Implementing Agents and the impact of water and sanitation delivery to schools in rural areas of KwaZulu-Natal

By

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PREFACE

The research contained in this dissertation was completed by the candidate while based in the School of Engineering in the College of Agriculture, Engineering and Science, University of KwaZulu-Natal, Howard College Campus, South Africa.

The contents of this work have not been submitted in any form to another university and, except where the work of others is acknowledged in text, the results reported are due to investigations by the Candidate.

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Date: 29th November 2021

DECLARATION OF PLAGIARISM

I, Ms. Serisha Sirputh, declare that:

(i) the research reported in this dissertation, except where otherwise indicated or acknowledged, is my original work;

(ii) this dissertation has not been submitted in full or in part for any degree or examination to any other university;

(iii) this dissertation does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons;

(iv) this dissertation does not contain other persons' writing, unless specifically acknowledged as being sourced from other authors. Where other written sources have been quoted, then:

a) their words have been re-written but the general information attributed to them has been referenced;

b) where their exact words have been used, their writing has been placed inside quotation marks, and referenced;

(v) where I have used material for which publications followed, I have indicated in detail my role in the work;

(vi) this dissertation is primarily a collection of material, prepared by myself, published as journal articles or presented as a poster and oral presentations at conferences. In some cases, additional material has been included;

(vii) this dissertation does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the dissertation and in the References sections.

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ABSTRACT

South Africa, branded with the apartheid label, has for decades been subject to abject inequality which has managed to negatively influence almost every existing domain. Domains included jobs, land, schools, water, sanitation, electricity and roads, therefore the Government of the country has long since recognised the need to address these inequalities. This study focussed on inequalities of water and sanitation at schools in rural areas of KwaZulu Natal and the reasons why 27 years after democracy, which was achieved in 1994, schools in rural areas still do not have these basic services. The Government had proclaimed in its constitution that the equal and fair distribution of water and the provision of hygienic sanitation, is a human right. This proclamation lent itself to this research, which in turn, attempted to shed light on the current water and sanitation situation in schools in rural areas in the KwaZulu-Natal province of South Africa.

Focus was placed on the Department of Basic Education (DBE) in KwaZulu-Natal, with emphasis on its infrastructure provision for water and sanitation. The study revealed that schools in rural areas had far less of a provision with regards to basic services, such as water and sanitation, over and above the fact that they do not have facilities such as laboratories, libraries, school halls, etc. KwaZulu-Natal was chosen as a point of departure, as the study demonstrated that, this province is amongst one of the provinces, with the worst backlogs in relation to water and sanitation facilities at schools in rural areas.

The drive for school infrastructure equality, since democracy was so great, that a Norms and Standards for Schools Infrastructure document was developed in 2013, by the DBE, to ensure that there was a progressive plan of action for all schools in the country to have access to adequate water and sanitation facilities, as well as, extra over facilities such as libraries and laboratories, etc., by the year 2026. With due consideration to these far-reaching interventions for equality, this study explored why certain rural schools in the country still utilised unhygienic sanitation facilities and are subjected to drinking water from rainwater harvesting tanks.

The responsibility for infrastructure procurement for schools was consequently, investigated. The study revealed that the responsibility for infrastructure procurement lies with organisations, termed Implementing Agents(IA's) who were introduced by Government, after the inception of the Public Finance Management Act, 1999. The IA therefore had the main responsibility for the procurement of school infrastructure. Even with criteria set out by the DBE for organisations who would qualify as IAs, there still exists a substantial backlog in the provision of the basic services of water and sanitation.

The study found that the IA presents numerous challenges associated with the procurement and contract management process which only result in delayed procurement of water and sanitation facilities in schools in rural areas. Suggestions are presented in the study, by professionals in the Built Environment,

to alleviate these challenges and possibly fast track service delivery of these basic services to schools in rural areas.

This study adopts theoretical perspective related to pragmatism and the methodology is linked to survey research. Data was collected via mixed methods. Qualitative (a semi structured interview) and quantitative data (structured questionnaire) was analysed via the NVivo 12 and SPSS version 26 software programmes respectively.

Key words: Inequality, Implementing Agents, Built Environment Professionals, Infrastructure, Backlogs, Water and Sanitation

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LIST OF ACRONYMS

BEP - Built Environment Professional

BOQ - Bill of Quantities

CIDB - Construction Industry Development Board

DBE - Department of Basic Education

IA - Implementing Agent

VIP - Ventilated Improved Pit

CHAPTER 1: INTRODUCTION

1.1 Introduction

This chapter introduces the topic and discusses background information related to the research problem, which is the slow delivery of water and sanitation to schools in rural areas of KwaZulu-Natal. It investigated whether the Implementing Agent (IA) has contributed to the above-mentioned slow delivery whereby the Implementing Agent (IA) arrangement is explored with regards to the public procurement in South Africa, with specific emphasis on adequate water and sanitation delivery to schools in rural areas in KwaZulu-Natal. This chapter further outlines the research questions and objectives together with the significance of the study, the structure of the study, ethical considerations, assumptions and limitations.

1.2 Background to Study

The World Bank reports that water is central to economic growth and is an essential element of human life (The World Bank, 2021). Water has gained the forefront in many countries, as it supports food growth, management of the environment and it assists in ensuring that human beings have as little contact with human waste as possible. This will ultimately result in a decrease in diseases, healthier living conditions as well an increased attendance of girls in school, to name but a few benefits (World Health Organization, 2009).

Service delivery in South Africa is pivotal and is one which the government viewed with very high priority for economic growth (Mavuso, 2021). The country has made a substantial amount of progress with regards to basic service delivery since the democratic government had taken their seat in parliament in the year 1994 such as *"89.8% of households utilise piped water, that 63.4% use flush toilets connected to either public sewerage or to a local septic tank, that 63.9% of households receive refuse removal services and finally that 87.6% of households had access to electricity"* (Statistics South Africa, 2017: xiii). However, despite this there are major disparities/inequalities between the various provinces and municipalities within the country. Rural communities have access to far less, which is because of unequal development, poverty and the cost of providing bulk infrastructure services for water and sanitation to distant rural areas of the country. (Statistics South Africa, 2017).

This study focussed on schools in rural areas of KwaZulu-Natal in South Africa, its water and sanitation backlog, as it relates to the mere provision of it or its adequate, clean, hygienic and reliable provision as well as an understanding of whether the introduction of Implementing Agents (IA) for public infrastructure is a possible reason is why the schools in rural areas do not have an adequate provision of water supply and adequate sanitation.

The water and sanitation challenge was one, which was adopted by many countries, when they signed up and committed to sustainable development goals in the year 2015 (United Nations Development Program, 2021). South Africa is one of the countries that also signed up for the United Nations Sustainable Development Goals in 2015.

One can appreciate that the global emphasis for the need of adequate water and sanitation, will filter down to education facilities together with the reflection that school going children, in order to benefit from their education, must be provided with facilities and services that enable and advance, rather than hinder their education progress.

Despite the commitment and policies and legislation such as Reconstruction and Development Policy. The White Paper on Water and Sanitation, 1994, The National Water Act 1998, The National Development Plan 2030 and the Millennium Development Goals, to mention a few, a learner in a rural school drowned in a pit toilet in the year 2014. Michael Komape was five years old and attended Mahlodumela Primary School in Polokwane in South Africa (Daily Maverick, 2021). This incident occurred 20 years after democracy and the express intent by government and the Department of Basic Education (DBE) to address the water and sanitation crisis at schools in South Africa.

The inequalities which had presented itself at the start of democracy in 1994, meant that extensive effort had been invested by the Government in order to sift through and conceptualise a long-term plan to address and ensure all citizens constitutional right to adequate water and sanitation. For schools, this subsequently culminated in the Norms and Standards for School Infrastructure which was published in 2013. The Norms and Standards provide a clear indication of the type of facilities which should be built, in schools, in order for a school to function efficiently (Department of Basic Education, 2013).

One has to consider that, at the time of writing, it has been 27 years since the advent of democracy, yet this study will reveal that schools in rural areas of the country and more specifically in rural areas of KwaZulu-Natal are still plagued by inequalities. A report conducted in 2013, by an organisation called Equal Education, reported that three thousand, five hundred and fifty four (3544) schools did not have electricity, and over and above this number eight hundred and four (804) did not have a reliable source of electricity, two thousand, four hundred and two schools (2402) schools had no water supply while a further, two thousand six hundred and eleven schools (2611) had an unreliable water supply source, nine hundred and thirteen (913) schools did not have ablution facilities, and eleven thousand, four hundred and fifty schools (11450) schools utilised pit latrines, Twenty two thousand, nine hundred and thirty eight (22938) schools did not have stocked libraries, while nineteen thousand, five hundred and forty one schools (19541) did not have space for a library, twenty one thousand and twenty one (21021) schools did not have laboratories, two thousand seven and three schools (2703) had no fencing or any

form of security and nineteen thousand, three hundred and seven (19307) schools did not have a computer/media centre (Equal Education, 2013).

The supply of infrastructure to schools and more specifically, water and sanitation is categorized as public procurement. Public procurement is a function whereby *"public sector organisations acquire goods, services and development and construction projects from suppliers in the local and international market, subject to the general principals of fairness, equitability, transparency, competitiveness and cost effectiveness*" (Ambe and Badenhorst Weiss, 2012:244).
The vision of the KwaZulu-Natal Department of Education is to be *"an innovative hub for quality teaching and learning that produces learners developed to exploit opportunities for lifelong success"*. (Department of Education, 2021). Their mandate therefore is concentrated on the quality of the teaching aspect and not directly related to infrastructure provisions, albeit, sound infrastructure is an enabling factor for quality education.

The government therefore, allowed for the cession of the infrastructure procurement function to other organisations who understood construction procurement. It is for this reason that the DBE utilises "other" entities who are commonly referred to Implementing Agents (IA's) for DBE to procure their school infrastructure.

The Construction Industry Development Board (CIDB) describes an Implementing Agent as *"an agent of the Client who is a government department or state-owned enterprise which implements a project on a client's behalf"* (Construction Industry Development Board, 2011) and the pre-requisite to be an implementing agent for infrastructure is that an organisation must possess the skill, have the capacity and capability as well as systems in place in order to execute infrastructure projects (Department of Education, 2019:21).

In recent years however there have been findings by the Department of Education themselves with regards to these IA's and the level of services which they provide, which has ultimately resulted in the negative impact on the delivery of water and sanitation to schools. Some findings include lack of proper knowledge and skill, accountability, fraud and corruption, poor planning resulting in additional costs (variation orders) to school projects, late payment of contractors and Built Environment Professionals (BEP's) etc., (Department of Education, 2019). This study explored the Implementing Agent arrangement and obtained perspectives of BEP's who are working or have worked with IAs in order to understand if the introduction of the IA is a possible reason why schools in rural areas of KwaZulu-Natal do not have adequate provisions of water supply and adequate sanitation supply.

The study further explained that the IA acts as a construction Project Manager, and also appoints a separate team of built environment professionals to manage the procurement of school infrastructure. Therefore, this relationship between the IA and BEP was further investigated. The study posed questions

to the BEP, as it related to the capacity, skill and competency of the IA. The aspects of accountability, corrective action on defaulting contractors, prolonged processes for the adjudication of tenders and for extension of time claims, over-reliance on the BEP to manage the projects and late payment of contractors and BEP's, etc., were explored. The latter aspects inevitably prolong the construction procurement process resulting in a slow delivery of water and sanitation facilities to schools in KwaZulu-Natal.

Various suggestions were put forward by the BEP's in order to alleviate these challenges and to ensure that water and sanitation delivery at schools is fast tracked. These, together with the characteristics of the IA and the challenges they present, was explored in further detail in this study.

1.3 Problem Statement

Water and Sanitation is considered a constitutional right in South Africa, yet after 27 years of democracy, learners at schools and in particular in schools in KwaZulu-Natal, do not have adequate clean, safe and reliable water and sanitation facilities. The DBE appoints IAs to ensure the delivery of water and sanitation infrastructure to their schools. The shortcomings/challenges presented by the IA was viewed as potential reason for the negative impact on service delivery, such as adequate water and sanitation facilities in schools in rural areas of KwaZulu-Natal.

1.4 Research Questions

The following research questions are applicable to this study:

1.4.1 What strategies and policies have the South African Government introduced and applied since democracy in order to address the water and sanitation inequalities which have been created as a result of apartheid.

1.4.2 Why has the Department of Basic Education utilised Implementing Agents to enable the delivery of water and sanitation provision in schools in rural areas of KwaZulu-Natal?

1.4.3 What is the current status of water and sanitation in schools in rural areas in KwaZulu-Natal?

1.4.4 What are the challenges experienced by built environment professionals (BEP's) when working with Implementing Agents (IA's) in the delivery of water and sanitation to schools in rural areas of KwaZulu-Natal?

1.4.5 How can the challenges be overcome to enable the fast-track delivery of water and sanitation to schools in rural areas in KwaZulu-Natal?

