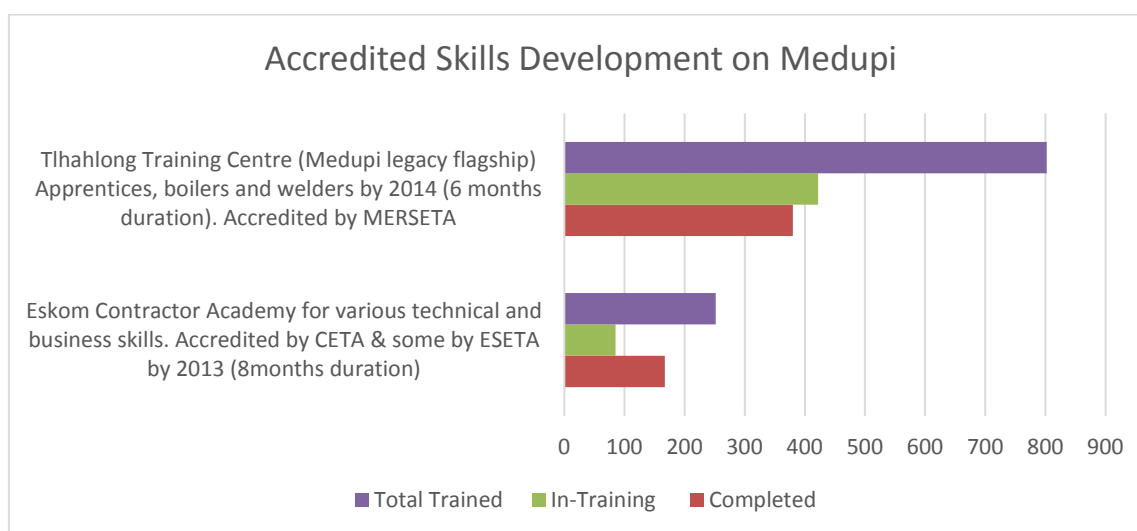


Figure 6-3: Medupi Power Project accredited skills development

e. Medupi Power Project summary

The Medupi Power Project has gone a step further in achieving the socio-economic objectives which comes with these projects. From the findings it shows that it created more employment than was expected. Construction works started in 2007, and the first phase of the project which consists of the construction of three units, the first of which was estimated to start electricity production in last quarter of 2012 (Scheepers & Marais, 2012). However, this did not happen and it was expected for first power by second half of 2014. The cost of the project was set to increase from R91.2 billion to R105 billion in the year 2013 (Patel, 2013). Having these delays and cost overruns earlier on in the project might definitely affect the employment figures. However, it does not change the fact that there was still more employment than was planned for. It also shows that the project is under contractual obligations to train employees for training programmes which are accredited. Hence, these training programmes are sustainable and, when these skills are transferred, they can be used elsewhere once this project has been completed. However, the main challenge for Medupi Power Project is the fact that so far through the data that were collected, there have not been any records with regard to any independent bodies to monitor the compliance of these obligations. There is a need to understand to what extent the project has been able to succeed

on its ASGISA objectives. The fact that there are several training programmes taking place does not necessarily mean the project has been able to deliver on its core socio-economic objectives.

6.1.3 Gautrain Project Phases 1 and 2

a. Targets and contractual obligations compliance monitoring measures

The Gautrain Project Phases 1 and 2 – like the Medupi Power Project – was committed to several SED obligations. From the onset this project seemed to have well-defined clear objectives. The socio-economic objectives to be achieved were well detailed and listed. There were specific figures and numbers as to the actual objectives which were meant to be achieved for specific categories and numbers. This is a clear indication of how dedicated the Gautrain Project was in delivering on their socio-economic objectives. As indicated in Section 5.3.1, targets were made for expected total achievements for each SED element. It has also been indicated in the findings that, as a monitoring measure, Bombela submitted monthly SED reports to the province and the ISEM within 45 days after the end of each contract month in order to validate compliance with the SED obligations. There was also a penalty-and-reward regime which was developed to penalise the concessionaire in the case that it failed to meet its SED obligations within a specific quarter and, therefore, also in case that they exceeded their obligations, the “credit” could be used as an offset for under-performance for future quarters (Gautrain, n.d.). The fact that the Gautrain had an independent body to check for compliance and went even further to introduce a penalty regime, shows how seriously the Gautrain Project took their SED commitments by making sure that these objectives were delivered.

b. Job creation

The Gautrain Project Phases 1 and 2, like the other two projects in this research, had the same shape of graph in terms of employment creation as indicated in Figure 6-4 which is a graph created from the findings Table 5-6. More employment was created during the second year of the construction and, like the other projects, it is a clear indication that construction jobs are created only for a short time and they do not usually last the duration of the entire project.

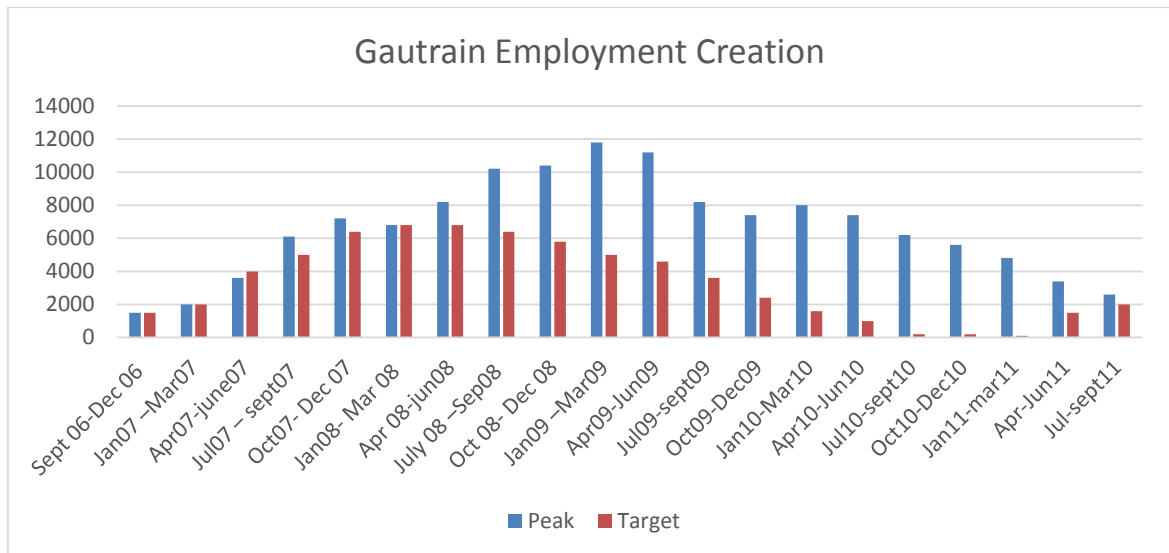


Figure 6-4: Gautrain Project Phases 1 and 2 actual employment created

Attempts to collect information to determine how the Gautrain Project Phases 1 and 2 fared in terms of actual jobs created per each skills level for expatriates and locals were not successful. Hence, the figures for actual employment per category for expatriates and locals were not provided in this research. However, looking at Figure 6-5, which was created from the findings in Table 5-7 and considering the findings given for July 2008 as the average, the graph indicates the number of expatriates employed on the Gautrain Project Phases 1 and 2. Out of 11,001 jobs created 1,061 were taken by expatriates. Considering the initial target for expatriates was 228 but 1,061 expatriates were employed (which is quite a big number) can be interpreted that there was a lack of required skills among locals.

