

MEGA CONSTRUCTION PROJETS IN SOUTH AFRICA: CULTURAL
COMPLEXITY

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to the School of Construction Economics and Management, University of the
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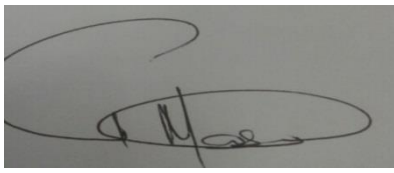
August 2019

DECLARATION

I hereby declare and certify that the entirety of the work contained therein is my own independent work. Each significant contribution and quotation from the works of other people has been attributed, cited and referenced.

This report is submitted to the Faculty of Engineering and Built Environment, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for my Master degree in Construction Project Management, 2019. It has not been submitted before for any other degree or examination in any other University

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A handwritten signature in black ink, appearing to read 'Gcobisa Mashegoana', is written over a horizontal line.

Gcobisa Mashegoana

Date: August 2019

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First and foremost, I thank you Lord for making everything possible. In You I live, In You I move and In You I have my very own being. You gave me all the strength I needed to complete this project.

Philippians 4:13 "I can do all things through Christ who strengthens me."

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Definitions and acronyms to be used in-text specifically for Mega Construction Projects.

Acronyms

Table 1 – Acronym Table

Acronym	Description
SA	South Africa
MCP's	Mega Construction Projects
MP	Mega Projects
PM	Project Management

Glossary

Table 2 – Glossary Table

Term	Definition
Construction	The act or process of building something such as a house or road (Schwalbe, 2015).
Project	It's a temporary endeavour undertaken to create a unique product, service or result (Schwalbe, 2015).
Mega Projects	Major infrastructure projects that cost more than US\$ 1 billion or projects of a significant cost that attract a high level of public attention or political interests due to their substantial interest on communities (Flyvbjerg, 2014).
Complexity	The state or quality of being complex; having many parts connected or related, intricacy.
Culture	The beliefs, customs, arts, etc. of a particular society, group, and place or time (Webster, 2015).
Project Management	Application of knowledge, skills, tools and techniques to project activities to meet the project requirements (Brockmann, 2009).

ABSTRACT

Mega construction projects (MCPs) represent one of the strategic options towards achieving sustainable development objectives in countries at different levels of development; the MCP's success is reported to be significantly lower in developing countries than in those with more mature economies. South Africa is not immune from this as recent projects have shown. Statistics of challenged and failed mega projects testify that the impact of cultural complexities on mega project implementation over the years has become a talking point that needs a deeper understanding. This is pertinent with mega projects as strategic alliances exacerbate culture and national cultural differences which would require more harmonising to effect utmost success.

The possibility of cultural disruptions in implementing Mega Construction Projects (MCPs) in South Africa using Medupi and Kusile coal plant projects as cases for this study was explored with the intention of enlightening project stakeholders in order to assist developing countries achieve their sustainable development objectives and overcome the challenges that hinder the successful development of MCPs. Questionnaires and interviews were held with implementing agencies and key personnel and permission was sought to peruse through relevant documents. Analysis of the qualitative data was performed using content analysis and thematic analysis of transcribed interviews. Based on the findings, the study results reveal that there are cultural disruptions that can be found in implementing mega construction projects, ignoring and mismanaging these cultural differences could lead to massive project delays.

Chapter 1

1.0 Introduction

As a new democratic developing country, South Africa still faces major challenges of poverty, unemployment and inequality; these challenges to some extent were largely created by the socio economic ills of the past regime (Khatleli, 2016) .

In order to address these challenges and goals the South African Government adopted a National Infrastructure Plan in 2012. The plan's main objective was to transform SA economic landscape while simultaneously creating significant numbers for new jobs, and strengthening the delivery of basic services. The planned investments as per the National Infrastructure Plan are in energy, road, rail, ports, public transport, bulk water and sanitation, hospitals, basic and higher education infrastructure and innovative projects such as the Square Kilometre Array and Meerkat telescopes (SA-Government, 2012). The 2012 investment plan among other government initiatives included Eskom's new power stations, Medupi and Kusile which were estimated to be about R205.1 billion in 2012 over three years (SA-Government, 2012).

Mega infrastructure /construction projects which are “large – scale complex ventures that typically cost a US\$ 1 billion or more, which take many years to develop and build, involve multiple public and private stakeholders, are transformational, and impact millions of people.” as per Flyvbjerg (2014) definition, and investments aim to bring about big changes in the geography of countries and life of people as in the SA's context, some of these megaprojects become landmarks for countries and bring significant prosperity, but some become unforgettable catastrophes (Othman, 2014). Othman (2014) continues to state that MCP's are the future of cities, states and individual livelihoods, however the challenge is that these projects are prone to slippages, either with regard to budget or time—or both due to a number of challenges or complexities such as technology or supporting infrastructure, the skills and the capacity that is required to manage these projects and the management of multicultural teams usually involved.

This study sought to investigate cultural complexities that affect the implementation of Mega construction projects in South Africa's context. The term complexity in the context of this study as defined by Johnson (2009) is generally used to characterize something with many parts where those parts interact with each other in multiple ways. While the concept of

culture is briefly defined by Webster (2015) as the beliefs, customs, arts, etc. of a particular society, group, and place or time.

Furthermore, the main objective of this chapter is to give a background to this study, to briefly define the research problem that this study was set to cover and outline the aim of this study together with its objectives, research questions, tabulate the research methodology followed in conducting this research, articulate the significance of the study, how this study is organised and the conclusion of the chapter.

1.1 Background to Study

Mega Construction Projects (MCPs) represent one of the strategic options towards achieving sustainable development objectives in both developing and developed countries, unfortunately historical evidence suggests that the success rate for huge infrastructure projects in developing countries is significantly lower than in countries with more mature economies (Zeybek, 2006).

The low performance rate could also be attributed to the fact that MCP's are by nature complex; they are risky and time-consuming undertakings that are usually commissioned by governments and delivered by national and international participants with a variety of cultural differences, backgrounds, political systems, organizational structures and languages. MCP's attract high levels of public attention and political interest due to the substantial cost, direct and indirect impact on the community, environment and budgets (Georgieva, 2012).

MCP's unique nature and characteristics also require high design knowledge and technical skills, multi-organizational synergies, competent human resources, professional managerial capabilities as well as large-scale investment (Othman, 2014). Developing countries suffer from having shortcomings in providing these essential knowledge, skills, capabilities, and finance which ultimately challenge the successful development of MCPs in these countries (ibid).

In order to assist developing countries achieve their sustainable development objectives and overcome the challenges that hinder the successful development of MCPs, these challenges have to be identified, validated, classified and addressed.

Literature and case studies reviewed to date highlight a number of challenges and complexities around the development of MCPs in developing countries, for the purpose of this study the focus will be more on investigating, identifying and validating the existence of

cultural differences normally found in implementing Mega Construction Projects in South Africa's (SA) context and investigate the level of managerial acumen required to manage such cultural complexities with the aim of assisting the South African and other governments in other developing world to achieve their sustainable development objectives through the successful development of MCP's.

1.2 Research Objective and Methodology

Problem Statement

Mega Construction Projects have a brief history in South Africa; since most of the expertise cannot be found locally a lot of companies and project staff is from abroad, therefore a plethora of different cultural considerations require new procedures and protocols.

The existence of cultural disruptions in implementing Mega Construction Projects in South Africa is here explored for this study.

1.3 The aim of the study

The main aim of this study was to establish the existence of cultural disruptions in implementing Mega Construction Projects in South Africa.

1.4 Objectives of the study

The following objectives were utilized to achieve the aim stated above, namely:-

1. Assess the understanding of the concept of culture by workers in SA projects.
2. Iterate the cultural differences that exist in SA with regard to their impact in the work environment in SA projects.
3. Investigate and identify internal organisational cultural dynamics and their impact thereof in implementing mega construction projects in SA context.
4. To establish the existence and level of impact of cultural diversities and practices that is brought about by a project external factors and stakeholders in SA projects.
5. To assess the challenges occasioned by splicing foreign culture into South African culture in projects.

1.5 Research Questions

1.5.1 The Main Question

The main research question was - What are the cultural disruptions in implementing Mega Construction Projects in South Africa?

1.5.2 Objectives Questions

As stated in section 1.4, below is the list of the study objectives that were utilised to achieve the aim of this study together with the research questions.

Table 3 – Research Sub-Objectives and Research Sub - Questions

Sub - Objectives	Sub - Questions
Assess the understanding of the concept of culture by workers in SA projects.	How is the concept of culture understood by workers in SA projects?
Iterate the cultural differences that exist in SA with regard to their impact in the work environment in SA projects.	What are the cultural differences that exist in SA projects and with regard to their impact in the work environment in SA projects?
Investigate and identify internal organisational cultural dynamics and their impact thereof in implementing mega construction projects in SA context.	What are internal cultural dynamics that can be found in organisations and the impact of organisational culture in implementing mega construction projects in SA context?
To establish the existence and level of impact of cultural diversities and practices that is brought about by a project external factors and stakeholders in SA projects.	What are typical cultural barriers and practices that could be brought about by factors that are external to projects in SA projects?
To assess the challenges occasioned by splicing foreign culture into South African culture in projects.	What are typical challenges that could be brought about by splicing foreign culture into South African culture in projects?

Source: (Author's own,2018)

1.6 Significance of the study

MCPs in SA are always implemented by parties from different jurisdictions and backgrounds, mostly alien to the work cultures in SA (Ernst & Young, 2013). It is crucial that the disruptiveness's of these culture shocks are understood and managed as they could be contributing to the inefficiencies of implementing MCPs in SA.

SA has experienced and still is experiencing endemic delays in implementing mega construction projects (Khatleli, 2016), the study will assist to establish to what extent some of these delays are occasioned by cultural incongruences and intend to make a contribution through the findings which will be a useful source of information for identifying and managing cultural disruptions (misunderstandings/incongruences) in Mega Construction Projects.

The study findings will be useful in guiding students, practitioners and other readers/researchers for further and future referencing as a starting point to carry out similar research on the topic and add to the existing knowledge. They expend their energies in the areas which have not been covered by this study.

1.7 Organization of the study

The rest of this study is organized as follow: -

Chapter 1: Introduction - Provides a background to this study; defines the research problem, outlines the aim of this study together with its objectives, research questions, tabulate the research methodology followed in conducting this research, articulate the significance of the study and conclude with the organisation of the study.

Chapter 2 - Chapter 4: Literature Review - Cover various concepts covered in the title of the study through literature scrutiny which includes conceptual definitions, theoretical literature review and further discussion on mega projects, culture, complexity, SA construction industry and empirical literature review.

Chapter 5: Research Methodology - Describes the various elements of research design, research methods and methods used to collect data.

Chapter 6: Case Studies Medupi and Kusile Coal Plant Projects - The main focus of chapter is to provide a brief background of the two Mega projects chosen for this study, namely Medupi and Kusile Coal Plant Projects, Lephalale (SA).

Chapter 7: Research Results - This chapter discusses the findings of the collected data.

Chapter 8: Research Discussion - Provides the analysis of the literature reviewed and research results.

Chapter 9: Conclusion - Provide the conclusion of the study from the literature, research and the two case studies.

Chapter 10: Bibliography - The last chapter, chapter ten is a list of references and appendices.

1.8 Chapter Summary

This chapter presented a description of the research process followed in this study; it began by providing an introduction, background to the study, problem statements, objective of the study with its five objectives and research questions, significance of the study and concluded with the study organization.

Chapter 2

2 LITERATURE REVIEW – MEGA CONSTRUCTION PROJECTS

2.0 Introduction

The literature review starts off with an overview of various definitions of mega projects, provide a historical and the current overview of the construction industry both globally and in SA context, outline the key challenges found in the implementation of mega construction projects and will end by briefly by looking at the concept of complexity and culture in relation to the implementation of mega construction projects in SA projects.

Chapter 2 therefore focuses on defining Mega Construction Projects, characteristics of Mega Projects, the history of mega construction projects /massive projects in developing and developed countries and conclude with examples of mega construction projects implemented globally in the recent past.

2.1 Mega Construction Projects (MCP) – Definition

MCP's are generally defined as large –scale , complex projects that are designed and constructed over a period of time, normally four years or more , at a cost of more than US\$ 1 billion and involve and have an impact on multiple public and private stakeholders (Galloway, P., Kris, P. and Dignum, J., 2014).

Gruno (2004) calls them the “giants” among the projects; Gruno (2004) puts the emphasis on the aspect of multi-organizational enterprises (MOEs) and characterizes these by (I) singularity, (II) complexity, (III) goal-orientation (technical, financial, time) and (VI) the nature and the number of project owners.

According to Fylvbjerg (2014) -one of the most cited scholars in the world on megaprojects planning and management,- the word Mega is derived from the Greek word “Megas” which means great, large, vast mighty and important. The concept of a project is described as ‘a temporary endeavour undertaken to create a product, service or result’ (Schwalbe, 2015).

Flyvbjerg (2014) defines Mega projects as large – scale complex ventures that typically cost a US\$ 1 billion or more, they take many years to develop and build, they involve multiple public and private stakeholders, they are transformational, and impact millions of people. Megaprojects can be conceived as giant civil and electromechanical engineering infrastructure such as bridges, dams, rail and road transport infrastructure, major sports facilities, electricity generating power stations, mass housing and bulk infrastructure, airports, nuclear power plants, energy resources refineries, goods transportation pipelines, monumental museums, mining infrastructure, outer space projects, military projects and structures of social entertainment as well heritage value (Cost, 2015).

Cost (2015) continues to state that Megaprojects are extremely complex by almost any dimension by which complexity can be measured. They involve massive numbers of actors that are involved in very complex interrelationships, the size of Megaprojects command resources that are equivalent in size to the gross domestic product of small nations, the degree of complexity is very high and combines multiple layers of electro-mechanical and civil engineering systems and their lifecycle is extremely long, running into decades and they have implications that have national and even global dimensions.

Various definitions of MCP's were found in the literature review, the definition that this study adopted is Flyvbjerg's definition.

Flyvbjerg (2014) defines Mega projects as large – scale complex ventures that typically cost a US\$ 1 billion or more, they take many years to develop and build, they involve multiple public and private stakeholders, they are transformational, and impact millions of people.

2.2 Characteristics of Mega Construction Projects

The divergences between the different definitions come from the focus point of the researchers and from their approaches to analyse mega projects. Based on all the characteristics taken from the definitions, a sum-up is made in Table 4 below.

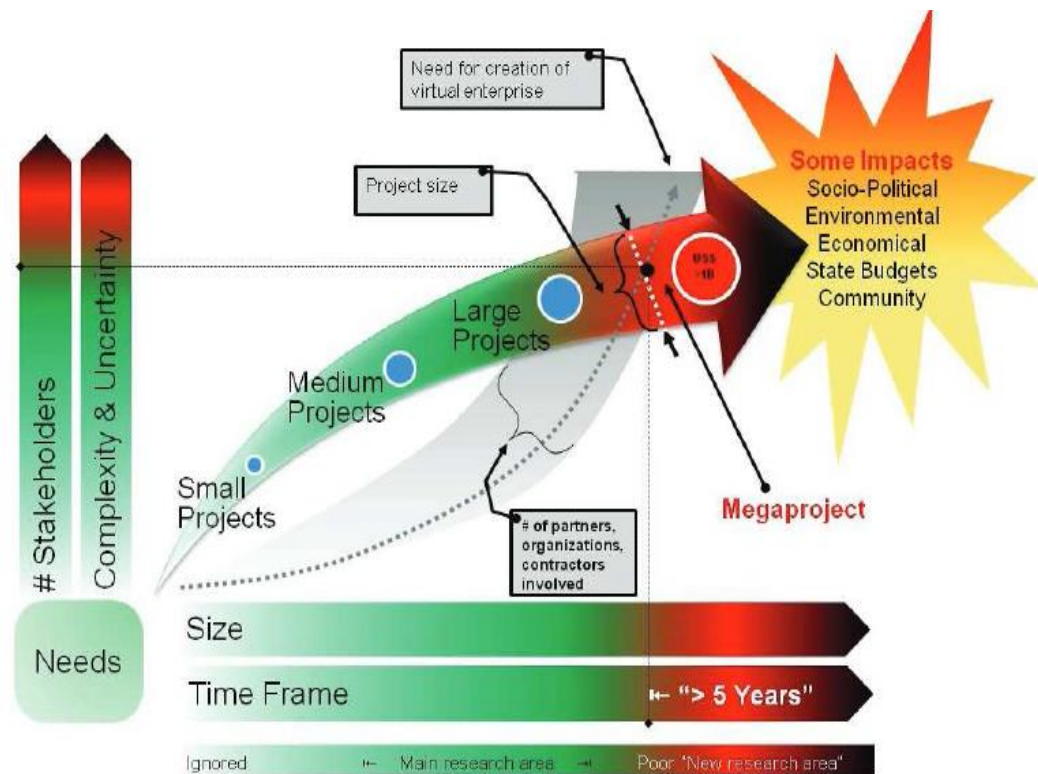
Table 4 – Mega Construction Project - Characteristics and Descriptions

Element	Characteristics and Description
Size	Large scale project (huge scope) Technologically and logistically demanding
Complexity	Requires the management of numerous, concurrent, and complex activities. Contains a large elements of technological innovation
Cost	Exceeds one billion US dollar
Time	Exceeds 5 years long duration Program urgency
Success	Different objectives. Fail to meet costs estimations, time schedules, and anticipated project outcomes Goal-orientation (technical, financial, time) Poor performance in terms of economy, environment, and public support. Leads to cost overruns and lower-than-predicted revenues that hinder economic growth instead of advancing it.
Impacts	Impacts on the community, environment, state budgets. Socio-political impacts
Singularity	Unique, no megaproject looks like another
Implementation owner	Requiring multidisciplinary inputs from many organizations A “virtual enterprise” for the execution of the project.
Stakeholders and shareholders	Attracts a high level of public attention or political interests. The nature and number of project owners Conflicts, poor cooperation between partners
Uncertainty	Associated with high risk.
Knowledge	New subject of research

Source: (Youcef J., Johaness A. and Ekambaram A., 2012)

Table 4 represents the characteristics and elements describing megaprojects, but when trying to represent them as shown in **Figure 1** below, we may notice that the illustration cover all the types of project from smallest to mega ones.

Figure 1 - Characteristics of Megaproject



Source: (Youcef J., Johanness A. and Ekambaram A., 2012)

Figure 1 above represents general illustration of projects and among them megaprojects. This illustration includes the stakeholders, complexity, uncertainty, cost, time, size and the number of the organizations involved in the realization of the project.

2.3 History of Mega Projects

It is critical to note that since the advent of the Seven Wonders of the World, man has always been fascinated by huge structures. The ancient wonders of the world as mentioned below serve as a confirmation that the concept of construction mega project has been around the globe for too long, they date back as far as 285 and 247 B.C and could even be older (National Geographic News, 2007).

According to (National Geographic News, 2007) the ancient wonders of the world are:

- The great pyramid of Giza in Egypt, Africa.

- The Hanging Gardens of Babylon, Iraq.
- The Statue of Zeus at Olympia, Greece.
- The Temple of Artemis at Ephesus, Turkey.
- The Mausoleum at Halicarnassus, Turkey.
- The Colossus of Rhodes, Greece
- The Light House of Alexandria, Egypt

The Lighthouse of Alexandria, Egypt for example was the only ancient wonder that had a practical use, serving as a beacon for ships in the dangerous waters of the Egyptian port city of Alexandria, now called El Iskandariya (National Geographic News, 2007).

Figure 2: The Lighthouse of Alexandria, Egypt



Source: (National Geographic News, 2007)

However, not only are megaprojects large, they are constantly growing ever larger in a long historical trend with no end in sight. When New York's Chrysler Building opened in 1930 at 319 meters it was the tallest building in the world (Flyvbjerg, 2014). The record has since been surpassed continues Flyvbjerg (2014) seven times and from 1998 the tallest building has significantly been located in emerging economies with Dubai's Burj Khalifa presently holding the record at 828 meters.

Measured by value, the size of infrastructure projects has grown by 1.5 to 2.5 percent annually in real terms over the past century, which is equivalent to a doubling in project size two to three times per century (Mirek, 2017).

2.4 Mega Construction Projects – Global View

The importance of infrastructure as a key driver of growth, competitiveness and social well-being is well established, yet a significant number of economically viable infrastructure political cycles, short-term investment horizons, a lack of viable financing structures, inappropriate risk assessment frameworks , implementation complexities and a lack of long-term vision mean that much needed investment does not flow to infrastructure and development – causing a \$1 trillion annual shortfall towards a \$4 trillion demand in infrastructure alone (Mirek, 2017).

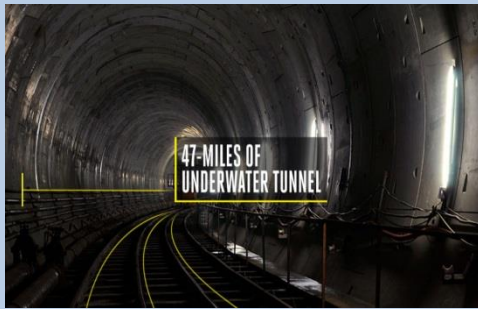
Mirek (2017) continues to predict that these problems will worsen, as infrastructure ages in developed economies and new pipelines of projects are needed in the world's fastest growing emerging economies. Unless the private and public sectors can develop new models and approaches to collaboration, progress will not be achieved (Ibid). Conversely, despite the costs, time overruns, and the fact that 2/3 of megaprojects continue to fail, megaprojects continue to increase in size and number (PWC, 2015).

Table 5 below shows six of the top twenty five most impressive mega construction projects that are being implemented worldwide in the last five years.

Table 5 – Top worldwide mega construction projects

Panama Canal Expansion,  Time to build :11 years Cost to build: \$ 5.25 billions	Aizhai Suspension Bridge, China  Time to build :5 years Cost to build: \$ 600 millions
--	---

Marmaray Tunnel, Turkey



Time to build :9 years

Cost to build: \$ 4.5 billions

Three Gorges Dam, China



Time to build :18 years

Cost to build: \$ 22 billions

One World Trade Center, New York



Time to build :9 years

Cost to build: \$ 4.5 billions

Jubail Industrial City, Saudi Arabia



Time to build :9 years

Cost to build: \$ 4.5 billions

Source: (Newcomb, 2015)

Historical performance data for megaprojects speak their own language; the performance has been very poor across the globe. In particular MCP's are often over-budgeted and/or behind schedule and, once finished, they deliver less benefits than planned. Statistics reveals that nine out of ten such projects have cost overruns. Cost overruns of up to 50 % in real terms are common, over 50 % not uncommon (Ernst & Young, 2013) .

Recent examples include: - the cost overrun for the Channel tunnel, the longest underwater rail tunnel in Europe, connecting the UK and France, was 80 % over budget in real terms; Denver International Airport, 200 % cost overrun; Boston's Big Dig, 220 %; the UK National Health Service IT system, 400-700 % and lastly the Sydney Opera was 1,457 % over budget and 10 years late (Ernst & Young, 2013) .

Sadly, cost overrun is a problem experienced both in private as well as public sector projects, and things are not improving; overruns have stayed high and constant for the 70-year period for which comparable data exists. While as stated above that developing

countries seem to perform the worst in implementing MCP's; all countries and continents for which data is available are not immune to cost and time overruns.

2.5. Mega Construction Projects in Africa

"The total demand for infrastructure investment and maintenance from developing countries is estimated at more than US\$ 900 billion a year, with greatest needs in Africa and Asia (Khatleli, 2016:3). According to Khatleli (2016) Africa's economic growth for 2013 averaged 4% as opposed to the global economic growth of 3%. Africa's economic growth inevitably had a great contribution from the implementation of megaprojects.