1.5 Research Objectives

1.5.1 To determine what strategies and policies the South African government introduced and applied since the democracy in order to address the water and sanitation inequalities, which have been created as a result of apartheid?

1.5.2 To explore the current status of water and sanitation in schools in rural areas in KwaZulu-Natal even with the introduction of Implementing Agents?

1.5.3 To understand why the Department of Education utilised implementing agents as opposed to performing this function on their own?

1.5.4 To determine what were the challenges experienced by built environment professionals (BEP's) when working with Implementing Agents in the delivery of water and sanitation to schools in rural areas of KwaZulu-Natal?

1.5.5 To propose solutions to the challenges, to enable the fast-track delivery of water and sanitation to schools in rural areas in KwaZulu-Natal.

The research objectives are aligned to detailing the effect of apartheid on South Africa and how it has affected the Basic Education sector as well. The study explored the extent of inequality, which the democratic government had to rectify and examined what policies and legislation had to be considered in an attempt to create equality amongst the people of the country.

The introduction of the Implementing Agent was explained, together with the roles and responsibilities and the reason why provincial departments opt to rather utilise IAs for infrastructure development within their departments as opposed to conducting this function by themselves.

The status quo of water and sanitation facilities of schools in rural areas of KwaZulu-Natal was be researched as per the insight which was provided by the BEP's who are working at schools in rural areas of KwaZulu-Natal.

The challenges which are experienced by professionals when working with IAs was explained together with possible suggestions or solutions to overcome these challenges.

1.6 Significance of the study

The aim of the research is to prove, that the IA arrangement posed by the Government, is contributing to the slow delivery of water and sanitation to schools in rural areas in KwaZulu-Natal. The significance of the study is underpinned by the understanding that, acknowledging the challenges posed by the IA, enables one to propose potential solutions to rectify the current situation or, it even simply indicates that, to enable fast track service delivery to schools, the IA must be removed from the procurement equation.

The study's intention is to provide in-depth information with regards to challenges that the IA presents to procurement and contract administration of construction projects, based on data gathered from Built Environment Professionals (BEP's) who are appointed to work with them (the IA). This study will also contribute immensely to the Built Environment in South Africa, as it is a topic which has not been researched with much vigour. Further studies can be derived from this topic which will advance the research in this area.

The study also presents significance on the socio-economic realm as it links the importance of education to children in underprivileged areas together with the notion that acceptable drinking water and sanitation facilities at schools are a prerequisite for a better education experience.

Additionally significance is also derived wherein, fast track service delivery creates a pattern of increased job opportunities for IAs, BEP's, contractors, suppliers of material, etc. The latter ultimately results in a contribution to the economy of the country.

1.7 Research Methodology

Saunders, Lewis and Thornhill (2007:5) describe research as "*something that people undertake in order to find out things in a systematic way, thereby increasing their knowledge*" The emphasis on systematic infers that there are various steps and processes which must be followed in order to reach a conclusion or recommendation for one's research. Research can be categorised as quantitative, qualitative or mixed methods, with the latter being a combination of qualitative and quantitative (Cresswell, 2014).

The nature of this study warranted the author to utilise both qualitative and quantitative research methods, thereby the utilisation of mixed methods research. The findings from the two methods were triangulated, thereby enabling collaboration, comparison and validation (Dudoskiy, 2012). The data for the two methods are collected separately, yet simultaneously and the process of merging the data is termed convergent parallel design. Convergent parallel design overcomes the weaknesses in one method with the strengths of the other (Creswell, 2014).

1.7.1 Quantitative Research

Quantitative research is number orientated and entails working with items which can be measured in a logical way in order to determine relationships between them (Creswell, 2014).

The quantitative segment of this research was in the form of questionnaires. There was a total of 120 participants from the built environment. These individuals constituted Quantity Surveyors, Civil and Structural Engineers, Electrical Engineers and Architects.

The participant names (company names) were obtained from the relevant professional body websites and built environment directories.

The data gathered via the questionnaire was analysed electronically via the Statistical Package for Social Sciences software (SPSS), version 27. SPSS can perform various statistical analysis for social sciences research. Gogoi (2020:2424) indicates that "*SPSS is a software which is widely used for quantitative research methods specially to develop the explanation of social science research into an analytical way*" Simple random sampling was utilised for the quantitative data.

1.7.2 Qualitative Data

Qualitative research is interested in understanding, describing and explaining phenomenon by either analysing experiences of individuals or groups, analysing interaction and communications or by analysing documents (Gibbs, 2007).

The qualitative part of this research involved conducting semi -structured interviews, with BEP's. Twelve built environment professionals were interviewed. The interviews were analysed via the utilisation of the NVivo software (version 12). Purposive sampling was utilised for the interviews. Saunders, Lewis and Thornhill (2007), indicate the purposive sampling enables the researcher to utilise their judgement when selecting their participants as these participants will best enable the researcher to answer their research questions and meet the objectives of the research (Saunders, Lewis and Thornhill, 2007: 230).

1.8 Ethical considerations

"*Ethics is a branch of philosophy which deals with the dynamics of decision making concerning what is right and what is wrong*" (Sarker and Das, 2020:40). The following was considered when conducting this research

a) The dignity of the research participant.
b) Consent was obtained from the participant prior to the collection of data. For this study an "informed consent letter was attached to the questionnaire. For the interview the author explained the purpose of the research and the participant was free to withdraw from the interview should they so wished. None of the participants were offered money and donations were not sought for this study.
c) The protection of the privacy, anonymity and confidentiality of the participants were guaranteed. For this study, no personal information was collected from any of the participants. In terms of the interviews, the participants were assured that their names were not utilised in the study. The participants were assured that all information gathered in the form of interviews and questionnaires were kept confidential.
d) A level of confidentiality was ensured. The participants were assured that all information gathered in the form of interviews and questionnaires will be kept confidential.
e) Affiliations and conflicts of interest were requested to be declared. This was not found during this research study.
f) The author also obtained ethical clearance from the UKZN ethical clearance office prior to the collection of data. The reference number for the ethical clearance is HSE REC/00002088/2020. The ethical clearance letter is attached under Appendix A of this study.
g) The author obtained gatekeepers letters from BEP organisations in the industry prior to undertaking the data collection for the research.

1.9 Limitations

As the study aimed to investigate schools in rural areas of KwaZulu-Natal only, the participants of this study was limited to those organisations in the consulting sphere of the built environment in KwaZulu-Natal. Aspects of the research methods can result in generalisations of the data gathered. To counteract/limit this, the author had utilised both quantitative and qualitative research methods and data collection tools and the data gathered is compared side-by-side via a process referred to as triangulation. Triangulation ensures internal validity and reliability of the results and limits the potential generalisation of responses received from the participants of this research. Additionally, and with regards to the interviews, the Covid 19 pandemic restricted face to face contact and therefore the interviews had to be conducted via online platforms.

1.10 Structure of the Study

Chapter 1 – Introduction

This chapter provides the reader with an overall understanding of the topic, together with some background information based on the research which was conducted. This chapter also stated the problem statement, research questions, research objectives and significance of the study. The author also briefly described the research methodology which was utilised as well as the ethical considerations and limitations of the study.

Chapter 2 – Literature Review

This chapter provides the reader with an in-depth understanding of the literature as it relates to inequality in the country, reforms in water and sanitation, the status quo of water and sanitation in schools in rural areas of KwaZulu-Natal and the responsibility for schools' infrastructure provision.

Chapter 3 –The Implementing Agent

This chapter provides the reader with an understanding of the literature as it related to the challenges which are being experienced with implementing agents in the built environment sector.

Chapter 4 – Research Methodology

This chapter indicates in further detail, which research methodology approach was adopted as well as the research methods which were chosen to collect data for this study. The data analysis techniques were also expanded upon and the author specifies how the sample frame for this research was selected.

Chapter 5 – Data Analysis and Research Findings

This chapter provides an in-depth analysis of the data which was collected via the questionnaires and the interviews. Each question from the questionnaire was evaluated via the SPSS, version 27 software

and the data from the semi-structured interviews were analyses via the NVivo 12 software. The data from the questionnaires and semi-structured interviews were triangulated and conclusions and recommendations were arrived at.

Chapter 6 – Conclusions and Recommendations

This chapter presents the findings of the research study, as it relates to the problem statement, research questions, research aims and research objectives. A summary of the data analysis is provided together with recommendations.

1.11 Summary

Chapter one provides the background information so that the reader is able to conceptualise the enormity of the water and sanitation challenge in South Africa as a whole. The focus on schools is also explained. Additionally, this chapter stated the research problem, the objectives and significance of the study and provided an overview of the research methodology that was utilised, together with an understanding of how the data was analysed in order to reach conclusion/recommendations for the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The importance of water cannot be over emphasised and as such, for those individuals who are accustomed to an uninterrupted flow of water daily, a day without water due to a burst municipal water pipe or routine maintenance, prioritises one's attention and realisation to the fact that, a significant amount of water is necessary for a comfortable human existence. It is a fact that human beings, animals, and plants/trees require water to sustain themselves. This study aimed to provide the reader with an understanding of water and the related sanitation crisis in South Africa. It attempted to provide an understanding of where and how the water challenge emanated by delving in and explaining the huge feat which the South African government had to contend with and are still contending with, when dealing with the equitable allocation of water and sanitation to its people. This study's aimed to provide a detailed perspective of the poor water and sanitation situation in schools in rural areas of KwaZulu-Natal and aimed to understand whether implementing agents (IA's) of government, who have been tasked to address this problem, have contributed to the reason that many schools in this province do not have the proper provision of these services, considering, its importance for human existence. In order to explain the latter, this chapter provided context to the water and sanitation discussion and allowed the reader to conceptualise and understand, how and exactly why the country has arrived at such a dire situation with regards to their basic service delivery to schools. In contextualising, this chapter the following was, therefore discussed, for example, the global response to water and sanitation, the historic inequality related to apartheid in the country as it related to water and sanitation, inequality as it related to youth/ learners in the country and also as it related to apartheid, the government legislation which was introduced by the new democratic government in order to address the water and sanitation challenge, the past progress on water and sanitation in the country, since the introduction of the aforementioned legislation, the country's response to the global pandemic, Corona Virus (Covid 19) as well how it affected and worsened the already ominous situation in the basic education sector and lastly introduced the implementing agent who, as a result of government legislation was tasked by the Department of Basic Education, to procure and manage infrastructure for water and sanitation provision at schools in rural areas, mainly to fast track it. However, it was later discussed and demonstrated that the latter intention by the government, has play more of a role to delay the process, rather than fast track it.

2.2 Water and sanitation – The global response

During the year 2018, approximately 2.2 billion people worldwide, did not have access to safe drinking water, 4.2 billion people did not have access to basic sanitation and 3 billion people lacked basic hand washing facilities (Osseiran and Lufadeju, 2019). In 2018, 892 million people worldwide practiced open defaecation United Nation Children's Fund (UNICEF) and World Health Organisation (WHO), (2020).

The aforementioned figures have prompted world leaders and organisations to address this challenge with extensive effort and therefore water has claimed the forefront position as an international human right. Adequate and sufficient water also supports the ability to utilise and enjoy water borne sanitation facilities which promote cleanliness, hygiene and disease control. Water, sanitation and hygiene are complimentary parts of an equation which result in a healthier lifestyle. The United Nations records that, the effects of a reliable and clean water supply can only be appreciated when it is coupled with improved sanitation facilities and hygiene (United Nations, 2020). Accordingly, the United Nations assert that, water, sanitation and hygiene are dependent on the presence of the other, that is to say, without a toilet facility which is designed to separate human waste from human contact, the result will be a contaminated water supply and thereby the inability to wash hands with clean water (United Nations, 2020).

The United Nations Children's Fund, commonly known as UNICEF campaigns for the importance of the three aspects, i.e., water, sanitation and hygiene and the interdependence of one on the other. WASH, an acronym for "water, sanitation and hygiene" is a programme initiated by the World Health Organisation (WHO), which addresses these facets (United Nations, 2016).

In an effort to address the water, sanitation and hygiene challenge, 193 countries who are also member states of the United Nations, an organisation formed in the year 1945 to address socio economic and environmental challenges, had agreed and committed to Sustainable Development Goals (SDG), also known as Global Goals. South Africa also committed to the SDG's. This agreement was concluded in the year 2015.

SDGs are a compilation of seventeen goals, which, if achieved will end poverty, ensure longevity of the planet and attain peace. The target date, to achieve these goals was fifteen years, that is to say, by the year 2030. Examples of SDG goals include, an end to hunger, quality education, reduced inequalities, clean water and sanitation, sustainable cities and communities, responsible consumption and production, decent jobs and economic growth, etc., (United Nations Development Programme, 2021).