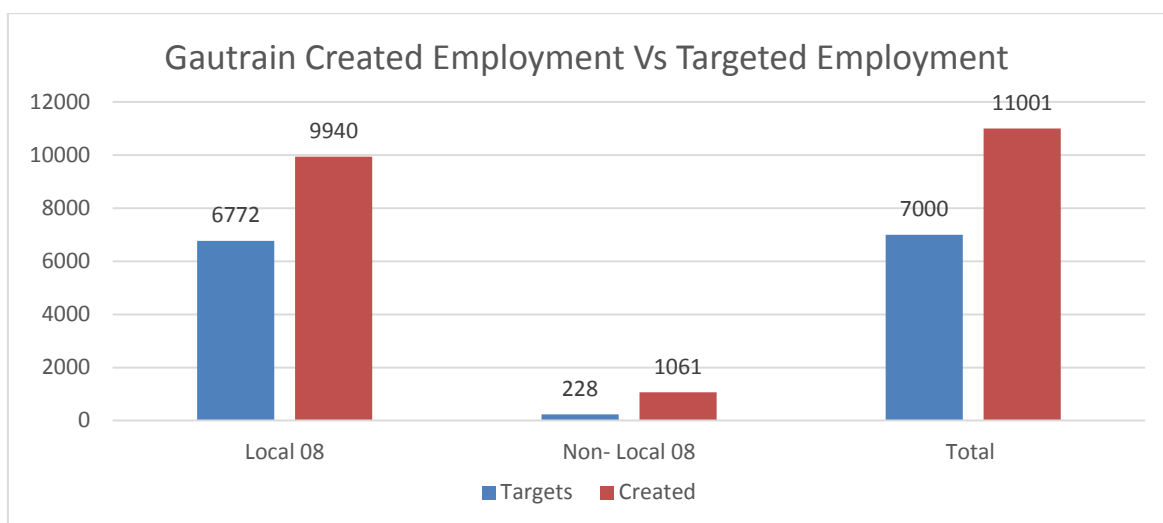
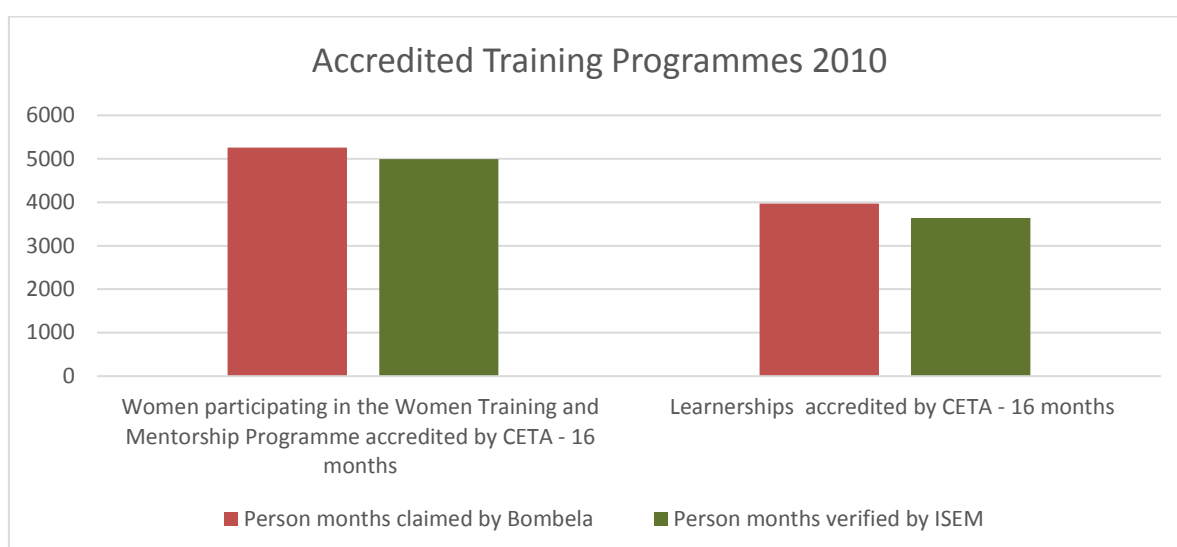


Figure 6-5: Gautrain Project Phase 1 and 2 actual employment created versus targeted employment

c. Skills development

There were several skills programmes on the Gautrain Project Phases 1 and 2 as part of the SED objectives. **Appendix E** indicates the programmes which were offered on the project. The project had been committed to providing skills development and women's learnerships and mentorships. The Gautrain Project Phases 1 and 2, like the Medupi Power Project, had several accredited training programmes. Figure 6-7 is a graph created from the findings in Section 5.3.3 c, which indicates the number of person-months spent on accredited training programmes on the Gautrain Project Phases 1 and 2 by the year 2010 (the year the construction phase ended). Therefore, according to the graph and as verified by the ISEM, it shows how committed the Gautrain Project Phases 1 and 2 was in fulfilling their SED objectives. The fact that these projects were accredited indicates that there was a significant step in creating sustainable skills and further it is mentioned in one of the findings that some of the candidates after graduation were able to be employed by Bombela in the operation phase of the contract.



d. Gautrain Project Phases 1 and 2 summary

The Gautrain Project Phases 1 and 2, like the other two projects, had socio-economic impacts on the host country. For instance, the actual created employment exceeded the targeted employment. The construction was in two phases, the first phase was initially planned to last 45 months, however, it was completed three weeks ahead of schedule. The second phase was initially expected to be completed in 54 months, however, it took 57 months to complete (Creamer Media's Engineering News, 2015). The Gautrain Project was estimated to cost R25 billion but, by the time the project was completed, it indicated a R20 billion overrun (Slater, 2015). Just like in the case of Medupi, having these delays and cost overruns earlier on in the project might definitely affect the employment figures. However, it does not change the fact that there was still more employment than was planned for.

Furthermore, there was a notable step with regard to skills transfer, as some of the training was actually accredited. The most important point by far is that the project had an independent monitoring body (namely, ISEM) which was able to verify that their contractual obligations were fulfilled. However, the researcher was not able to verify the information with ISEM as the information collected was from the Gautrain websites.

6.2 Summary of Analysis

Chapter 6 contained a discussion of the findings on the evaluation of employment creation and skills transfer on all three case studies against the research questions. Each case study concluded with a summary of the impacts, the main challenge on the case studies and lessons learnt.

CHAPTER 7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The aim of this chapter is to provide conclusions and recommendations for further research.

7.2 Conclusions

Through the research findings it can be concluded that:

- Lack of skills is a major issue in sub-Saharan Africa and, although some of the above projects went the “extra mile” to transfer and develop skills, there are still a lot of areas for improvement when delivering these capital projects to cater for employment creation and skills transfer.
- It is clear that most project developers in sub-Saharan Africa have very little focus on employment creation and skills transfer. As a result, this is seldom part of the contractual obligations.
- It seems contractors from large-scale projects are reluctant to commit to advance labour planning and training programmes until the project starts. As much as the contractor has its role to deliver, this point also speaks to a greater commitment from the initiating body (client or host country) in gearing up for these large-scale projects.
- All three projects analysed have chances of creating more employment by using labour-intensive methods.
- It seems the project developers and the host countries assume that all workers with the necessary skills profiles are readily available and this puts constraints on worker availability due to the limited existing skillsets.
- Although some skill gaps can be met through short, targeted training programmes, many specialised skills require longer training programmes where the training would take longer than the length of the construction period, making it close to impossible to transfer such skills during the construction phase.

- Training lead times are longer from operational jobs, for example, Medupi Power Project where a broad spectrum of training is possible, whereas lead times for the construction work force are shorter which does not give much time for specialised training. According to Bacon and Kojima (2011:18), the classifications are defined as follows:

Construction, installation and manufacturing effect: the employment created by the design, manufacturing, construction, delivery, and installation of the plant required to meet the final demand or policy. This is defined for the number of years required to enable a newly ordered plant to be up and running.

And

Operations and maintenance effect: the employment required to operate and maintain an energy investment once the plant or equipment is installed, calculated for the duration of the life of the plant or the equipment.

Some construction projects consist of the construction phase and thereafter the operation phase. For such projects, the duration is much longer and, therefore, this provides more time for on-the-job training, whereas capital projects, which only consist of the construction phase do not give much time for specialised training.

- It has also been observed that labour and skills demand for a project are subject to constant revision in terms of size, definition and accuracy. For example, it was observed again and again through the findings that the labour and skills demand kept changing from the early stages of a project through to completion.
- It seems the main training opportunities are short courses for semi-skilled occupations (for example, labourers, trades assistants, steel fixers and welders).
- It seems the importance of targets, contractual enforcement, monitoring and external audits are not given much weight.

7.3 Recommendations

The research findings illustrate that there has been a significant positive shift in employment creation and skills transfer on capital projects. Although this research has identified areas of weakness, the following recommendations are suggested for continued success:

- It is important at an early stage of the development of the project to determine the skills requirements and labour demand for the construction phases (Northern Territory Government, Department of Employment, Education and Training, 2004).

- An assessment should be undertaken of the capacity of the current labour force to meet the demands these capital projects bring (Northern Territory Government, Department of Employment, Education and Training, 2004).
- Training programmes and strategies should be developed and implemented to meet the skills requirements of the projects in the event that highly skilled employees are recruited from the local work force (Northern Territory Government, Department of Employment, Education and Training, 2004).
- A skills forecasting model needs to be applied which should be based on the project details (Northern Territory Government, Department of Employment, Education and Training, 2004).
- A systematic compliance monitoring process should be set up for skills development and employment creation. Skills audit compliance reports should be mandatory for all capital projects (Department of Higher Education and Learning, n.d-1:6).
- A continual monitoring exercise should be put in place by the skills initiatives to evaluate performance of the skills training programmes (National Skill Development Corporation, n.d:1).
- Skills development should be an obligatory contractual agreement on projects. Two of CETA's Strategic plans is to establish a credible mechanism for skills planning and encourage better use of construction workplaces for skills development (CETA, 2014).
- A review of the choice of mentors and training company on these projects is also recommended. Hiring the right people can help reduce the amount of training required (Billikopf, 2014).
- Budget should be set aside to ensure that the trained entrepreneurs are absorbed within the industry either as employees or employers. In such a set up, it is ensured that money invested in the skills development is not wasted. This post-training support is necessary (The Sbu, cited in Gauteng Infrastructure Renewal and Investment Plan (GIRIP), 2008).
- Trainees should be encouraged to have the mindset to achieve to the best of their ability within the time frame of the training programme and be creatively guided along a path of independence (The Sbu, cited in Gauteng Infrastructure Renewal and Investment Plan (GIRIP), 2008).
-

- The relevant institutions (such as CIDB, CETA and others) should devise a joint method to monitor the adequacy of the training received. Training service providers must have adequate facilities and the requisite experience to teach labour-intensive construction methods (The Sbu, cited in Gauteng Infrastructure Renewal and Investment Plan (GIRIP), 2008).
- The business development exit strategy must foster strong links with industry. It is not enough to spend money on the programme only to see the productivity lost when skills are under-utilised (Kuruvilla & Chua, 2000:13).
- Training should concentrate on average or long-term skills demand (Northern Territory Government, Department of Employment, Education and Training, 2004).
- It is important to follow up on the contractors on these capital projects and come up with a comparative measure of their success given that most of them had the same goals. (International Labour Office, 2011).
- Consideration should be given to establishing regional databases of workers who have been through the training system and passed adequately (Department of Higher Education and Training, n.d-2:13). The intention being that, should another capital project arise in the same area, the workers from a previous capital project could be invited to work on the new project.