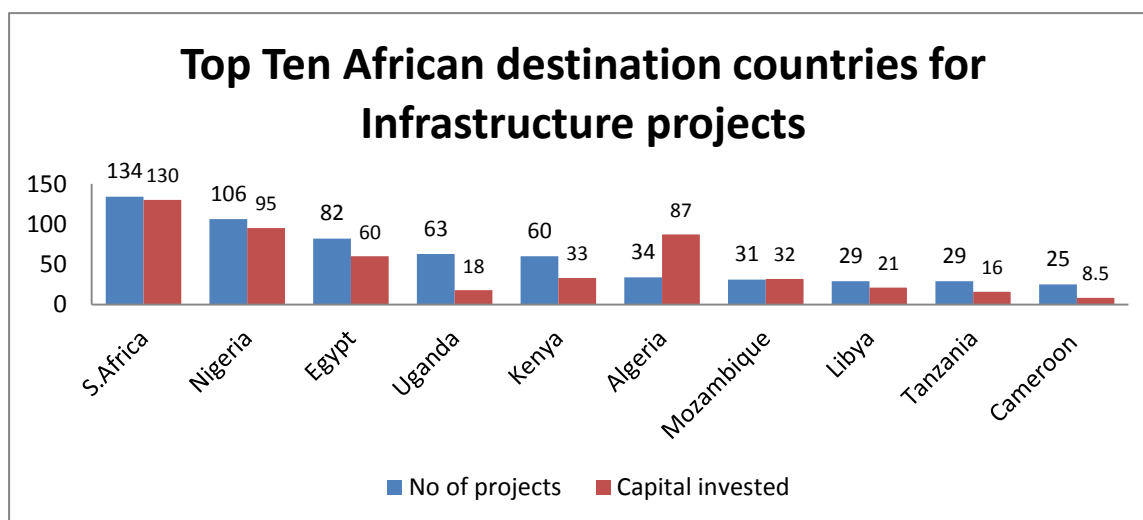
The present performance picture of the construction industry in Africa is also not a desirable one, uncertain global macroeconomic conditions and domestic challenges have led to lower growth projections for sub-Saharan Africa (SSA) as a whole. Growth in SSA fell to 3.5% in 2015, significantly below the 5 -7% average experienced by the region over the last decade. SSA's 2016 growth forecast is even lower at only 1.4%, the first time that the region's growth has been lower than the world average since 2000 (Ernst & Young, 2013).

According to PWC (2016) the total number of infrastructure construction projects in Africa that had broken ground by 1 June 2016 is 286 and are valued at US\$50m or above, collectively, these projects are worth US\$324bn. As a region, West Africa had the most number of projects with 92 projects and also the most in terms of value at US\$120bn. However, South Africa was the single country with the largest number of projects (41) followed by Nigeria (38).

A noticeable positive growth is from North Africa, whereby North Africa saw a significant jump in the number of projects. The number of projects in North Africa increased by 44.8% and the value of projects increased by 195%, signifying an increase of confidence in the region (PWC , 2016).

The Deloitte and Touche (2016) confirms Ernest and Young survey report that South Africa had the most infrastructure projects (with a combined value of close to US\$130 billion) in 2013; refer to Figure 3 below.

Figure 3: Top ten African destination countries for Infrastructure projects



Source: (Ernst & Young, 2013)

With regard to the main contributors in the industry in terms of sectors, the picture has not changed much, similar to the past three years, the greatest number of projects fall into the Transport sector (33.6%), followed by Real Estate (22.4%), Energy & Power (21%) and Shipping & Ports (8.4%). Not surprisingly, the share of Mining projects more than halved to 2.8% while Oil & Gas decreased to 4.5% (Ernst & Young, 2013).

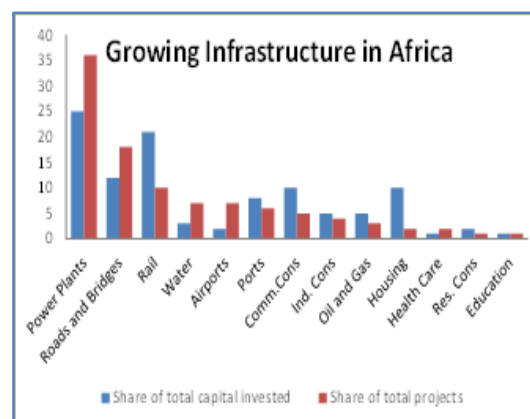
The comparison of the sector's contribution is displayed in Table 6 and Figure 4 below. It can be noted that more work is required in the education sector to close the gap of skills shortages in Africa.

Table 6 -- Growing infrastructure in Africa

Projects by sector	Number of projects	projects by number(%)	Value of projects	Share of projects by value(\$bn)
Energy and Power	60	21%	50.7	18.4
Transport	96	34%	62.8	19.4
Real Estate	64	22%	53	16.4
Water	11	22%	4.3	1.3
Mining	8	4%	26.4	8.1
Oil & Gas	13	5%	84.6	26.1
Shipping and Ports	24	8%	31.4	9.7
Social Developers	2	1%	0.4	0.1
Healthcare	6	2%	0.8	0.3
education	2	1%	0.4	0.1

Source: (Ernst & Young, 2013).

Figure 4 – Growing infrastructure in Africa



Source: (Ernst & Young, 2013).

2.6 Mega Construction Projects - The South African Construction Industry

Mega Construction Projects have a brief history in South Africa; The South African Government uses MCP's as one of its economic vehicle to transform economic landscape while simultaneously creating significant numbers of new jobs, and strengthen the delivery of basic services (Babatunde Y. and Wang Y., 2015).

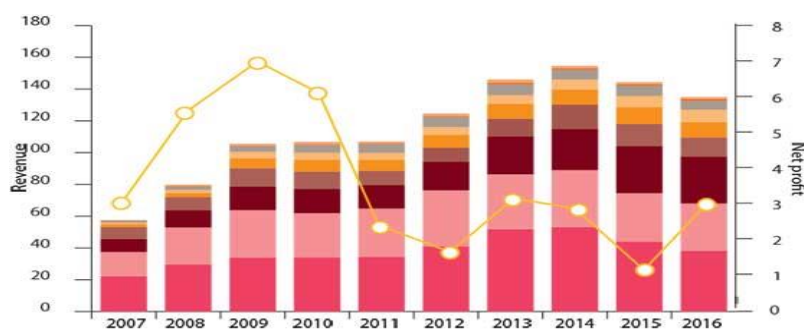
Numerous megaprojects have been implemented in South Africa to meet different objectives ranging from Energy, Transport and Sport etc. For example GFIP e-toll project in 2011 to alleviate traffic congestion in Gauteng as well as the construction of stadiums for the 2010 Soccer World cup (Babatunde Y. and Wang Y., 2015).

South Africa is not yet at a level of a developed country, therefore MCP's are used as a means to address the infrastructure backlog and enhance economic competitiveness (Khatleli, 2016). The country is however confronted with numerous challenges in implementing MCP's which includes among other things; the skills shortage or skills misplacement, restive labour force, the perceived political interference and influence, the poor level of planning and poor stakeholder analysis and engagement thereof (ibid).

Khatleli (2016) also mentions few more examples of these mega project failures in SA, namely; the implementation of the Gauteng Freeway Improvement Project (GFIP) and Eskom Medupi Coal Plant Project recently, which resulted in unpleasant kickbacks due to lack of meaningful public participation.

As can be seen in Figure 5 below, there has been exponential growth in the SA construction in terms of revenue generated from 2011 to 2014, followed by downward trend in 2015 and 2016, (PWC, 2016).

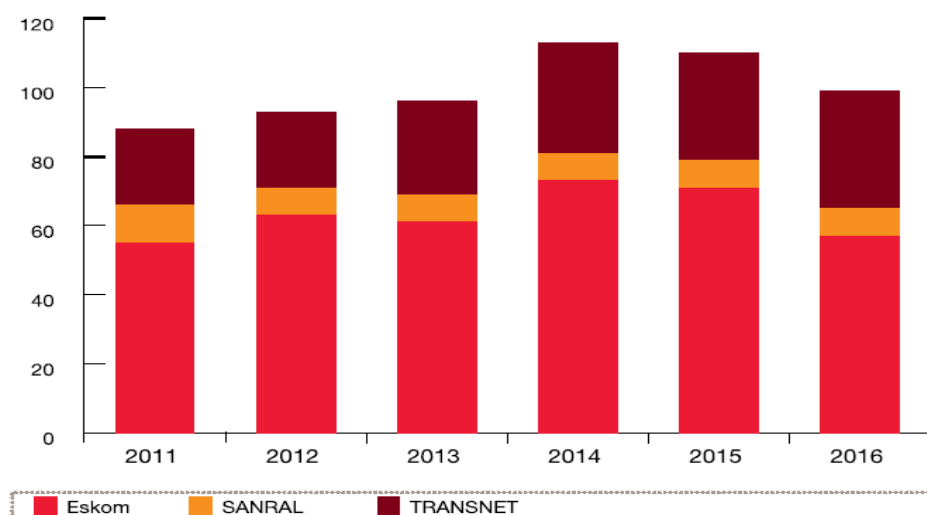
Figure 5: SA Construction growth patterns.



Source: (PWC, 2016).

The majority of public sector capital expenditure in South Africa is undertaken by Eskom, Transnet and the South African National Roads Agency (SANRAL). Figure 6 below illustrates the capital expenditure by each of these institutions individually and in aggregate.

Figure 6: Capital Expenditure by Eskom, Transnet and SANRAL



Source: PwC analysis, company annual reports

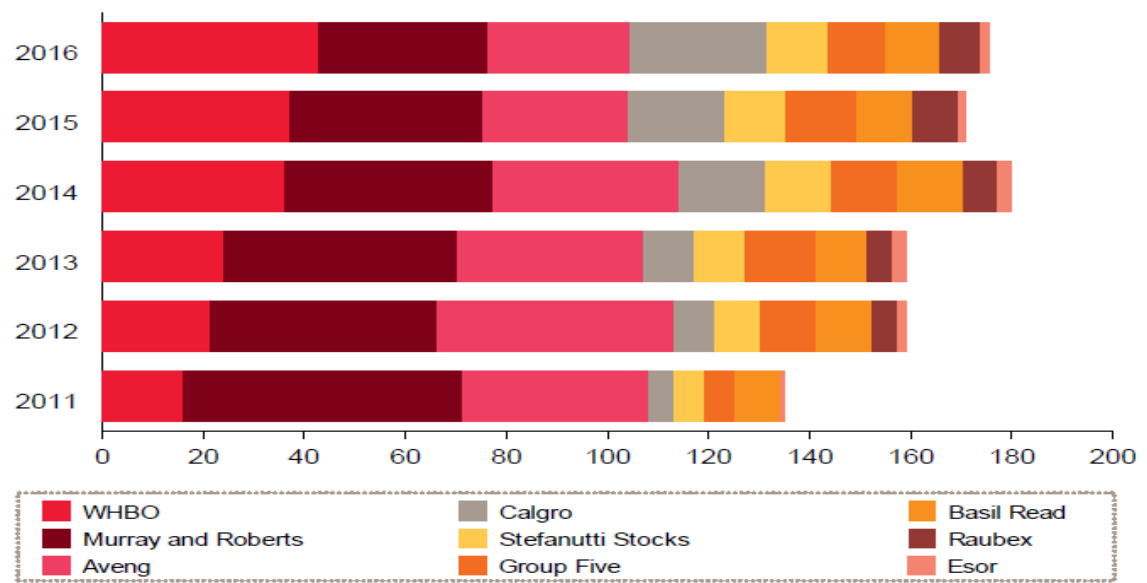
Source: (PWC , 2016).

Eskom, Transnet and SANRAL have been reliable sources of public sector expenditure over the years. Figure 6 reflects a 14% decrease in total capital expenditure in 2016 to R98 billion. The bulk of this decrease is attributable to the decrease in capital expenditure by Eskom, which shrank by 19% to R57.3 billion in 2016. Expenditure by SANRAL also declined in 2016, with a marginal increase in expenditure by Transnet being noted (PWC , 2016).

Government has remained committed to significant capital expenditure in the construction of the Medupi and Kusile power stations. Unfortunately though, over-expenditure on Eskom projects and the funding debate at SANRAL has detracted from real growth in public sector infrastructure.

The private sector also plays a significant role in the constructions industry, the key active industry players includes; The Group Five, WHBO, Murray and Roberts and Aveng etc. PwC analysis report also reflects a decline in construction growth and expenditure in the private sector. This decrease in expenditure underlines the challenges experienced by the industry.

Figure 7: SA Construction Secured Order Book (R' billions)



Source: PwC analysis, company annual reports

Source: (PWC , 2016).

The secured order book shows a decreased (4%) on the prior year, this was for the first time in a period of five years. Figure 7 above, reflects that the secured order book covers 1.3 times current-year-revenue, in line with the prior year as the lower order book was mirrored by lower revenue (PWC , 2016).

2.7 Chapter Summary

The reviewed literature reveals that MCP's have become a popular form of work in modern organizations both in developed and developing countries. It is therefore not a surprise that mega construction projects have received considerable attention in literature in recent years. Chapter presented historical statistics which shows that Mega Construction projects have been around, a number of projects have been implemented both successfully and unsuccessfully in the recent past.

The reviewed literature also reveals that even though infrastructure megaprojects generally have great potential to generate wealth and benefit society, projects often fail to materialize or, when completed, are unable to meet expected performance targets. However, it is not all

doom across the African continent; there are positive signs of future growth in the industry as suggested by historical evidence.

Sadly, the concept of project complexity has received little detailed attention in project management literature. The next chapter will review the literature on project complexity relevant to project management with emphasis towards the construction industry and the establish the existence of cultural disruptions in implementing Mega Construction Projects in South Africa.

Chapter 3

3 LITERATURE REVIEW – MEGA PROJECTS COMPLEXITY AND CONCEPT OF CULTURE

3.0 Introduction

Chapter 3 provides the last section of literature review for this study; this chapter first looked at the definition of complexity and culture, organisational culture, characteristics of culture. The chapter also tabulates the difference between complexity and complication, identifies typical cultural barriers and practices that could hamper progress on construction site, then reviews how complexity and culture should be managed in mega construction projects in South African context.

The poor performance statistics reflected in the previous chapter, is echoing Gruno (2004) definition of mega construction projects as “giants” among the projects; Gruno (2004) puts the emphasis on the aspect of multi-organizational enterprises (MOEs) and characterizes these by (i) singularity, (ii) complexity, (iii) goal-orientation (technical, financial, time) and (vi) the nature and the number of project owners.

3.1 The concept of Complexity

The first important aspect regarding complex project is the definition of the word complex and its distinction from complicated. Understanding the differences is an important baseline for its implication on managing projects.

According to the Webster Dictionary, ‘complex’ is defined as “composed of two or more parts; involving many parts” – whereas complicated is something “difficult to analyze or understand”. The difference relates to the interconnection between parts. In complex parts, there is interdependency between different parts. In complex systems there are interactions amongst parts of the system producing neither linear nor predictable outcomes (Maylor et al., 2008). Further expanding this concept, Whitty and Maylor (2009), states that “a complex system is a system formed out of many components whose behavior is emergent”. The outcome of the complex system cannot be inferred from the behavior of its components.

Complexity is an attribute that does not depend on the observer in opposition to complicatedness. According to Browning (2014), complexity is an objective characteristic of the system and complicatedness is a subjective one. Complicated may be related to the number of stakeholders involved. In complicated projects, complication can be managed with expertise, a better understanding of the parts that constitutes the system.

Weaver (2007) supports (Maylor's et al., (2008) description of complexity. According to Weaver (2007), the stem of the word complexity i.e. Complex is composed of the Latin words com (meaning: "together") and plex (meaning: woven). This is best contrasted with Complicated where plic (meaning: folded) refers to many layers. A complex system is thereby characterised by its inter-dependencies, where as a complicated system is characterised by its layers.

According to Johnson (2009), complexity is generally used to characterize something with many parts where those parts interact with each other in multiple ways, culminating in a higher order of emergence greater than the sum of its parts. Johnson (2009) further explains that the term complexity is used to describe the behaviour of a system or model whose components interacts in multiple ways and follow local rules, meaning there is no reasonable higher instruction to define the various possible interactions.

The crucial question therefore is "what makes a project complex?" and also why mega construction projects are regarded as a complex?

Complex projects according to (Lopez, et al., 2015) are those projects that are:-

- Are characterized by uncertainty, ambiguity, dynamic interfaces and significant political or external influences; and/or
- Usually run over a period which exceeds the technology cycle time of the technologies involved; and/or
- Can be defined by effect, but not by solution

Lopez, et al., (2015) further notes that some of the causes of project complexity in detail to include:

- Details – number of variables and interfaces
- Ambiguity – lack of awareness of events and causality

- Uncertainty – inability to pre-evaluate actions
- Unpredictability – the inability to know what will happen
- Dynamics – rapid rate of change
- Social structure – numbers and types of interactions
- Interrelationships – many interdependencies and interconnections exist

As projects become more complex, managing these projects becomes more challenging, implying that a high degree of managerial acumen will be required in managing these.

Project complexity affects the way projects should be managed. According to Baccarini (1996), complex projects require a greater managerial effort during their execution. This author defines project complexity as “consisting of many varied interrelated parts and operationalized in terms of differentiation and interdependency”. Therefore, project complexity can be applied to different dimensions of the project management process, like organization, technology, decision-making, and environment. In such a way, when defining project complexity, one needs to state for which dimension the concept is being used (Baccarini, 1996).

Complexity is a measure of the difficult to achieve the desired understanding of a complex system –although high levels of uncertainty are a fundamental aspect of complex projects, it is not an exclusive definition. In this sense, complexity is a variable and not a qualitative concept (Maylor, 2009).

3.2 Complexity, complicated, involved and intricate

Complexity can be interpreted to encompass anything characterized by difficulty. Ika and Hodgson (2014) operationalize project complexity as being based on nine diverse 'difficulty' factors such as: criticality of project, project visibility and accountability; clarity of scope definition. This meaning of complexity has a subjective connotation implying difficulty in understanding and dealing with an object. Therefore, this interpretation of complexity is in the eyes of the observer. Furthermore, in many cases this meaning of complexity is better subsumed within the concept of uncertainty.

Just like there is no absolute definition of "intelligence", there is no absolute definition of "complexity"; the only consensus among researchers is that there is no agreement about the specific definition of complexity (Weaver, 2007).

Interestingly, the use of the term complex is often confused with the term complication. In simple terms complex is the opposite of independent, while complicated is the opposite of simple (Weaver, 2007).

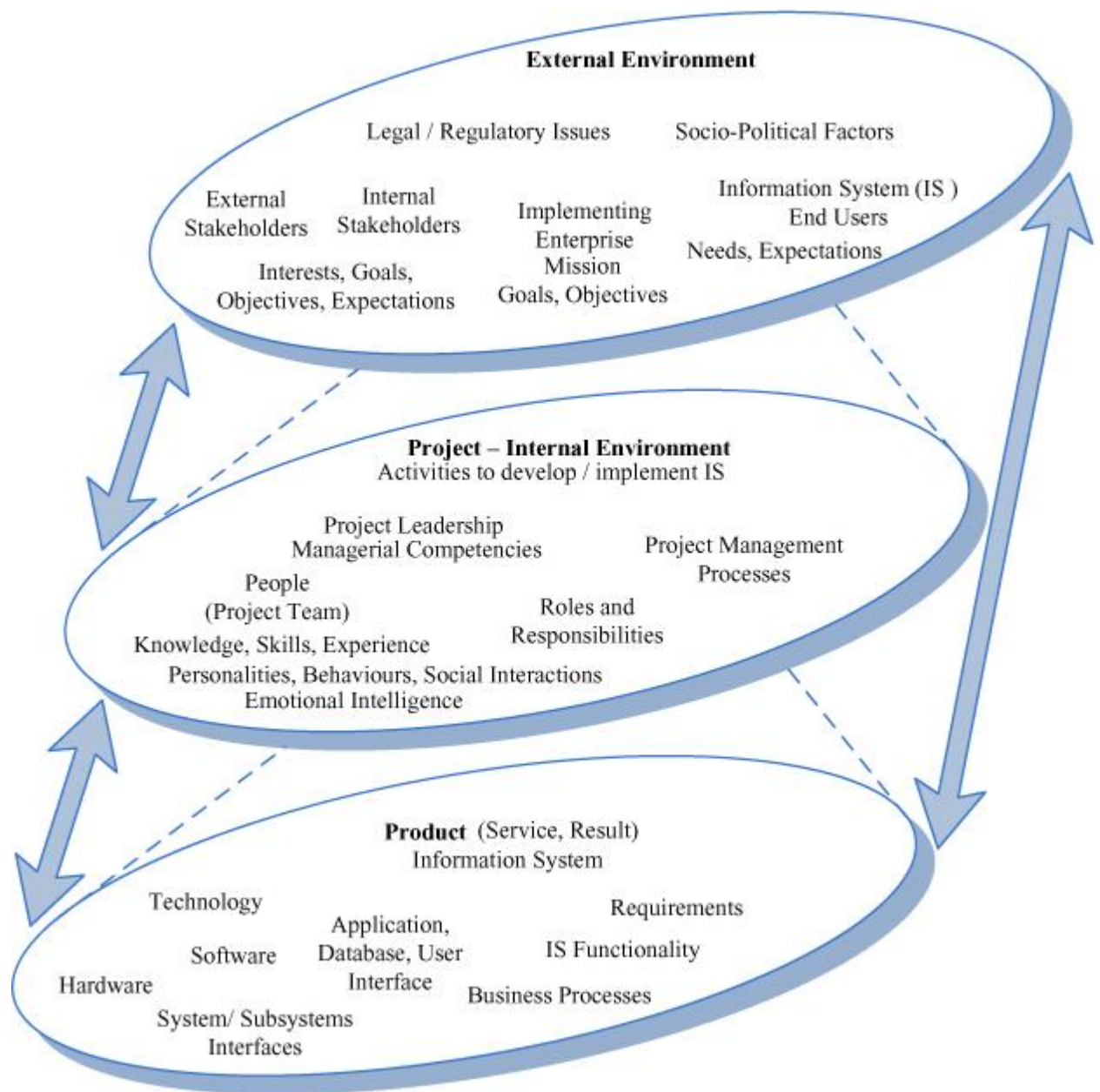
3.2 Complexity in Mega construction projects

Complexity is an intriguing characteristic of construction projects. It is the degree of complexity that determines the overall approach to a project, specifically the required resources as well as tools and techniques.

It is crucial to note, that over the years discussion on complexity has progressed from just considering the technical complexity to include other categories, for example Baccarini (2016) distinguishes between organizational and technological complexity. Baccarini (2016) introduces task, social and cultural complexity, Task complexity combines technological and parts of organizational complexity, especially planning and organizing. It excludes leadership which is part of the social complexity. There can be little discussion that the number and diversity of stakeholders in a project along with the strength of their impact (interest and power) increases its complexity.

Stakeholders' cultural diversity may influence project outcome to a large extent. The more cultures meet in a project, the more complex it becomes since it requires coordination of an increasing number of different cognitive maps (Brockmann 2009) (Brockmann, 2009); this we term "cultural complexity". Figure 8 below summarises different forms of complexities that can be found in construction projects.

Figure 8: Mega Construction Project Complexity



Source: (Brockmaan, 2009)

3.3 Complexity in the work environment

The term complex environment refers to the real world challenges of living and working in a context where there are many different groups with diverse interests (Ganson, 2013).