The SDG global target for water was to *achieve "universal and equitable access to safe and affordable drinking water for all and to achieve access to adequate and equitable sanitation and hygiene for all and to end open defaecation", (*United Nations Children's Fund and World Health Organisation, 2020),

The progress report for each member country is the responsibility of the Joint Monitoring Programme (JMP) which is an affiliate of WHO and UNICEF. The organisation has recently become known as the WHO/UNICEF Joint Programme for Water Supply, Sanitation and Hygiene. The sole function of the WHO/UNICEF Joint Programme for Water Supply, Sanitation and Hygiene is to monitor each countries progress on WASH and their mandate is to maintain the database of all WASH related information for member countries. The JMP derived what is termed a "ladder" for drinking water, sanitation and hygiene and as with all ladders, there are a series of rungs which represents the level of acceptable service which a country can provide to their citizens, (WHO/UNICEF JMP, 2021).

The JMP ladder for drinking water, sanitation and hygiene is depicted in Table 2.1. The levels of service are considerate of the fact that not all countries are able to provide the most progressive form of water, sanitation or hygiene, as this depends vastly on the available resources in a country, which includes both fiscal resources and current infrastructure. That is to say, the necessity for the installation of a flushable toilet in an area that does not as yet, have the plumbing and waste water infrastructure to accommodate that same equivalent, will not assist in attaining the SDG goals.

Therefore, the ladder has been structured to ensure that, in the interim, an acceptable and approved solution is provided for communities, until such time that a country is able to further improve their service delivery.

Further Legislation and Policy Frameworks within the Water Sector in South Africa were also introduced and these are also discussed in this study. These included The White Paper on Basic Household Sanitation, the Strategic Framework for Water Services (2003), the National Development Plan and The Millennium Development Goals.

Table 2.1: JMP Ladder for Drinking Water, Sanitation and Hygiene (United Nations, 2020)

DRINKING WATER	SANITATION	HYGIENE
SAFELY MANAGED		
Drinking water from and improved source, located on the premises, available when needed and free from faecal and priority chemical contamination	Use of improved facilities which are not shared with other households and where excreta are safely disposed in-situ or transported and treated off site	
BASIC		
Drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip including queuing	Use of improved facilities which are not shared by other households	Availability of hand washing facility on premises with soap and water
LIMITED		
Drinking water from an improved source, for which collection time exceeds 30 minutes for a round trip including queuing	Use of improved facilities which are shared by two or more households	Availability of hand washing facility on premises without soap and water
UNIMPROVED		**NO FACILITY**
Drinking water from an unprotected dug well or unprotected spring	Use of pit latrines without a slab or platform, hanging latrines or bucket latrines	No handwashing facility on premises

Table 2.1: JMP Ladder for Drinking Water, Sanitation and Hygiene (United Nations, 2020) /Continued

SURFACE WATER	OPEN DEFAECATION	
Drinking water directly from a river, dam, lake, pond, stream, canal or irrigation canal	Disposal of human faeces in fields, forests, bushes, open bodies of water, beaches and other open spaces or with solid waste	

Levels of service range from the bottom most rung which classifies drinking water as surface water from rivers, dams, etc and open defaecation in bushes, etc., for sanitation.

Unimproved levels of service are representative of services that are not monitored, regulated or tested and are still unacceptable in relation to the health and hygiene needs of people.

Higher levels of service represent an improvement in the type of facility provided and to a great extent an increase in the level of dignity, one is offered especially in relation to sanitation.

South Africa is the focus of this study. As of the year 2020, approximately 33% of the South African population was characterised as rural settlement (The World Bank, 2021). A rural settlement or area is one in which has "*a low population density and large amounts of undeveloped land*" (National Geographic, 2021). The largely rural status lends itself to the ascribing factor for the provision of *basic service delivery* as described on the JMP ladder, as water and sewer infrastructure have not yet been introduced to cover the full extent of these rural areas. The JMP define "basic" as drinking water from an improved source (piped water, boreholes, delivered water, as opposed to surface water), however the water must be collected from a source which is within 30 minutes for a round trip from the individuals dwelling (WHO/UNICEF, 2021).

One can appreciate that the global emphasis for the need of adequate water and sanitation, will filter down to education facilities together with the reflection that school going children, in order to benefit from their education, must be provided with facilities and services that enable and advance, rather than hinder their education progress.

This study's focus on education is entrenched in the confidence that, assisting the children of a country to grow and develop, allows for the country itself to grow and develop. This confidence is also asserted by organisations such as Amnesty International, an international organisation, whose mandate focusses on addressing various injustices (inequalities) of human rights worldwide (Amnesty International, 2020). The organisation states that "*education can play a positive role in reducing inequalities*" South Africa is a country entrenched with inequalities which has resulted in the detriment to the economy of the country. "*Inequality manifests itself through skewed income distribution, unequal access to opportunities and regional disparities*" (International Monetary Fund, 2020). Therefore, in identifying ways to uplift a country and dispel inequalities, exerted effort should be focused on the children of the

country. Additional support of this notion, was given by the former and late President of South Africa, Mr. Nelson Mandela who stated that, "*No country can develop unless its citizens are educated*". He also fervently notes in the autobiography, A Long Walk to Freedom, that "*Education is a great engine of personal development. It is through education that the daughter of a peasant can become a doctor, the son of a mine worker can become the head of the mine, that the child of a farm worker can become the president of a great nation"* (Mandela, 1918-2013).
In particular, this study aims to explore whether over time, the introduction of implementing agents into the procurement process is possibly one of the reasons for the limited and or inadequate water and sanitation provisions in schools in rural areas of KwaZulu-Natal.

2.3 Inequality and the youth of South Africa

Youth are thought to be the future of any country and as mentioned previously, this decree directs this study and its focus on schools and education. Youth need to be afforded opportunities to uplift themselves and their communities, however in South Africa, there has been consistent and persistent inequalities which has suppressed that. If inequality is not addressed, the youth of South Africa, will be destined with disadvantages for decades to come.

Amnesty International (2020) states that "*education can play a positive role in reducing inequalities*" Therefore, in identifying ways to uplift a country and dispel inequalities, the preliminary focus must be that of the youth of the nation. The late president of South Africa, Mr. Nelson Mandela stated that "*No country can develop unless its citizens are educated*.

Inequalities in any country is represented by the wealth distribution of the country and evidently, it has been noted that the richest 20% of people in South Africa possess 68% of the wealth of the country, in contrast to the poorest 40% who only possess 7% of the wealth (International Monetary Fund, 2020).
The wealth distribution of the country is measured by the Gini Index, which is an international measure of the level of inequality in a country and which allows one to understand the income (wealth) distribution of a country. Perfect equality is governed by an index value of 0 and any index that is closer to 1, identifies a country that is more unequal in its distribution of wealth (Ramzai, 2020). South Africa's most recent Gini Coefficient calculation in 2021 represents an index figure of 0.63. This coefficient, in fact rose from 0.61 in 1996 to 0.65 in 2005, and as per the current figure (0.63) has since declined. However, the aforementioned mentioned figures (0.61 to 0.65) signified increased inequality, despite the post-apartheid governments' intended focus to reduce inequality over a period of time (Amnesty International, 2020).

It is well known that South Africa's inequality has been brought about by apartheid (Leibbrandt and Shipp, 2018). Leibbrandt and Shipp (2018), strongly associated the country's inequality to the legacy of the apartheid system in South Africa. The word apartheid hails from the Afrikaans speaking dialect

which essentially means "apartness" (Britannica, 2021). The National Party when elected as the government of South Africa in 1948, introduced apartheid which was legislated and fundamentally provided for the separation of people grounded on the race group within which they were born into (South African History Online, 2019).

Lipton (1985:2) describes apartheid as "*the system of legalized and institutionalized race discrimination and segregation in SA".* Lishivha, (2018), suitably describes apartheid as "*a systematic discriminatory form of governance that benefitted White South Africans and subordinated Black South Africans."*

Since 1994, the democratic South African government, however, must be recognised and acknowledged for the effort invested in addressing this inequality (apartheid). The Governments efforts can be appreciated when implementations such as the introduction of the Broad Based Black Economic Empowerment (BBBEE) Policy was legislated, which enabled the previously disadvantaged Black people fair access to jobs and other economic activities, which fundamentally meant a share in the wealth of the economy (Beaubien, 2018). Additionally, BBBEE is not only as the name suggests, for example, Black Empowerment by advancing people into jobs, it also encompasses skills development, employment equity, socio-economic development, preferential procurement and enterprise development, which seeks to ensure that all citizens of the country, regardless of race or age have equal opportunities to participate in the economy of the country (Bowmans, 2021).

Additional exertions included the undertaking to alleviate poverty and ensure fair and equitable access to health care, water, sanitation, education, shelter and to allow its citizens freedom of religion, freedom of speech, etc., (South African Constitution, 1996). These undertakings are all documented in Chapter 2 of the South African constitution, The Bill of Rights.

These far reaching and well considered implementations have assisted many people born of South African origin to achieve a fair degree of equality since the onset of democracy in 1994. Some of the successes of the democratic government include the increase in the amount of Black people and women in particular, in senior management positions. (Department of Trade and Industry, 2013).

Notwithstanding, BBBEE, there have been other interventions, which the government wished to implement and were largely successful in. Booysen (2014), states that after 20 years of democracy, the rights of human beings in South Africa are given some considerations. Booysen (2014), records that the "good things", include, free education, multi-racial schools, free houses, old age grants, clinics and basic medical care, school feeding schemes and gender rights, etc.

However, for any long-term endeavour there must exist a high degree of momentum and consistency to achieve a goal and more than two decades since the first democratic elections in South Africa in 1994, the continued success and the sustainability of the measures put in place by the government is not one, that the country will be able to boast of immeasurably (Scott, 2019).

An article published in the Mail and Guardian Newspaper on 31 January 2020, made the following express statement: *"More than 5.3 million households and 21-million people don't have clean water, despite money being spent on dams and pipelines to deliver water to 95% of the population."* The article further states that corruption and mismanagement have had a hand at the R1.3 trillion-rand worth of infrastructure and *"that many places are worse off than in 1994"* (Mail and Guardian, 2020).

A "master plan" tabled by the water and sanitation minister in 2019 indicated that 898 billion rand was required in order to fix the country's ailing water and sanitation infrastructure. The master plan also indicated that fewer people are receiving water and sanitation than in 1994. The report also tables mismanagement, corruption and a skills shortage, which are fundamental aspects which this study attempted to uncover, in relation to who or which bodies are responsible for the provision of water and sanitation to rural schools in KwaZulu-Natal.

Regardless, of the now apparent loss of the government in the water and sanitation sphere, this chapter demonstrated that there have been substantial strides by the South African government, in a positive direction, which ensured that the majority of the population was provided with a form of water and sanitation service. This study investigated the history of water in South Africa to conceptualise what barriers prevented the country from providing its entire population with even a basic level of service delivery for water and sanitation for many years.

2.4 The history of South Africa relative to water and sanitation

Based on the focus of the study, research provides evidence that apartheid has contributed to the limited-service provision of water and sanitation in the country and in schools in KwaZulu-Natal. This statement is entrenched in the White Paper (comprehensive report, which aims to allow its readers an opportunity to conceptualise, solve or reach a decision on a specific problem) which was drafted to address the Water Supply and Sanitation Policy of 1994. It is stated that the "*history of water and sanitation cannot be separated from the history of the country as a whole"* (Asmal 1994:4).

Asmal (1994) and other authors such as Funke, Nortje, Findlater, Burns, Turton, Weaver, & Hattingh (2007) declare that discrimination in water distribution dates back to as far as the seventeenth century. At that time the country, was essentially vast spaces of semi-arid to arid land inhabited by the indigenous and nomadic Khoi and San people who strategically followed rainfall patterns in order to hunt for game and vegetation. Their way of life lacked much responsibility, apart from that of the wellbeing of their immediate families as compared to the way of life of many of those who now live in the twenty first century (Funke, *et. al.*, 2017). The history of water as described by Funke, *et. al*., (2007) and Asmal (1994) communicates a story of discrimination and wide scale apathy for people who were merely born with a darker skin.

Figure 2.1 enables one to conceptualise the timelines of South African history since the 1600s with specific emphasis on the natural resource being water, which the Khoi-Khoi and San people relied upon and it focuses on decisions taken by political parties who took the liberty to direct its supply and distribution/allocation.