7.4 Further Studies

There is a need for more and deeper analysis into other capital projects in sub-Saharan Africa in order to understand and quantify the benefits these projects can deliver and, in so doing, use the opportunities they provide to the maximum.

REFERENCES

- AFDB, OECD, UNDP, UNECA. (2012). *Promoting Youth Employment* (African Economic Outlook). Retrieved from <http://www.africaneconomicoutlook.org/fileadmin/uploads/PAGES-%20Pocket%20Edition%20AEO2012-EN.pdf>
[Accessed: 29 November 2015]
- AFDB and OECD. (2005). *African Economic Outlook 2012: Promoting youth employment*. Development Centre and African Development Bank, OECD: Paris.
- African Development Bank. (2009). *Medupi Power Project Appraisal Report*. Retrieved from http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/South_Africa_-_Medupi_Power_Project_-_Appraisal_Report.pdf
[Accessed: 27 August 2015]
- Africa Economic Outlook. (2012). *Promoting Youth Employment*. Africa Economic Outlook.
- Andrew, C. & Thoms, I.M. (2012). *Design and construction of the Gautrain Rapid Rail Link. Proceedings of the ICE – Management, Procurement and Law*, 165(1):41-54.
<http://doi.org/10.1680/mpal.2012.165.1.41>
[Accessed: 15 September 2014]
- Bacon, R. & Kojima, M. (2011). *Issues in estimating the employment generated by energy sector activities*. Sustainable Energy Department, The World Bank.
- Billikopf, G. (2014) *Helping workers acquire skills*. Labour management in Agriculture: Cultivating Personnel Productivity, University of California.
- Bangure, K. (2013). A snapshot of key infrastructure developments across Africa. *Built Environment Indaba 2013*. Frost & Sullivan, March 2013.
- Bowen, G.A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2):27-40.
- Brixiova, Z., Mutambatsere, E., Ambert, C. & Etienne, D. (2011). *Closing Africa's Infrastructure Gap: innovative financing and risks*. *Africa Economic Brief*, 2(1):April 2011, AfDB Chief Economic Complex.
- Business Monitor International database. (2014, May). Retrieved from <https://bmo.bmiresearch.com/data/datatool?iso=MW>
[Accessed: 29 March 2015]

"Capital Project" Investopedia. Investopedia, 31 July 2014. Web. 1 August 2014. Retrieved from <http://www.investopedia.com/terms/c/capital-project.asp> [Accessed: 08 August 2015]

Construction Education and Training Authority. (CETA). (2014). *Strategic Plan of the Construction Education and Training Authority 2011 – 2016*.

Construction Industry Development Board. (2013). *Standard for developing skills through infrastructure contracts*. (2013, August 8). Construction Industry Development Board.

City of Johannesburg. (2014). Gautrain creates thousands of jobs. (2014, October 20). City of Johannesburg.

City Press (2014). *Medupi: Almost at Full Steam*. January 19:14. Johannesburg: City Press.

Creamer Media's Engineering News. (2015). *Gautrain rapid rail link, South Africa*. (2015, January 16). Creamer Media's Engineering News. South Africa.

Crowe, S., Cresswell, K., Robertson, A., Hubby, G., Avery, A. & Sheikh, A. (2011). The Case study approach. *BMC Medical Research Methodology*, 11:100.

Department of Higher Education and Learning. (n.d-1). *Guidelines on the Implementation of SETA Grant Regulations*. Pretoria: Department of Higher Education and Learning SA.

Department of Higher Education and Learning (n.d.-2), *National Skills Development Strategy III, Progress report 2011-2013*. Pretoria: Department of Higher Education and Learning South Africa.

Department of Public Works. (2012). *EPWP (Expanded Public Works Programme) Large Project Guidelines: Scaling Up Service Delivery and Contributing to Job Creation*. (2012, August). Retrieved from <http://www.opensaldru.uct.ac.za/handle/11090/59>. [Accessed: 19 February 2015]

Deloitte & Touche. (2013.-b). *Deloitte on Africa : African Construction Trends Report 2013*. (2013). Sandton: Deloitte & Touche.

Deloitte & Touche. (n.d). *Job creation: Generating Growth and Opportunities*. (n.d). Sandton: Deloitte & Touche.

Deloitte & Touche. (n.d). *The reality of Employment : Entrepreneurship the key to SA's job creation ambitions*. (n.d.). Sandton: Deloitte & Touche.

Deraniyagala, S. & Kaluwa, B. (2011). *Macroeconomic Policy for Employment Creation: The case of Malawi*. Geneva: International Labour Office, Employment Policy Department.

EYGM Limited. (2013). *Africa by numbers 2013-14*. EYGM Limited. Retrieved from <http://www.ey.com/ZA/en/Issues/Business-environment/Africa-by-numbers---main-page> [Accessed: 04 February 2015].

ESI Africa. (2013). *Leadership and training initiatives at Medupi*. Retrieved from <http://www.esi-africa.com/leadership-and-training-initiatives-at-medupi/> [Accessed: 16 April 2014].

Eskom. (2010). *JOINT MEDIA RELEASE EskomHitachi*. Eskom Media Desk. Retrieved from http://www.eskom.co.za/OurCompany/90YearCelebrations/Pages/Media_Releases.aspx [Accessed: 13 March 2015].

Eskom. (2011). *The Eskom Factor*. Eskom Holdings Limited. Retrieved from <http://www.eskom.co.za/OurCompany/SustainableDevelopment/Documents/EskomFactor.pdf> [Accessed: 29 November 2014].

Eskom. (2013a). *Legacy Programme – Job Creation*. pdf. Retrieved from http://www.eskom.co.za/Whatweredoing/NewBuild/MedupiPowerStation/Pages/Legacy_Programme.aspx [Accessed: 22 January 2015].

Eskom. (2013b). *Medupi Brochure*. Communications and Stakeholder Management Department Group Capital Division. Retrieved from http://www.eskom.co.za/Whatweredoing/NewBuild/MedupiPowerStation/Documents/BROCHURE_medupipowerstationproject.pdf [Accessed: 29 November 2014].

Eskom. (2013c). *Medupi Legacy Programme*. Eskom. Retrieved from http://www.eskom.co.za/Whatweredoing/NewBuild/MedupiPowerStation/Pages/Medupi_Legacy_Programme.aspx [Accessed: 07 January 2015].

Eskom. (2014). *Aligning Skills Demand and Supply in Mega Infrastructure Construction Projects*. 18-19 November 2014, *DHET Conference*. Retrieved from <http://www.dhet.gov.za/TVET%20Conference/Commission%201/Nthabiseng%20Malebo-Medupi%20Leadership%20initiative-Aligning%20supply%20and%20demand%20of%20skills.pdf> [Accessed: 13 March 2015].

Eskom. (2013d). *Medupi Fact Sheet. (2013, September)*. Sandton: Eskom.

Eskom. (2013e). *Medupi Power Station. Medupi Brochure*. Communications and Stakeholder Management Department, Group Capital Division. Sandton: Eskom.

Filmer, D. & Fox, L. (2014). *Youth Employment in sub-Saharan Africa*. Washington DC: International Bank for Reconstruction and Development / The World Bank.

Fine, D., Van Wamelen, A., Lund, S., Cabral, A., Taoufik, M., Dorr, N. & Cook, P. (2012). *Africa at Work: Job Creation and Inclusive Growth*. McKinsey Global Institute. Retrieved from http://www.mckinsey.com/insights/africa/africa_at_work [Accessed: 17 April 2015]

Flyvberg, B., Bruzelius, N. & Rothengatter, W. (2003). *Megaprojects and Risk: An Anatomy of Ambition*. Cambridge, MA: Cambridge University Press.