Complex environments require extensive understanding, analysis and conflict assessment to determine the economic, political, social, religious, and other interests of diverse groups. Organizations are becoming increasingly more complex as industries evolve. These days, it is becoming a norm to have an extremely complex and diverse workforce. People of all generations are working together as one. They are employees from different backgrounds, all working in the same institution (Ganson, 2013).

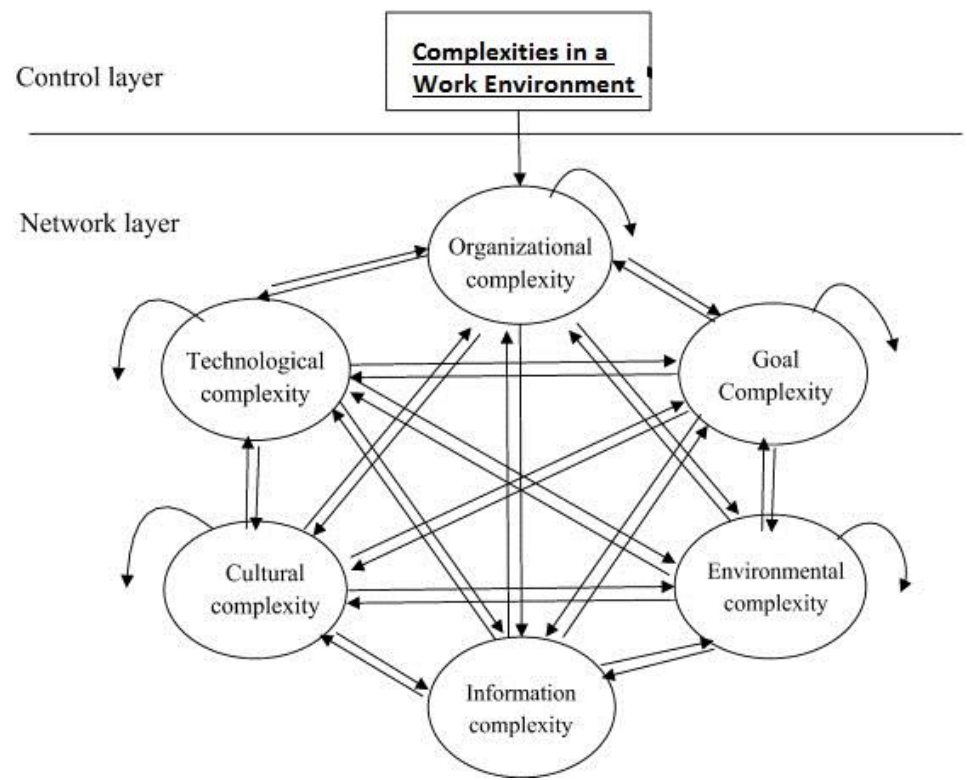
As such, leaders are finding it increasingly difficult to manage a complex workforce effectively. With such a diverse group of employees, there are bound to be certain problems that occur for example, staff might not communicate effectively with one another. It's easy for misunderstandings to occur, and for employees to become disengaged with what they're doing (Jarche, 2016).

Another example is that of flexibility, one of the main issues with a complex workforce is that your employees have different ways of thinking and reasoning. For some, sitting behind a desk all day is not a great engagement driver. Modern employees are used to having flexibility, and being given more freedom to conduct their work.

Although managing a complex workforce is challenging, it can also be very rewarding. The key is finding solutions that help to get the best out of the people (Ganson, 2013).

According to Jarche (2016), working with a complex workforce requires different skills with different management styles for the organisation to remain connected; firstly, Coordination which is; making sure things gets done effectively and efficiently. Most organizations do this well; the second one is Collaboration which is working together for a common objective, usually directed through someone in authority and lastly Cooperation should be the default behaviour for connected organizations working. Figure 9 below shows different forms of complexities that can be found in a work environment.

Figure 9: Work Environment Complexities



Source: (Jarche, 2016)

3.4 Complexity in multinational projects

As companies leverage their operations across national borders to take advantage of multinational sourcing, joint ventures, and alliances, their business practices need to be more effective in managing cross-cultural issues and challenges. Managing cultural issues and challenges necessitate guidelines and unified direction toward project objectives, technology transfer and project integration to be “synthesized and orchestrated” centrally and translated across borders into the cultures of the local operations (Martinez, 1995).

Linkages among individual work components also need to be developed and effectively “managed” across geographical areas and organizational cultures. Thus, multinational project teams need to be integrated not only across the miles, but also be unified among different business processes, management styles, operational support systems, and organizational cultures (Bahrami 1992, DeMaio 1994, McFarlin 2008).

3.5 Complexity in working in different cultures

Today's global market has impacted projects and programs in no lesser way than it has processes. Indeed, one can argue that multiculturalism has a more profound effect on projects simply because projects involve multiple parties or organisations, which necessitates the building of temporary working relationships with people who may come from a different corporate culture. This requires specific skills in cross-cultural communication and trust building. Culture cannot be summarised in a short list of rules, neither a lists of cultural dos and don'ts cannot provide the critical thinking skills necessary to build trusting relationships (Brockmann, 2009).

Culture itself can be complex especially in the construction of mega projects which involve multi different stakeholders. Section 3.6 below will unpack the concept of culture in more detail and look at how cultural complexities relates to the construction of mega projects.

3.6 The concept of Culture

When invoking a study involving different aspects of cultures, one must first answer the questions: What is culture?

The meaning of culture has been much debated by many anthropologists and sociologists, and definitions vary according to the context in which the term is used. This study will therefore present a specific definition of “culture” as it applies to this paper.

Culture is a unique aspect of mankind. It reflects how people differ from other people as well as from the animal world. Human behaviour is the product of a very complex learning process that takes place within a cultural context (Springer, 2012).

Culture is not a characteristic of an individual; it encompasses a number of people who were conditioned by the same education and life experiences. These include the culture of a group, a tribe, a geographical region, a national minority, or a nation, culture refers to the collective mental programming that these people have in common; the programming that is different from other groups, tribes, regions, minorities or majorities, or nations (Barthorpe, 2006).

Culture does not only exist in the minds of people; however, it does become crystallized in the institutions these people have built together: their family structures, educational structures, religious organizations, associations, forms of government, work organizations, law, literature, settlement patterns, buildings, and even scientific theories. All of these reflect common beliefs that derive from the common culture (Hass, 2010).

Culture, therefore, is the collection of values, norms, beliefs, customs, institutions, and forms of expression that reflects the thoughts, feelings, actions, and interests of people (Oxford Dictionary, 2016).

Other definitions of culture are:-

“... the act of developing the intellectual and moral faculties especially by education” (Merriam Webster Dictionary, 2016).

“... the ideas, customs, and social behaviour of a particular people or society” (Oxford Dictionary, 2016).

“... the way of life, especially the general customs and beliefs, of a particular group of people at a particular time” (Cambridge Dictionary, 2016).

“... the collective programming of the mind which distinguishes the members of one group or category of people to others” (Hofstede, 2005).

Taylor (1958) is one of the first scholars who coined and defined culture in his work Primitive Culture. Taylor (1958) saw culture as that complex whole which includes knowledge, belief, art, morals, law, customs or any other capabilities and habits acquired by man as a member of society.

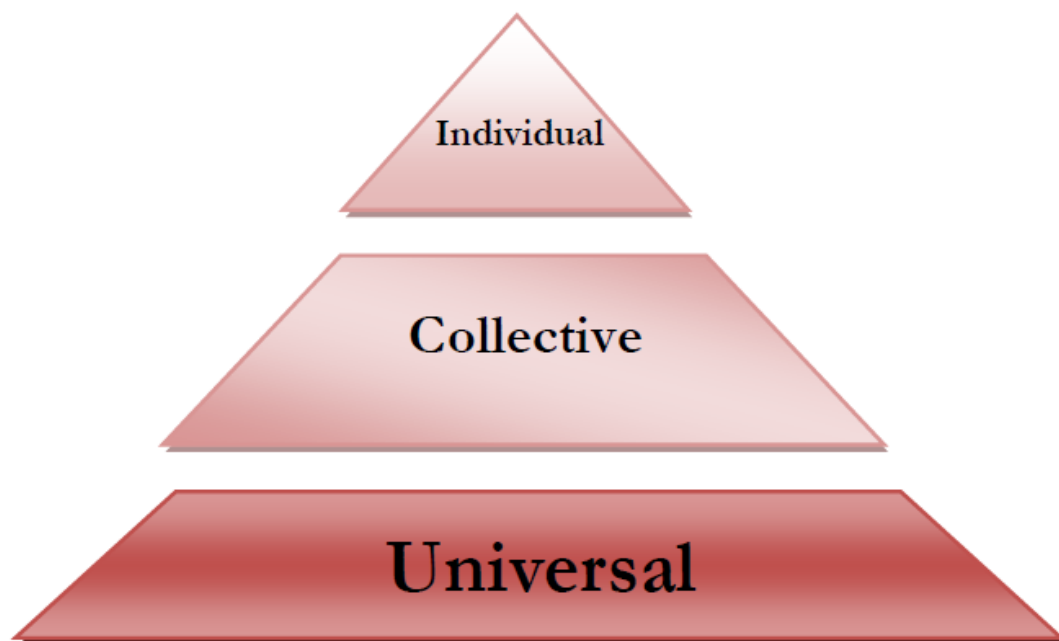
Taylor (1958)'s definition captures the exhaustive nature of culture; it is not regarded as an univocal one. Similarly with the concept of intelligence and complexity, there is no absolute definition of "culture"; the only consensus among researchers is that there is no agreement about the specific definition of culture, for culture this could be attributed to the fact that culture is an evolving concept.

The definition of culture differs greatly according to the research fields, according to Hofstede (2005) the word culture originates from the Latin word “colere” which means to inhabit or to cultivate. It is defined as: “The collective programming (thinking, feeling and acting) of the mind which distinguishes the members of one group or category of people from another.

According to Hofstede (2005) the term, culture, was introduced to business life in the late 1980's, to refer to the attitudes and behaviour of members of an organization or business unit. The term became more and more popular over the last twenty years as businesses tended to be more active internationally. This is the reason why understanding different cultures has become a business necessity.

Hofstede (2005) identified culture to be the mental programming of the mind: every person carries within him or herself patterns of thinking; feeling; and potential acting which are learned throughout their lifetime. Hofstede (2005) further identified 3 layers of mental programming which are: individual, collective and universal. Based on these 3 layers, Hofstede (2005) constructed a culture triangle as shown in Figure 10 below.

Figure 10: Hofstede Theory on Levels of Mental Programming



Source: (Hofstede, 2005).

The Individual level (personality) focuses on mental programming exclusive to each person. Hofstede suggests that this level is at least partly inherited. The collective level (culture) on the other hand focuses on the mental programming that is learned from others (that is specific to a group of people) while the Universal level (human nature) focuses on all humans, and is also likely inherited: instincts for survival et cetera (Hofstede, 2005).

These three levels of mental programming are encountered by managers in their day to activities as they come together to interfere with the successful implementation of project within the global business community these managers operate in (Hofstede, 2005).

The Researcher selected four definitions as they are the relevant to achieve the aim of this study:

“ ... Culture as the cumulative deposit of knowledge, experience, beliefs, values, attitudes, meanings, hierarchies, religion, notions of time, roles, spatial relations, concepts of the universe, and material objects and possessions acquired by a group of people in the course of generations through individual and group striving” (Hofstede, 2005)

“... the ideas, customs, and social behaviour of a particular people or society” — Oxford Dictionary

“... the way of life, especially the general customs and beliefs, of a particular group of people at a particular time” — (Cambridge Dictionary, 2016).

“... the collective programming of the mind which distinguishes the members of one group or category of people to others” — (Hofstede, 2005).

3.7. Cultural differences that exist in South Africa

South Africa is known for its ethnic diversity and with eleven official languages and eight other recognised languages; the country is a melting pot of cultures. Often referred to as the ‘Rainbow Nation’, South Africa is home to a fascinating mix of citizens. There are the Nguni (comprising the Zulu, Xhosa, Ndebele and Swazi people), the San people, the Sotho-(Sotho, Tswana & Pedi), the Tsonga and the Venda. Then there are the people of European origin, as well as people of mixed race and Asian descent, the rich culture of each of these groups brings its own vibrancy to SA diversity (Booyens, 2007).

There are also hybrid mixtures of different cultures, and an overarching South African culture which ensures that, no matter what a person’s cultural heritage, they are, at heart, proudly South African (Booyens, 2007). Indeed, as South Africa’s democracy evolves, it is becoming a more diverse but integrated country and cultural diversity continues to be one of its strongest assets.

South Africa's cultural diversity is expressed in a number of ways; one of the most distinguishing factors is communication and people's behaviour.

Table 7: Different verbal and non-verbal elements of culture

Cultural non-verbal and verbal In the table below find the various cultural groups and their non-verbal, verbal and social behaviour compared			
Cultural Groups	Non Verbal	Verbal	Social Behaviour
African Culture	☐ Don't make eye contact ☐ Look down and remain silent ☐ First greet men then greet women ☐ Men sometimes walk in public holding hands as a sign of friendship / respect for each other ☐ Men walk in front of women to show that there is a leader and to also protect the women in the event of danger ☐ Sitting is a sign of respect to superior	☐ They mostly talk loudly and shout across to the person across the street ☐ Value system does not allow the person to whisper. They perceive this to be rude ☐ They're comfortable to laugh and cry loudly in public ☐ Youngsters are not allowed to address their superiors by name	☐ Respect for authority ☐ Live according to nature demands ☐ Have a need for affiliation ☐ Believe in ancestral spirits ☐ Consult with a witch doctor and accept guidance from a Sangoma
Western/Coloured Culture	☐ Make eye contact ☐ Greet with a firm handshake ☐ Greet each other with a kiss and hug ☐ Standing as a sign of respect to superior	☐ Talk in a well-modulated tone of voice within their circle of space ☐ Whisper and talk in lowered tones so as not to disturb or distract others in their surroundings	☐ Openness ☐ Question authority ☐ Assertiveness ☐ High need for achievement ☐ Individualism
Asian Culture Hindu Muslim Chinese	☐ In greeting with each other, put hands together as if in prayer ☐ Make eye contact ☐ Men shake hands and kiss both cheeks ☐ Muslim women avoid contact with unrelated men and cover up hair and face	☐ Verbal communication is in modulated tones ☐ Do not display emotions publicly, worried what people will think ☐ Men appear to be the spokesperson ☐ Men are authoritarian. Women are very conservative	☐ Friendly ☐ Have own traditional food ☐ Show a positive approach towards business

Source: (SA Culture and Diversity Handbook, 2013)

In addition to the non-verbal and verbal cultural elements mentioned above South Africa is experiencing the influences of both globalization and internationalization, as well as numerous challenges presented by cultural diversity including language, race, culture ,age, gender, religion, abilities, sexual orientation, heritage and different identities .Now, more than ever before with the implementation of affirmative action and equal opportunity programs, changes are occurring in the workplace and in people's values and norms that impact on the level and style of management (Hass, 2010).

3.8 Culture in a workplace environment

Workplace culture is a unique sociological construct. While it may work in much the same way as any other type of culture does in a community (ethnic or religious culture), it differs in one major respect: it is inherently multi-cultural (Hartfield,2002).

In South Africa this is particularly true, with the average workplace containing employees of all races, genders, religions, political affiliations and many other differentiating factors. This makes the creation and maintenance of a positive and unifying workplace culture all the more difficult – and all the more important.

Handy (2012), an Irish philosopher and a world-leading figure in organisational culture, identified four overarching types of workplace culture.

Power culture

In some organizations, power is held in the hands of very few trusted and authorized decision-makers. These people enjoy special privileges in the workplace and delegate responsibility to the rest of the company. Employees in these types of environments are expected to follow their superiors' instructions to the letter and do not have the liberty to express alternative viewpoints. Such cultures often suffer in the long run, falling victim to high staff dissatisfaction at the lower hierarchical levels.

In SA context a conflict is likely to arise in situations when a female employee is in a position of power, certain tribes view women to be followers, whereby men may still find it difficult to take instructions from a female employee (Hass, 2010).

Some of the SA community members tend to stereotype women, black people, white people, those with rank, those with different sexual orientations, with disabilities or anyone who we perceive to be part of the so - called “out” groups, this could be attributed to the ills of the past regime (Hass, 2010). This way of thinking still influences how appointments and promotions in organizations are made, how leaders interact with subordinates, how various cultures interact in the workplace and their contributions to the overall organizational.

Task culture

In a task culture, solving problems and achieving the targets of the company are at the heart of the team's interactions. In these types of companies, small teams (generally four to five people) with similar interests and specializations are grouped and expected to contribute

equally to the task at hand. These employees tend to remain stimulated and content, and are given the room to innovate and think creatively.

Person culture

In these organizations, the wellbeing of the company takes a backseat to the personal importance of each employee – and eventually suffers for it. When employees place too much emphasis on their own concerns in the absence of a strong sense of teamwork or common goal, productivity, staff satisfaction and loyalty all tend to be low.

South Africa is one of the most diverse nations in the world. To enable a cohesive society, the country have one of the most progressive constitutions in the world that gives protection to the rights of every individual to be valued, respected and not to experience any form of discrimination.

Role culture

In a role culture, every employee is given responsibilities based on their delegated role and their professional specialisation, as well as their educational background and even their personal preference. This is all done in the interest of extracting the best performance out of each individual. In these cultures, power and responsibility are the results of hard work and proven performance, and employee motivation as well as work performance tend to be higher than average.

According to (Handy, 2012), most companies are hybrids of more than one of the above four cultural overarching types, or even all four. All have their pros and cons, and all are suited to different industries, companies of varying sizes, different sociocultural contexts, and different points in the company's development.

3.9 Hierarchy in South Africa

The South African economy is dominated by large corporations with a relatively underdeveloped small and medium enterprise sector. Consequently, the traditional South African organisational structure is a pyramid, consisting of many layers with a strong vertical inclination. However, due to global management trends of the recent past structures have been flattening. Decentralized decision-making and more responsibility at the lower organisational levels are the results of the globalisation process (Scholtz, 2012).

Scholtz (2012) continue to state that groups within South Africa tend to live side by side rather than merge. For a foreigner, not aware of the strong influences Apartheid still holds for the South African society, this may feel slightly surprising. Nonetheless, South Africans are moving towards sharing a common identity in areas such as sport and some commonalities can be identified in the areas mentioned below.

Strategy

Planning is done on a short-term (one-year) to medium-term (five-year) basis. Nevertheless, a lot of larger and progressive organisations have developed long-term strategic plans and initiatives covering up to ten years or more. Though the country is growing more business-friendly after having ended its long isolation, a foreigner to South Africa's complex legal framework and tax system is well advised to seek the assistance of local professionals.

Meetings in South Africa

Meetings can be rather informal. Be punctual according to schedule, yet do also plan some time in between two meetings in case the other will make you wait. There will considerable time to engage in small talk at the beginning of a meeting, to greet the participants and exchange business cards. Gift giving in a business context is uncommon in South Africa (Scholtz, 2012).

Negotiations

The most important aspect of conducting business successfully in South Africa is building stable personal relationships because the majority of South Africans want to trust the person they are dealing with. Direct confrontation tends to be avoided. Most South Africans do not appreciate haggling over profit and expenses. Instead, they aim at creating a win-win situation for the mutual benefit of all parties involved (Scholtz, 2012).

Decisions

The responsibility of decision-making is usually passed up the hierarchy. Disregarding this tradition would mean to challenge the established order of things, and is not necessarily an advisable move! Trying to avoid any unnecessary delay, it is prudent to negotiate with the person who actually has the authority to make decisions. Note that a lot of the time deadlines are not really perceived as binding commitments but rather as somewhat fluid. It is therefore advisable to include dates when setting up a contract with your business partners.

Time perception in South Africa

Throughout South African business life it is essential to be on time, especially when attending a meeting. And in this case, being on time means being at the given spot, preferably ten to five minutes before the actual meeting starts according to schedule (Scholtz, 2012).

Appointments

Appointments are necessary for South African business life. Regardless of their cultural background, most South Africans clearly prefer a face-to-face encounter to a telephone call or email contact.

Avoid scheduling meetings from mid-December to mid-January or the two weeks surrounding Easter, as these are prime holiday periods (Scholtz, 2012).

Dress code in South Africa

At work business, people are generally dressed more or less conservatively. Do not be surprised, however, to also come across people dressed in traditional African garments at work or during business meetings. This is certainly common during evening gatherings and dinners.

Wining and dining

Business lunches and dinners are very common in South Africa. Also, business breakfasts are quite popular. Although actual negotiations are not carried out during a meal, business may be discussed.

Business cards

It is common to exchange business cards at a meeting, and it is often done before or at the very end.

“When cultural diversity is created through understanding, performance and communication is enhanced between employees and management. This is vital for the successful running of a company, no matter how big or small.”

Adapting a more holistic organisational culture is the solution to ending cultural segregation, which is especially important in a country like South Africa where the population is made of up individuals from hundreds of different cultures (Scholtz, 2012).

3.10 Organizational Culture

Organisational culture is the set of shared beliefs, values, and norms that influence the way members think, feel, and behave. Culture is created by means of terminal and instrumental values, heroes, rites and rituals, and communication networks. The primary methods of maintaining organisational culture is through the socialization process by which individuals learn the values, expected behaviours, and social knowledge necessary to assume their roles in the organisation (Booyens, 2007).

Organizational culture is defined by Schrodts (2002) as the underlying beliefs, assumptions, values and ways of interacting that contribute to the unique social and psychological environment of an organization.

Organizational culture includes an organization's expectations, experiences, philosophy, as well as the values that guide member behavior, and is expressed in member self-image, inner workings, interactions with the outside world, and future expectations.

Culture is based on shared attitudes, beliefs, customs, and written and unwritten rules that have been developed over time and are considered valid (The Business Dictionary, 2006). Organization culture also includes the organization's vision, values, norms, systems, symbols, language, assumptions, beliefs, and habits (Needle, 2004).

Simply stated, organizational culture is “the way things are done around here” (Deal & Kennedy, 2000). While the above definitions of culture express how the construct plays out in

the workplace, other definitions stress employee behavioural components, and how organizational culture directly influences the behaviours of employees within an organization.

Under this set of definitions, organizational culture is a set of shared assumptions that guide what happens in organizations by defining appropriate behaviour for various situations (Ravasi & Schultz, 2006)). Organizational culture affects the way people and groups interact with each other, with clients, and with stakeholders. Also, organizational culture may influence how much employees identify with their organization (Schrodt, 2002).

Denison model on Organisational Culture

The Denison Model recognizes that cultural traits, managerial behaviors, and even organizational strategies can all be linked to a core set of beliefs and assumptions about the organization and its environment (Denison, et al., 2012).