A brief explanation in consultation with Funke, *et. al. (*2017) and Asmal (1994) of this timeline (Figure 2.1) is summarised:

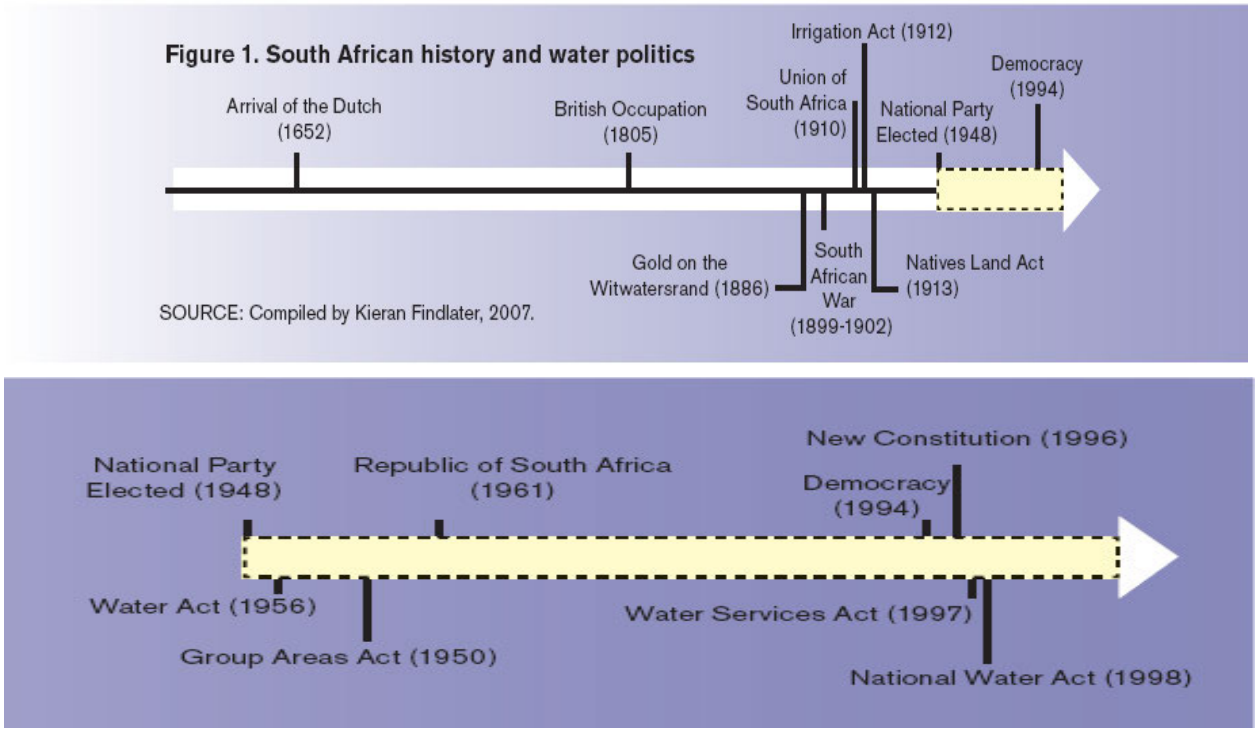


Figure 2.1: Water Politics - South African Timeline (Findlater *et al*, 2007).

a) In the year 1652, signalled significant transformation for the nomadic Khoi-Khoi and San people of the Cape in South Africa, as the Dutch East India Company (DEIC) established their Cape colony and swiftly transformed the area from a trading post into a settler one. The Dutch unilaterally took a decision to introduce the concept of private land ownership for their people. Essentially, the Dutch appropriated privilege on land, in a country, that they could not declare any true and just patriotism to. The odious decision ultimately ordained restriction and lack of freedom for the Khoi-Khoi and San people, (Funke, *et. al.,* 2017 and Asmal, 1994).
b) The Dutch further warranted that land demarcations for their people, must be concentrated along rivers, which fundamentally meant that any livestock and vegetation which thrived on the water from the rivers, were inevitably, the property of the DEIC, thus threatening the livelihood of the Khoi-Khoi and San people.
c) The decision regarding private land ownership was eventually legalised in a court of law and led to the *Riparian Principle*. Riparian refers to land being situated on the banks of rivers, (Funke, *et. al.,* 2017 and Asmal, 1994).

d) The Dutch reign however ended in 1805, as a result of the takeover by the British. The British were in favour of the Riparian Principle, making it more challenging for the indigenous people to have free and fair access to land and water, (Funke, *et. al.,* 2017 and Asmal, 1994).

e) Extensive emphasis was then placed on irrigation, agriculture and gold mining, consequentially, all activities that sapped water resources in an already low rainfall country, (Funke, *et. al.,* 2017 and Asmal, 1994).

f) A significant period of time elapsed under British (foreign) rule. However, independence was finally seized in 1948, when the reigns of the country was transferred to the country's National Party (NP). The momentous discharge of power from foreign rule, however, did not signify liberation for certain people in the country but rather aided separation or apartheid, (Funke, *et. al.,* 2017 and Asmal, 1994).

g) The White Paper on Water Supply and Sanitation Policy makes pertinent references to "Grand apartheid", signifying "the division of the country into homeland territories, own affairs administration" and ultimately the greater good of the "White sector of South Africa", which was the stance that the NP withheld.

h) Over time, the South African war and pressures from the rest of the world led to the contraction of the country's economy, (Funke, *et. al.,* 2017 and Asmal, 1994).

i) The NP had to implement alternate measures in order to spur economic development. Economic opportunities in the form of water works schemes, were one of the measures put in place to provide work opportunities/investments for white people, with little or no consideration on the need to look after the needs of the non-whites in the country, (Funke, *et. al.,* 2017 and Asmal, 1994).

j) The promulgation of the National Water Act of 1956 and the formation of the Department of Water Affairs (DWA) should have borne testament to the equal distribution of water amongst the country's citizens. However, it rather favoured agriculture and mining efforts, as this boom proved, at that time, to be more lucrative. Long-term stability and sustainability of the natural resource (water) was also not being considered and the resource was being over exploited (Funke, *et. al.,* 2017 and Asmal, 1994).

k) By the year 1980 it was becoming increasingly evident that the unsubstantiated and unsustainable way in which water had been managed had "*resulted in worrying levels of degradation of many South Africans primary water sources*", ((Funke, *et. al.,* 2017) and Asmal, 1994).

l) However, after many years, much awaited democracy was achieved in 1994 which sanctioned significant changes in the generally biased supply and allocation of water. The time lapse, however, since the Dutch rule, meant that the country had become riddled with vast inequalities, which were as a result of many years of political strife, struggle and race division. The reversal of inequality would entail extensive and expensive sifting, examination and implementation, in

order to undo the injustices of the past and to reap rewards for the equitable access and distribution of water and sanitation specifically, among other aspects. The task, while immeasurable was one of the many which the new democratic Government (The African National Congress - ANC) widely advocated for, since its election, ((Funke, *et. al.,* 2017) and Asmal, 1994).

2.5 Government legislation and policies related to water and sanitation

The following section highlights the exertions by the ANC Government to reform the country, specifically in relation to the provision of water and sanitation for its citizens. Policies were introduced in order to sectionalise and better understand the complexity of the problem, all while ensuring that the suggestions of the citizens were taken into consideration, which emphasised the governments alignment to democracy. The following policies were discussed, that is, The Reconstruction and Development Policy Framework, The White Paper on Water and Sanitation, 1994, The Water Services Act 1997 and The National Water Act, 1998, The White Paper on Basic Household Sanitation, 2001, The Strategic Framework for Water Services, 2003 and The National Development Plan 2030.

2.5.1 The Reconstruction and Development Policy Framework

In 1994, the ANC realised that South Africa had become a land of disproportion in many spheres (water, electricity, sanitation, road networks, buildings, schools, etc.) which often existed side by side. The imbalance, in whichever sphere it was viewed from, ultimately aligned to the rich versus poor or the developed versus the underdeveloped. While this notion may be typical, Figure 2.2, captured in Durban in 2020, depicts how the country has learnt to adapt to the rich and poor living side by side. Figure 2.2 depicts a popular golf course adjacent to an informal settlement in the City of Durban in KwaZulu-Natal. The notable feature over and above the clear division created by shrubbery and fencing, is the congested configuration of the makeshift houses, which thousands of people have become accustomed to. The houses are constructed from wood, metal sheets and plastic, with no founding and very minimal protection from the elements.

Figure 2.2: Papaw Sewgolum Golf Course in Durban (Miller 2020)

The issue of inequality which the ANC resolved to address, still remains at the forefront of many discussions at parliamentary level to date. Inequality was mentioned at the most recent State of the Nation Address (SONA) on 11 February 2021. The SONA is an address delivered by the President of South Africa and highlights the proposed plans for the coming years. President Cyril Ramaphosa stated "*inequality is deepening and to address the deep inequalities in our society, we must accelerate the implementation of BBBEE on ownership, control and management of the economy*" (State of the Nation Address, 2021)

The advent of the democratic government had therefore sought to develop an overarching policy, which would ensure the eventual eradication of the inequality amongst its citizens. This led to the formation of the Reconstruction and Development Policy (RDP) framework (O'Malley, 2004).

The policy framework was one that integrated and allowed all the people of the country to participate in the process of change in order to purge the previously widely accepted notion of apartheid. The aim as quoted from O' Malley (2004) is one which would result in a "*democratic, non-racial and non-sexist future".*

When addressing the water and sanitation crises it was acknowledged that the mere provision of safe and clean water and an accepted form of sanitation cannot be detached from the maintenance of water supply and sanitation services. Therefore, it was widely accepted that the two facets must work hand in hand in order to ensure long-term sustainability (White Paper on Water supply and Sanitation Policy, 1994). Based on the country's' "rural" status quo, it was not immediately feasible to provide water and sanitation networks, as this was linked to substantial infrastructure and maintenance costs.

The RDP while being developed for the country as a whole dealt with various other aspects of the country had placed economic value in water resources and recognised that the provision of infrastructure, which supports water supply and sanitation services, will have a direct impact on the development and improvement of the South African economy.

The three main goals of the RDP Policy framework relative to water and sanitation considered the enormity of the inequality in the country and therefore divided the goals practically and manageably into short, medium and long-term ones.

a) Short term: The need to provide each and every person with clean and safe water which would support their health and hygiene needs. The National Water and Sanitation programme determined that each person required between 20 and 30 litres per capita, per day in order to meet their health and hygiene needs. This, in some cases necessitated a short distance walk, that is not more than a stipulated 200m in order to collect this water. Individuals must also be provided with an adequate sanitation facility accompanied by waste and refuse removal.
b) Medium Term: – Provision of at least 50-60 litres per capita per day of water to individuals within their yards, i.e., alleviating the needs to carry water in buckets over distances and an improved sanitation and water/refuse collection system.
c) Long Term: The provision of water and sanitation to every South African.

Funding for the above-mentioned goals with the foresight of maintaining the infrastructure in the long run, was earmarked to be received via the implementation of water tariffs i.e., the users of water will be responsible for the payment of any water utilised which was over and above, that which government deemed free use for each person. This plan of action was well received in many urban areas but attracted widespread antagonistic reactions from those who lived in rural areas, which largely was not unreasonable. In essence they just could not afford to pay for the service (Asmal,1994).

2.5.2 The White Paper on Water Supply and Sanitation Policy, 1994

The true reality of the water and sanitation crisis was realised when the appointed minister for Water and Affairs and Forestry in 1994, Professor Kader Asmal drafted the first White Paper in relation to water supply and sanitation services in November 1994.

Professor Asmal was unambiguous when he noted that the water and sanitation back log deserved comment by all those who were affected, so that they could participate in the process of the policy formation (Asmal, 1994).

To conceptualise the accumulation of inequalities for water and sanitation in 1994 when democracy was achieved, the following statistics are worthy of mention:

a) In 1994, 15.9 million of a population of 39 million, did not have access to safe water supplies, (WWF South Africa, 2016). Twenty million people did not have access to adequate sanitation (Masindi and Dunker, 2016). These figures equate to a percentage of approximately 50% of the population.

The crucial factor is one that directs attention to the context that the majority of those who did have access to safe water and sanitation belonged to the white minority and was also relative to those individuals who lived in areas with little or no infrastructure development related to water supply (Asmal 1994). This is depicted in Figure 2.3.

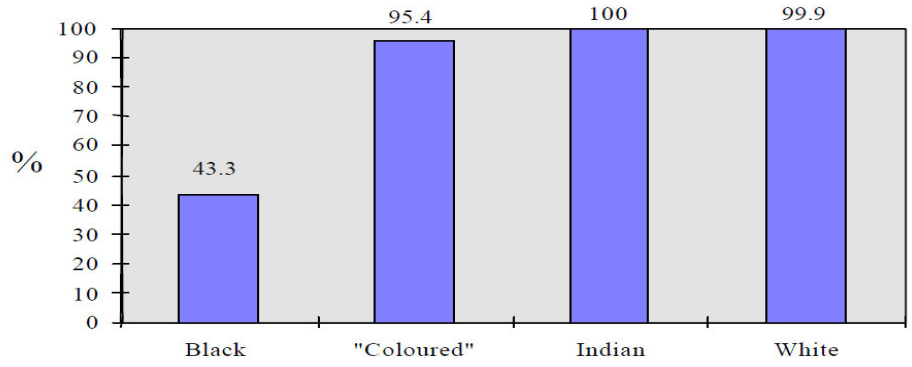


Figure 2.3: Piped water distribution in South Africa in 1994, Baseline Household Statistics Source: White Paper on Water Supply and Sanitation, (Asmal 1994)

According to the percentages on Figure 2.3, 99.9% of white people in the country had access to piped water to their homes as opposed to the 43.3% of black people.