Gautrain. (2008). *Gautrain to Boost Skills Development*. Retrieved from <http://www.gautrain.co.za/newsroom/2008/03/gautrain-to-boost-skills-development/>
[Accessed: 09 January 2015]

Gautrain. (n.d.-a). *Bombardier Celebrates the Completion of the Gautrain Women Learnership Program*. Retrieved from <http://www.gautrain.co.za/about/sed-delivery/training/bombardier-celebrates-the-completion-of-the-gautrain-women-learnership-program/>
[Accessed: 20 September 2015]

Gautrain. (n.d.-b). *Gautrain Delivers on Job Creation Promises to Fight Poverty*. Retrieved from <http://www.gautrain.co.za/about/sed-delivery/job-creation/gautrain-delivers-on-job-creation-promises-to-fight-poverty/>
[Accessed: 25 September 2015]

Gautrain. (n.d.-c). *Gautrain Empowers Women through Skills Training*. Gautrain. Retrieved from <http://www.gautrain.co.za/about/sed-delivery/training/gautrain-empowers-women-through-skills-training/>
[Accessed: 25 September 2015]

Gautrain. (n.d.-d). *Gautrain Exceeds Job Creation Targets Despite Tough Economic Downturn*. Retrieved from <http://www.gautrain.co.za/about/sed-delivery/general/gautrain-exceeds-job-creation-targets-despite-tough-economic-downturn/>
[Accessed: 25 September 2015]

Gautrain. (n.d.-e). *Gautrain Provides Training on Scarce and Critical Skills*. Retrieved from <http://www.gautrain.co.za/about/sed-delivery/job-creation/gautrain-provides-training-on-scarce-and-critical-skills/>
[Accessed: 25 September 2015]

Gautrain.(n.d.-f). *Good Achievements on Socioeconomic Deliverables*. Retrieved from <http://www.gautrain.co.za/about/sed-delivery/job-creation/good-achievements-on-socio-economic-deliverables/>
[Accessed: 02 October 2015]

Gautrain. (n.d.-g). *Good Results on Gautrain's Socioeconomic Initiatives*. Retrieved from <http://www.gautrain.co.za/about/sed-delivery/general/good-results-on-gautrains-socio-economic-initiatives/>
[Accessed: 02 October 2015]

Gautrain. (n.d.-h). *September Achievements for Gautrain's Socioeconomic Initiatives*. Gautrain. Retrieved from <http://www.gautrain.co.za/about/sed-delivery/job-creation/september-achievements-for-gautrains-socio-economic-initiatives/>
[Accessed: 02 October 2015]

Gautrain. (n.d.-i). *Social Economic Development: Delivering on Gautrain's Social Economic Goals*. Johannesburg: Gautrain Managment Agency.

Gautrain. (n.d.-j). *Gautrain's Initiatives Enlarge Skills Database*. Johannesburg: Bombela Concession Company (Pty) (Ltd) Gautrain.

Gautrain. (n.d.-k). *Gautrain Annual Environmental Status Report. (2010)*. Johannesburg: Bombela Concession Company (Pty) (Ltd) Gautrain. Retrieved from <http://gma.gautrain.co.za/uploads/doc/GMA-Annual-Report-2010.pdf>. [Accessed: 12 March 2015]

The Skills Portal. (2008). *Gautrain provides skills for women in construction*. 19th June 2008 Retrieved from <http://tspde.pl.privatelabel.co.za/page/skills-development/622568-Gautrain-provides-skills-for-women-in-construction#.VkBlhLcrLIU>. [Accessed: 17 June 2014]

Gerbert, P. Emmert, H. & Ermias, T. (2013). *Prioritizing and Attracting Private Infrastructure Investments in Africa*. Bcg.

Greiman, V. (2010). *The Big Dig: Learning from a mega project*. Ask Magazine, Summer (39):47-52.

Hannon, P. 2013, *African infrastructure review*, Nedbank Capital, March 2013.

Hesse-Biber, S.N. & Leavy, P. (2010). *The Practice of Qualitative Research*. Thousand Oaks, CA: Sage. Second edition. Retrieved from <https://books.google.com/books?hl=en&lr=&id=FVjcZk7mCFwC&oi=fnd&pg=PR1&dq=%22of+binge+drinking+in+college,+the+questions+asked+in+this+type+of%22+%22meaning+from+their+data.+The+focus+of+research+is+generally+words%22+%22addition,+the+research+process+itself,+a+iso+referred+to+in+this+book+as%22+&ots=6tStvjggaa&sig=zKT7oxK31WXCKTtWjvzxh0p2i3o> [Accessed: 15 June 2014].

Hoepfl, M.C. (1997). *Choosing qualitative research: A primer for technology education researchers*. Journal of Technology Education, 9(1):47-63. Retrieved from <http://scholar.lib.vt.edu/ejournals/JTE/v9n1/hoepfl.html>. [Accessed: 20 July 2014]

International Labour Conference. (2008). *Skills for improved productivity, employment growth and development: Fifth item on the agenda*. Geneva: International Labour Office.

International Labour Office. (2014). *Global employment trends 2014: Risk of a jobless recovery?* Retrieved from <http://alltitles.ebrary.com/Doc?id=10842325>. [Accessed: 17 March 2015]

International Labour Office (2011). *Skills development impact evaluation: A practical guide*, (ILO/CINTERFOR) first edition 2011,

International Monetary Fund. (2014). *Regional economic outlook: Sub-Saharan Africa: Fostering durable and inclusive growth*. Washington, DC: International Monetary Fund.

- KPMG. (2013a). *Infrastructure and economic development – Mozambique's promising future*. (2013). Africa KPMG Research Press Release.
- KPMG. (2013c). *Planned infrastructure spending and the NDP: Mind the gap: An analysis of the infrastructure spending gap and its impact on employment creation*. Johannesburg: KPMG.
- KPMG. (2013b). *Mega projects with special feature on Africa's infrastructure market*. KPMG, IINSIGHT: The global infrastructure magazine (No 4/ 2013). Retrieved from <https://assets.kpmg.com/content/dam/kpmg/pdf/2013/02/insight-megaprojects.pdf> [Accessed: 14 July 2014]
- Klaver, A.(2012). *Speed kills*. Project Manager Magazine, (December/January):19.
- Kudzanayi, B. 2013, *A snapshot of key infrastructure development across Africa* CBE BE Indaba Presentation, Frost & Sullivan, March 2013.
- Kuruvilla, S., & Chua, R. (2000). *How Do Nations Develop Skills? Lessons from the Skill Development Experiences of Singapore*. Retrieved from <http://digitalcommons.ilr.cornell.edu/cbpubs/8/>
- Macfarlane, R. & Joseph Rowntree Foundations (2000). *Using local labour in construction: A good practice resource book*. Bristol, UK: The Policy Press / The Joseph Rowntree Foundation.
- Mahuron, S. (2015). *Skilled Labor vs. Unskilled Labor*. Houston: Hearst Newspapers, LLC.
- Marrelli, A.F. (2005). The performance technologist's toolbox: Literature reviews.*Performance Improvement*, 44(7):40-44.
- Murray & Roberts. (2010). *Medupi Rising*. (2010, June). Johannesburg: Murray & Roberts.
- Merrow, E.W. (2011). *Industrial megaprojects: concepts, strategies, and practices for success*. London: John Wiley & Sons.
- Molekoa, L. (2011). *Medupi power station project, South Africa*. Creamer Media's Engineering News. Retrieved from <http://www.engineeringnews.co.za/topic/medupi-power-station> [Accessed: 07 September 2014]
- Mota-Engil. (2012). *Nacala Corridor – A challenge at the scale of the Mota-Engil Group*. Portugal: Mota-Engil. Retrieved from <http://www.motaengil.pt/NewsDetail.aspx?contentId=2494&parentContentId=187&year=2014&month=-2147483648&Language=2> [Accessed: 10 February 2014]
- Murray & Roberts. (2011). *Ground Zero: Preparing for the next growth phase*. ROBUST : Murray & Roberts Group Magazine. Retrieved from http://www.murrob.com/publications/robust_mar2011/pdf/robust_mar11.pdf [Accessed: 16 September 2014]

National Skill Development Corporation (n.d). *Guidelines for Accreditation, Affiliation and Continuous monitoring of Training Centres for the Skill Ecosystem*, Government of India Ministry of skill development and Entrepreneurship

National Statistics Office. (2014). *Malawi Labour Force Survey 2013: Key Findings Report*. (2014, April). National Statistical Office Zomba, Malawi.

Northern Territory Government, Department of Employment, Education and Training. (2004). *Workforce NT Report*. Darwin.

O'Caroll, S. (2012) *Mega trends Driving Transport and Logistics in sub-Saharan Africa*, Powerpoint presentation, 2012, Frost and Sullivan. Retrieved from <http://www.slideshare.net/FrostandSullivan/mega-trends-driving-transport-logistics-6-2613>. [Accessed: 19 July 2014]

Page, J. (2012). *Youth, Jobs, and Structural Change: Confronting Africa's employment Problem.* African Development Bank. Tunis, Tunisia Retrieved from <http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/PDF/Papers/Working%20Papers%20Series%20155%20-%20Youth%20Jobs%20and%20Structural%20Change.pdf> [Accessed: 27 June 2014]

Paycheck.in. (2016). *Definition of Unskilled, Semi-skilled, Skilled & Highly Skilled Workers*. Retrieved from <http://www.paycheck.in/main/salary/minimumwages/definition-of-unskilled-semi-skilled-skilled-highly-skilled-workers>

Patel, K (2013), *The Medupi delay why should you care*. Daily Maverick South Africa

PricewaterhouseCoopers. (2013). *Africa gearing up : Future prospects in Africa for the transportation & logistics industry*. PricewaterhouseCoopers. Retrieved from <http://www.pwc.co.za/en/press-room/transport-logistics.html> [Accessed: 06 March 2015]

Railways Africa (2009) *Gautrain and Skills Development*. Retrieved from Railwaysafrica.com [Accessed: 05 March 2015]

Richards, A. (2012). *Ensuring that capital efficiency is achieved through project implementation*. Sandton: Deloitte & Touche.