These core beliefs and assumptions lie at the heart of an organization's culture. In the Denison Organizational Culture Model, these core beliefs and assumptions are summarized in terms of four main cultural "traits" that appear, through research, to have an impact on organizational performance (Denison, et al., 2012). They are: -

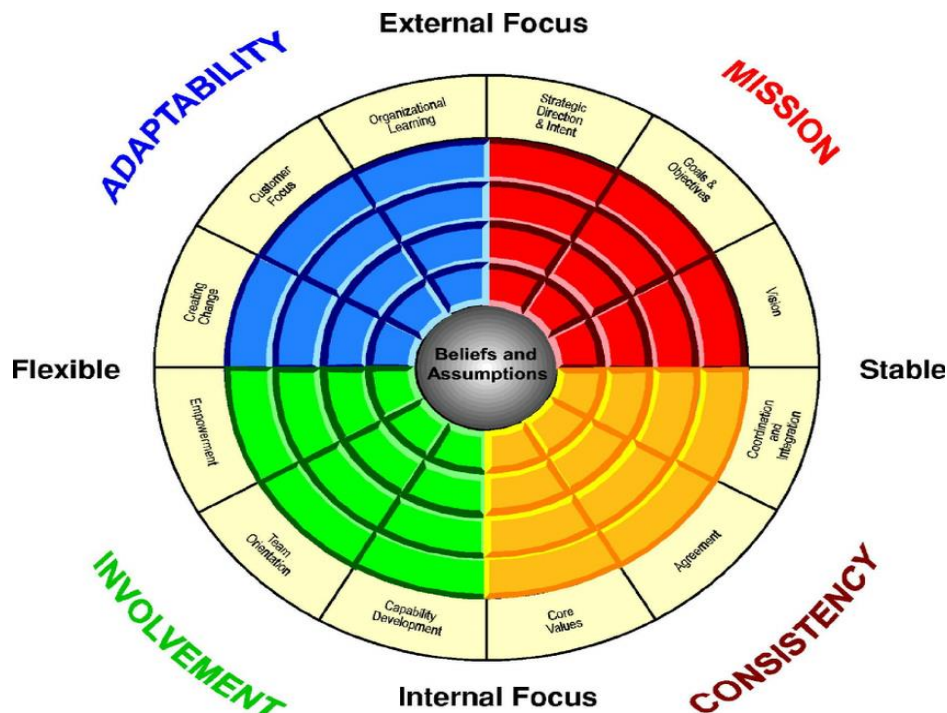
Adaptability - Translating the demands of the business environment into action.

Mission - Defining a meaningful long-term direction for the organization

Involvement - Building human capability, ownership and responsibility.

Consistency - Defining the values and systems that are the basis of a strong culture.

Figure 11: Denison Organisational Culture - Internal Focus



Source: (Denison, et al., 2012)

As mentioned in the previous paragraph, Denison characterizes the mutual influence of the four cultural factors upon the organization's efficiency. These four traits and three indexes within each trait and provides a powerful graphic representation of an organization's culture and are important and essential affect the organization efficiency.

Denison further had studied the organizational culture into two dimensions:-

Dimension 1: Internal focus when attention is given to what is going on inside the organization and external focus when attention is devoted to what is happening outside the organization.

Dimension 2: Stability and control namely, interest in maintaining the existing situation, flexibility and freedom of action, namely interest in changes and development.

Every organisation has a culture that can have a significant influence on the attitudes and behaviours of organisation members. The competencies and values of employees and leaders play a key role in determining the effectiveness and success of an organization.

While there is considerable variation in the definitions of organisational culture, it appears that most contain the following characteristics (Booyens, 2007):-

Observed behavioural regularities - When organisation members interact, they use common language, terminology, and rituals and ceremonies related to deference and demeanour.

Norms - Standards of behaviour evolve in work groups that are considered acceptable or typical for a group of people.

Dominant values - An organisation espouse and expect its members to share major values. Typical examples in schools are high performance levels of faculty and students, low absence and dropout rates of students, and high efficiency.

Philosophy - Policies guide an organisation belief about how employee and client are to be treated. For example, most school districts have statements of philosophy or mission statements.

Rules - Guidelines exist for getting along in the organisation or the ropes that a newcomer must learn in order to adapt to the team in order to become an accepted member.

Climate - This is an overall atmosphere that is conveyed in an organisation by the physical layout and the way in which members interact with clients or other outsiders.

As can be seen in **Figure 12** below, none of these characteristics can by itself represent the essence of organisational culture. However, the characteristics taken collectively reflect and give meaning to the concept of organisational culture.

Figure 12: Characteristics of Organizational Culture



Source: (Booyens, 2007).

A strong organizational culture is reflected by vision congruence, the existence of order principles, team work, employees' creativity, innovation, empowerment, alignment between parts, the same direction and purpose, high co- ordination and integration, employee development conforming to business' needs (Denison et al., 2012).

3.11 Cultural Complexity in Mega Construction Projects

The objective of this section was to investigate, identify and validate the existence of cultural barriers and practices that are brought about by factors that are both internal and external to projects; namely – Internal and External stakeholders and the organisation's corporate culture and the level of impact thereof in implementing Mega Construction Projects in SA context.

Without doubt, mega construction projects are complex in nature; the low success rate could also be largely attributed to the fact that they are risky and time-consuming undertakings that are usually commissioned by governments and delivered by national and international participants with a variety of cultural differences, backgrounds, political systems, and languages (Georgieva, 2012).

An international construction project extends beyond the one that is undertaken by a construction enterprise outside its home country to include a project that is undertaken in a

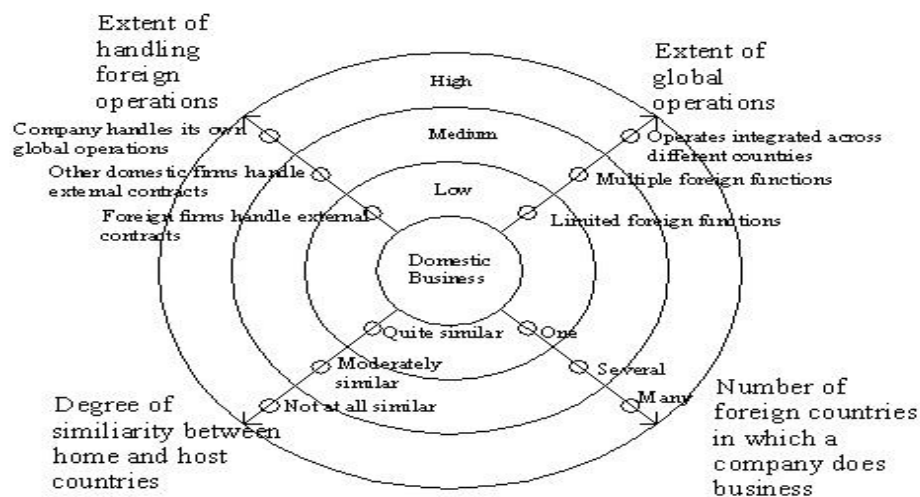
home country involving foreign firms as participants of project stakeholders (Lopez, et al., 2015).

As such, multinational construction team integration creates challenges for construction clients and managers of projects which in the case of mega projects can be in the form of technical, social, and managerial complexities (Babatunde Y. and Wang Y., 2015).

Babatunde and Wang (2015) also state that in construction projects, technical complexities arise from the design and technologies employed in the design and construction processes; social complexities arise from the inevitable impact of projects on the environment and social systems; and managerial complexities arise from the managerial and governance aspects of projects.

Companies operating globally therefore need to have some form of cultural awareness. Figure 13 illustrates the extent to which a company needs to understand global cultures at different levels of involvement. The further a company moves out from the sole role of doing domestic business, the more it needs to understand cultural differences at a global market space (Hofstede, 1997).

Figure 13: Cultural Awareness and Extent of Global Involvement



Source: (Hofstede, 2005).

According to (Babatunde Y. and Wang Y., 2015); typical cultural risks that are found in the international construction project environment are:-

- Native language as well as number of languages on the project
- Cultural values
- Different currencies
- Work ethics
- Religion
- Teamwork versus individual effort
- Trust
- Dispute management
- Standards terminology and differing priorities
- Management practices and expertise
- Economic culture
- Inflation
- Market conditions
- Interest rates
- Exchange rates
- Gender
- Disability
- Age differences
- Dissimilar procedures, practices, and tools leading to integration issues

The list is long and cannot be exhausted, what comes out clearly is that there are many cultural complexities that come into play when managing complex teams with dissimilar cultural norms, complicated contractual agreements, and multiple methodologies.

The question is how the above mentioned cultural risks are respected in different cultures.

The conflicts might arise as a result of innate perceptions of how different people to the majority have to be treated. For example gender, disability and age differences are one of the sensitivities and critical topics in SA legislation in the area of equity, which might not be the case in other countries, if such cultural differences are not identified upfront and managed, they might lead to massive project delays.

3.12 How are cultural complexities managed in projects

As stated in the above sections that if cultural differences and complexities are not identified upfront and managed, they might lead to massive project delays.

Hass (2010) places strong emphasis on the type of leadership style that is required to manage such complexities by suggesting the comprehensive project complexity model by suggesting a number of steps.

Figure 14: Manage Complexity



Source: (Hass, 2010).

The four steps in the complexity management process as outlined in Figure 14 are:

1. Diagnose project complexity using the project complexity model
2. Assign competent leaders commensurate with the complexity profile
3. Select the project approach commensurate with the complexity profile.
4. Manage complexity dimensions that are present on your project

To lead complex layers of teams, project leaders must first understand their team dynamics, must leverage the potential of teams, master team leadership, and learn to use sophisticated collaboration, communication, and coordination systems to address cultural differences.

Johnson (2009) state that; one cannot emphasise enough the fact that teams are a critical asset used to improve performance in all kinds of organizations. Yet today's business leaders consistently overlook opportunities to exploit their potential, confusing teams with

teamwork, empowerment, or participative management. The business community cannot simply meet 21st century challenges, from business transformation to innovation to global competition, without understanding the diversity of our teams, managing those differences to leverage and integrate the power and wisdom of teams especially in projects.

3.13 The Research Gap

There are very few studies that provide guidance on the effective planning and execution of MP. It is important to verify if some project management practices are more difficult to implement on MCP, or if there are certain practices in need of modification to suit MCP. Conversely, it is important to identify other management practices that may be critical to the success of MCP's (Caldas, C. and Gupta, A.2017).

The current body of knowledge suggests that MCP are more sensitive to certain factors than smaller-sized projects. Even though the capital projects industry has expanded, it is still underprepared to successfully execute MCP. For all the reasons mentioned above, there is a need to research further and identify, prioritize, and manage critical impact factors such as cultural complexities during project planning and execution to improve the probability of success on MCP.

3.14 Chapter Summary

Chapter 3 presented the last sections of the literature review which revealed that there are so many definitions of culture and complexity out there, there is just no absolute definition of "culture"; and that of complexity and the only consensus among researchers is that there is no agreement about the specific definitions of these concepts.

The concept of culture is an evolving concept that differs from year to year and from country to country, and can be defined as the cumulative deposit of knowledge, experience, beliefs, values, attitudes, meanings, hierarchies, religion, notions of time, roles, spatial relations, concepts of the universe, and material objects and possessions acquired by a group of people in the course of generations through individual and group striving (Hofstede, 2005).

The reviewed literature shows that Complexity should not be confused with difficulty and complicated; the three concepts are different and mean different things. Complicated speaks more into system inter-dependences while complication speaks to different layers.

The involvement of international participants in local projects involves complex team with different cultural complexities in addition to cultural differences that already exist in South Africa work environment all these cultural complexities calls for complex leadership style of management.

Chapter 4

4 RESEARCH DESIGN, METHODOLOGY, METHODS AND CASE STUDIES

4.0 Introduction

The previous two chapters presented a literature review on the definition of mega projects, the concept of culture and that of complexity and an overview of the SA construction industry. This chapter will present the research design, methodology and methods employed for this study. It will discuss sampling, how data from literature will be analysed, as well as the approach followed with interviews and survey data collection and analysis. The research imitations, research validity, reliability and ethics will also be discussed.

4.1 Problem Statement Formulation

Mega Construction Projects have a brief history in South Africa; since most of the expertise cannot be found locally a lot of companies and project staff is from abroad, therefore a plethora of different cultural considerations require new procedures and protocols.

As revealed by the literature, one of the key challenges that contribute to inefficiencies of implementing MCP's in SA is around cultural differences that are brought about by internal cultural dynamics in SA projects and multicultural global business community.

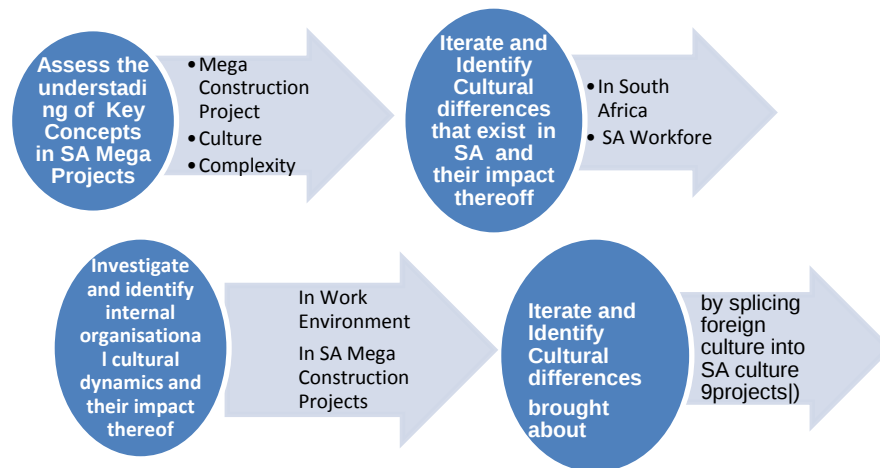
The Researcher initiated a research to establish the existence of cultural disruptions in implementing Mega Construction Projects (MCPs) in South Africa using Medupi and Kusile coal plant projects as cases.

The Researcher made the following assumptions when formulated the research topic:

1. The shortage of critical and adequate skills needed to implement mega construction projects in South Africa will continue to be a challenge in the near future.
2. South Africa will continue to form strategic alliances with the international business community.

The below process diagram shows how the topic was formulated.

Figure 15 - Topic Formulation Process Diagram



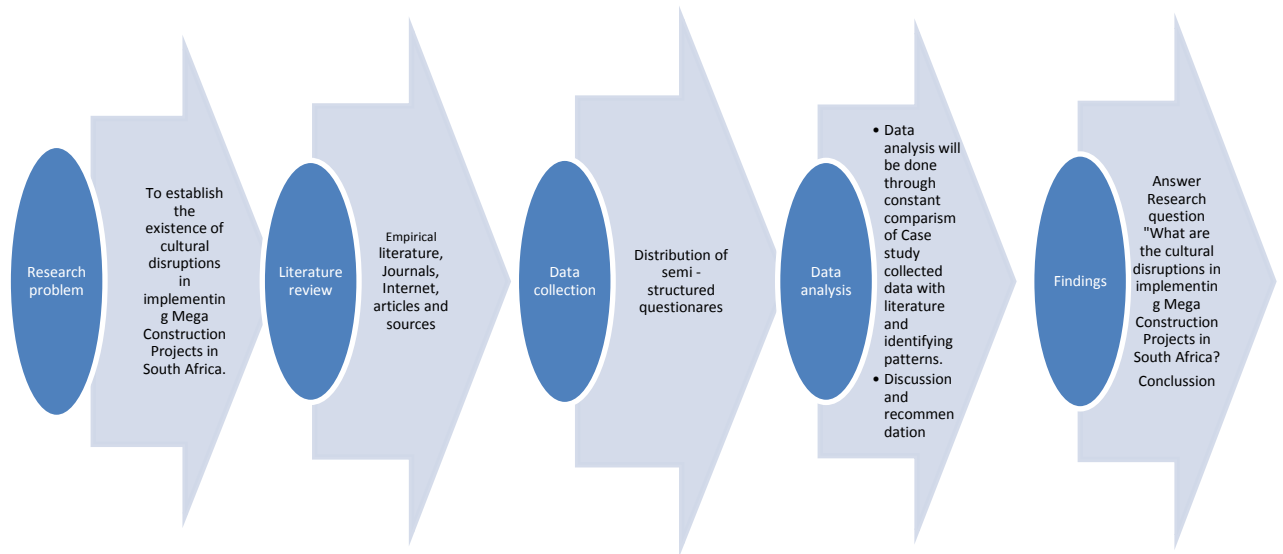
Source:(Author's own,2018)

4.2 Research Design and Approach

Saunders, et al., (2015) Describe a research design as a general plan of how the researcher will undertake the study to answer his or her research question(s), specifying the resources from which data will be collected, the methods of collecting and analysing these, and further discuss ethical issues and constraints that the research will inevitably encounter while conducting a study.

According to Saunders, et al., (2015) research design is the conceptual structure within which research is conducted. It constitutes the blueprint for collection, measurement and analysis of data. Particularly to achieve the aim of this study, a research methodology that consists of literature review and Medupi and Kusile Coal Plant Projects case studies were developed to accomplish its objectives.

Figure: 16 - Research Design Diagram



Source:(Author's own,2018)

4.3 Research philosophy

This overarching term research philosophy relates to the development of knowledge and the nature of that knowledge in a particular field (Saunders, et al., 2015).

There are five major philosophies found in business and management according to Saunders (2015) and they are:

Positivism – relates to the philosophical stance of the natural scientist. This entails working with an observable social reality and the end product can be law-like generalisations similar to those in the physical and natural sciences.

Realism – The essence of realism is that what the senses show us is reality, is the truth: that objects have an existence independent of the human mind

Interpretivism - is an epistemology that advocates that it is necessary for the researcher to understand differences between humans in our role as social actors. This emphasises the difference between conducting research among people rather than objects such as trucks and computers.

Postmodernism – emphasis the role of language and of power relations, seeking to question accepted ways of thinking and give voice to alternative marginalised views.

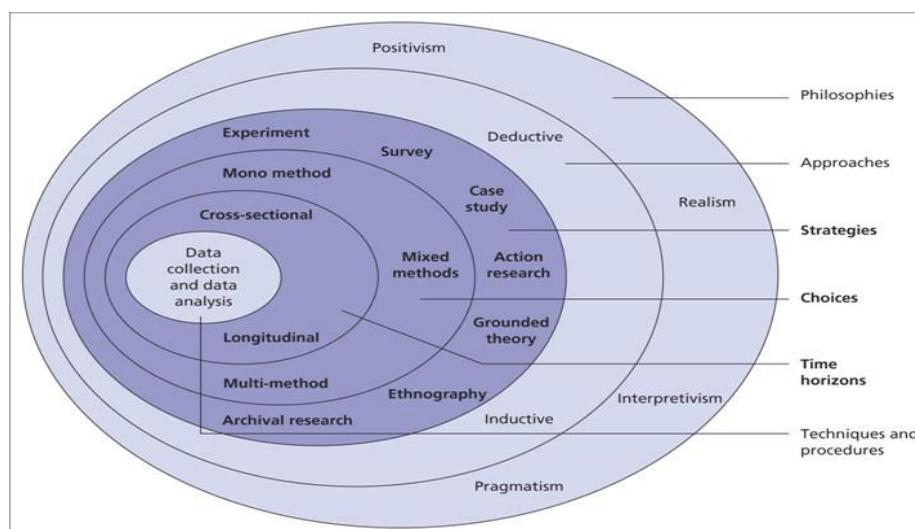
Pragmatism – asserts that concepts are only relevant where they support action (Kelemen and Rumens, 2008). It holds that the most important determinant of the research philosophy adopted is the research question. For a pragmatist, a research starts with a problem and aims to contribute practical solutions that inform future practice.

Which of the five major research philosophy is better?

It would be easy to fall into the trap of thinking that one research approach is ‘better’ than the other. This would miss the point. All research philosophies are ‘better’ at doing different things. As in most cases, which is ‘better’ depends on the research question(s) the Researcher is seeking to answer.

The practical reality is that research rarely falls neatly into only one philosophical domain as suggested in the ‘onion’ diagram (see Figure 16) below.

Figure 17: The Research Onion



Source: (Saunders et al, 2007).

The discourse in the research philosophy centres around four areas focusing on the research strategy, how data will be gathered, analysed and applied to fulfil the aim and objectives of this study.

As outlined in Figure 15 (Section 4.2) above, to establish the existence of cultural disruptions in implementing Mega Construction Projects in South Africa, Research

Participants , literature reviews, surveys and other data sources were formulated and used to :

1. Collect the subjective qualitative data from the Medupi and Kusile projects employees (Skilled, semi- skilled, Management and Professionals etc)
2. Analyse the collected data through comparison of primary data with secondary data.
3. Identify common themes and patterns from participants responses
4. Report explored findings and recommend.

The research completed in this study is exploratory and was set out to collect qualitative data. Saunder, et al., (2015) noted that qualitative research is associated with an interpretive philosophy. Saunder, et al., (2015) further stated that it is interpretive because researchers must make sense of the subjective and socially constructed meanings.

The data was collected from the surveys using quantitative means and interpreted qualitatively. Participants were asked to indicate severity on an interval scale to ensure that the results of the survey still reflect the perception of the participants.

This study also includes a Phenomenology philosophy as it focuses on experiences, occurrences and events with disregard or minimum regard for the external and physical reality (Dudovskiy, 2016) . It includes better understanding of meanings attached by people and its contribution to the development of new theories. It also focuses on meaning and employs multiple methods to reflect different aspects of the issue. The ideas were generated from rich amount of data by the means of induction and human interests, as well as stakeholder perspective (Dudovskiy, 2016).

4.4 Research Methodology

1. The product of this report was the result of research using professional journals, articles, books and experiences in this field, experience rooted in real world applications specifically in the South African context.

A number of key concept used in search engines namely Mega Construction Projects, Complexity, Cultural Complexity, Major Infrastructure Investment and SA Construction Industry.

2. The methods chosen demonstrated a shift from theory to practice; most parts of this research are practical. It is intended for general use, even non-construction and non-project management people will be able relate, understand and apply the findings.

Qualitative research method which was chosen for this study is an inquiry process of understanding based on distinct and methodological traditions of inquiry that explore a social or a human problem. The Researcher builds a complex, holistic picture, analyses words, reports detailed views of informants and conducts the study in a natural setting (Srivastava & Thomson, 2009).

Other methods of research are **Quantitative Research** which emphasize objective measurements and the *statistical, mathematical, or numerical* analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing *statistical* data using *computational* techniques (Cresswell, 1994); and **Mixed Research** method which is a combination of qualitative and quantitative method.

The reasoning behind choosing a qualitative approach was, as Maxwell (2005:22) states that “the strengths of a qualitative research derive primarily from its inductive approach, it focuses on specific situations or people”. The Cases Medupi and Kusile coal plant projects meet these requirements, these are ones of the numerous megaprojects that are implemented in South Africa to meet different objectives ranging from: 1) to enhance economic competitiveness and 2) to address energy shortages, infrastructure backlog, unemployment and alleviate poverty.

4.5 Delineations

The term *Delineations* and sometimes referred to as *Delimitations* - deliberately self-imposed constraints on the research. The Researcher defines the boundaries in the problem area within which the study will be done, and the population or situation to which the findings may apply (Morey, 2018).

The study has made the following delineations:

- Focus of the study was only on Mega construction projects , complex projects that are designed and constructed over a period of time, normally four years or more , at a cost of more than US\$ 1 billion and involve and have an impact on multiple public and private stakeholders

- Focus of the study was only on the energy sector in South Africa
- Focus on opinions of key stakeholders of Medupi and Kusile coal plant projects
- Focus on the cultural complexities throughout all construction phases of the projects

4.6 Limitations of study

Limitations - these are constraints to the study that are beyond your control but that may influence the data. Limitations may emerge at any time during your study (Cresswell, 2013) and Morey (2018) Defines *limitations* of the *study* as those characteristics of design or methodology that impacted or influenced the interpretation of the findings from your *research*

The Researcher identified the following research limitations for this study:

- Currently there are only few mega construction projects in SA; this could result in limited data being collected.
- The focus of the study was only on the energy industry, this excluded participants within the construction industry and further limited the amount data collected.
- The research made use of qualitative data to draw conclusions; the resulting findings therefore reflect the sample groups' view on cultural complexities surrounding the implementation of MCP's.
- The constraint around the availability of key personnel for interviews hence a sample was used to draw conclusions.
- The Researcher faced some constraints on resources namely: access to people, time and finance to conduct the interviews.

4.7 Ethical Concerns

The definition of ethics simplified as per the English Dictionary (2016) is moral principles that govern a person's behaviour or the conducting of an activity.