A comparative analysis of the equivalent statistics for water and sanitation, since the ANC's declaration to address the inequality challenge, resulted in vast improvements. In 2008, 5 million people did not have access to water, compared to 15.9 million in 1994 and 15 million people did not have access to sanitation compared to 20 million respectively, albeit the population statistics in 2008 was approximately 49 million people (The Water Project, 2021). By the year 2019, a general household survey was conducted by Statistics South Africa, which is a national government department formed for the production and distribution of statistics which will essentially assist government when key policy decisions need to be made (Statistics South Africa, 2019). The latest statistics relative to the aspect of water and sanitation was released in 2019 and with a population of approximately 56 million, approximately 88% of the population had an improved source of water (Statistics South Africa, 2019). These statistics attest to the commitment made by the ANC.

In the year 1994 and before, many of the rural areas utilised the bucket system. A bucket toilet is a basic form of a dry toilet whereby a bucket (pail) is used to collect excreta. Usually, faeces and urine are collected together in the same bucket (Statistics South Africa, 2019). The bucket system was earmarked to be phased out within five years of the new democracy.

In addition, The White Paper on Water Supply and Sanitation 1994 clearly specified, its goal, to ensure that all South Africans could have access to basic water and sanitation services within seven years or less (Asmal,1994).

The aforementioned White Paper presented basic guidelines aligned to the RDP, which were also divided into the short-, medium- and long-term goals which were previously described in this paper. In addition, however, the reliability of the supply was pinned on the fact that it should not fail to provide water supply due to drought in more than one year in fifty and that there should be adequate measures put in place to ensure that the supply is maintained on a regular basis. The quality of the water should be of sufficient minimum standard related to chemical content and other factors such as taste, smell and appearance. The planning for the provision of water should have the foresight of the White Paper's basic guidelines. (The White Paper on Water Supply and Sanitation Policy, 1994)

Sanitation provision related specifically to just adequate sanitation and not the most improved form of sanitation, as the lack of water infrastructure in most areas lent itself to the consequential lack of water borne sewerage. The cost of the initial infrastructure for water supply and the related and additional cost for sewerage systems would create an unattainable budget provision for the department of Water Affairs and Forestry in the short term (Bester and Austin, n.d).

For this reason, it was agreed that the Ventilated Improved Pit (VIP) toilet system would suffice as a temporary measure and an accepted/adequate form of basic sanitation. The VIP system does not require water for its operation and is fundamentally a substantially deep pit, dug into the ground, where human excreta is collected. The pit is covered with a concrete cover slab which accommodates a hole for a pedestal and a black vent pipe. The vent pipe, typically projecting to a higher level than the entrance door of the VIP system, provides for both odour and hygiene/fly control, by ensuring that wind blown over the pipe syphons out stale air from the pipe, thereby removing odours. A mesh fitted on the top of the pipe prevents the nuisance of flies entering the pit, or if they have already entered via the pedestal, they are then unable to leave due to the mesh (Bester and Austin, n.d). A simplistic illustration of the operations of VIP system is shown in Figure 2.4.

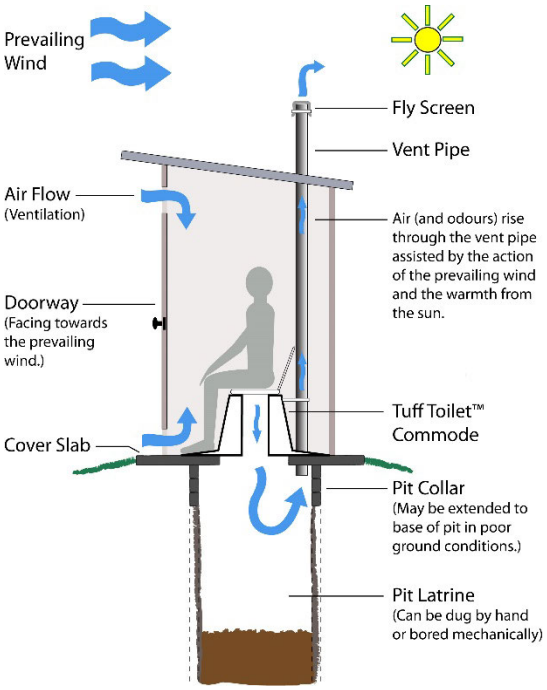


Figure 2.4: The Ventilation Improved Pit System Toilet (Tilley, Luthi, Zurbrugg, Scherttenlieb, 2008)

2.5.3 The Water Services Act 1997 and the National Water Act 1998

The limited water and sewer infrastructure in the country meant that the water and sanitation issue in the country could not be undertaken without fragmenting the task into manageable parts. This led to the division of the water sector in South Africa, into one that dealt with water management and one that was aligned to the constitution of South Africa, which stated that the country's citizens must be provisioned with a right to water services which automatically also translated to a right to an accepted form of sanitation.

Therefore, the Water Services Act of 1997 (WSA) and the National Water Act of 1998 (NWA) was later promulgated. The Water Services Act of 1997 focused on the right to water services to South Africans and the National Water Act of 1998, focused on water management (Statistics South Africa, 2017).

The National Water Act 1998, slogan, i.e., "some for all, forever" translated into consistency and sustainability.

Mackey (1999:1), elaborates on the slogan when he stated that "*water resources are restricted (Some) and although the use of water must not/is not limited to just human health and well-being, but must also be utilised for economic, industrial, agricultural purposes, etc, (For All) we must be in a position to conserve and protect the water resources (Forever)".*

Conservation and sustainability of the resource was placed high on the list of priorities, as the way in which water was previously (prior to 1994) managed was a major concern. Past practices which debilitated water resources included gold mining, which over time resulted in acid mine drainage. Acid

mine drainage refers to the contamination of rising ground water when it comes into contact with the exposed pyrites within the rock of an abandoned mine. (Funke, *et. al*, 2007).

The ANC government again decided that the most progressive way to manage the water aspect was again to divide it into more manageable parts. The result was four key principles which became the pillars of the Water Sector in South Africa and represented an attempt to solve the problem within the sector.

These principles/pillars are decentralisation, equitable access, efficiency and sustainability of water resources. These aspects needed to be addressed in order to fulfil the purpose of the National Water Act, 1998. The principals/pillars are discussed further as follows:

a) Decentralisation

The constitution which came into effect in the year 1996, placed significant emphasis on all the people of the country. The constitution therefore represented the collective opinions and thoughts of the South African people and had been arrived at, by general agreement, (South African History, Online, 2019). This approach was followed for the management of water resources. In order to achieve one of the purposes of the National Water Act, 1998 (NWA), it was agreed that not all decisions must be made at parliamentary level but must be decentralised to enable lower levels of government and municipalities, in consultation with end users and stakeholders to make decisions in respect of water resources, its access, provision and management.

b) Equitable Access:

The amount of water that is utilised on a daily basis without financial recovery to the government was regulated. (Funke, *et al*, 2007).

c) Efficiency:

To prevent the wastage of water, the National Water Act 1998, makes provision for water licensing and pricing mechanisms or financial assistance and subsidy programmes. While the government acknowledged the right of individual's access to water, its usage and management are two sides of the same coin from a social economic and environmental perspective. The introduction of the licensing system allows for the fair allocation of water if there is a probability that water supply will exceed demand or water quality will become a threat in the near future (National Water Act, 1998).

Water charges came into effect to create social equity. Water users were charged in relation to the type of use, their geographical area or their individual use. Income generated from the water pricing was earmarked for funding the cost of water management (National Water Act, 1998).

d) Sustainability:

The NWA (1998) terms the protection of water resources as the "reserve". The term signifies the quantity of water that needs to remain in rivers to ensure efficient functioning of the ecosystem and the amount of water that individuals need to be allocated in terms of their rights related to their human needs of personal hygiene and food preparation. There has to be an ideal balance to ensure that the water resources of the country are well managed, allocated and at the same time protected for future generations.

In summary the purpose of the National Water Act of 1998 is to ensure that South Africans water resources are protected, used, developed, conserved, managed and controlled in ways which take into the following factors:

a. Meeting the basic Human needs of present and future generations.
b. Promoting equitable access to water.
c. Redressing the results of past racial and gender discrimination.
d. Promoting the efficient sustainable and beneficial uses of water in the public interest.
e. Facilitating social and economic benefit.
f. Providing for growing demand for water uses.
g. Protecting aquatic and ecosystems.
h. Reducing and preventing pollution and degradation of water resources.
i. Meeting international obligations.
j. Promoting dam safety and managing floods and droughts.
(Department of Water and Sanitation, 1998).

The clear link between sanitation and water goes without saying. The apartheid stance which was given to water was also the same stance given to sanitation services, (Asmal 1994:4). It is stated in the White Paper that *"the history of the development of sanitation services is closely aligned to the history of water services development in South Africa".*

2.5.4 The White Paper on Basic Household Sanitation (2001)

Based on the large scale of households which did not have access to even basic household sanitation, there was a need to address this aspect by identifying those households with the greatest demand. The White Paper on Basic Household Sanitation was introduced in 2001 to address this. This policy also focused on acceptable and safe forms of human waste removal, as well as the hygiene practices related to same (Statistics South Africa, 2017).

2.5.5 The Strategic Framework for Water Services, 2003

This policy was introduced in order to outline the water sector's vision for the ten years from the year 2003. The policy became necessary, as the country now had in place a local government and the sector recognised the need to change the approach in which the original goals could be met. The policy

encompassed needs of both those in the poor rural communities to those people living in urbanised areas, where tariffs were detailed and discussed. The goals and aspirations were still aligned to that of the RDP and emphasized the obligation to ensure that the people living in the country were at least, in the first instance, provided with their basic need in relation to water supply and water service (reliability and turnaround time for maintenance), as well as basic sanitation supply and service. Thereafter improved levels of service dependent on prevailing circumstances must be considered, for example, once a community is provided with basic services, questions which must be answered include, *what is the current situation in relation to the existing water services infrastructure, in order to upgrade the quality of the service provided?* (Department of Water Affairs and Forestry 2003:27).

There were also several indicators to determine the progress within the Water Sector both on local and international scale. These indicators are briefly discussed:

2.5.6 The National Development Plan 2030

The South African Government launched a National Development Plan in 2013, with the ultimate aim of reducing poverty and inequality in the country by the year 2030. This afforded the country approximately 17 years in which to address various key issues that contribute to poverty and inequality in the country. Some of these key issues include "*low employment levels, inadequate quality of education, the lack of quality health care, insufficient food security and nutrition advice, limited access to clean running water, unsafe living environments"*, to name a few (National Development Plan 2030, 2011:25). The government appointed a national planning commission to manage and lead this program to fruition.

The National Development Plan recognises the need to provide equitable access to water and sanitation and envisages a South Africa that will understand the importance of water and the role it will play for the economic growth of the country. It is therefore envisioned that this resource will be prioritised for planning and infrastructure development as well as preservation of the resource for sustainability (Official Guide to South Africa, 2018/2019).

2.5.7 The Millennium Development Goals (2000)

The Millennium Development Goals, signify commitment by relevant countries at the dawn of the new millennium to achieve certain social goals in their respective countries within a 15-year period. This therefore created an additional opportunity for accountability for South Africa. There were eight agreed goals. Goal one, being to eradicate extreme hunger and poverty (World Health Organisation, 2021).

This goal, while not explicit on how and what should be done to achieve it, when reviewed from a South African context, it does focus in the direction of meeting the basic needs of the people in the country.

When the 15-year timeframe for the Millennium Development Goals was exhausted the United Nations introduced sustainable development goals (SDG), which were more specific. Goal 6, provided specific reference to water and sanitation and was divided into two components, that is to say,"

"Goal 6: Ensure availability and sustainable management of water and sanitation for all

a) 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all.
b) 6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations (United Nations, 2018).

2.6 Progress in Water and Sanitation Provisions in South Africa

There has been significant progress in the provision of basic services to people in South Africa, especially those people who were historically marginalised. Twenty years after democracy, the amount of people who have been afforded access to water, within 200m of their dwellings increased from 60% in 1994 to approximately 95% in 2011/2012. Improved levels of sanitation, i.e., the ventilated pit latrine increased from 50% in 1994 to 83% in 2011/2012 (The South African Presidency, 2014).

Colea, Bailey, Cullis and New (2018: 39) state that "*even though the number of households who were provided with RDP levels (25 Litres of water per person per day within 200m of their dwelling and not interrupted for more than seven days in a year) of water and sanitation had increased by at least 24% over a 20-year period, this indicator is a focus on extreme poverty, i.e., the number of people that the government had enabled to surpass the poverty line".* The people in question have been afforded only an improved level of water and sanitation delivery in accordance with the RDP. Further improvements will only be possible when additional funds are available to focus on infrastructure development, which will enable greater levels of service delivery. The success, therefore, is still marred with levels of inequality.