Scheepers, C. & Marais, S. (2012). *Constructing the Medupi Power Station*. Richard Ivey School of Business, The University of Western Ontario.

Slabbert, A. (2013). *Medupi Training: Relevant or Public relations exercise?* 29th October 2013 Moneyweb Retrieved from <http://www.moneyweb.co.za/archive/medupi-training-relevant-or-public-relations-exerc/> [Accessed: 18 January 2015]

Slater, D (2015), *Back to basics approach mitigates cost overruns* (2015, July 17). Creamer Media's Engineering News. South Africa.

- South Africa.info. (2009). *Skills shortage SA's "biggest constraint."* (2009, February 19). Retrieved from <http://www.southafrica.info/business/economy/gtibr-190209.htm#.VjIYorcrLIU> [Accessed: 27 February 2015]
- Statistics South Africa. (2015). *Quarterly Labour Force Survey, Quarter 4, 2014.* (2015, February 10). Pretoria: Statistics South Africa.
- Sy, A. (2014, January). *Africa in focus: Jobless Growth in Sub-Saharan Africa.* Brookings.
- Sylph Education Solutions. (n.d). *Skills Development.* Sylph Education Solutions Ltd. Retrieved from <http://www.sylphedu.com/skills-development> [Accessed: 14 March 2015]
- Szolnoki, G. & Hoffmann, D. (2013). *Online, face-to-face and telephone surveys – Comparing different sampling methods in wine consumer research.* Wine Economics and Policy, 2(2):57-66. Retrieved from <http://doi.org/10.1016/j.wep.2013.10.001> [Accessed: 29 June 2014].
- Tabassi, A.A. & Abu Bakar, A.H. 2009. *Training, motivation, and performance: The case of human resource Management in construction projects in Mashhad, Iran.* International Journal of Project Management, 27(5):471-480.
- Tancott, G. (2014). *Feasibility study for Gautrain expansion.* Infrastructure News and Service Delivery.
- Technical, Entrepreneurial and Vocational Education and Training Authority of Malawi.(2013). (TEVETA) Retrieved from <http://www.tevetamw.com/index.php/about-us/about-teveta>. [Accessed 20 July 2014].
- The sbu. (2013). *Skills development in construction.* Retrieved from <http://www.thesbu.com/blog/entry/skills-development-in-construction/>.
- The skills portal. (2013). *Electricity Infrastrure Programmes : Welding's role in delivering electricity infrastructure programmes.* (2013, April 12).The skills portal. Retrieved from <http://www.skillsportal.co.za/content/weldings-role-delivering-electricity-infrastructure-programmes> [Accessed: 30 September 2015].
- Thomas, D.R. (2006). *A general inductive approach for analysing qualitative evaluation data.* American Journal of Evaluation, 27(2):237-246.
- University of Sheffield. (n.d). *Finance.* Retrieved from https://www.sheffield.ac.uk/finance/staff-information/help/capital_projects/definition [Accessed: 08 January 2015].
- Vale. (n.d), *Logistica :Railroads.* Retrieved from <http://www.vale.com/EN/business/logistics/railways/Pages/default.aspx>. [Accessed: 27 November 2015].

Vale. (2013). Our Logistics operations in Mozambique complete two years. Retrieved from <http://www.vale.com/EN/aboutvale/news/Pages/nossa-operacao-logistica-em-mocambique-completa-2-anos.aspx>
[Accessed: 19 September 2014]

Vale. (2012). *Delivering value through capital efficiency*, Annual report 2012. Vale.

Van der Merwe, C. Van der Merwe, E., van Zyl, O.A.W. & Negota, G. (2012). *Gautrain: successful implementation of socio economic development objectives*. Sandton: Gautrain Management Agency. Paper presented at the 31st Annual Southern African Transport Conference 9-12 July 2012 “*Getting Southern Africa to Work*”, CSIR International Convention Centre, Pretoria, South Africa. In: Proceedings 31st Annual Southern African Transport Conference 2012.

Wikipedia. (2015). *List of Transportation Mega Projects* Wiki Article. Retrieved from https://en.wikipedia.org/wiki/List_of_transport_megaprojects.
[Accessed: 17 March 2015]

World Bank. (2014). *Malawi – Skills Development Project*. World Bank. Retrieved from <http://documents.worldbank.org/curated/en/2014/05/19603349/malawi-skills-development-project>
[Accessed: 29 July 2015]

World Bank. (2009). *Africa Development Indicators 2008/2009: From the World Bank Africa Database*. The World Bank. Retrieved from <http://elibrary.worldbank.org/doi/book/10.1596/978-0-8213-7787-1>
[Accessed: 27 January 2015]

Zainal, Z. (2007). *Case study as a research method*. Journal Kemanusiaan, (9):1-6.

APPENDIX A: ETHICS PROCEDURE



Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL) R14/49 Mwamlima

CLEARANCE CERTIFICATE

PROTOCOL NUMBER H13/11/21

PROJECT TITLE

Challenges faced delivery selected key capital projects in the Sub-Saharan Africa: Case studies in South Africa and Malawi

INVESTIGATOR(S)

Ms B Mwamlima

SCHOOL/DEPARTMENT

Civil and Environmental Engineering

DATE CONSIDERED

22/11/2013

DECISION OF THE COMMITTEE

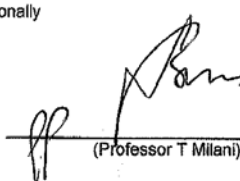
Approved Unconditionally

EXPIRY DATE

17/12/2015

DATE 18/12/2013

CHAIRPERSON


(Professor T Milani)

cc: Supervisor : Prof R McCutcheon

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10003, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**


Signature

08, 05, 2014
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX B: QUESTIONNAIRES

BEFORE THE INTERVIEW:

I want to thank you for taking the time to meet with me today. My name is Bwighane Mwamlima and I would like to talk to you about your experiences participating in the delivery of Nacala Corridor Railway Project with regards to the research report that am working on.

The title of the research is: *“An evaluation of employment creation and skills transfer during the delivery of capital projects in sub-Saharan Africa with a focus on three selected case studies”* with the intention of capturing lessons that can be used in future capital projects. The interview should take less than an hour. Although I will be taking some notes during the session, I can't possibly write fast enough to get it all down. So please be patient with me when I ask you to repeat some of your answers.

All responses will be kept confidential. This means that your interview responses will be shared only with research team members and we will ensure that any information we include in our report does not identify you. Remember, you don't have to talk about anything you don't want to and you may end the interview at any time. Are there any questions about what I have just explained? Are you willing to participate in this interview?

AFTER THE INTERVIEW:

Thank you very much for your time and assistance. I do appreciate it.

INTERVIEW SCHEDULE A (1)

ONE-TO-ONE INTERVIEWS: NACALA CORRIDOR RAILWAY PROJECT

- 1. PROJECT MANAGER**
- 2. SITE AGENT (PLANNING)**
- 3. HEAD OF LOGISTICS**

A. BACKGROUND

1. Could you please give me your professional background and the position that you hold on this project?
2. What are your current duties on this project?

B. THE PROJECT

3. Please give me a brief summary of the Nacala Corridor Railway Project?
4. Is this project under any binding commitments or contractual obligations to create employment or transfer skills through the implementation of the projects?
5. At the start of this project did you have targeted employment numbers?
6. If "yes", what were the targeted numbers of employment?
7. Were these targets detailed and broken down into specific categories (i.e. skilled, semi- skilled, unskilled and expatriates vs non-expatriates)?
8. Have you been able to meet this target so far?
9. If "yes" /"no" what is the number of created jobs against targeted employment?
10. What are the categories of the employment created (in terms of skilled, semi-skilled, unskilled and expatriates vs non-expatriates)? Please explain.
11. With regard to Skills transfer, did you have any targets as to the number of skills development programmes the project will offer?
12. Can you please explain and give me a list of these training programmes?
13. Were these training programmes accredited? What was the length of these training programmes?
14. Was the time spent on training sufficient to create sustainable skills?
15. Were there any compliance monitoring measures in place to monitor the employment creation and skills training programmes?
16. What strategies, interventions, tools, for example, would you recommend to be sustained and / or scaled up in order to create more employment and develop skills on such projects? Please provide a justification for your response.
17. Is there anything you would like to add?

INTERVIEW SCHEDULE B (1)

TELEPHONIC INTERVIEW:
HUMAN RESOURCES MANAGER

A. BACKGROUND

1. Could you please give me your professional background and the position that you hold on this project?
2. What are your current duties on this project?

B. THE PROJECT

3. Please give me a brief summary of the Nacala Corridor Railway Project?
4. Is this project under any binding commitment or contractual obligations to create employment or transfer skills through the implementation of the project?
5. At the start of this project did you have any targeted employment number?
6. If "yes", what were the targeted numbers of employment?
7. Were these targets detailed and broken down into specific categories (i.e. skilled, semi- skilled, unskilled and expatriates vs non-expatriates)
8. Have you been able to meet this target so far?
9. If "yes" / "no" what is the number of created jobs against targeted employment?
10. What are the categories of the employment created (in terms of skilled, semi-skilled, unskilled and expatriates vs non-expatriates)? Please explain.
11. Do you have any skills training programmes on the project?
12. So far how many training programmes have you done? Can you please give me a list of these training programmes?
13. Were these training programmes accredited? And what was the length of these training programmes?
14. Would you give me a list of the number of employees who have been trained so far and in what skills?
15. Was the time spent on training sufficient to create sustainable skills?