While the term research ethics refer to the standards of behavior that guide the conduct in relation to the rights of either involved or affected by the research (Saunders, et al., 2015).

Cresswell (2003) states that for research to be ethical it must be designed so that a respondent does not suffer physical harm, discomfort, pain, embarrassment or loss of privacy hence sound research ethics principles will be upheld throughout all stages of this study.

Mark Saunders pg. 239 (2016) further states that there are numerous ethical concerns which emerge during the design and plan of the research study, when seeking access to organisations, to participant during data collection, analysing, managing and reporting the data. The researcher in this case ensured that ethical considerations are adhered to during the process. Proper authorisation was sought from the participating company which is Eskom SOC Holdings LTD before the semi-structured surveys were distributed.

No pressure was applied to anyone to participate or grant permission or access. Respect for people's privacy was considered and no harm was caused. The researcher requested consent from all participants before partaking in the study. Integrity and objectivity was applied when explaining the intention of the study to participants.

The researcher ensured relevancy of material to the study and recognition to the author during literature review. Noting that this is an exploratory research and it is prone to biasness (Dudovskiy, 2016), the researcher tried to avoid and manage it. The researcher also ensured that the reviewed literature and collected data received accurate interpretation and attention. Remaining anonymous and confidential was assured in every step to the participants during the study. The researcher ensured that both the participant's and the author's beliefs and opinions were respected. Fairness and honesty was applied during data analysis. Finally, the right of the participants to withdraw at any given time should they wish was explained. Fortunately, none of the selected participants withdrew during the process.

The possible consequences and ethical implications of this research were considered throughout the research process.

The following ethical rationales were utilized:-

1. The integrity and objective of the research was clearly stated upfront, to ensure that all the participants feel protected and respected when conducting interviews and surveys.
2. The confidentiality of data and maintaining the anonymity of the participants was strictly adhered to.
3. Due diligence was exercised when analysing and reporting the research findings.
4. The sensitivity regarding people's cultural beliefs and practices was taken into consideration for example imposing one's belief to others is considered to be unethical.
5. The main findings of the study were shared with participants in the pursuit of reciprocity and mutual benefit.

4.8 Research Population

A study population is about the overall and available list of possible participants who fit the requirements for this study. Target population represent specific segment within wider population that are best positioned to serve as a primary source for the research (Dudovskiy, 2016). The population in this regard which was used intensively comprising of all major key project stakeholders namely of Medupi and Kusile projects, Eskom senior management team, the project management team, leading and sub-contractors, consultants, general workforce and surrounding communities. A sample of 2000 potential participants was selected.

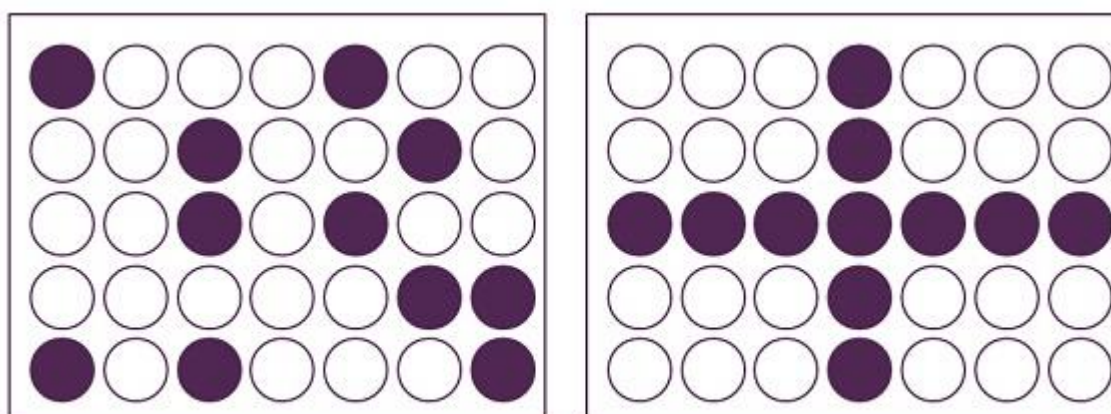
4.9 Sampling Plan

In research terms a sample is a group of people, objects, or items that are taken from a larger population for measurement. The sample should be representative of the population to ensure that the Researcher is able to generalise the findings from the research sample to the population as a whole (Miles & Huberman, 2015).

The sampling techniques that were available for this research were:

- Probability sampling also known as random sampling is a sampling technique, in which the subjects of the population get an equal opportunity to be selected as a representative sample (Surbhi, 2016).
- Nonprobability sampling (Non random sampling) is a method of sampling wherein, it is not known that which individual from the population will be selected as a sample (Surbhi, 2016).

Figure 18: Probability Sampling Vs Non –Probability Sampling



Probability Sampling Vs Non-Probability Sampling

Source: (Surbhi, 2016).

The research used was a probability technique and random systematic sampling to select the sample. Upon receipt of the target population of 2000 people from the identified projects which was requested during the application to conduct research, every person was labelled with a unique number. To start the selection, the first sample was random. The sample size was estimated to be at least 2000 participants i.e. estimation of minimum 120 participants. The sample fraction equaled to $250/2000 = 30/250 = 1/8$. This meant every eighth person on the list would be chosen to be included in the study. The first person was randomly selected. The issue of size in probability/ representative sampling is associated with survey where you need to make inferences from your sample about a population to answer a research question and meet your objectives (Saunders, et al., 2016).

The development of a meaningful potential participant sample is essential in any research study in order to ensure reliable results. Probability sampling was used to select the potential participants to ensure a representative sample of the Medupi and Kusile stakeholders.

A sample of 2000 potential participants was selected from a population of about 19,086 Medupi and Kusile workforce, which is a fair representative percentage. The 11% sampled, comprises of all major key stakeholders namely, Eskom Senior management, Middle and Junior management, project management team, leading and sub-contractors, consultants, general workforce and surrounding communities.

4.9 Data Collection Methods

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes (Kothari, 2013).

There are several ways of collecting the appropriate data which differ considerably in the context of costs, time and other resources at the disposal of the researcher (Saunders, et al., 2015).

The Researcher considered many factors when choosing a data collected method for this data, namely, study evaluation, including the target population, the timeframe for collecting data, and the budget for collecting information using the method chosen. Research data was collected using primary and secondary source from various Respondents through questionnaires, interviews, intensive search on recent integrated literature review and use of cases study.

The data collection methods used by the Researcher, according to Dudovskiy, (2016) to provide the following advantages:-

Table 8: Data Collection Methods

METHOD	DESCRIPTION	ADVANTAGES
Surveys/Questionnaire	A questionnaire/survey is defined as a formalised set of questions for obtaining information from respondent's researcher (Saunders, et al., 2015).	• Can survey many people • Not time-consuming • Relatively inexpensive • Everyone gets the same instrument • Objective interpretation
Interviews	Can be defined as a qualitative research technique which involves conducting intensive individual interviews with a selected number of respondents to explore their perspective on a particular area or program in order to collect in- depth information (Braun & Clarke, 2006).	• Researcher can know how people are interpreting questions • Able to ask for more detail when needed • Provide detailed data

Observations	A way of collecting data through observing. It is classified as a participatory study, because the researcher has to immerse herself in the setting where her respondents are while taking notes or recording: (Dudovski, 2016).	• Low burden for people providing data • Objective interpretation
Case studies	Case study research refers to an in-depth, detailed study of an individual or a small group of individuals. Such studies are typically qualitative in nature, resulting in a narrative description of behavior or experience (Kothari, 2013).	• Case studies are narrowly focused, • Provides a high level of detail • Able to combine both objective and subjective data to achieve an in-depth understanding.

Source: (Dudovski, 2016),

Only few face to face interviews were conducted, the majority of the survey was done using an electronic questionnaire this approach was used to costs associated with transcribing interviews and travelling.

Standard questionnaires were issued to the sampled population to ensure consistency in analysis. A questionnaire is defined as a formalised set of questions for obtaining information from respondent's researcher (Saunders, et al., 2015).

Case study research refers to an in-depth, detailed study of an individual or a small group of individuals. Such studies are typically qualitative in nature, resulting in a narrative description of behavior or experience researcher (Saunders, et al., 2015).

Case study research is not used to determine cause and effect, nor is it used to discover generalizable truths or make predictions. Rather, the emphasis in case study research is placed on exploration and description of a phenomenon (Kothari, 2013).

4.10 Data Analysis Plan

Data analysis is defined by Cresswell (2013) as a process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap and evaluate collected data.

Collected data in its raw form is normally meaningless, data has to be processed and analysed. The analysis involves the interpretation of data gathered through the use of analytical and logical reasoning to determine patterns, relationships or trends (Cresswell, 2003).

There are many different data analysis methods, depending on the type of research. Below are few methods that are most commonly used to analyze qualitative data as described by (Braun & Clarke, 2006) : -

- **Content analysis:** This is one of the most common methods to analyze qualitative data. It is used to analyze documented information in the form of texts, media, or even physical items. When to use this method depends on the research questions. Content analysis is usually used to analyze responses from interviewees.
- **Narrative analysis:** This method is used to analyze content from various sources, such as interviews of respondents, observations from the field, or surveys. It focuses on using the stories and experiences shared by people to answer the research questions.
- **Discourse analysis:** Like narrative analysis, discourse analysis is used to analyze interactions with people. However, it focuses on analyzing the social context in which the communication between the researcher and the respondent occurred. Discourse analysis also looks at the respondent's day-to-day environment and uses that information during analysis.
- **Grounded theory:** This refers to using qualitative data to explain why a certain phenomenon happened. It does this by studying a variety of similar cases in different settings and using the data to derive causal explanations. Researchers may alter the explanations or create new ones as they study more cases until they arrive at an explanation that fits all cases.

The process of analysis was conducted using thematic analysis to identify common patterns and themes and to conduct primary and secondary data comparisons. It is possible according to (Dudovskiy, 2016), to compare the findings of interview/focus group/observation any other qualitative data collection method with the findings of literature review and discussing the differences between them.

Thematic analysis of qualitative data is a process of bringing order, structure and interpretation to the mass collected data (Rossman, 1999). It can be an essentialist or realist method, which reports experiences, meanings and the reality of participants, or it can be a constructionist method, which examines the ways in which events, realities, meanings, experiences and so on are the effects of a range of discourses operating within society (Clarke, 2006). The analysis of the collected qualitative data commenced during the data collection process. The semi – structured questionnaires were analysed as and when they were received from participants. The following steps were taken:

- a. The researcher read through thoroughly every questionnaire and response to familiarise herself with the raw data.
- b. The researcher then *organised* and labelled the responses from each participant to each question.
- c. This was followed by the *coding and recoding* process which led to the identification of common themes and interpretations by participants.
- d. The pattern identification was conducted by reviewing and refining the identified themes. Level one involved reviewing at the level of the coded data extracts. This means the researcher needed to read all the collated extracts for each theme and consider whether they do articulate or appear to form a coherent pattern. (Braun & Clarke, 2006).
- e. The researcher then tied and cross-referenced the identified patterns to the *research objectives and compared with* literature review. This will however be discussed in Chapter 7 and results will form basis for informed and verifiable conclusions.

The collected data was analysed manually using the researcher's memo as a referral. This means that the process of reading and re-reading through the raw data (responses), the organisation of the data, the coding and sub theme identification were conducted manually. This process began as and when a response was received by email or hand delivery.

The use of key concepts was identified; these included but were not limited to:

- 1) Repeated words by participants
- 2) Something familiar that the researcher read about before
- 3) Something surprising
- 4) Something that participants stated is vital
- 5) Theories and concepts used in responses
- 6) Underlying patterns
- 7) Metaphors

Themes that emerged were used to identify relationships and association with the intention of providing explanations for the findings. "A theme captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set" (Braun & Clarke, 2006).

4.11 Reliability and Validity

Reliability refers to the extent to which the data collection techniques or analysis procedures will yield consistent findings (Saunders, et al., 2015).

Validity is concerned with whether the findings are really about what they appear to be about (Saunders, et al., 2015). In general, validity is an indication of how sound your research is; it refers to the credibility and the believability of the research.

Qualitative research has become increasingly popular in the past two decades. Therefore, much time has been spent reviewing ways to judge the reliability and validity of qualitative research findings, Credibility - Often called internal validity, refers to the believability and trustworthiness of the findings.

Lincoln & Guba (1985) discuss a variety of ways to enhance qualitative work and each should be easily identified in any good study:-

Credibility – this is viewed as one of the most important constructs that assists in establishing trustworthiness of research. Credibility means we have confidence in the findings of the study and it can be established in a number of ways

1. Prolonged engagement in the setting with a range of people.

2. Triangulation where multiple data sources are used to produce understanding.
3. Peer debriefing defined as a process of exposing oneself to a disinterested peer in a manner paralleling an analytical session and for the purpose of exploring aspects of the inquiry that might otherwise remain only implicit within the inquirer's mind (Lincoln & Guba, 1985)

Transferability – this means the findings have applicability in other contexts. Giving a 'thick description' of a phenomenon in sufficient detail allows readers to evaluate the extent to which the conclusions drawn are transferable to their settings and people.

Dependability – this is concerned with demonstrating that the findings are consistent and could be repeated. External audits can help with this where a researcher not involved in the research examines the processes and findings of the research study in order to evaluate accuracy and if the findings and conclusions are supported by the data.

Confirmability – this is the extent to which the findings of a study are shaped on what has been reported by participants and not researcher bias. Reflexivity is an important concept here and involves the researcher attending to how knowledge has been constructed and the effect of the research on the researcher and the researcher on the research.

To ensure validity and reliability of this study, purposive sampling was used to ensure that research instruments are only administered to individuals who are involved in both Medupi and Kusile projects.

The Researcher used identical questions for interviews and surveys, same techniques and tools were used to collect and analyse data. The reliability of the findings from the outcomes, findings and recommendations of this study was discussed with three senior participants from Eskom SOC Holdings to gather additional perspectives and to obtain recognition of the process and results. This to a large extent contributed to confirmability.

The researcher found it important to include the background and experiences of the participants to ensure that using them on this research as subjects is reliable and can be validated. This was achieved during data collection to validate the reliability of their contribution. To build on credibility of this study, the Researcher sampled suitable qualified managers.

The available and used literature review on this research study identified validated the objective as it has been previously tested (Flyvbjerg, 2014). The research group discussions were also conducted several times with other researchers especially on MCP literature review. A peer debrief was also conducted with another qualitative researcher to verify and identify anywhere the data was independently (Burnard, et al., 2008).

The research objectives were communicated and discussed with the Researcher's Supervisor (Face Validity and through class assignments). Furthermore, every section of this study was reviewed, validated and passed by a knowledgeable, qualified and accredited study supervisor Dr.Nthatsi Khatleli from the School of Construction Economics and Management, University of the Witwatersrand.

4.12 CASE STUDIES – MEDUPI AND KUSILE COAL PLANT PROJECTS

The main focus of section 4.12 is to provide a brief background of the two Mega projects chosen for this study, namely Medupi and Kusile Coal Plant Projects, Lephalale (SA).

4.12.1 Medupi Coal Power Station Project - Project Description

Medupi is a greenfield coal-fired power plant project located west of Lephalale, Limpopo Province, South Africa. Medupi is the fourth dry-cooled, baseload station built in 20 years by Eskom after Kendal, Majuba and Matimba power stations. The name “Medupi” is a Sepedi word which means “rain that soaks parched lands, giving economic relief” (Eskom, 2015).

The power station is the fourth largest coal plant in the southern hemisphere, and is set to be the biggest dry-cooled power station in the world. The boiler and turbine contracts for Medupi are the largest contracts that Eskom has ever signed in its 90-year history. (Eskom, 2015).

According to the (Eskom, 2015) website , the planned operational life of the station is estimated to be 50 years. The new power station will comprise of six units with a gross nominal capacity of 800MW each, resulting in a total capacity of 4 800 MW.

The uniqueness of this project lies in the fact that Medupi is being built backwards – traditionally Eskom has always started building Unit 1 and ended with Unit 6. This new

approach is the result of the rock conglomeration on the southern side which is excavated and reused as the engineering fill on the northern side.

The objective of the project is to enhance Eskom power supply and energy security in an efficient and sustainable manner so as to support both economic growth objectives and South Africa's long term carbon mitigation strategy and also to contribute to the growth of South Africa's GDP by approximately 0.35% per year (Eskom, 2015).

4.12.2 Project Value

In July 2016, Eskom officially updated its cost-to-completion estimates for Medupi. The State-owned utility reported that Medupi was now expected to cost R145-billion, rather than the earlier revised estimate of R105-billion (Eskom, 2016).

4.12.3 Project Duration

The project was scheduled to be completed in four years from the commencement of the construction activities, which started in May 2007. Limited skills, poor upfront planning, inadequate quality control, labour strikes, ambitious implementation timelines, improper Environmental Impact Assessment and costly technical errors were among the key reasons for delays at Eskom's new build projects Medupi.

The entire six-unit Medupi project is expected to be completed in 2020.

The first unit, Unit 6, was first synchronized to the grid in the first quarter, beginning March, of 2015. In August 2015, Unit 6 of Medupi became commercially operational.

Unit 5 was successfully synchronized to the national grid on September 8, 2016, ahead of the revised schedule, and reached full load on December 17, 2016. After completing performance, reliability and compliance tests, the unit attained commercial operation on April 3, 2017, also ahead of schedule.

Figure 19 - Medupi Unit 6



Source: (Eskom, 2015)

Figure 19 above shows unit six, which is one the 6 units at Medupi, this unit was commissioned and added to the national grid in March 2015.

4.12.4 Project Key Stakeholders

Medupi currently has 17 086 construction contractor employees working on site of which 7 679 are from the Lephalele municipality many of which have undergone training and skill development through the legacy programs. The number of employees includes foreign nationals but excludes 2000 supporting staff.

Medupi key stakeholders comprises of the project's clients, shareholders and investment community, operating companies, joint-venture partners/service providers/suppliers/subcontractors, unions, financial institutions, government and regulators, communities and special and other interest groups.

4.12.5 Is the project on budget or on time?

The project has been affected by technical and labour difficulties. However, measures have been put in place to accelerate the progress and recover the lost time. This has been evident through the latest achievements of the project milestones as per the project plan.

Figure 20 - Medupi Powerstation - End State



Source: (Eskom, 2015)

Figure 21 – Medupi Construction Site



Source: (Eskom, 2015)

The above figures give a glimpse of the high level of complexity involved at Medupi coal plant project.

4.12.5 Kusile Power Station Project - Project Description

The Kusile power station project, which is located near the existing Kendal power station, in the Nkangala district of Mpumalanga, will comprise six units, each rated at an 800 MW installed capacity for a total capacity of 4 800 MW. Once completed, Kusile will be the fourth-largest coal-fired power station in the world (Eskom, 2016).

The power station will be the first in South Africa to install flue-gas desulphurisation (FGD) a state-of-the-art technology used to remove oxides of sulphur, such as sulphur dioxide, from exhaust flue gases in power plants that burn coal or oil. This technology is fitted as an atmospheric emission abatement technology, in line with current international practice, to ensure compliance with air – quality standards, especially since the power station is located in a priority air shed area.

Figure 22 – Kusile Construction Site



Source: (Eskom, 2015)

Figure 22 above shows Kusile construction site. The operational life of the power station is expected to be 60 years.

4.12.6 Is the project on Time or on Budget?

The most recent budget revision for Kusile increased the power station's cost to R161.40-billion, from a previous revised estimate of R118.50-billion (Eskom, 2015).

The project has had massive delays and its completion date has been postponed from 2017 to 2021. According to **(Eskom, 2016)** the first synchronisation of Kusile Unit 1 was expected to enter commercial operation in July 2018 as per the revised scheduled. However Eskom connected the first power-generating unit of the new Kusile coal-fired power station at the end of December 2016, reaching the milestone ahead of schedule and adding 800 MW to further stabilise the energy grid, the projected completion date is 2021.

Initially the project was expected to take 6 years to complete, but the project has since been delayed and is now expected to be complete by 2021.

4.13 Chapter Summary

This chapter set forth the research process undertaken for the study inclusive of research approaches, strategies, data types and adopted collection methods, set the population and sampling techniques.

The research design was presented together with the research methodology and methods that were used for this study. Secondly, it described the interview and survey design, which includes the methods used for collection of data, sampling and analysis. Due consideration was given to limitations, reliability and validity and ethics.

Chapter 4 also presented two case studies of Eskom coal plant mega construction projects Medupi and Kusile. The statistics presented in this chapter shows that these are large-scale mega infrastructure projects that South Africa see as the basis of a development model.

However “Large projects”, like Medupi and Kusile as shown above are vulnerable to project delays caused by many factors which may vary from issues around land disputes, to disputes over water supply, to changes in markets, big cost overruns and to cultural differences of which all needs to be managed carefully.

Chapter 5

5 RESEARCH RESULTS

5.0 Introduction

The literature reviewed within this study provided an in-depth description together with a theoretical framework for this research. Chapter 6 presents the data analysis and findings of the research conducted as part of the field work.

It discusses results obtained from the respondents. The research analysis will start by reviewing the collected data. The selected sample has been broadly discussed within research methodology in the preceding chapter. The results present qualitative data results obtained from the distributed surveys and interviews with respect to the study objectives and the first section of the questionnaire explores the general information of the participants taking part in the research. Thematic analysis method was then deployed to analyse the collected data.

5.1 General Methodology Used

As stated in chapter 4 above that a participatory approach was adopted to conduct the research.

A sample of 2000 potential participants was selected, comprising of all major key project stakeholders namely, Eskom senior management team, the project management team, leading and sub-contractors, consultants, general workforce and surrounding communities.

Data collection techniques employed in the research included interviews and administration of semi-structured questionnaires. Only few face to face interviews were conducted, however all key project stakeholders of the sampled population were covered, with the majority being general workforce and surrounding communities to obtain more clarity on the information provided as they represent the views of the majority of the stakeholders.

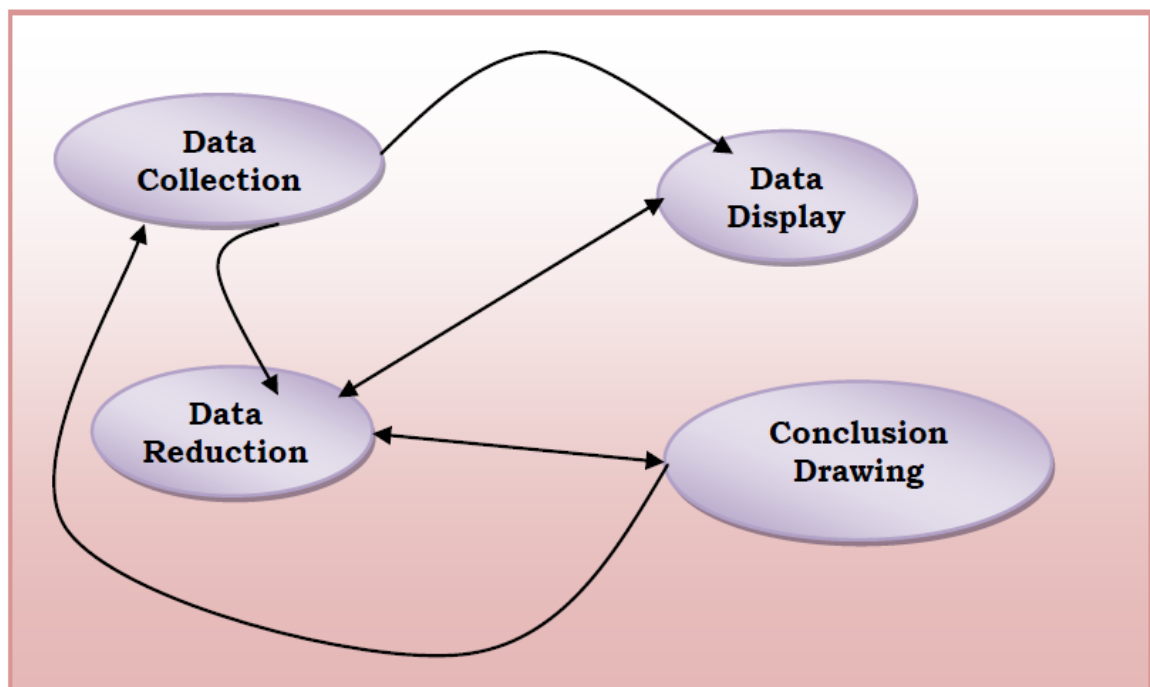
The majority of the survey was done using an electronic questionnaire this approach was used to save costs associated with transcribing interviews and travelling. Standard questionnaires were issued to all the sampled population that is Eskom senior management team, the project management team, leading and sub-contractors, consultants, general workforce and surrounding communities to ensure consistency in analysis

The first phase of the study involved the questionnaires and then follow ups interviews, meetings and discussions with key personnel on project sites i.e. Medupi and Kusile.