Statistics South Africa began generating a "General Household Survey" (GHS) in 2002, which provided data on the general living conditions of people in the country, their access to basic services as well as access to food and health care (Statistics, South Africa, 2019).

Table 2.2: Access to Piped Water. (Statistics South Africa, 2019).

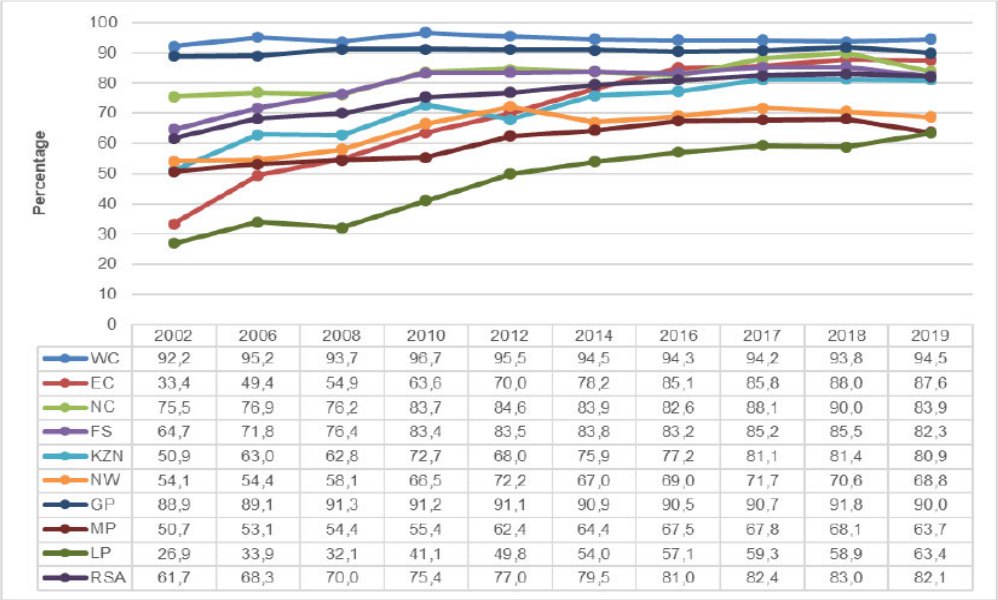
Water source	Year									
	2002	2004	2006	2008	2010	2012	2014	2016	2018	2019
	Percentage									
Piped (tap) water in dwelling	40,4	40,1	41,2	43,6	42,8	44,6	46,4	46,6	46,3	44,9
Piped (tap) water on site/yard	27,7	29,3	30,2	27,0	29,1	27,6	27,0	26,8	28,5	28,5
Borehole on site	2,7	1,6	1,2	1,2	1,1	1,4	1,9	1,8	2,1	2,2
Rain-water tank on site	1,3	0,3	0,4	0,5	0,3	0,6	0,4	0,8	1,2	1,4
Neighbour's tap	0,6	2,3	2,1	2,6	2,5	2,9	2,7	2,4	1,9	2,5
Public/communal tap	13,6	14,8	15,4	15,6	15,5	15,8	14,0	13,2	12,3	12,2
Water-carrier/tanker	0,6	0,6	1,1	1,1	1,4	1,4	1,2	2,4	1,8	1,7
Water vendor	2,8	2,7	2,3	1,9	1,3	1,1	1,2	1,6	1,3	1,7
Borehole outside yard	5,9	4,7	3,3	3,5	3,2	2,3	2,7	2,1	1,5	1,4
Flowing water/stream/river	0,7	0,6	0,3	0,3	0,3	0,2	0,4	0,2	1,7	1,6
Stagnant water/dam/pool	1,4	1,0	1,0	0,6	0,3	0,4	0,5	0,3	0,1	0,1
Well	2,0	1,8	1,3	1,5	1,5	1,3	0,9	1,0	0,3	0,5
Spring	0,3	0,2	0,2	0,3	0,6	0,5	0,7	0,9	0,6	0,9
Other	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,4	0,5
Total	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**

Table 2.2 reveals the progress in relation to the access to piped water for the citizens of South Africa. The latest GHS was conducted in 2019 (at the time of writing). Access to piped water does not necessarily signify that water is piped into one's dwelling. Access avenues for piped water included tap water into dwelling, tap water in a yard, water via a neighbour's tap or a public tap which entails walking to collect water. Apart from piped tap water into a dwelling, all other opportunities for piped water, is not the most convenient. Piped water into a dwelling increased a mere 4.5% since the year 2002 (40.4% versus 44.9%). This percentage fell in the year 2019, as there was a decline in the number of people who paid for piped water into their dwellings. The percentage increase of piped water into a yard also increased insignificantly, from 27.7% in 2002 to 28.5% in 2019. Table 2.2 also brings to the fore that some individuals albeit minute percentages, still rely on water from boreholes, rivers and streams, stagnant pools, wells and springs. It is concerning to noted that 25 years into democracy, this still was the case. That being said and with the facts tabled in Table 2.2, the reliability of the water supply is also an aspect that must be considered. Water supply should be operational and available for ""*at least 350 days per year and should it be interrupted; this interruption must not exceed 48 hours in each instance*" (The Department of Water Affairs and Forestry, 2003:66).

With regards to sanitation, there has been notable improvements as illustrated in Table 2.3. Between the year 2002 and 2019 there was approximately a 20% increase in the number of people who had improved access to sanitation. The definition of improved access however indicated either improvement to a flush toilet or from having no toilet to the provision of a VIP system. Table 2.3 indicates that there was definitively an upward trend in all provinces for this statistic and the national averages for the country are indicated by the figures for RSA. The nine plots on Table 2.3 are representative of the nine provinces of the country and it can be seen that there are some parts of the country which have advanced at a quicker pace than others. For example, the Western Cape (blue graph) has historically not been significantly plagued by the existences of bucket toilets and therefore the drive for improved sanitation

is represented by a flatter slope, which is in stark contrast to other provinces such as the Eastern Cape or the Limpopo Province which is represented by the red and green plots respectively

Table 2.3: Access to Improved Sanitation Services. (Statistics South Africa, 2019)



	2002	2006	2008	2010	2012	2014	2016	2017	2018	2019
WC	92,2	95,2	93,7	96,7	95,5	94,5	94,3	94,2	93,8	94,5
EC	33,4	49,4	54,9	63,6	70,0	78,2	85,1	85,8	86,0	87,6
NC	75,5	76,9	76,2	83,7	84,6	83,9	82,6	88,1	90,0	83,9
FS	64,7	71,8	76,4	83,4	83,5	83,8	83,2	85,2	85,5	82,3
KZN	50,9	63,0	62,8	72,7	68,0	75,9	77,2	81,1	81,4	80,9
NW	54,1	54,4	58,1	66,5	72,2	67,0	69,0	71,7	70,6	68,8
GP	88,9	89,1	91,3	91,2	91,1	90,9	90,5	90,7	91,8	90,0
MP	50,7	53,1	54,4	55,4	62,4	64,4	67,5	67,8	68,1	63,7
LP	26,9	33,9	32,1	41,1	49,8	54,0	57,1	59,3	58,9	63,4
RSA	61,7	68,3	70,0	75,4	77,0	79,5	81,0	82,4	83,0	82,1

Regardless of improved sanitation facilities, the use of the bucket system still persisted even in the year 2019. Albeit that the percentage of households which utilised the bucket system in 2002 was approximately 12.6% and this decreased to 2.4% in 2019. This figure does represent a fair decline (Statistics South Africa, 2019).

2.7 South Africa's Water and Sanitation Response to Covid-19

It is evident from the improvements in the water and sanitation provision in the country since either by ensuring access to water and sanitation where there was none at all or a better quality of water and sanitation. This aspect was an issue that the South African Government embraced and were actively addressing since 1994.

The twenty first century however imposed a global pandemic which brought to the forefront numerous unaddressed issues related to water and sanitation, which should have been nullified at some point in the previous 25 years.

The novel Coronavirus, commonly known as Covid-19 is a respiratory disease spread via saliva droplets when human beings cough, sneeze or speak. While a detailed understanding of the virus, its origin, transmission, prevention and cure is an ongoing process, people around the world have been advised to keep at least a two-meter distance from others (referred to as physical distancing), in order to prevent infection as the droplets expelled from a person's nose and mouth generally do not have a significant aerosol effect and therefore should fall to the ground or on surfaces. Nevertheless, the virus is able to survive on surfaces and people infect themselves if they touch an infected surface and then proceed to

touch their eyes, mouth and nose. The World Health Organisations' remedy and recommendation for combating the virus, relates directly to regular hand washing with soap and water. Hand sanitizers are also recommended when one's hands are not visibly dirty, however washing of hands with soap and water is seen as the first line of defence (World Health Organisation, 2020).

The virus has scourged almost every country in the world and as of 15 October 2021, there were 239,437,517 million infections confirmed and 4,879,234 million deaths and these numbers are continuously rising. South African figures at as 15 October 2021 were 2,914,827 million cases and 88 506 deaths.

In view of the hand washing remedy which has been widely recommended, the emergence of the virus in, South Africa, has resulted in many questions about water management in the country. Up to the year 2020, many people did not have this basic provision or had an unreliable source of it. The Covid-19 pandemic has exposed long standing governance failures such as water management in the country and since the declaration of the national state of disaster in South Africa, national and provincial governments have been scrambling to assist communities in dire need of water (Lepule, 2020).

Many municipalities within the country have been able to confidently state that they have assisted in the provision of water to at least 80% of people living in their cities. However, the type of provision is seldom mentioned. People still have to travel distances to obtain water and thereafter carry buckets back to their homesteads, which means that it is seldom from a tap which has been plumbed into their households or if this is the case, the water provision is unreliable (Lepule, 2020).

2.8 Overview of the education sector in South Africa

Considering that this study's focus is on water and sanitation at schools in rural areas of KwaZulu-Natal, it is worthy to now introduce and focus on the water and sanitation situation in the education sector, albeit always bearing in mind that the history and root cause (prior sections of this chapter) of the problem (inequality in South Africa) always needs to be at the forefront of one's mind when the education sector is examined.

Education in South Africa is divided into two separate components/departments with each component managing different sectors of the education realm, i.e., the Department of Higher Education and Training (DHET) and the Department of Basic Education (DBE). The DHET is responsible for the tertiary education and professional training and the DBE is responsible for primary and secondary school education. The focus of this study is the DBE which equips private, public, early childhood development centers and special needs schools. The DBE's vision is "to provide *all our people with access to lifelong learning, education and training opportunities, which will in turn contribute towards improving the quality of life and building a peaceful prosperous and democratic South Africa"* (Department of Basic Education, 2019).

The DBE's imperative is an oversight one and ensures that the policies and procedures as well as the directive provided by the constitution of South Africa, relative to basic education, is incorporated into a national document which outlines the policies and procedures for education in the country. The DBE is therefore, decentralized and as such this arrangement facilitates the oversight role and the creation of Provincial Education Departments (PED) within the nine provinces of the country with further subdivision into district offices, which are based on demarcations, linked in most instances to the various municipalities within a province (Department of Education, 2013)

Figure 2.5 indicates the different PED's and are represented by the colours, green, orange and light yellow (Focus to be on the colour coding of the map only). The different colours denote the boundaries and whether these boundaries are the same as the district municipal boundaries (green), a sub-division of a municipal boundary (orange) or crosses a district municipal boundary (light yellow). In total there are nine PED's. The white section on Figure 2.5 represents the landlocked country, Lesetho, which does not form part of South Africa.