16. What effect, if any, do you feel the project has on the surrounding community in which you work? Please explain.
17. What were some barriers, if any, that you encountered with regard to creating employment and developing skills?
18. How did you overcome these barriers?
19. Do you believe large-scale projects can be used as tools for creating employment and transferring skills
20. What recommendations do you have for future efforts with regard to employment creation and skills transfer?
21. Is there anything you would like to add with regard to employment creation and skills transfer on capital projects such as the Nacala Railway Project?

APPENDIX C: NACALA CORRIDOR RAILWAY PROJECT MANPOWER RECORDS

Table C-0-1: Nacala Corridor Railway Project manpower records for the year 2012

2012																				
Manpower by Function	March		April		May		June		July		August		September		October		November		December	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
1. Mass Earthworks & Pavement Layers	29	29	123	123	123	123	134	134	172	172	178	178	188	188	218	218	255	255	266	266
Engineers / Supervisors / Foreman / Technician					10	10	14	14	17	17	20	20	19	19	24	24	26	26	27	27
Team Leader					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Skilled Labour					3	3	4	4	8	8	8	8	11	11	14	14	17	17	21	21
Plant Operator & Driver	29	29	123	123	93	93	99	99	119	119	119	119	120	120	139	139	164	164	167	167
Unskilled Labour					16	16	16	16	28	28	29	29	37	37	39	39	47	47	50	50
2. Drainage & Erosion					37	37	120	120	190	190	206	206	253	253	299	299	352	352	398	398
Engineers / Supervisors / Foreman/ Technician					15	15	21	21	26	26	30	30	29	29	37	37	39	39	40	40
Team Leader																				
Skilled Labour					2	2	39	39	68	68	74	74	99	99	129	129	155	155	190	190
Plant Operator & Driver					10	10	11	11	13	13	13	13	13	13	15	15	18	18	19	19
Unskilled Labour					10	10	49	49	83	83	88	88	111	111	118	118	140	140	150	150
3. Containment					5	5	7	7	10	10	10	10	30	30	33	33	39	39	43	43
Engineers / Supervisors / Foreman / Technician					1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	3
Skilled Labour					1	1	2	2	4	4	4	4	5	5	7	7	9	9	11	11
Plant Operator & Driver					3	3	3	3	4	4	4	4	4	4	5	5	5	5	5	5
Unskilled Labour													18	18	19	19	23	23	24	24
4. Concrete Structures					1	1	115	115	176	176	194	194	216	216	268	268	317	317	365	365
Engineers / Supervisors / Foreman / Technician					1	1	24	24	30	30	35	35	33	33	42	42	45	45	47	47
Team Leader							1	1	2	2	4	4	5	5	5	5	7	7	7	7
Skilled Labour							49	49	86	86	94	94	125	125	163	163	196	196	239	239
Plant Operator & Driver							20	20	24	24	24	24	25	25	28	28	34	34	34	34
Unskilled Labour							20	20	34	34	36	36	28	28	30	30	35	35	38	38

2012																				
Manpower by Function	March		April		May		June		July		August		September		October		November		December	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
5. Concrete Production					10	10	14	14	16	16	18	18	19	19	22	22	25	25	27	27
Engineers / Supervisors / Foreman / Technician					1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2
Skilled Labour					0	0	1	1	1	1	1	1	2	2	2	2	2	2	3	3
Plant Operator & Driver					6	6	7	7	8	8	8	8	8	8	9	9	11	11	11	11
Unskilled Labour					3	3	5	5	6	6	7	7	8	8	9	9	10	10	11	11
6. Quarries					21	21	25	25	35	35	36	36	44	44	49	49	58	58	63	63
Managing Staff - -					3	3	3	3	3	3	3	3	5	5	5	5	6	6	7	7
Team Leader							0	0	0	0	0	0	0	0	0	0	1	1	1	1
Skilled Labour					1	1	2	2	4	4	4	4	6	6	8	8	9	9	11	11
Plant Operator & Driver					10	10	11	11	13	13	13	13	13	13	15	15	18	18	18	18
Unskilled Labour					7	7	8	8	14	14	15	15	19	19	20	20	24	24	26	26
7. Superstructure																				
Engineers / Supervisors / Foreman / Technician																				
Team Leader																				
Skilled Labour																				
Plant Operator & Driver																				
Unskilled Labour																				
8. Site Camp	140	140	199	199	259	259	213	213	321	321	357	357	385	385	397	397	458	458	516	516
Engineers / Supervisors / Foreman / Technician	53	53	71	71	78	78	86	86	107	107	124	124	116	116	136	136	146	146	150	150
Team Leader							0	0	0	0	0	0	0	0	0	0	1	1	1	1
Skilled Labour	72	72	80	80	90	90	71	71	123	123	135	135	176	176	177	177	212	212	259	259
Plant Operator & Driver	7	7	11	11	7	7	7	7	9	9	9	9	9	9	10	10	12	12	12	12
Unskilled Labour	8	8	37	37	85	85	49	49	82	82	88	88	84	84	73	73	87	87	94	94
9. Factories													35	35	117	117	138	138	158	158
Engineers / Supervisors / Foreman / Technician													2	2	12	12	13	13	14	14
Team Leader													1	1	1	1	2	2	2	2
Skilled Labour													5	5	59	59	70	70	86	86
Plant Operator & Driver													1	1	1	1	1	1	1	1
Unskilled Labour													27	27	43	43	51	51	55	55

2012																				
Manpower by Function	March		April		May		June		July		August		September		October		November		December	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
10. Equipment			12	12	95	95	94	94	120	120	123	123	130	130	156	156	184	184	197	197
Engineers / Supervisors / Foreman / Technician					5	5	6	6	8	8	9	9	9	9	11	11	12	12	12	12
Team Leader							0	0	0	0	0	0	0	0	0	0	0	0	0	0
Skilled Labour					7	7	11	11	20	20	22	22	29	29	38	38	45	45	56	56
Plant Operator & Driver			12	12	83	83	76	76	92	92	92	92	92	92	107	107	126	126	129	129
P = Peak and A = Average																				

Table C-0-2: Nacala Corridor Railway Project manpower records for the year 2013

2013																								
Manpower by Function	January		February		March		April		May		June		July		August		September		October		November		December	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22
1. Mass Earthworks & Pavement Layers	289	289	297	297	307	307	372	372	429	429	488	488	439	439	441	441	454	454	463	463	480	480	475	475
Engineers / Supervisors / Foreman / Technician	30	30	32	32	33	33	37	37	39	39	43	43	48	48	45	45	46	46	44	44	40	40	40	40
Team Leader	1	1	1	1	1	1	1	1	2	2	2	2	4	4	5	5	6	6	6	6	6	6	6	6
Skilled Labour	25	25	28	28	29	29	32	32	35	35	37	37	44	44	46	46	47	47	46	46	46	46	44	44
Plant Operator & Driver	175	175	168	168	177	177	225	225	268	268	318	318	301	301	303	303	307	307	318	318	337	337	331	331
Unskilled Labour	58	58	67	67	67	67	78	78	85	85	87	87	42	42	43	43	48	48	49	49	51	51	54	54
2. Drainage & Erosion	466	466	525	525	535	535	600	600	655	655	699	699	628	628	642	642	674	674	669	669	667	667	656	656
Engineers / Supervisors / Foreman / Technician	45	45	49	49	50	50	55	55	59	59	64	64	72	72	67	67	69	69	66	66	61	61	60	60
Team Leader			1	1	1	1	1	1	1	1	1	1	3	3	3	3	4	4	4	4	4	4	4	4
Skilled Labour	227	227	256	256	264	264	287	287	312	312	336	336	395	395	409	409	422	422	418	418	412	412	392	392
Plant Operator & Driver	19	19	19	19	20	20	25	25	30	30	35	35	33	33	34	34	34	34	35	35	37	37	37	37
Unskilled Labour	175	175	201	201	201	201	233	233	254	254	262	262	126	126	129	129	144	144	147	147	153	153	163	163
3. Containment	50	50	56	56	57	57	65	65	71	71	76	76	57	57	59	59	62	62	62	62	63	63	63	63
Engineers / Supervisors / Foreman / Technician	3	3	4	4	4	4	4	4	5	5	5	5	6	6	5	5	5	5	5	5	5	5	5	5
Skilled Labour	13	13	14	14	15	15	16	16	17	17	19	19	22	22	23	23	23	23	23	23	23	23	22	22
Plant Operator & Driver	6	6	5	5	6	6	7	7	9	9	10	10	10	10	10	10	10	10	10	10	11	11	11	11
Unskilled Labour	28	28	32	32	32	32	38	38	41	41	42	42	20	20	21	21	23	23	24	24	25	25	26	26
4. Concrete Structures	425	425	472	472	485	485	540	540	596	596	650	650	715	715	712	712	741	741	732	732	726	726	702	702
Engineers / Supervisors / Foreman / Technician	52	52	56	56	57	57	64	64	68	68	75	75	83	83	77	77	80	80	76	76	70	70	70	70
Team Leader	7	7	7	7	8	8	10	10	15	15	21	21	40	40	23	23	28	28	27	27	27	27	27	27
Skilled Labour	287	287	324	324	333	333	362	362	394	394	424	424	499	499	517	517	533	533	528	528	521	521	496	496
Plant Operator & Driver	36	36	34	34	36	36	46	46	55	55	65	65	62	62	62	62	63	63	65	65	69	69	68	68
Unskilled Labour	44	44	51	51	51	51	59	59	64	64	66	66	32	32	32	32	36	36	37	37	38	38	41	41
5. Concrete Production	30	30	31	31	33	33	39	39	42	42	46	46	43	43	43	43	44	44	44	44	43	43	41	41
Engineers / Supervisors / Foreman / Technician	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Skilled Labour	3	3	4	4	4	4	4	4	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	6
Plant Operator & Driver	12	12	11	11	12	12	15	15	18	18	22	22	21	21	21	21	21	21	22	22	23	23	23	23
Unskilled Labour	13	13	13	13	15	15	16	16	16	16	16	16	13	13	13	13	13	13	13	13	11	11	10	10