Data and information collected from the interviews were analysed using the thematic analysis method to bring out consistencies between different sets of data in order to draw meaningful conclusions. Both the Statistical Package for Social Sciences (SPSS) and the Pivot Table of Excel were used to analyse the data collected. The first task of the data analysis was to 'display' the data i.e. put them in an organised form in order to facilitate cross-referencing of findings and aggregation of data. This made it possible for quantification of key responses to the questions asked.

Some initial data cleaning, information gathering and analysis were carried out at various stages of the data collection exercise to fill in gaps that emerged during the initial analysis to allow cycling forth between thinking about the existing data and generation of new strategies for collecting new data. The components of the data analysis using the interactive model are outlined in Figure 16 below.

Figure 23: Data Analysis Model



Source: (Miles & Huberman, 2015)

5.2 Re-visiting Study Aim

This research aim was to establish the existence of cultural disruptions in implementing Mega Construction Projects in South Africa.

5.3 Re-visiting Objectives of the study

The following objectives were utilized to achieve the aim stated above, namely:-

1. Assess the understanding of the concept of culture by workers in SA projects.
2. Iterate the cultural differences that exist in SA with regard to their impact in the work environment in SA projects.
3. Investigate and identify internal organisational cultural dynamics and their impact thereof in implementing mega construction projects in SA context.
4. To establish the existence and level of impact of cultural diversities and practices that is brought about by a project external factors and stakeholders in SA projects.
5. To assess the challenges occasioned by splicing foreign culture into South African culture in projects.

As stated above, the study adopted the exploratory survey design, using the purposive and convenience sampling methods, data was collected from 2000 Medupi and Kusile stakeholders.

The questionnaires were sent out on more than one occasion to try and increase the response rate received each time. Saldivar (2012) developed a table showing the acceptable response rates for varying methods of survey study as presented in table 8 below.,

Table 9 – Prime Response Rate Survey

Survey Mode	Response Rate
In person	80-85 %
Phone	80%
Mail	50-70%
Email	40-60%
Online	30%

In accordance to table 9, the response rate for online surveys must at least be 30% while Hamilton (1999) also notes that online surveys average a response rate in the range of about 30%. For purposes of the research the questionnaires were sent out using emails and

hand delivered to ensure that all individuals had access to the questionnaires and clarity could be easily provided regarding the questions.

The survey questionnaires and the interview questions were structured to cover the study objectives above as mentioned in section 6.3. However, out of the 2000 surveys, 1800 were deemed valid responses for analysis. This decision was based on criteria set which required that if more than 80% of the questions in a questionnaire left unanswered, the response will be deemed invalid.

5.4 Analysis of the Study

5.4.1 Stakeholders Researched

At the end of the data collection and analysis, it came out that, of the 1800 valid respondents, 756 persons (42.2%) of them belonged to contractors employees (Skilled Labour), 360 persons were general workers (Unskilled Labour) (20%), 198 persons (11%) were Foreign Nationals, 298 persons (16.6%) were Middle and Senior Management 108 persons (6.0%) belonged to the Lephalele and Mpumalanga community and 80 persons classified as others.

The 198 foreign nationals sampled comprised of foreign nationals from China (46); Germany (36); Congo (10) Italy (12) Zimbabwe (50) and other (44). One hundred and seventy four persons of the foreign nationals (96%) we males and the remaining twenty four were females. Their age group was between (25 years to 50 years).

Table 10 – Stakeholders Researched

Researched Stakeholder	Percentage
Contractors employees (Skilled Labour),	42.2 %
General workers(Unskilled Labour)	20%
Junior, Middle and Senior Management	16.7%
Foreign Nationals	11.1%
Lephalele and Mpumalanga community	6.7%
Others	3.3%

5.4.2 Gender

In the management of projects in a developing country such as South Africa, issues of gender are very important because of the increasing campaigns for gender equality especially cultural barriers. Data collected indicated that 1300 persons (72.2%) in project management positions at both Medupi and Kusile were males and 500 persons (27.8%) females.

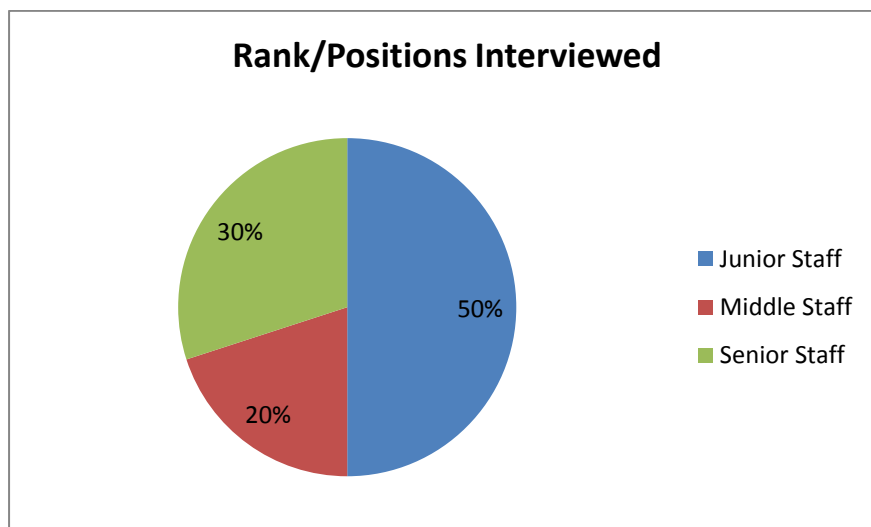
Table 11 – Gender of the participants

Gender	Percentage
Males	72.2 %
Females	27.8%

5.4.3 Rank/Position of Persons Interviewed

Persons who were interviewed for the study were categorized into two groups - senior and junior staff. It was found that 70 percent of persons interviewed were junior staff members while 30 percent of them were senior staff.

Figure 24 – Rank /Positions of People Interviewed



Source:(Author's own,2018)

5.4.4 Number of Years in Organization

One's depth of experience is important in project management. This therefore was considered as a major factor in the research. The years of experience of respondents in project management ranged from one to twenty two (22) years. It was ascertained that the majority of these persons had experience in project management and had been involved in several projects.

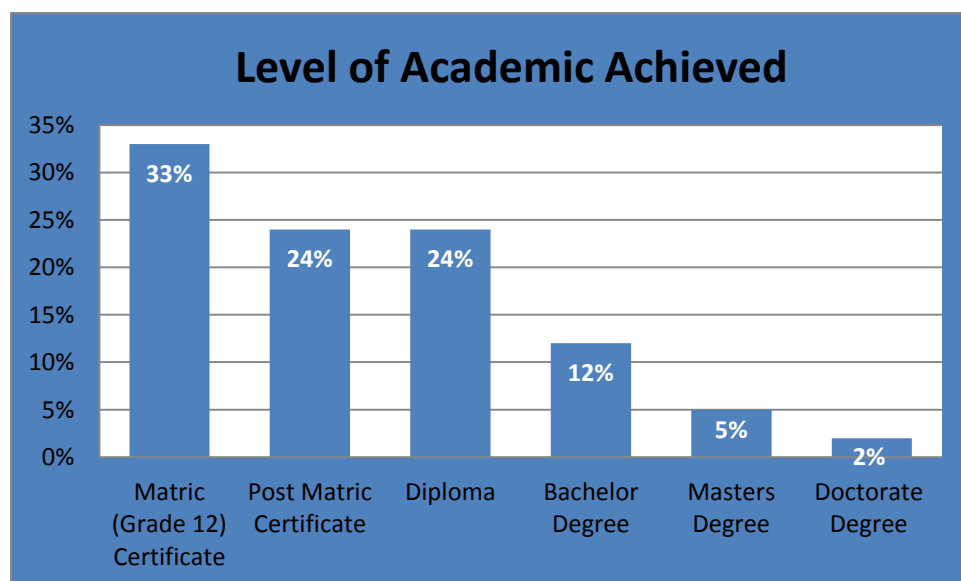
Table 12 – Rank /Positions of Person Interviewed

Years of Experience Range	Level of Experience in project Management
20 years and above	10%
Between (16 – 19) years	28%
Between (10 – 15) years	34%
Between (6 – 14) years	20%
Between (1-5) years	8%

5.4.5. Level of Academic Achievement

The academic backgrounds of the respondents were categorized into Matric (Grade 12) Certificate, Post Matric Certificate, Diploma, Bachelor Degree, Master's Degree, and Doctorate Degree holders. The results are presented in Figure 14 below.

Figure 25: Level of academic achievement



Source: (Author's own,2018)

After the analysis, it was ascertained that majority of respondents (33%) were matric holders whereas 38 persons (24%) were diploma holders and another (24 %) had post matric certificates. Only (12%) were bachelor of degree holders. Similarly, (5%) percent had their Masters and the remaining (2%) had their doctorates.

5.4.6. Research Interviews Process

Over and above the questionnaires that were used to collect data, another method used was interviews. The study was conducted using a qualitative approach to provide enhanced understanding and generate rich descriptions of the concept of cultural differences at Medupi and Kusile construction sites. The interviews took place over a 3-month period between April 2018 and June 2018, and each lasted approximately an hour.

In the interviews, the participants were asked a number of open-ended questions and they were strongly shaped by the probing questions to seek further details.

5.5. Research Study Findings

5.5.1 Assess the understanding of the concept of culture by workers in SA projects.

a) Definition of the term Mega Construction Projects

Respondents during the interviews were asked to define the term mega construction projects; there were a number of various definitions given. Table 10 below gives an overview of how the interviewees responded as they were asked to define MCP's.

The survey questionnaire listed a number of descriptions of MCP's, and respondents were asked to select the one that most describes their understanding of MCP's.

Table 13 – Definition of Mega Construction Project

Definition of Mega Construction Projects	Percentage
Large –scale , complex projects that are designed and constructed over a period of time, normally four years or more , at a cost of more than US\$ 1 billion and involve and have an impact on multiple public and private stakeholders	30%
The “giants” among the projects; Gruno (2004) puts the emphasis on the aspect of multi-organizational enterprises (MOEs) and characterizes these by (I) singularity, (II) complexity, (III) goal-orientation (technical,	6%

financial, time) and (VI) the nature and the number of project owners.	
The concept of a project is described as 'a temporary endeavour undertaken to create a product, service or result'	16%
Large – scale complex ventures that typically cost a US\$ 1 billion or more, they take many years to develop and build, they involve multiple public and private stakeholders, they are transformational, and impact millions of people.	48%

The definition MCP's that stood out at 48 % is (Flyvbjerg, 2014) definition of MCP as stated in the literature section of this study which is

(Flyvbjerg, 2014) Defines MCP's as Large – scale complex ventures that typically cost a US\$ 1 billion or more, they take many years to develop and build, they involve multiple public and private stakeholders, they are transformational, and impact millions of people.

Analysis of Project

What is a successful project?

One of the questions that were asked during the interview and in the questionnaire was to find out respondents' view about what a successful project is to establish if cultural complexities is viewed by many as one of the factors that can influence the success of the project. There were a plethora of responses that characterized the divergent views of answers.

A careful analysis of the responses brought to the fore three basic words that run through the project management book of knowledge. These are customer satisfaction, quality and time. According to them, these were the most important ingredients for a project to be considered a success. A follow-up question to find out the necessary ingredients for a project to be successful elicited several responses namely: - the availability of funds, stakeholder buy-in and good governance.

In responding to project failures or delays experienced at Medupi and Kusile; respondents who had encountered and witness such indicated the outlines factors as possible reasons that could contribute to a project failure:

- Financial constraints - Lack of funds and delays in the release of funds and poor financial management of project funds.
- Lack of effective and adequate planning
- Lack of proper project management know –how
- Political Interferences - Frequent government interference into operations
- Poor stakeholder management – No proper identification and planning of stakeholders.
- Lack of proper controls around contract management
- Project complexities (Technology and Cultural barriers)

b) Definition of the term Complexity

Respondents during the interviews were asked to define complexity in project and work context; there were a number of various definitions given. Table 10 below gives an overview of how the interviewees responded as they were asked to define complexity.

The survey questionnaire listed a number of descriptions of complexity, and respondents were asked to select the one that most describes their understanding of complexity.

Table 14 – Definition of Complexity

Definition of Complexity	Percentage
Complex is defined as “composed of two or more parts; involving many parts”	15.1%
Is a system formed out of many components whose behavior is emergent	22.2%
Complexity is generally used to characterize something with many parts where those parts interact with each other in multiple ways, culminating in a higher order of emergence greater than the sum of its parts.	43.7%
Is a project characterized by uncertainty, ambiguity, dynamic interfaces and significant political or external influences; and/or	33%

The response from Respondents varied, what was common from the response was the view that a system and a project complexity is characterised by many parts involved. As can be seen from the response in Table 11 above, 43.7% plus 33% = 76.7 %

c) Definition of the term Culture

Respondents during the interviews were asked to define the forever evolving concept of culture in SA's context; there were a number of various definitions given. Table 10 below gives an overview of how the interviewees responded as they were asked to define culture.

The survey questionnaire listed a number of descriptions of culture, and respondents were asked to select the one that most describes their understanding of culture.

Table 15 – Definition of Culture

Definition of Culture	Percentage
The way people behave, dress and eat	11.1%
A system of shared beliefs, values, customs, behaviours	34.2%
The beliefs, customs, arts, etc., of a particular society, group, place, or time	51.7%
The characteristics and knowledge of a particular group of people, defined by everything from language, religion, cuisine, social habits, music and arts".	5%

The definition culture that stood out at 51 % is Webster (2015) definition of culture as stated in the literature section of this study which is

Webster (2015) defines culture as

- the beliefs, customs, arts, etc., of a particular society, group, place, or time
- a particular society that has its own beliefs, ways of life, way of doing things art, etc.
- a way of thinking, behaving, or working that exists in a place or organization (such as a business) .

Other additional definitions of culture given by the Respondent among others include the following:-

- Culture is the shared beliefs & values that are reflected in traditions & habits as well as more tangible manifestations-stories, symbols, even buildings & products.
- Culture knits a collection of individuals into an integrated entity called "organisation."
- Culture is the shared meaning that a group of people creates over time through shared experiences and history.
- Culture is essentially composed of interpretations of a world and the activities & artefacts that reflect these.

d) Definition of the term “Organisation culture

Respondent were asked to define the term organisation culture. This was an open ended question.

A careful analysis of the responses brought to the five three basic definitions as listed below

Table 16 – Definition of Organization Culture

Definition of Organisation Culture	Percentage
Organisation culture is a system of informal rules that spells out how people are to behave most of the time	14 %
The process of acculturation or socialization-acquiring beliefs & values-happens by hearing the stories, seeing the symbols, participating in the rituals, observing the examples people set, and also by reading the manuals and newsletters, listening to corporate communications, reward & punishment, and so on (Booyens, 2007).	24.2%
Employee beliefs, attitudes, and behaviours: Not what the fancy marketing brochures say, but what we actually believe & value; not the way things should be done, but the way things actually get done; not how we "talk the talk" but how we "walk the walk" (Booyens, 2007).	33.8%
An organisation's self-identity: What we really think about who we are and where we are going.	28%

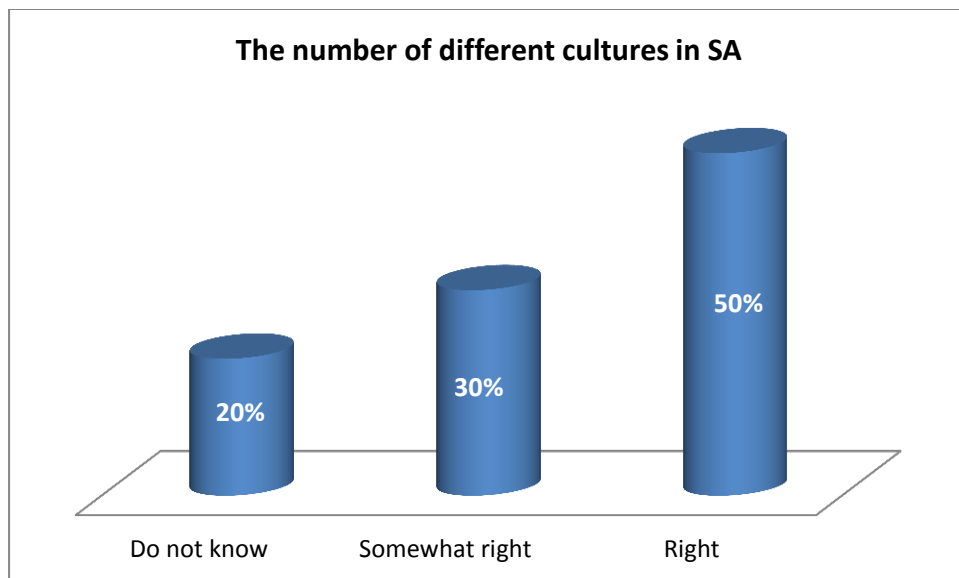
5.5.2 Iterate the cultural differences that exist in SA with regard to their impact in the work environment in SA projects.

South Africa's culture is one of the most diverse in the world and has given rise to the term "Rainbow Nation". South Africa's cultural diversity is expressed in a number of ways; one of the most distinguishing factors is communication and people's behaviour.

Respondent were asked the below questions to iterate the cultural differences that exist S.A.

a) How many cultures are in South Africa?

Figure 26 – Number of different cultures in SA.



Source:(Author's own,2018)

Respondent were asked to list of different cultures in S.A. 20 % respondent that they do not know the different cultures that exist in SA, 30% mentioned half of the existing SA cultures while 50% of the respondent mentioned all the major ethnic group as follows:

- The black population of South Africa is divided into four major ethnic groups; namely Nguni (Zulu, Xhosa, Ndebele and Swazi), Sotho, Shangaan-Tsonga and Venda. There are numerous subgroups within these, of which the Zulu and Xhosa (two subgroups of the Nguni group) are the largest.

- The culture brought to South Africa by the European settlers and Indian, Chinese and Cape Malay culture in South Africa

b) Characteristics of South Africa culture?

Identify the four main characteristics of SA diverse culture

Table 17 – Main characteristics Defining SA cultures.

Main characteristics of SA culture	Percentage
Race, Language, Class and Ethnic group	10%
Language, Race, Religion and behaviour	30%
Language, Religion, Behaviour, Beliefs	20%
Traditions, Customs, Language and Religion	24 %
Age, Gender, Race and Geographic's	16%

Gender, race, religion and behavior were viewed by many respondents (30%) as the main characteristics that defines the South African culture. Twenty four percent (24%) of the respondents are of the view that traditions, customs , language and religion are what defines the SA culture, Twenty percentage listed language, religion, behavior and beliefs, followed by sixteen percent (16%) for age, gender, race and geographic's and lastly ten percent (10%) believes that race, language , class and ethics group are the more dominant characteristics.

It was observed from the respondent response that the common traits and beliefs that form the mindset of a group, define their culture.

5.5.3 Investigate and identify internal organisational cultural dynamics and their impact thereof in implementing mega construction projects in SA context

a) Analysis of Cross –Cultural Impact on Mega Projects

Power Distance

This is the extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally. The basic problem involved is the degree of human inequality that underlies the functioning of each particular society.

Relationship between Interviewees and Superiors

Respondents were asked to describe the relationship between them and their superiors based on the scale - very good, good, average, and poor. This is shown in Table 10

Table 18 – Relationship between Interviewees and Superiors

Relationship Type	Percentage
Very Good	31.5%
Good	54.2%
Average	10.7%
Poor	4.3%

Relationship between Interviewees and Subordinates

Respondents were asked to describe the relationship between them and their subordinates based on the scale - very good, good, average, and poor. This is shown in Table 15.

Table 19 – Relationship between Interviewees and Subordinates

Relationship Type	Percentage
Very Good	55.5%
Good	35.2%
Average	8.0%
Poor	1.3%

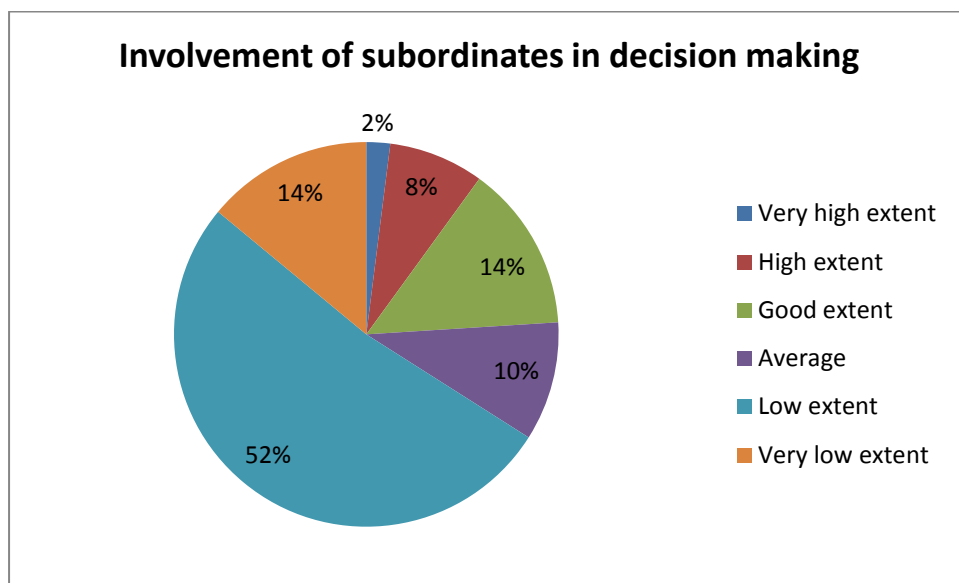
In the analysis of Table18, (54.2%) described the relationship between them and their bosses as good, (10.7%) said it was average, (31.5%) said it was very good and the remaining (4.3%) claimed it was poor.

It was observed that the views of the superiors and that of subordinates with regard to the relationship that existed between them differ significantly. In the analysis of Table 19, (55.5%) described the relationship between them and their subordinates as very good, (8%) said it was average, (35.2%) said it was very good and only the remaining (1.3%) claimed it was poor.

b) Involvement of subordinates in decision making

In every human institution, especially in a work environment, the extent of involvement in decision making determines the extent of ownership as indicated in Table 17

Figure 27 – Involvement of subordinates in decision making



Source:(Author's own,2018)

On the question of the extent to which subordinates are involved in decision making regarding the projects, 2 percent described their involvement as very high, 8 percent said their involvement was high, 14 percent described their involvement as good, 10 percent said their involvement was on the average, 52 percent described their involvement as low, and 14 percent said their involvement was very low.