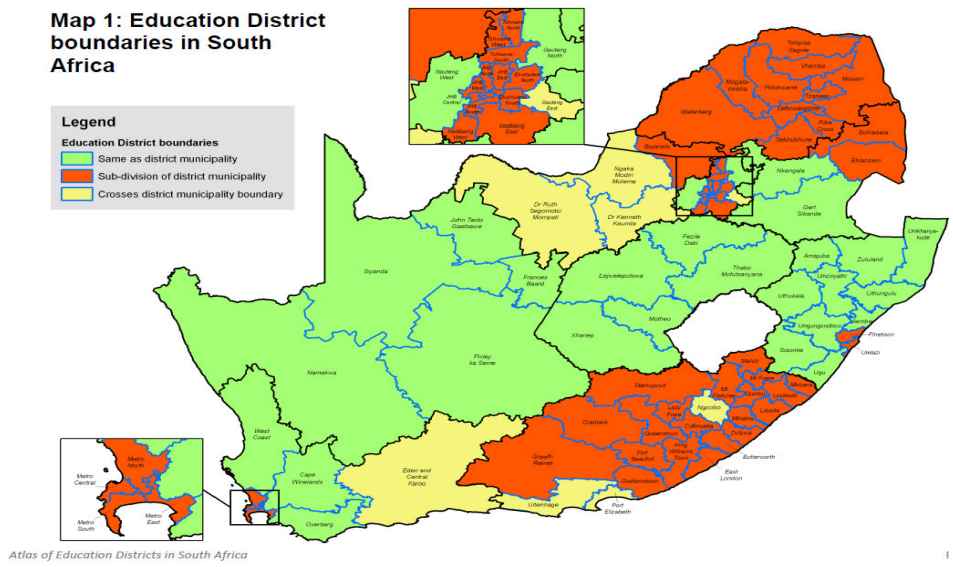
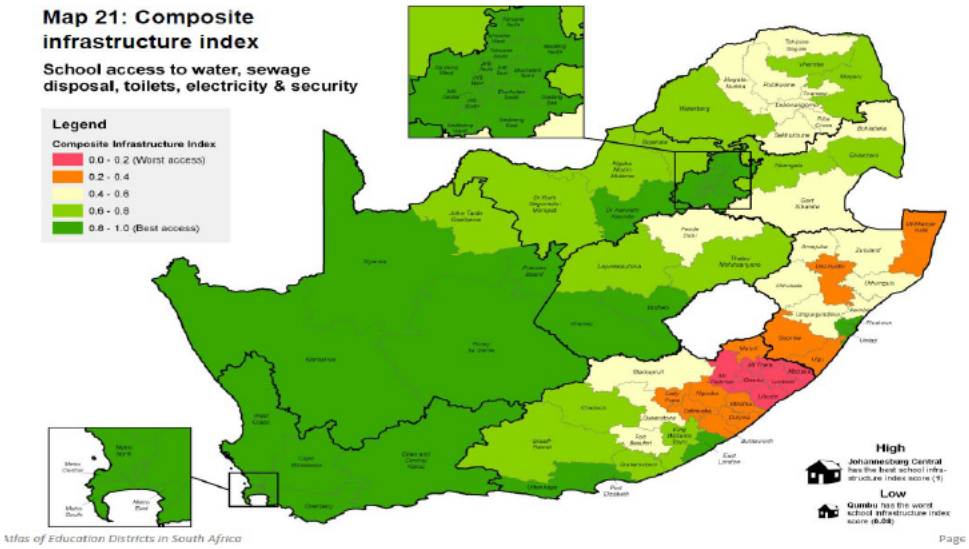


Figure 2.5: Map depicting education districts in South Africa. (Department of Education, District Atlas 2013)

The mandate of each PED is to act as a conduit to the national department as well as to implement the policies and procedures outlined by the national department. This mandate is filtered down to the district offices and there are clear and finite lines of communication from the bottom of the ladder rung to the top. Funding and management of schools within the PED is the direct responsibility of the PED (Department of Basic Education, 2019). It is therefore vital that PED work in unison with the DBE to prepare, plan, collate and manage data from the relevant schools to ensure that national government is well informed and can prioritise schools accordingly (Department of Basic Education, 2013).

Considering the Provincial Education Districts which had been created, Figure 2.6 illustrates the worst PED's relative to their infrastructure related to water, sanitation, electricity and security.



Legend:

0.0 – 0.2 Worst Access

0.2 – 0.4

0.4– 0.6

0.6– 0.8

0.8– 1.0 Best Access

Figure 2.6 Map depicting education districts with infrastructure ranging from worst access to best access in South Africa. (Department of Education District Atlas, 2013)

The colour coding, for example. dark green, light green, light yellow, orange and pink depict a scale ranging from the best access to the worst access respectively. The focus should therefore be the pink and orange areas which represent the worse areas. These areas are concentrated in the Eastern Cape and KwaZulu- Natal provinces. KwaZulu-Natal is subdivided into nine education districts, namely, uGu, Sisonke, Pinetown and Umlazi, uMgungundlovu, uThukela, Amajuba, uMzinyathi, Zululand and uMkhanyakude.

uGu, Sisonke, uMzinyathi and uMkhanyakude districts have very poor infrastructure with the other districts in a better state. While Figure 2.6 dates back to the year 2013, it nonetheless exemplifies that after 19 years of democracy (1994 – 2013) and after an express intent by government to rectify inequalities in schools in the country, many schools' infrastructure was not sufficient to cater for the basic needs of water and sanitation.

2.9 Inequality and the education sector in South Africa

The overall focus of this study is on the Basic Education in South Africa, with emphasis on schools and why in the 21st century, certain schools in the country are still without basic or adequate water and sanitation.

Inequalities are vested in the state of the infrastructure, which the children and teachers are forced to utilise. "*Some buildings have not been renovated since they were built during the apartheid era, which in the first instance is of questionable quality, built in some instances with now deteriorating and dangerous asbestos materials for roof coverings. School building conditions range from unhygienic sanitary facilities, which are not renovated or cleaned on a daily basis, classrooms with leaking or absent roof coverings which have been blown off during violent storms, broken glazing and dangerous electrical connections, to name a few*"(Amnesty International 2020: 8) Additionally, "*distances which have to be traversed by scholars in order to attend school are arduous and sometimes dangerous, entailing the crossing of rivers and enduring inclement weather. All these extenuating factors were entrenched during apartheid and still some have not been addressed"*(Amnesty International 2020: 67).

Mills and Cummings (2016) indicate that the lack of water and sanitation in schools also has implications from a socio-economic perspective and point out various socio-economic circumstances, such as learner absence from school due to contraction of diarrheal diseases, absenteeism in female learners as their menstrual health cannot be adequately managed and an increase prevalence of worm infections which can also have an effect on a child's cognitive function. In addition, the lack of privacy in the existing ablution facilities also leads to assault and violence.

The right to education was included in the Chapter 2 of the Constitution, i.e., the Bill of Rights and as described in Section 29, clause 1a and b, everybody should be afforded the "*right to basic education*", "including adult basic education and to further education". Education can be seen as a pre-qualifier to enjoy other rights to which South Africans are entitled to (Mtwesi, 2018). Some of the other rights which are included in the Bill of Rights include equality, human dignity, life, freedom and security, freedom of expression, political rights and labour relations. Mtwesi (2018) also maintains that this right is not a right which should be granted "if" the government has sufficient funds to realise it, it is a right regardless!

Therefore, even with ailing school infrastructure and appalling sanitation conditions within schools, the need to provide education was placed on a very high pillar as it results in the attainment of security of income and the corresponding ability to provide for your dependents and ultimate success of the individual and progressive success of the country (Tiso Skills Fund, 2017).

Therefore, it is a fact the inequalities in school infrastructure was wide spread. Schools ranged from being constructed from mud, metal and asbestos, (all deemed dangerous materials as they erode over

time), a lack of water, sanitation, electricity, insufficient number of classrooms and sanitation facilities, lack of facilities such as libraries, laboratories, school halls, parking facilities, walkways and sports facilities. The combination of inequalities was school specific and with explicit reference to water and sanitation, while some schools may have had a certain quality of water or sanitation facility, some schools did not have this provision at all. However, it was clear that many schools attended by Black learners did not have extra over, albeit important facilities such as libraries, laboratories, school halls, parking facilities, walkways and sports fields (Amnesty International, 2020). Therefore, targets needed to be set and their order of importance were determined by taking into consideration the Bill of Rights in the SA constitution, which enforces human health and dignity. This therefore placed the water and sanitation needs of a school as one of the top priorities for government (Amnesty International, 2020). The following pictures depicts the two scenarios. Figures 2.7. and 2.8 depicts, Durban Girls College in KwaZulu-Natal Durban, which, founded in the 1800s asserts an array of beautiful high-rise architectural buildings to accommodate learners. Facilities provided included laboratories, libraries, sports fields as well as a boarding facility which house approximately 40 girls (Bland, 2020).

Figure 2.7: Durban Girls College: Exterior Buildings and Sports Field (Bland, 2020)

Figure 2.8: Durban Girls College: Exterior Buildings and Courtyards (Bland, 2020)

In contrast, Mountain Home Primary School, (Figures 2.9 and 2.10) in KwaZulu-Natal, depicts a few rudimentary buildings which mainly house classrooms. Additional facilities such as libraries are non-existent

Figure 2.9: Mountain Home Primary, KwaZulu-Natal (Author s Observations, 2020)

Figure 2.10: Mountain Home Primary School, KwaZulu-Natal (Author s Observations, 2020)

2.10 The South African Schools Act and studies conducted to identify inequality in schools

On 15th November 1997, the government promulgated the National Schools Act, which catered for equality in education regardless of the race of an individual and this was followed by the South African Constitution and related Bill of Rights which enforced the right to education (Department of Education, 2013).

The department of education acknowledged that the development of a child can be influenced by the environment in which they are brought up in (Department of Basic Education 2019). For this reason, extensive investigations in the form of surveys and reports were conducted since the beginning of democracy. The first survey, The School Register of Needs Survey (SRN) was conducted in 1996 and collected data from every school in the country and assessed and provided feedback on the state of current infrastructure or lack thereof. Thereafter plans were put in place to address the inefficiencies per school. Another SRN survey was repeated in the year 2000 and there was notable positive difference within a four-year period, therefore the use of the survey data as a forecasting tool was invaluable and was seen to be serving its purpose (Asmal, 2000). Based on the 1996 survey, 55% percent of learners had no ablution facilities. The 55% of schools related to a remarkable 6.6 million scholars. In addition, the learner toilet ratio equated to 41:1. A further 35% of schools did not have access to water which equated to approximately 8160 learners without water (Mkhize and Naidu, 2014).

In contrast to the above, in the year 2000 when the second survey was done there were 16.6% of learners (1.9 million) without toilets at their schools and the learner toilet ratio being improved to 35:1. The 35% of schools with no water improved to 28% (Asmal, 2000).

The survey data created opportunities for initiatives which would assist in the provision of service delivery. The Accelerated Schools Infrastructure Delivery Initiative (ASIDI) and the Provincial Schools Building programme were two initiatives which aided in reducing the backlog (Department of Basic Education, 2019).

A subsequent survey report derived from SRN was launched and was referred to as National Education Infrastructure Management System (NEIMS) (Department of Education, 2011). This report also contained information related to each school in the country and was coupled with photographs, which assisted department individuals to access the current situation more accurately.

Further surveys to identify backlogs and inequalities began focusing towards a nationally recognised “standards approach”, referred to as the “Norms and Standards for School Infrastructure”, which provided a benchmark for the type and quality of infrastructure in schools. The standards became a national endeavor and a survey of schools in 2011, revealed that 45% of schools did not comply with the nationally recognised standards (Department of Education, 2019). These standards are discussed further in this chapter.

The 2011 NEIMS report, also provided an indication of the status quo of water and sanitation in schools in 2011. The report indicated that 20% (4988 schools) utilise VIP pit latrines, 46% (11450 schools) still utilise the conventional pit latrines and 3.6% (913 schools) of schools had no ablution facilities.

The progress has been slow. An analysis of NEIMS Reports from the year 2009 to 2019, as shown (Tables 2.4 and 2.5) indicate that there has been steady progress in an attempt to eradicate the number of schools where improvements (elevation from no facility to a pit latrine or from a pit to a VIP or to a municipal flush toilet, etc) needed to be affected. The analysis of the Department of Education's NEIMS Reports from 2009 up to and including 2019 (2010, 2012 and 2017 report was not available) shows downward trajectory for service provisions for water and sanitation, which in this case is good news. Tables 2.4 and 2.5 indicate that in the year 2004, there were 2444 schools with no water supply, and 970 school with no ablution facilities. As the years progressed, these numbers kept reducing, signifying that more schools have been now afforded these service provisions until the year 2018, when all schools had a form of water provision (boreholes, municipal supply, municipal tankers or rain water harvesting) represented by zero and by the year 2019 in Table 2.5, all schools had some form of ablution facility (municipal flush, pit latrines, chemical toilets, etc) represented by zero.

Table 2.4: Analyses of number of schools with no water (Department of Basic Education, NEIMS report 2009-2019)

Year	No of schools with no water supply
2009	2444
2010	No data
2011	2402
2012	No data
2013	1772
2014	604
2015	452
2016	171
2017	No data
2018	0
2019	0

Table 2.5: Analysis of number of schools with no sanitation facilities (Department of Basic Education NEIMS report 2009-2019)

Year	No of schools with no ablution facilities
2009	970
2010	No data
2011	913
2012	No Data
2013	822
2014	474
2015	128
2016	68
2017	No data
2018	37
2019	0

Further statistics retrieved from the 2011 NEIMS indicate the following findings:

a) 3544 schools did not have electricity, and over and above this 804 did not have a reliable source of electricity.
b) 2402 schools have no water supply while a further 2611 have an unreliable water supply,
c) 913 schools did not have ablution facilities, and 11450 schools are utilising pit latrines
d) 22938 schools did not have stocked libraries, while 19541 did not have space for a library
e) 21021 schools did not have laboratories,
f) 2703 school had no fencing or form of security,
g) 19307 schools did not have a computer/media centre.
(Equal Education, 2013).

The above statistics while, distressing, begs the question as to why these statistics were so high, after 19 years of democracy?