2013																								
Manpower by Function	January		February		March		April		May		June		July		August		September		October		November		December	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22
6. Quarries	71	71	76	76	78	78	90	90	100	100	109	109	88	88	91	91	97	97	99	99	98	98	99	99
Managing Staff - -	7	7	7	7	7	7	7	7	6	6	6	6	6	6	6	6	7	7	8	8	4	4	5	5
Team Leader	1	1	1	1	1	1	1	1	2	2	2	2	4	4	5	5	6	6	6	6	6	6	6	6
Skilled Labour	13	13	15	15	15	15	17	17	18	18	20	20	23	23	24	24	25	25	24	24	24	24	23	23
Plant Operator & Driver	19	19	19	19	19	19	25	25	30	30	35	35	33	33	33	33	34	34	35	35	37	37	37	37
Unskilled Labour	30	30	35	35	35	35	41	41	44	44	46	46	22	22	22	22	25	25	26	26	27	27	28	28
7. Superstructure	2	2	2	2	7	7	8	8	9	9	9	9	16	16	119	119	129	129	127	127	126	126	127	127
Engineers / Supervisors / Foreman / Technician	2	2	2	2	7	7	8	8	9	9	9	9	11	11	37	37	39	39	37	37	34	34	33	33
Team Leader													1	1	22	22	27	27	26	26	26	26	26	26
Skilled Labour															23	23	24	24	23	23	23	23	22	22
Plant Operator & Driver													4	4	7	7	7	7	7	7	8	8	8	8
Unskilled Labour															30	30	34	34	34	34	36	36	38	38
8. Site Camp	600	600	670	670	679	679	754	754	819	819	881	881	899	899	821	821	853	853	837	837	818	818	793	793
Engineers / Supervisors / Foreman / Technician	167	167	181	181	179	179	199	199	213	213	233	233	260	260	215	215	222	222	211	211	195	195	193	193
Team Leader	1	1	1	1	1	1	1	1	1	1	2	2	3	3	4	4	5	5	5	5	5	5	5	5
Skilled Labour	310	310	350	350	360	360	392	392	426	426	459	459	534	534	536	536	553	553	547	547	540	540	514	514
Plant Operator & Driver	13	13	13	13	13	13	17	17	20	20	24	24	22	22	16	16	16	16	17	17	18	18	17	17
Unskilled Labour	109	109	126	126	126	126	146	146	159	159	164	164	79	79	51	51	57	57	58	58	60	60	64	64
9. Factories	185	185	210	210	214	214	239	239	261	261	279	279	262	262	271	271	286	286	283	283	282	282	278	278
Engineers / Supervisors / Foreman / Technician	15	15	17	17	17	17	19	19	20	20	22	22	24	24	23	23	24	24	22	22	21	21	20	20
Team Leader	2	2	2	2	2	2	3	3	4	4	6	6	11	11	14	14	16	16	16	16	16	16	16	16
Skilled Labour	103	103	116	116	120	120	130	130	141	141	152	152	179	179	185	185	191	191	189	189	187	187	178	178
Plant Operator & Driver	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Unskilled Labour	64	64	74	74	74	74	86	86	93	93	96	96	46	46	48	48	53	53	54	54	56	56	62	62
10. Equipment	215	215	220	220	229	229	275	275	317	317	365	365	368	368	377	377	386	386	392	392	403	403	393	393
Engineers / Supervisors / Foreman / Technician	14	14	15	15	15	15	17	17	18	18	20	20	22	22	21	21	21	21	20	20	19	19	19	19
Team Leader	0	0	1	1	1	1	1	1	1	1	1	1	3	3	3	3	4	4	4	4	4	4	4	4
Skilled Labour	66	66	75	75	77	77	84	84	91	91	98	98	116	116	120	120	124	124	122	122	121	121	115	115
Plant Operator & Driver	134	134	129	129	136	136	173	173	207	207	245	245	228	228	233	233	237	237	245	245	260	260	255	255
P = Peak and A = Average																								

Table C-0-3: Nacala Corridor Railway Project manpower records for the year 2014

2014														
Manpower by Function	January		February		March		April		May		June		July	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A
	23	23	24	24	25	25	26	26	27	27	28	28	29	29
1. Mass Earthworks & Pavement Layers	472	472	453	477	514	490	514		513		510		383	
Engineers / Supervisors / Foreman / Technician	39	39	43	37	34	37	34		33		30		22	
Team Leader	6	6	6	6	15	6	15		15		15		10	
Skilled Labour	43	43	44	50	45	54	45		45		45		30	
Plant Operator & Driver	330	330	308	330	370	332	370		370		370		286	
Unskilled Labour	53	53	52	53	50	60	50		50		50		35	
2. Drainage & Erosion	647	647	650	649	652	650	652		642		635		623	
Engineers / Supervisors / Foreman / Technician	59	59	65	59	65	59	65		62		57		45	
Team Leader	4	4	4	6	4	6	4		4		4		4	
Skilled Labour	389	389	392	392	390	392	390		390		390		390	
Plant Operator & Driver	37	37	34	37	38	38	38		31		29		29	
Unskilled Labour	158	158	155	155	155	155	155		155		155		155	
3. Containment	62	62	62	64	68	68	68		68		68		68	
Engineers / Supervisors / Foreman / Technician	5	5	5	5	5	5	5		5		5		5	
Skilled Labour	22	22	22	22	23	23	23		23		23		23	
Plant Operator & Driver	11	11	10	13	15	15	15		15		15		15	
Unskilled Labour	25	25	25	25	25	25	25		25		25		25	
4. Concrete Structures	696	696	697	699	683	707	615		483		315		164	
Engineers / Supervisors / Foreman / Technician	68	68	75	68	70	68	50		30		30		5	
Team Leader	29	29	29	29	22	28	22		18		10		4	
Skilled Labour	491	491	491	491	491	491	443		370		230		130	
Plant Operator & Driver	68	68	63	68	60	60	60		25		15		5	
Unskilled Labour	40	40	39	43	40	60	40		40		30		20	
5. Concrete Production	40	40	42	43	42	43	42		42		40		39	
Engineers / Supervisors / Foreman / Technician	3	3	3	3	3	3	3		3		2		2	
Skilled Labour	6	6	6	8	6	8	6		6		5		4	
Plant Operator & Driver	23	23	23	23	23	23	23		23		23		23	
Unskilled Labour	9	9	10	10	10	10	10		10		10		10	

2014														
Manpower by Function	January		February		March		April		May		June		July	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A
	23	23	24	24	25	25	26	26	27	27	28	28	29	29
6. Quarries	99	99	97	102	98	102	98		92		87		77	
Managing Staff - -	6	6	7	7	7	7	7		4		4		4	
Team Leader	6	6	6	6	6	6	6		3		3		3	
Skilled Labour	23	23	23	23	23	23	23		23		23		23	
Plant Operator & Driver	36	36	34	36	35	36	35		35		30		20	
Unskilled Labour	28	28	27	30	27	30	27		27		27		27	
7. Superstructure	127	127	125	130	125	135	125		125		125		125	
Engineers / Supervisors / Foreman / Technician	33	33	36	33	36	33	36		36		36		36	
Team Leader	28	28	23	28	23	28	23		23		23		23	
Skilled Labour	22	22	22	22	22	22	22		22		22		22	
Plant Operator & Driver	8	8	8	8	8	8	8		8		8		8	
Unskilled Labour	37	37	36	40	36	45	36		36		36		36	
8. Site Camp	784	784	816	913	805	919	805		795		765		755	
Engineers / Supervisors / Foreman / Technician	190	190	220	187	220	190	220		220		190		180	
Team Leader	5	5	5	5	5	5	5		5		5		5	
Skilled Labour	509	509	514	642	510	635	510		510		510		510	
Plant Operator & Driver	17	17	16	16	20	16	20		20		20		20	
Unskilled Labour	62	62	61	62	50	72	50		40		40		40	
9. Factories	276	276	269	276	267	276	267		267		167		118	
Engineers / Supervisors / Foreman / Technician	20	20	20	20	20	20	20		20		15		10	
Team Leader	17	17	17	17	15	17	15		15		10		6	
Skilled Labour	176	176	170	176	170	176	170		170		100		60	
Plant Operator & Driver	2	2	2	2	2	2	2		2		2		2	
Unskilled Labour	60	60	60	60	60	60	60		60		40		40	
10. Equipment	390	390	386	385	386	382	386		386		386		356	
Engineers / Supervisors / Foreman / Technician	18	18	18	18	18	18	18		18		18		18	
Team Leader	4	4	4	6	4	6	4		4		4		4	
Skilled Labour	114	114	114	114	114	114	114		114		114		114	
Plant Operator & Driver	254	254	250	247	250	244	250		250		250		220	
P = Peak and A = Average														