The involvement of subordinates in decision making varied greatly between the employment levels within Eskom. Senior Management response indicated that the degree of their involvement in decision making is very high; this could be attributed to the fact that accountability and value for money is of topmost priority and invested in their roles. This approach gave staff ownership of the decision and as such using the decision as a rule of measure became easy.

However, within the public sector where policies implemented are policies of the ruling government, even though successive governments had proclaimed their interest in soliciting a consensus before most decisions are taken, in reality it was rare for a subordinate to be involved in consensus before most decisions are taken, in reality it was rare for a subordinate to be involved in a decision making which to a great extent explained the rating of 52% for low extent response that came mainly from junior level staff .

c) Extent to which low level staff are allowed to take initiatives

The extent to which low level staffs are allowed to take initiatives was described by (56%) as never, (33%) somehow, (12.4%) as good and (1.6) as high.

Table 20 – Extent of low level staff are allowed to take initiatives

Extent Level	Percentage
Never	56%
Somehow	33%
Good	12.4%
High	10%

d) Effectiveness of the rate of information flow

Finally, on the rate of information flow and its effectiveness, (27.4%) said it was quite efficient, while (65.5%) said information was inefficient. Only (5.1%) said it was very efficient. The remaining (1.9%) indicate information flow was poor.

In most cases, organisations with flat organograms the flow of information are normally quick, timely and easily updated. While organisations where 100% of their organograms are tall and bedevilled with bureaucratic procedures, information flow is found to be inefficient.

Table 21 – Effectiveness of the rate of information flow

Information Flow Rate	Percentage
Quite efficient,	27.4%
Inefficient	65.5%
Efficient	5.1%
Poor	1.9%

e) Masculinity vs. femininity

This refers to the distribution of roles between the genders, which is another fundamental problem for any society. This distinction opposes “tough” masculine and “tender” feminine societies. The duality of the sexes is a fundamental fact with which different societies cope in different ways.

Hofstede, (2005) reveals the importance to respondents’ concepts of “feminine” versus “masculine” work, which are varied across countries as well as across occupations.

Masculinity stands for a society in which gender roles are clearly distinct. Men are

supposed to be assertive, tough, and focused on material success. Women, on the other hand, are supposed to be emotional.

Femininity on the other hand stands for a society in which gender roles overlap. Both men and women are supposed to be modest, tender, and concerned with the quality of life. A situation of this kind is likely to affect project management positively or negatively in a multi-cultural society like South Africa where gender equality still needs be addressed aggressively.

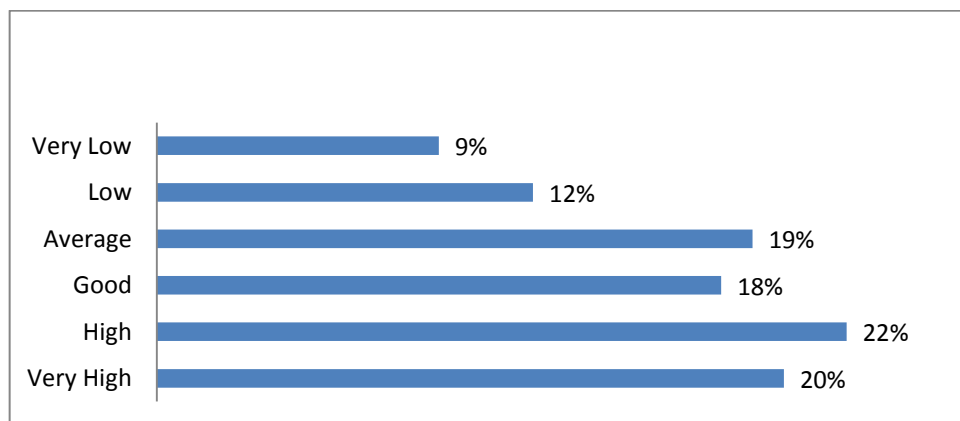
In South African context, The Employment Equity Act 1998 was enacted to achieve equity in the workplace. The EEA not only aims at protecting employees against unfair discrimination but also aims at enhancing and developing those who were previously disadvantaged referred to as designated groups, (in the context of this study: women) (The Employment Equity Act 55, South Africa, 1998).

f) Gender Sensitivity Medupi and Kusile Project

To assess the real information on the ground and its impact on project management in these projects, respondents were asked the extent to which their organizations were gender sensitive.

Here, 20 percent said it was very high while 22 percent described it as high. Twenty four (18) percent pointed out their organization's sensitivity to gender could be described as good, 19 percent described theirs as average, 12 percent said theirs was low with the remaining 9 percent indicating it as very low.

Figure 28 – Gender sensitivity within organization



Source:(Author's own,2018)

g) Level of Bias against women for promotion

On the issue of the level of bias against the promotion of females in the organizations, 20 percent of respondent said it was high, 38 percent of them also described it as good, 12 percent said it was on the average, 20 percent said it was on a low level and the remaining 10 percent said it was at a very low level.

Table 22 – Level of bias against women for promotion

Level of Bias	Percentage
High	20%
Good	28%
Average	22%
Low	20%
Very Low	10%

The rate of distribution of key positions as presented in table 22 is skewed in favour of males. Reasons provided by respondents were that woman in both top and middle level management due to child birth and subsequent maternity leave disrupts operational processes. To avoid this, promotions are skewed in favour of male team which is totally unacceptable as it discriminates women for being naturally women.

h) Sympathy for the employees with a disability

The level of sympathy for employees with a disability in organizations were as follows; 38 percent said it was high, 32 percent said it was good, 20 percent described it average, 8 percent side it was low and 2 percent said it was very low.

Table 23 – Sympathy for the employees with a disability

Level of Sympathy	Percentage
High	38%
Good	32%
Average	20%
Low	8%
Very Low	2%

The organisation appeared more sympathetic to the employees with disability, however many cited that more can still need be done to develop these employees to take up positions at senior level, presently there is low representation of employees with disability at senior level of management.

i) Individualism vs. collectivism

This is the degree to which individuals are supposed to cater after themselves or remain integrated into groups, usually around the family. Positioning one's self between these poles is a basic problem all societies face. Individualism connotes a society in which the ties between individuals are loose. Everyone is expected to look after him/herself and his/her immediate family only. Collectivism on the other hand stands for a society in which people from birth onward are integrated into strong, cohesive in-groups, which protects the person throughout the person's in exchange for unquestioning loyalty.

j) Help from colleagues in a project team

On the issue of the extent to which respondents expect to receive help from their colleagues in the project, 2 percent said their expectation was very high, 14 percent stated that on the average they expect to receive help from their colleagues, 24 percent said to a high extent they also expected to receive help from their colleges, 60 percent of the respondents said to a good extent they expect to receive help from their colleagues.

Table 24 –Help from colleagues in a project team

Extent of help	Percentage
Very high extent	2%
High extent	24%
Good extent	60%
Average extent	14%

Response as presented in Table 24, highlight the extent of dependency that the project team members have on each other, which appears to be relatively high, this could be attributed to the fact that most of the employees of these two projects are immigrants workers, as mostly originate outside Mpumalanga and Lephalale and beyond the borders of South Africa.

k) Individual interest prevail over collective interest

On the question of the extent to which individual interest prevailed over collective team interest; 68 percent of the participants answered yes to the opinion that individual interest prevailed over collective team interest, 22 percent of them said they weren't sure as to whether or not individual interest prevailed over collective team interest and the remaining,

10 percent where of the view that collective team interest did not prevail over individual interest.

Table 25 – Individual interest prevail over collective interest

Extent of Individual interest prevailed over collective team interest	Percentage
Yes	68%
Unsure	22%
No	10%

It came out that poor remuneration and poor performance management system in these projects has made its team members advance individual aspirations over the collective interest. It had silently created an “each man for him, God for us all” environment. This is one of the cultural barriers that hamper progress on site, as some team members may lose focus of the end goal, which is energise both Medupi and Kusile on time and within cost.

I) Uncertainty avoidance

This refers to the extent to which culture prepares its members to feel either comfortable or uncomfortable in unstructured situations. Unstructured situations are situations that are novel, unknown, surprising, and different from the usual. The basic problem here is the degree to which a society tries to control the uncontrollable.

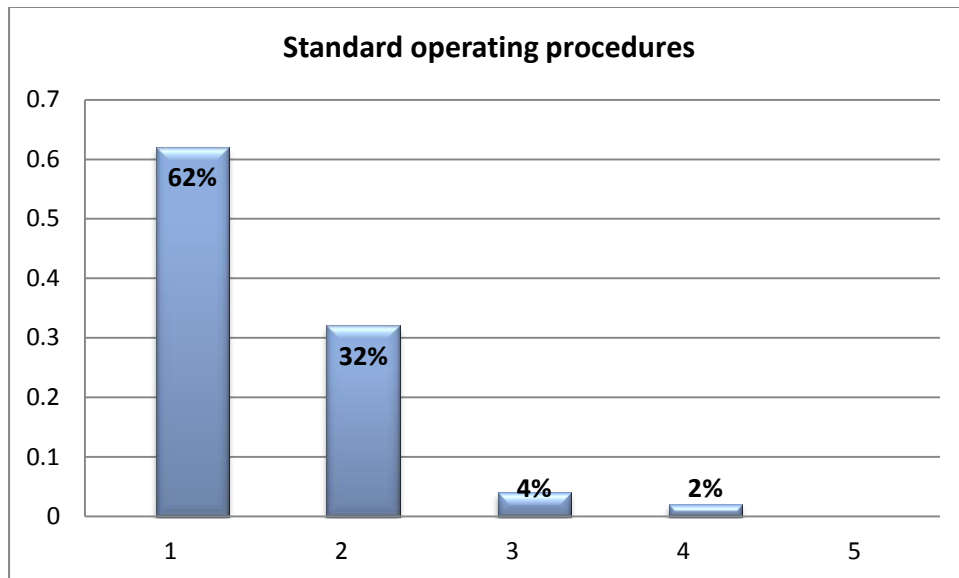
Project management must therefore reconcile two conflicting aspects of projects; the increasingly important need for speed in project delivery and the equally important need for reliability in delivering the project as promised. Project management must deal with uncertainty in an attempt to deliver project outcomes with certainty. In Parkinson’s approach on how to deal effectively with this conflict, Parkinson suggests the need to develop strategies to avoid expansion of project lead-time while protecting against Murphy’s Law “Whatever can go wrong, will” (Barthorpe, 2006).

It is so unfortunate that many of these unknown and uncontrollable situations have occurred at Medupi and Kusile, the majority of respondents said they were inadequately prepared for many of these instances.

m) Standard Operating Procedures

Participants were asked if activities in their organization were based on standard operating procedures as presented in Figure 29.

Figure 29 – Standard operating procedures



Source:(Author's own,2018)

The results revealed 2 percent of respondents said that standard operating procedures were followed to a low extent whereas 4 percent were of the opinion that standard operating procedures were followed to a somehow extent. Similarly, 32 percent indicated that standard operating procedures were followed to a good extent while the 62 percent were of the opinion that standard operating procedures were followed to a high extent.

Given the safety hazard inherent in the nature of the task of producing electricity, there is zero tolerance in the organisation for any non-compliance to the set operating standard.

n) Individualism vs. Communitarianism

This refers to the extent to which culture prepares its members to get involved in issues relating to the development of the society and the role of members of the community towards the realization of a favourable environment (one that promotes healthy co- existence between leaders and subordinates).

With projects of this magnitude it is practically impossible not to involve the members of the surrounding communities. However community engagement was not properly done at Medupi and Kusile, the project had to learn the hard way that communities can put your project to a standstill if they are not properly engaged from the initial stages of the project.

o) Employees' Interest to organizational interest

Respondents were asked to describe how important they valued employee's interest to organizational interest. The breakdown of the results is as follows; 58 percent valued employees' interest so high and said it was very important; 17 percent of them said employees' interest in the organization could be rated as important and the remaining 25 percent said their interest is of no importance to the organization.

Table 26 – Employees' Interest to organizational interest

Extent level of employees' interest to Organizational Interest	Percentage
Very important	58%
Not important	25%
Important	17%

It was observed that the employees feel alienated from the organizational interest due to the fact that the service offered are tied to governmental policies which exist as long as the government was in power.

p) Appreciation of little achievements

Showing appreciation for work done serves as a means of influencing a workforce to perform set targets. The results are presented in table 27.

Table 27 – Appreciation of little achievement

Extent to which little achievements are appreciated	Percentage
Very high extent	13.3%
High extent	16.8%
Good extent	26%

Average	35.9
Low Extent	8%

From Table 27 majority (35.9%) percent said on average, 26 percent said to a good extent they appreciated little achievement while 16.8 percent said to a high extent they appreciated little achievement. On the other hand, 13.3 percent said on a very high extent they appreciated little achievement. The remaining 12 percent said on the low extent they appreciate little achievement.

5.5.4 To establish the existence and level of impact of cultural diversities and practices that is brought about by a project external factors and stakeholders in SA projects

a) Level of tribalism in organizations and its effect on projects

In a multi-culture society like South Africa, tribalism plays a leading role in job security and employment. The extent to which tribalism plays a role in project management may affect projects carried out. The results are presented in Table 34.

Table 28– Level of tribalism in organizations and its effect on projects

Level of tribalism in organizations and its effect on projects	Percentage
Very high level	34.2%
High level	22%
Average	23.8%
Low level	14%
Very low level	6%

The analysis revealed majority (34.2%) of respondents describing the level of tribalism in their project environment as very high although 23.8 percent said it was on average and 6 percent considered it as low. The results suggest that tribalism, to some extent may adversely influence project management.

The respondents strongly felt that tribalism within these projects was noted to be very high due to polarization which is deeply rooted in SA's democratic dispensation. Some are of the

view that different public administrations have tried to appoint members of their political party to critical positions invariably created a tribalistic environment.

b) Protection of workers by the country's labour law

Majority (80%) of respondents were divided as to whether the country's labour law protected their interest at all. While 50 percent of the respondents said the country's labour law protects them quite well, 40 percent said the country's labour law did not protect them at all. Sixteen (6) percent noted that protection offered by the law was very poor. Only 4 percent said the country's labour law protects them very well.

Table 29 – Protection of workers by the country's labour law

Extent to which protected by country's law	Percentage
Quite well	50%
Not all	40%
Very poor	6%
Very well	4%

c) Community Involvement in their project work (activities)

Community involvement in project delivery promotes ownership after the project is handed over. Based on this, respondents were asked to state the level of importance they place on community involvement in their work. 56 percent of the respondents said they considered the community involvement in their work as not very important; another 16 percent described the community's involvement as somewhat important. The implication of this is that the likelihood of community owning projects is low. However, 28 percent said community's involvement is important.

Table 30 – Community involvement in project work (activities)

Extent level of community involvement in their Work (activities)	Percentage
Very important	56%
Not important	16%
Important	28%

Further more, the Participants were asked an open general questions to cite examples if any of incidents that were caused by the exclusion of the community of Lephalele in the construction of the Medupi and Kusile projects .

Table 31 – Medupi and Kusile Projects Disruptions

Examples of Disruptions caused by lack of community involvement in Medupi and Kusile Projects	Percentage
Public Protest - Due to None hiring of local people.	36%
Public Protest - At Medupi site that was caused by the relocation of the remains of the ancestors of the community, which is a very cultural sensitive issue in black communities	24%
Public Protest - Due to insufficient development of small medium enterprises in the area (as cited by the Community then).	18%
Public Protest - Due to demands by the community for the projects to invest back to the communities through social development initiatives.	22%

5.5.5 To assess the challenges occasioned by splicing foreign culture into South African culture in projects.

a) Communication as a barrier among cross- cultural teams

The respondents were asked to identify the common type of misunderstanding that is most prevalent in their daily life cross-cultural communication. The results are presented in Table 35 below.

Table 32 – Common type of misunderstanding

Common types of misunderstandings	Percentage
Verbal misunderstandings (misunderstanding the words/language used)	51.3%
Vocal misunderstandings (misunderstanding what is indicated due to the tone of voice)	23.8%
Non-verbal misunderstandings (misunderstanding the body language/gestures etc.	16.8%
Other	8.1%

From table 32 majority (51, 3%) percent said the most common type of misunderstanding that is experienced in their daily cross cultural teams is caused by misunderstanding in the words and language used, 23.8 percent said it is caused by (misunderstanding what is indicated due to the tone of voice) while 16.8 percent said it is caused by misunderstanding the body language/gestures and other reasons was 8.1%.

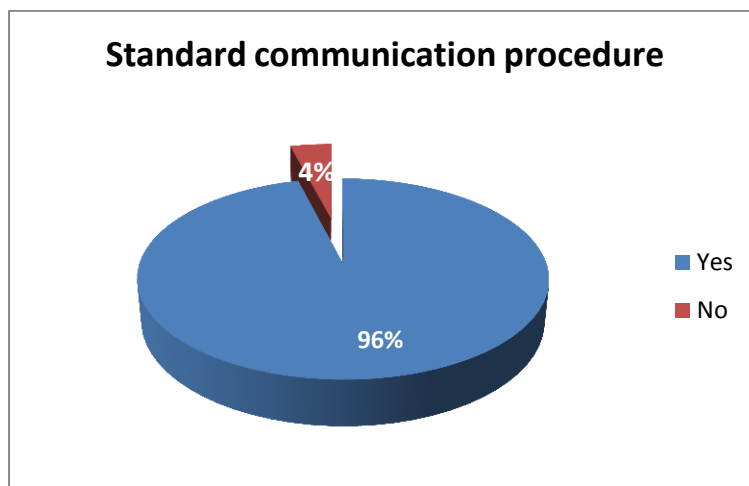
It was observed that majority of the respondents indicated that they have been exposed to cross cultural team communication and have been misunderstood to some extent during the project life cycle or have misunderstood someone in their teams as well.

Participants were of the opinion that speaking one common language will assist to a great deal and understanding their fellow team members' cultural background.

b) Standard Communication procedure

The question of whether clear standard communication procedures should be implemented for multi-cultural construction project teams to be effective was well received and supported by the respondents. 96 % said Yes, clear communication will eliminate some of the barriers while 4% felt that it will take more than a procedure to address the issue of communication.

Figure 30 – Standard communication procedure



Source:(Author's own,2018)

The respondents strongly believe that the implementation of a clear standard procedure will not only eliminate communication barriers, it will assist with the following as well:

- Language and method used for communication among the project team
- Facilitate open communication channels among management and workers
- Fast track resolution process in the event of disputes
- Timely and accurate communication of changes within the organization

c) Mutual Respect and Trust

The issue of mutual respect and trust was asked, that is, do their organisation values its people, irrespective of Age, Race, Beliefs, Colour and Gender.

Table 33 – Mutual Respect and Trust

Extent level of Mutual Respect and Trust	Percentage
Very high extent	13.3%
High extent	16.8%
Good extent	26%
Average	35.9
Low Extent	8%

From table 36 above majority (35.9%) percent said on average, 26 percent said to a good extent they are valued, 16.8 percent said to a high extent they are valued by their organisation. The remaining 12 percent said on the low extent they are valued.

d) Project Team Integration

The respondents were asked to rate how well does their organization integrate teams from different groups of people such black, youth, foreigners, women and people living with a disability.

It was observed that, 33 percent felt that somehow their organization do project team integration well, 14 percent answered always, 28.9 percent said usually their organization do team integration , with 19.1 % said seldom and the remaining 5% said never.

Table 34 – Project team integration

Extent level of employees' interest to Organizational Interest	Percentage
Somehow	33%
Always	14%
Usually	28.9%
Seldom	19.1%
Never	5%

In most instances delays in projects are caused by people rather than processes. It was interesting to note some respondents, indicated that they sometime do feel there is some element of discrimination behavior in their teams, ranging from slight to hate crimes, often

begins with negative stereotypes and prejudices towards a certain group of people which are often not officially reported.

e) Construction Project Dynamics and Complexities

In construction projects, technical complexities arise from the design and technologies employed in the design and construction processes; social complexities arise from the inevitable impact of projects on the environment and social systems; and managerial complexities arise from the managerial and governance aspects of projects.

The respondents were asked to Circle one statement that speaks most to their organisation or project environment.

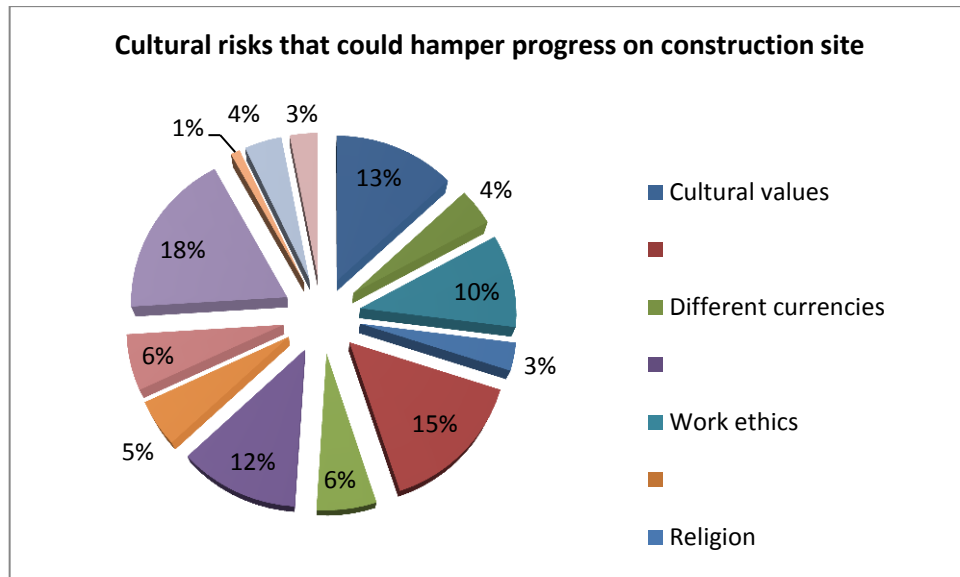
Table 35– Project dynamics and complexities

Team Dynamics	Percentage
Complexity Heterogeneous stakeholders;	43.3%
Numerous (sub)organizations with self-interests and sub-cultures;	34.4%
High degree of virtuality	12%
Multi-disciplinary	5.1%
Huge amount of information that needs to be processed resulting in complexity by volume and variety.	4.2%

From table 38 majority (43.3.%) percent said project complexities arise due to having o complex Heterogeneous stakeholders; this is later confirmed by the case studies of the projects as presented in Chapter 4 above, 34.4 said from having Numerous (sub)organizations with self-interests and sub-cultures, while 12% cited high degree of virtuality as a contributor and lastly 5.1% and 4.2 % said it is because of multi-disciplinarily and huge amount of information that needs to be processed resulting in complexity by volume and variety respectively.

f) Cultural risks that could hamper progress on construction site

Figure 31: Cultural risks that could hamper progress on construction site



Source:(Author's own,2018)

Lastly, it was quite interesting to observe the spread of response from the participants on cultural risks that could hamper progress on construction site . The three examples that came out very strongly are economic culture , team vs individual efforts and dispute management.

5.6 Chapter Summary

Chapter 5 presented qualitative data results obtained from the distributed surveys and interviews with respect to the study objectives and the first section of the questionnaire explores the general information of the participants taking part in the research.

In Chapter 6, which is the next chapter, the Researcher discusses the results obtained from the respondents, reviewed literature and the two case studies used in this study.

Chapter 6

6 DISCUSSION OF FINDINGS

6.0 Introduction

The data collected through literature survey, surveys and interviews strategy provided sufficient information in order for the research objectives to be met. This chapter focus is on the discussion of the findings obtained in the literature review and the research results.

This research sought to establish and validate cultural disruptions found in implementing Mega Construction Projects (MCPs) in South Africa using Medupi and Kusile coal plant projects as cases for this study with the intention of enlightening project stakeholders.

The research objectives sought to Assess the understanding of the concept of culture by workers in SA projects; Iterate the cultural differences that exist in SA with regard to their impact in the work environment in SA projects; Investigate and identify internal organisational cultural dynamics and their impact thereof in implementing mega construction projects in SA context; To establish the existence and level of impact of cultural diversities and practices that is brought about by a project external factors and stakeholders in SA projects and To assess the challenges occasioned by splicing foreign culture into South African culture in projects.

6.1 Assess the understanding of the concept of culture by workers in SA projects.

The first objective of the study dealt with the understanding of the concept of culture by workers in SA projects. To achieve this study objective, the Researcher looked at the following concepts:-

- Various definitions of mega construction projects
- Global, Africa and South Africa's view of mega projects
- Concept of complexity in relation to culture in SA construction projects, in the work environment and in multinational projects.

6.1.1 Mega Construction Project - Definition

The literature review started off with an overview of various definitions of mega projects to provide a historical and the current overview of the construction industry both globally and in the SA context.

This was achieved by focusing on defining Mega Construction Projects, Characteristics of Mega Projects, the history of mega construction projects /massive projects in developing and developed Countries and conclude by answering a question of “ which mega construction projects have been implemented or still active in globally– in the last five to ten years? “.

The theory generated defined mega construction projects as follow: -

Table 36 – Mega Construction Project - Definitions

Mega Construction Project Definitions	Source
Large –scale , complex projects that are designed and constructed over a period of time, normally four years or more , at a cost of more than US\$ 1 billion and involve and have an impact on multiple public and private stakeholders	(Galloway, P., Kris, P. and Dignum, J., 2014).
The “giants” among the projects; Gruno (2004) puts the emphasis on the aspect of multi-organizational enterprises (MOEs) and characterizes these by (I) singularity, (II) complexity, (III) goal-orientation (technical, financial, time) and (VI) the nature and the number of project owners.	Gruno (2004)
The concept of a project is described as ‘a temporary endeavour undertaken to create a product, service or result’	(Schwalbe, 2015).
Large – scale complex ventures that typically cost a US\$ 1 billion or more, they take many years to develop and build, they involve multiple public and private stakeholders, they are transformational, and impact millions of people.	Fylvbjerg (2014)

Various definitions of MCP's were found in the literature review, one definition that seems to be popular with the respondents is Fryberg's definition which was adopted for this study is that of Flyvbjerg (2014). The adopted definition was used as a basis for selecting the two cases for this study to collect data.

Flyvbjerg (2014) defines Mega projects as large – scale complex ventures that typically cost a US\$ 1 billion or more, they take many years to develop and build, they involve multiple public and private stakeholders, they are transformational, and impact millions of people.

The divergences between the different definitions come from the focus point of the researchers and from their approaches to analyse mega projects. A list of the key characteristics of MCP's was taken from the definitions, which includes among others, cost, size, time, complexities and the social impact.

6.1.2 Mega Construction Projects – The Global, Africa and SA Overview

Furthermore the literature revealed that though infrastructure megaprojects generally have great potential to generate wealth and benefit society, projects often fail to materialize or, when completed, are unable to meet expected performance targets.

Historical performance data for megaprojects speak their own language; the performance has been very poor across the globe especially in developing countries like South Africa and other African countries. In particular MCP's are often over-budgeting and/or behind schedule and, once finished, they deliver less benefits than planned. Statistics reveals that nine out of ten such projects have cost overruns. Cost overruns of up to 50 percent in real terms are common, over 50 percent not uncommon.

6.1.3 Concept of complexity in relation to culture in SA construction projects, in the work environment and in multinational projects.

This study shed light on some of the complexities found in implementing mega project and several reasons why projects fail and complexities in a work environment. The reasons advanced are as varied as the backgrounds and perspectives of respondents although many of the responses are intertwined. For example the respondents cited the lack of funds and delays in the release of funds, lack of effective and adequate planning and poor project management as some of the factors that cause failure and delays in projects. These would likely have an impact on the ability of the project to be completed on time and within cost.

With the stakes so high for project success especially in a developing country like South Africa proper management of these factors becomes critical. The factors that contribute to project failure are many as indicated above but cannot be insulated, one from the other due to the fact that they are interdependent and intertwined.

One of the complexities that was revealed by both the reviewed literature and from the research results is that of cultural differences that can be found in a work environment and in projects. As per the study first objective, the Researcher undertook to assess different understanding of the concept of culture from the existing literature and the Respondents.

6.1.4 The Concept of culture

The literature revealed that it is essential to properly understand the concept of culture, because its definitions are many and various. The most common one is the assertion that culture is a wholeness, which incorporates knowledge , convictions, art, virtues, laws, habits and many other skills and abilities which a human, being a representative of the society , acquires.

The paper investigated different definitions of culture as listed in Table 39 below and adopted Webster (2015)'s definition of culture as

- the beliefs, customs, arts, etc., of a particular society, group, place, or time
- a particular society that has its own beliefs, ways of life, way of doing things art, etc.
- a way of thinking, behaving, or working that exists in a place or organization (such as a business) .

Table 37 – The Concept of Culture - Definitions

Concept of Culture Definitions	Source
Culture is a unique aspect of mankind. It reflects how people differ from other people as well as from the animal world. Human behaviour is the product of a very complex learning process that takes place within a cultural context	(Springer, 2012).

Is the collection of values, norms, beliefs, customs, institutions, and forms of expression that reflects the thoughts, feelings, actions, and interests of people.	(Oxford Dictionary, 2016).
The collective programming of the mind which distinguishes the members of one group or category of people to others”	(Hofstede ,2005)
Culture includes knowledge, belief, art, morals, law, customs or any other capabilities and habits acquired by man as a member of society.	(Taylor,1958)
The beliefs, customs, arts, etc., of a particular society, group, place, or time A particular society that has its own beliefs, ways of life, way of doing things art, etc. A way of thinking, behaving, or working that exists in a place or organization (such as a business).	(Webster,2015)

Various definitions of culture were given by the Respondent, 80% of the respondents where more inclined to the general definition as stated in Oxford dictionary “As the collection of values, norms, beliefs, customs, institutions, and forms of expression that reflects the thoughts, feelings, actions, and interests of people” which is not in contrast to the definition adopted by the Researcher for this study.

Having attempted to draw a line between culture and organisational culture, the paper further investigated the organisational definition of culture to narrow down the research to a project environment.

According to recent literature, every organisation has a culture that can have a significant influence on the attitudes and behaviours of organisation members. The competencies and values of employees and leaders play a critical role in determining the effectiveness and success of an organization.

The research results were by no means in contrast to the above definition rather echoed and other author’s definitions. The definition that most of the respondent selected (33.8%) is

- Employee beliefs, attitudes, and behaviours: Not what the fancy marketing brochures say, but what we actually believe & value; not the way things should be done, but the way things actually get done; not how we "talk the talk" but how we "walk the walk".

It is crucial to note that "culture" is more than the sum of its definitions and it differs from country to country and region to region. It is not static, rather an evolving concept, evolving with social changes.

6.2 Iterate the cultural differences that exist in SA with regard to their impact in the work environment in SA projects.

The second objective of the research sought to iterate the cultural differences that exist in SA with regard to their impact in the work environment in SA projects, the research findings supported the literature, in terms of this objective.

It was interesting to note from the literature that South Africa is globally known for its ethnic diversity and with 11 official languages and 8 other recognised languages, the country's has melting pot of cultures. South Africa's cultural diversity is expressed in a number of ways; one of the most distinguishing factors is communication and people's behaviour and other elements which can either be verbal or nonverbal.

This study reveals that South Africa is also not immune in experiencing the influences of both globalisation and internationalisation, as well as numerous challenges presented by cultural diversity including language , race, culture ,age, gender, religion, abilities, sexual orientation, heritage and different identities .Now, more than ever before with the implementation of affirmative action and equal opportunity programs, changes are occurring in the workplace and in people's values and norms that impact on the level and style of management . The results of these changes can also be witnessed in cross cultural and diverse project management teams.

This research study was able to spark debate over what cultural beliefs, norms and values are considered important over other. The findings suggest that these factors cannot be looked at in isolation but in combination and in context.

A direct link between an employee's background which is largely characterised by their upbringing and their behavior at work was established through the undertaking of this study. The reason being that although organizations tend to build their own culture, that is "a certain way of doing things", some employees still find it difficult to adapt or change some of their entrenched cultural values.

An example as shown by the research results in Table 15 above, were low in terms of gender sensitivity in a workplace. Promotion was viewed by many respondents as not based on merit rather based on recommendation to meet equity targets. This made it a little difficult for a majority of women to rise to positions within the governmental project management enclaves as compared to their male counterparts. Many Respondents are of the view that, the constitutional provision has not yet been fully achieved in South Africa. Equality in the workplace appears to be largely a concept on paper with little impact on women's realities.

6.3 Investigate and identify internal organisational cultural dynamics and their impact thereof in implementing mega construction projects in SA context.

The objective of this section was to investigate and identify internal organisational cultural dynamics and their impact thereof in implementing mega construction projects in SA context.

The literature reveals culture as a sophisticated mechanism, and the principal potential of organisation life is its organisational culture: why people become members of the organisation; how the relations between them are developed; what stable norms and principles of organisation life and activities they observe.

Two key definitions of "Organisational culture" that stood out from the reviewed literature and research survey results were:-

1. Employee beliefs, attitudes, and behaviors: Not what the fancy marketing brochures say, but what we actually believe & value; not the way things should be done, but the way things actually get done; not how we "talk the talk" but how we "walk the walk" (Booyens, 2007).
2. An organisation's self-identity: What we really think about who we are and where we are going.

Denison and his research fellows distinguished and validated four measurements of organisational culture that are helpful for organizational performance: adaptability, consistency, involvement and mission. Adaptability suggests to the extent to which an organization can adjust conduct, structures and frameworks acquired in the wake of environmental changes.

(Denison et al., 2012) found that high involvement of employees creates a sense of ownership and responsibility. This sense of ownership grows a greater commitment to the organization. This is similar to the findings revealed by the two cases employed in this study.

The impact of organization cultural dynamics on mega construction projects became noticeable in the reviewed case studies. The following aspects were viewed by participants as being critical in managing organizational cultural dynamics. They are: -

- **Relationship between Interviewees and Subordinates and Interviewees and their Superiors** has a potential to either break or make the project. In instance where healthy relationships were found, team performance seems to excel as employees' morale are high and teams become highly motivated.
- **Power Distance** - This is the extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally. The basic problem involved is the degree of human inequality that underlies the functioning of each particular society.

The Researcher discovered that in South Africa projects, the degree of power distance still plays a major role in team dynamics and the concept of inequality is not yet grasped by many, as revealed by the response of the participants. However it is critical to note that a certain level of awareness is established, however the research findings revealed much more still needs to be done to address the challenge and the impact of inequality in South Africa projects.

- **Mutual Respect of values and beliefs** - Stakeholders and team members' beliefs and preferences should be listened to, respected and used in the planning and delivery of projects. All Participants valued being treated with consideration, and

information and practice that is personal or sensitive in nature and is free from intrusion and embarrassment.

- Know and listen to and respect the values, cultural background and beliefs of your employees in the work environment.
 - Promote relationships that are of equal value and mutual respect between staff and Senior Management.
 - Maintain the dignity, including physical privacy (bodily privacy and personal space) as well as confidentiality and privacy of information of your team
 - Recognise people's emotional, spiritual as well as their physical needs
 - Ensure the language used to talk about people is respectful
- Project Leaders are to familiarize themselves and comply with relevant legislation with regards to fair labour practices and other applicable legislations.
 - The organizational culture should have systems that allows sufficient time for sharing important information, encourage ideas and questions from staff and consumers and act upon them and Involve employees where appropriate, in decision-making regarding the project and reinforces communication between staff.

6.4 To establish the existence and level of impact of cultural diversities and practices that is brought about by a project external factors and stakeholders in SA projects.

The objective of this section was to establish the existence and level of impact of cultural diversities and practices that is brought about by project external factors and stakeholders in SA projects.

- The reviewed literature fully aligns with the research findings on the importance and influence surrounding communities in the development and implementation of mega construction projects cannot be overlooked. Construction projects are not implemented in vacuum, the environment and the people are to be

considered at the initial planning stages of the project. Some of the external factors as revealed by the literature reveals factors such as:-

- Native language as well as number of languages in the project
- Different cultural values and work ethics
- Different currencies from different countries
- Different views and beliefs on Religion, Employment Equity Act, Disability and Gender.
- Management practices and expertise tend to differ from country to country.
- Dissimilar procedures, practices, and tools leading to integration issues

Similar to the results presented by the literature review, the data collected through the two case studies reveals the cultural complexities that arise due to: -

- Different cultural practises and values
- Legislations and application thereof that differs from country to country
- Community disruptions
- Language barrier etc

The hiring of foreign nationals and people outside the Lephalele and Mpumalanga was not well received by these communities as a results community protest activities also contributed to a large extent to project delays , which was bound to happen in South Africa , a country where unemployment is very high.

It was interesting to learn about the public protest at Medupi site that was caused by the relocation of the remains of the ancestors of the community, which is a very cultural sensitive issue in black communities. This caused massive delays in the project; again the key lesson was, “know and engage all your key stakeholders”.

The data collected indicates that in a multi-culture society like South Africa, tribalism plays a leading role in job security and employment. The extent to which tribalism plays a role in project management may affect projects carried out.

With regard to compliance to difference legislation that governs the implementation of construction projects, the research results revealed that although SA is one of the highly legislated countries with respect to labour laws, the findings do not indicate that the majority

of companies are in full compliance. This presents an opportunity to the relevant legislation bodies to firm up their existing monitoring and control processes.

The research findings supported the literature that cultural diversity brought about by external factors could influence project performance if not identified upfront and managed properly. It is imperative for a project to have strategies for coping with the external environment, strategies that are flexible and adaptable in dealing with its external environment, particularly its customers an example could be that of forming strong meaningful partnerships with the community and labour union at the initial stages of these projects through forums and consultation.

6.5 To assess the challenges occasioned by splicing foreign culture into South African culture in projects.

Objective five, which was the last objective of this study, was to assess the challenges occasioned by splicing foreign culture into South African culture in projects.

It was established from the literature reviewed that construction projects that extend beyond the country's border are almost certain to involve complex team structures, it is not unusual for project teams to have sponsors, customers, architects, and developers sprinkled around the globe.

Diversity is increasing in many countries, and globalization is leading to a growing number of international projects. Cultural differences can either be a source of creativity and enlarged perspectives, or they can be a source of difficulties and miscommunication.

Typical cultural barriers of splicing foreign culture into South African culture in projects as revealed by the literature and the research findings were:

Project Team Integration - Multinational construction team integration creates challenges for construction clients and managers of projects specifically around communication the (method and language used), economic culture, ethnic background, values, social habits , work ethics, religion, gender sensitivity, and management practices.

Difficulty to adapt to the SA culture - The research findings supported the literature that SA culture on its own is quite diverse, which proves to be a challenge for a foreign national to adapt. For a foreigner, not aware of the strong influences Apartheid still holds for the South

African society, this may feel slightly surprising to learn about the different cultures among the different ethnic groups which are highly segregated by regions.

Strategy – Planning is done on a short-term (one-year) to medium-term (five-year) basis. Nevertheless, a lot of larger and progressive organisations are moving towards developing long term plans.

It was also established in the research that some of the foreign nationals found South Africa's complex legal framework and tax system to be complex.

Business Meetings - Meetings can be rather informal. One has to be punctual according to schedule, yet do also plan some time in between two meetings in case the other will make you wait.

Negotiations - The most important aspect of conducting business successfully in South Africa is building stable personal relationships because the majority of South Africans want to trust the person they are dealing with.

Decisions - The responsibility of decision-making is usually passed up the and South Africa's seem to be reluctant to take quick decisions

Time perception in South Africa - Throughout South African business life it is essential to be on time, especially when attending a meeting. And in this case, being on time means being at the given spot, preferably ten to five minutes before the actual meeting starts according to schedule

Appointments - Appointments are necessary for South African business life. Regardless of their cultural background, most South Africans clearly prefer a face-to-face encounter to a telephone call or email contact. Avoid scheduling meetings from mid-December to mid-January or the two weeks surrounding Easter, as these are prime holiday periods or scheduling project activities around this time.

Dress code in South Africa - At work business, people are generally dressed more or less conservatively.

Other gestures - These include among other things, hand shake when greeting, table manners, avoiding and maintaining eye contact when in conversation , How men ,women, youth are addressed and observation of different religious events.

The question therefore is how the above identified cultural differences should be respected and managed in a project or work environment. The conflicts might arise as a result of innate perceptions of how different people to the majority have to be treated. For example gender, disability and age differences are one of the sensitives and critical topics in SA legislation, which might not be the case in other countries, if such cultural differences are not identified upfront and managed, they might lead to project delays.

6.6. Chapter Summary

Chapter 6 presented a discussion of the findings and research results obtained in the reviewed literature and data collected from the research as per the study aim which sought to establish cultural disruptions in implementing Mega Construction Projects (MCPs) in South Africa using Medupi and Kusile coal plant projects as cases for this study which were explored with the intention of enlightening project stakeholders.

Chapter 7

7 CONCLUSION

7.0 Introduction

Chapter 7 presents the conclusion of the study, study recommendation and proposed future research on cultural complexities found in implementing mega construction projects.

7.1 Summary

This study explored with the intention of enlightening project stakeholders the possibility of cultural disruptions in implementing Mega Construction Projects (MCPs) in South Africa using Medupi and Kusile coal plant projects as cases. Five study objectives were further explored to achieve the study aim, namely:-

1. Assess the understanding of the concept of culture by workers in SA projects.
2. Iterate the cultural differences that exist in SA with regard to their impact in the work environment in SA projects.
3. Investigate and identify internal organisational cultural dynamics and their impact thereof in implementing mega construction projects in SA context.
4. To establish the existence and level of impact of cultural diversities and practices that is brought about by a project external factors and stakeholders in SA projects.
5. To assess the challenges occasioned by splicing foreign culture into South African culture in projects.

Questionnaires and interviews were held with implementing agencies and key personnel and permission was sought to peruse through relevant documents. Analysis of the qualitative data was performed using content analysis and thematic analysis of transcribed interviews.

The literature review purported the importance of using mega construction projects as a key driver of growth, competitiveness and social well-being is well established. The analysis of literature review revealed the importance of MCP's as a strategic approach to achieving sustainable economic development objectives for both developing and developed countries and con-currently highlighted the complexities found in their implementation.

Part of the literature expressed the existence of cultural complexities on mega project implementation over the years which have become a talking point that needs a deeper understanding. This is pertinent with mega projects as strategic alliances exacerbates culture and national cultural differences which would require more harmonising to effect utmost success.

It is further observed from the research results that the importance of culture and national cultural differences has become more critical especially for companies operating in international markets or having employees from different cultures.

7.2 Addressing the objectives

The first objective to assess the understanding of the concept of culture by workers in SA projects was carried out. The results were however, showed that the concept of “culture” could be confusing at times due to a number of various definitions that are available in literature and it is an ever changing concept.

The second objective to iterate the cultural differences that exist in SA with regard to their impact in the work environment in SA projects was addressed. The results confirmed the cultural differences that exist in SA ranging from language, in race, culture, age, gender, religion, abilities, sexual orientation, heritage and different identities. However it was established in this research that there commonalities found in the manner in which South African conduct themselves when doing business.

The third objective to investigate and identify internal organisational cultural dynamics and their impact thereof in implementing mega construction projects in SA context was carried out. This study results indicates that there organisational cultural dynamics that are found in organisations which affect the implementation of mega construction projects in SA. Every organisation has a culture that can have a significant influence on the attitudes and behaviours of organisation members. This culture normally cascades down to projects. The competencies and values of employees and leaders play a key role in determining the effectiveness and success of an organization in implementing its construction projects successful. The study displays descriptive Denison’s organizational culture model with four dimensions: involvement, consistency, adaptability, and mission.

The fourth objective to establish the existence and level of impact of cultural diversities and practices that is brought about by a project external factors and stakeholders in SA projects was achieved. The research results highlighted few examples and the impact thereof on construction projects. The one that could have detrimental impact on the project, which can put a project to a stop, is the impact of surrounding communities. The degree of strong and meaningful partnerships with the immediate communities and labour unions is of critical importance especially at the initial stages of the project which can be achieved through forums and proper consultation.

The fifth and the last objective to assess the challenges occasioned by splicing foreign culture into South African culture in projects was carried out. The Researcher established that diversity is increasing in many countries, and globalization is leading to a growing number of international projects. Cultural differences can either be a source of creativity and enlarged perspectives, or they can be a source of difficulties and miscommunication if not identified and managed well.

Based on the findings, the study results reveal that there are cultural disruptions that can be found in implementing mega construction projects, ignoring and mismanaging of these cultural differences could lead to massive project delays.

7.3 Research value add

Mega- construction projects (MCP) are important not only to the stakeholders involved in their development and construction, but also to the societies, economies, and environments impacted by them. Given the importance of MCP and the prevailing trend toward poor performance, the purpose of this paper was to identify and validate the possibility of cultural disruptions in implementing Mega Construction Projects (MCPs) in South Africa. The possibility of cultural disruptions in implementing Mega Construction Projects (MCPs) in South Africa using Medupi and Kusile coal plant projects as cases with the intention of enlightening project stakeholders in order to assist developing countries achieve their sustainable development objectives and overcome the challenges that hinder the successful development of MCPs.

The research has gone beyond any previous generic lessons learned, to enable project teams and all other project key stakeholders to make structured assessments of critical

mega construction project cultural factors. Identifying and validating these cultural factors will enable more accurate and thorough mitigation planning for them and, thus, improve mega-project performance.

7.4 Recommendations

Based on the findings of this study, the following recommendations were made:

The impact of cross cultural differences on projects in South Africa cannot be ignored. Organisations have to consider the concept of culture in their daily businesses to operate successfully in the global market space. Successfully managing cultural differences can enhance organisational effectiveness and give an organisation a strong competitive advantage. On the other hand, failure to manage cultural differences can cause serious problems such as delay of construction.

In today's multicultural global business community, to achieve project goals and avoid cultural misunderstandings, project managers should be culturally sensitive and promote creativity and motivation through flexible leadership.

7.5 Future research

Further investigation to establish and quantify the impact of cultural disruptions caused by cultural differences in implementing mega construction projects in SA is recommended.

It is further recommended that future studies be carried out in international construction projects to examine the relationship between mega construction project success and national cultural differences.

Consideration of the information presented above may lead to the question of "What is the level of managerial business acumen required to manage these cultural differences" in implementing mega construction projects.

It would be beneficial to the literature for future research to aim to uncover the barriers or obstacles and other complexities that are found in implementing mega construction projects

namely, lack of adequate skills, technological complexities, resources and stakeholder interference.

7.6 Chapter Summary

The complexity, size, duration, and risks associated with MCP make them very difficult to manage. These characteristics contribute to several MCP not achieving their business and project performance objectives. Studies suggest that the need to implement MCP will continue for many countries and corporations. Hence, capital project organizations need to evolve and adopt more proactive practices to better mitigate mega-project challenges. This research identified a number of cultural factors that have higher occurrence and performance impacts on MCP.

The research findings will assist the project fraternity to gain insight, alignment on the criticality of cultural complexities and their mitigation strategies. As a result of the data collected, the focus of the analyses and findings was heavy energy MCP's. Future research should be conducted to identify the cultural impact on the performance of MCP's on other sectors of capital projects industry, such as infrastructure and buildings.

Chapter 8

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