Table C-0-4: Nacala Corridor Railway Project summary of manpower by function 2012

2012																				
Manpower by Function	March		April		May		June		July		August		September		October		November		December	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
Team Leader	-	-	-	-	1	1	2	2	4	4	6	6	8	8	8	8	12	12	12	12
Skilled Labour	72	72	80	80	104	104	179	179	313	313	343	343	458	458	597	597	716	716	875	875
Plant Operator & Driver	36	36	146	146	212	212	234	234	282	282	282	282	285	285	330	330	390	390	397	397
Unskilled Labour	8	8	37	37	122	122	148	148	247	247	264	264	332	332	351	351	417	417	448	448
Managing Staff	-	-	-	-	3	3	3	3	3	3	3	3	5	5	5	5	6	6	7	7
Engineers / Supervisors / Foreman / Technician	53	53	71	71	110	110	155	155	191	191	223	223	211	211	268	268	286	286	295	295
Total	169	169	334	334	552	552	721	721	1,040	1,040	1,122	1,122	1,300	1,300	1,560	1,560	1,826	1,826	2,033	2,033
P = Peak and A = Average																				

Table C-0-5: Nacala Corridor Railway Project summary of manpower by function 2013

2013																								
Manpower by Function	January		February		March		April		May		June		July		August		September		October		November		December	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
Team Leader	12	12	13	13	14	14	17	17	26	26	36	36	69	69	79	79	95	95	91	91	92	92	93	93
Skilled Labour	1,047	1,047	1,182	1,182	1,217	1,217	1,324	1,324	1,439	1,439	1,550	1,550	1,817	1,817	1,888	1,888	1,949	1,949	1,928	1,928	1,904	1,904	1,812	1,812
Plant Operator & Driver	415	415	399	399	420	420	534	534	638	638	757	757	715	715	721	721	731	731	757	757	802	802	788	788
Unskilled Labour	522	522	599	599	601	601	695	695	756	756	779	779	379	379	390	390	434	434	441	441	457	457	486	486
Managing Staff	7	7	7	7	7	7	7	7	6	6	6	6	6	6	6	6	7	7	8	8	4	4	5	5
Engineers / Supervisors / Foreman / Technician	331	331	358	358	365	365	404	404	434	434	474	474	530	530	493	493	510	510	484	484	447	447	443	443
Total	2,333	2,333	2,558	2,558	2,624	2,624	2,981	2,981	3,299	3,299	3,602	3,602	3,516	3,516	3,577	3,577	3,726	3,726	3,709	3,709	3,706	3,706	3,627	3,627
P = Peak and A = Average																								

Table C-0-6: Nacala Corridor Railway Project summary of manpower by function 2014

2014																								
Manpower by Function	January		February		March		April		May		June		July		August		September		October		November		December	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
Team Leader	100	100	94	104	94	103	94	-	87	-	74	-	59	-	54	-	37	-	22	-	12	-	9	-
Skilled Labour	1,795	1,795	1,798	1,940	1,794	1,938	1,746	-	1,673	-	1,462	-	1,306	-	1,068	-	624	-	462	-	322	-	185	-
Plant Operator & Driver	785	785	748	779	798	773	798	-	756	-	739	-	605	-	422	-	239	-	174	-	116	-	74	-
Unskilled Labour	471	471	465	478	453	517	453	-	443	-	413	-	388	-	361	-	252	-	106	-	96	-	60	-
Managing Staff	6	6	7	7	7	7	7	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-	4	-
Engineers / Supervisors / Foreman / Technician	435	435	485	430	471	433	451	-	427	-	383	-	323	-	276	-	229	-	143	-	115	-	90	-
Total	3,592	3,592	3,597	3,738	3,617	3,771	3,549	-	3,390	-	3,075	-	2,685	-	2,184	-	1,385	-	911	-	665	-	422	-
P = Peak and A = Average																								

APPENDIX D: MEDUPI POWER PROJECT SKILLS DEVELOPMENT

Table D-0-1: Medupi Power Project summary of skills development

	Targeted	Completed	In Training	Length of Training	Accredited by	Date
FORMAL SKILLS DEVELOPMENT OVERALL TOTAL	2,000	2,416	360			2014
A. Eskom contractor academy (total / average)		167	85	One week per month over an eight-month period + 26 weeks' practical training programme	Registered by Energy Sector Education and Training Authority (ESETA), CETA	
Eskom contractor academy (Technical and business skills) (business development)		38	15	8 months	CETA, certificate awarded by university of Limpopo	
Eskom Contractor Academy (ECA) + practical training program – Business sustainability and finance, Supply chain management, Project management, People management, Safety, health, environment and quality (SHEQ)		167	85	8 months	Registered by Energy Sector Education and Training Authority (ESETA)	2011
Business skills programme (contractors at the Contractors' Training Academy)		28		8 months		2013
B. Medupi leadership initiative (MLI) (estimated total average)		580				
Financial Literacy course (ability to manage personal finances)		402		1 day	NONE	Oct. 2013
Drive Your Life course (Take control of own lives; understand options post project)		162		1 day	NONE	Oct. 2013
Further Education and Training courses	960	171	34	8 weeks	NONE	2013
Small, Medium and Micro Enterprise skills (SMME skills development and expansion of hub to provide incubation office space to entrepreneurs)				3 days	NONE	

	Targeted	Completed	In Training	Length of Training	Accredited by	Date
C. LSS (LSS is a joint venture involving Fedics site services and moon cloud)		1,760		N/A	NONE	2014
D. Tlhahlong Training Centre (Medupi legacy flagship) (apprentices) (total average)	1,400	380	422	Six months of institutional training and a further 54 weeks of on-the-job training under the guidance of a mentor and a training manager	Training centre accredited by Manufacturing, Engineering and Related Services Sector Education and Training Authority (MERSETA)	
Skills development (AATP) artisans in boiler-making, rigging, welding	700			6 months	MERSETA	
Pipefitters, general fitters, welders, boilermakers, riggers, steel erectors, quality control inspectors and technicians. (Six intakes over contract duration)	1,400		224	6 months	MERSETA	
HPA's other contractors (Pipefitters, general fitters, welders, boilermakers, riggers, steel erectors, quality control inspectors and technicians)			255	6 months	MERSETA	
Apprentices		380	300	6 months	MERSETA	2014
Boilermakers to technicians	75	7		6 months	MERSETA	
Source: Compiled by researcher from Eskom (2010), Molekoa (2011), Murray & Roberts (2011), Eskom (2011), ESI Africa (2013), Slabbert (2013).						

APPENDIX E: GAUTRAIN PROJECT PHASES 1 AND 2 SKILLS DEVELOPMENT

Table E-0-1: Gautrain Project Phases 1 and 2 summary of skills development

Through the National Skills Fund, the Gauteng Project provided critical and scarce skills training in construction and construction vehicle operation and National Skills Development Strategy (NSDS) learnerships						
	Targeted	Completed	In Training	Length of Training	Accredited by	Date
1. VARIOUS CONSTRUCTION-RELATED SKILLS		16,000				2008
2. LEARNERSHIPS TOTAL AVERAGE		136		16 MONTHS	NATIONAL QUALIFICATIONS FRAMEWORK (NQF) AND ENDORSED BY THE SOUTH AFRICA QUALIFICATIONS AUTHORITY (SAQA).	2010
1st Learnership Business administration NQF level 2	45	39		16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	Sept 2008
2nd Learnership total:	43	39		16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	
2 nd Learnership Business administration NQF level 2		28		16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	April 2009
2 nd Learnership Electrical NQF level 2		11		16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	April 2009
3rd Learnership total:	48	43		16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	
3 rd Learnership Business administration NQF level 3		15		16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	2010
3 rd Learnership Business administration NQF level 2		22		16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	2010
3 rd Learnership Electrical NQF level 3		6		16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	2010
Certificate in Road work construction			19	16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	
Trade certificates in Blasting, Millwright / Fitting & Turning / Diesel mechanics			9	16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	2007
Operator training (Plant, Crane, Excavator, TLB and Front-End Load Operations)				16 months	National Qualifications Framework (NQF) and endorsed by the South Africa Qualifications Authority (SAQA).	2007
Bombela electrical finance, procurement, human resources, contract administration and wiring			84	4 weeks		
3. EXPERIENTIAL LEARNING STUDENTS STUDYING TOWARDS THE NATIONAL DIPLOMA IN CIVIL ENGINEERING			20			

Source: Compiled by researcher from Gautrain (n.d.-c; n.d.-a).

APPENDIX F: NACALA CORRIDOR RAILWAY PROJECT MANPOWER HISTOGRAM

Table F-0-1: Nacala Corridor Railway Project histogram of manpower as at 12 March 2014