The National School Act was amended in 2007 and empowered the Minister of Education to prescribe norms and standards for infrastructure at schools and to stipulate mechanisms within which these norms and standards could be monitored.

2.11 Norms and Standards for school infrastructure

The Norms and Standards for school infrastructure in South Africa, was approved for issue and published as a government gazette on 29 November 2013. The norms and standards provide a clear indication of the type of facilities which should be built in order for a school to function efficiently.

They prescribe a standard which each provincial education department in South Africa must adhere to and which standards when deviated from, permits questioning related to accountability, not only from personnel in government but also the end users which are the communities who are often not considered (Equal Education, 2019).

The regulations for the minimum norms and standards for school's infrastructure caters for all infrastructure needs of schools. These include:

a) Universal access which ensures that buildings are user friendly and allows for easy access for disabled bodied individuals.
b) Standards for classroom sizes, which allow sufficient space for the learners as well as teachers.
c) A form of electricity which is installed in accordance with the relevant bylaws.
d) Adequate safe water supply from a legal water connection, which must be available for drinking, personal hygiene as well as cooking and food preparation.
e) Adequate number of sanitation facilities which afford and encourage personal hygiene, is secure and private and easily accessible for learners and teachers.
f) A library or media centre.
g) Laboratories for schools which offer science related subjects, together with the related apparatus.
h) Sport and recreation facilities.
i) Electronic connectivity.
j) Security fencing.

With the emphasis of this study, being water and sanitation, Annexure G of the Norms and Standards, sets out in detail, the requirements which must be allowed for sanitation facilities for learners and teachers.

The following timeframes were proposed by the government to address the backlog in education infrastructure in 2013 (Department of Basic Education, 2013):

a) In 3 years, all schools which were built of inappropriate and dangerous materials must be demolished and rebuilt and should a school not have the basic service provision of water and sanitation, this must be provided.
b) In 7 years, all schools, where infrastructure was deemed inadequate needed to be provided with the relevant facilities, for example, the number of classrooms in a school should align to the number of children attending the school. This also applied to the sanitation, water and electricity aspect.
c) In 10 years, the vision to ensure that all school going children were given the opportunity, to have within their reach, a library and laboratory.

d) In 17 years, all norms which are stated in the document must have been provided. These included sports courts, school halls, walkways, etc.

Based on the distribution of schools in South Africa, the province of KwaZulu-Natal was chosen for further interrogation for this study as past research has indicated that KwaZulu- Natal has the highest distribution of schools in the country therefore, which signifies that inequality could also be high. The province with the second highest distribution of schools is the Eastern Cape as shown Table 2.6.

Table 2.6: Distribution of Schools in South Africa (Department of Education 2020, NEIMS Report, 2011)

Province	Ordinary Schools	Special Needs Schools
Eastern Cape (EC)	5676	41
Free State (FS)	1615	18
Gauteng (G)	2031	97
KwaZulu-Natal (KZN)	5931	63
Limpopo (L)	3923	18
Mpumalanga (M)	1868	15
North West (NW)	1674	31
Northern Cape (NC)	611	10
Western Cape (WC)	1464	66
National Total	**24793**	**359**

Table 2.7 provides objectives and indicative timelines at which the DBE hoped to achieve its infrastructure provisions at schools based on the acceptable provision which was hinged on the infrastructure limitation of a particular area. The provision of water and sanitation either presented itself as rainwater tanks, municipal tankers or even boreholes and local reservoirs for water and either a "dry" or "wet" solution for sanitation. A dry solution entailed a ventilated improved pit "VIP" toilet and a wet solution being a toilet operated by water which is either connected to a municipal sewer system or conservancy tank or septic tank. Other norms and standards such as the eradication of mud schools and the provision of electric power were also prioritised for November 2016 (Department of Education, 2013).

The timelines indicated on Table 2.7 created targets for the Minister of Basic Education and the various provincial education departments. Mud schools were eradicated by November 2016. All schools must be provided with some form of power/electricity, water and sanitation by November 2016. Based on the author 's observations, this has not been achieved. Notwithstanding the latter, all schools were supposed to be provided with electronic connectivity and electric fencing by November 2020. This was also not achieved. The same stance will eventually be realised for the provision of libraries and laboratories, considering even basic needs have not been addressed yet.

Table 2.7: Timelines for the Norms and Standards for school infrastructure: (Department of Education, Norms and Standards for School Infrastructure, 2013)

No.	Description	By When	Norm and Standard
1	Replacement of all schools built entirely out of mud or other inappropriate materials	Nov 2016	
2	All schools that do not have access to any form of power supply, water or sanitation (no school must be without water sanitation or electricity)	Nov 2016	Forms of Power supply include one of the following: a. Grid electrical reticulation b. Generator c. Solar Powered energy d. Wind powered energy Sources of Water Supply include one or more of the following: a. A Municipal Reticulation Network b. Rain Water harvesting and when so required tanker supply from municipalities c. Mobile Tankers d. Borehole and when so required tanker supply from municipalities e. Local Reservoirs and dams Sanitation Facilities include one or more of the following: a. Water Borne Sanitation b. Small Bore Sewer Reticulation c. Septic and Conservancy tank Systems d. Ventilated improved pit latrines or e. Composting toilets
3	Norms and Standards related to water sanitation, classroom size electronic connectivity and perimeter fencing.	Nov 2020	
4	Libraries and Laboratories for Science and technology and the Sciences	Nov 2026	All schools must have a school library or a multimedia centre. All schools that offer science subjects must have a laboratory.

2.12 The Education Sector and the Corona Virus

The impact that the corona virus (Covid 19) has had on the education sector in South Africa is therefore comprehensible, as the need to social distance children as well as ensure good hand hygiene, was not possible in overcrowded classrooms. Considering that a classroom that is designed to accommodate approximately 40 learners, at times house as many as 60, the aspect of physical distancing becomes a challenge (Van de Berg and Spaull, 2020). The disparities in the education sector were becoming more apparent as one realised the need to provide clean water, clean and adequate toilets and to physical

distance. Schools in the country were placed on lockdown, as were many industries and sectors. This was an effort to prepare health systems for the ominous reality that the virus will take its course, reach its peak and strain the country's health care system. The period of the initial and strict lockdown which was imposed lasted for approximately two months, after which certain sectors were permitted to open under strict hygiene and protocol.

However, the return to school was marred with trade unions refusing to allow this to happen, especially in rural areas where the current school infrastructure would simply promote an increase in the number of infections in the country. Trade unions concerns centred around the lack of toilet and classroom facilities which meant that social distancing would be a problem as well as the provision of sanitisers and masks (McDonald, 2020).

McDonald (2020) indicated *"That the schools built during apartheid for black children in both urban and rural setting, still have chronic infrastructure shortages".*

The minister of Basic Education inadvertently succumbed, during a media briefing on the re-opening of schools, that the department had a poor record in relation to the exact and present circumstances in relation to water and sanitation provision in schools (Mahlati, 2020).

The government found itself in a challenging situation wherein decisions centred around core issues needed to be made, i.e., do they allow children to return to school, knowing full well that the past two decades have not entirely obliterated the imposed disparities or was the option of abandoning the school year the only way out; to curb the spread of the virus. These decisions needed to be taken amidst the knowledge that it has dire consequences for the future of the country and its economy as a whole, as children are essentially now forced to trail behind, resulting in fewer matriculants and university graduates who otherwise would have stood in great stead to make a difference for the country moving forward (McDonald 2020). Despite these challenges schools were permitted to open, in a staggered approach whereby, differing grades were permitted to return on alternate days, resulting in fewer children who would be in direct contact with one another. The Department of Basic Education, also assisted by providing sanitisers for all schools as well as the provision of face masks for the teachers and children (South African Government; 2020).

The next section, provides clarity on the state of school infrastructure funding and highlights the efforts which have been put in place in order to compensate those children who have been unfairly treated, albeit, there is still an immense backlog which needs to be addressed.

2.13 An understanding of funding for school education

In order to fulfil the norms and standards objectives, it is necessary to understand how capital is generated in the country and what role the national government plays to ensure that the premise laid down in the norms and standards are being addressed.

The South African Constitution provides adequate guidelines in this respect and indicated that the country's money must, every year be divided amongst the 9 provinces. This is termed the Division of Revenue (DOR) which defines the aforementioned division (National Treasury, 2013).

The stipulations in section 214 of the Constitution with regards to the division of the country's revenue is quoted as follows:

a) *The equitable division of revenue, raised nationally among the national, provincial and local spheres of government,*
b) *The determination of each provinces equitable share of the provincial share of that revenue.*
c) *Any other allocation to provinces, local government or municipalities from the national governments share of the revenue, and any conditions under which those allocations are made* (The Constitution of the Republic of South Africa, 1996).

The three tiers of government, i.e., national, provincial and local, all generate income via taxes, customs, traffic fines and value added tax (VAT), etc., for their operational duties and provision of services towards the improvement of the country as a whole. The revenue is divided via an equitable share formula, which, based on various factors calculates the amount of money, each province should be allocated (National Treasury, 2013). An in-depth discussion of the formula and calculation thereof is outside the scope of this research.

The government also allocates conditional grants to provinces and their municipalities and all these allocations and grants are scheduled in accordance to the objective that they intend to address. This allocation is indicated in Figure 2.11.

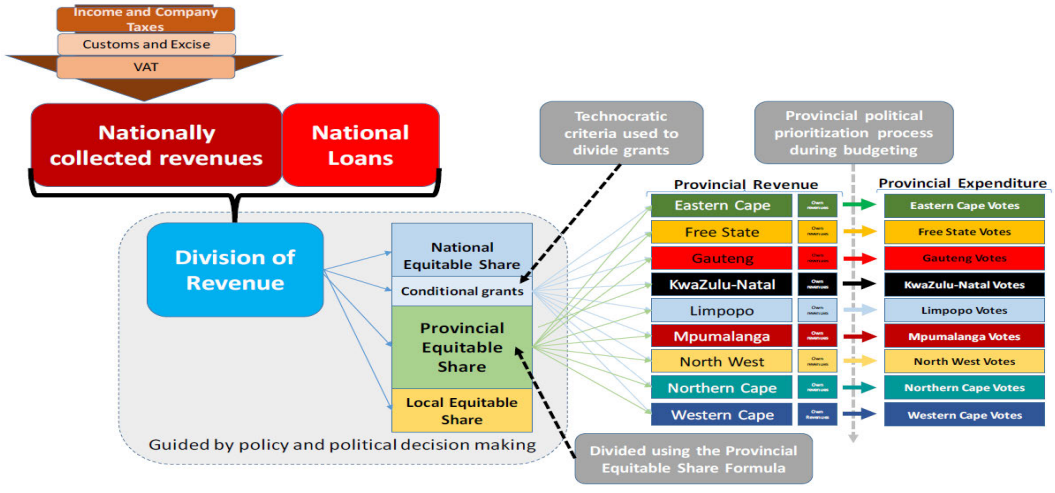


Figure 2.11: Diagram representing the division of revenue process amongst the three tiers of government, i.e., national, provincial and local. (Carter, Barberton and Biden; 2017)

Revenue is attained by the South African Government every year, mainly via the collection of taxes attained via the South African Revenue Services (SARS) and other forms of income, such as custom duties and traffic fines. Over and above the aforementioned revenue, the country's' plans and commitments over a specific period of time will determine the amount of money that needs to be borrowed every year for sustainability. This total amount (revenue and debt) which is then the budget of the country, is then divided based on a technocratic approach and a division of revenue formula, intended to distribute the revenue fairly amongst the national, provincial and local government spheres of the country. Technocratic refers to individuals who are employed and authorised by government to perform government functions and are experts in the field that they are employed in (Oxford University Press, 2021). The provincial share is then distributed amongst the nine provinces and this distribution is hinged on certain determining factors linked to the country's most important requirements. These requirements are 48% for education, 27% for health, 16% for a basic component, 5% for institutions, 3% for poverty, 1 % for economic output. These factors and the related percentages form the basis of the provincial equitable share distribution to the nine provinces of the county. A similar process is followed for the distribution of the local share of the revenue.

The equitable share amounts over the past 3 financial years is demonstrated in the Table 2.8. Three years have been chosen, in order to conceptualise the period that Government generally, utilises for planning of budgets in the foreseeable future (medium term).

Table 2.8 Division of Revenue for South Africa for the 2018, 2019 and 2020 financial years. (Division of Bill 2018-2020)

Province	**2018/2019 R'000**	**2019/2020 R'000**	**2020/2021 R'000**
Eastern Cape	65,499,660	68,824,353	71,415,216
Free State	26,178,043	28,186,642	30,017,344
Gauteng	93,384,285	102,448,280	112,117,907
Kwa-Zulu Natal	99,263,681	106,014,289	111,441,977
Limpopo	55,178,775	58,964,758	62,328,931
Mpumalanga	38,467,686	41,427,976	44,104,988
Northern Cape	12,475,021	13,424,046	14,289,699
North West	32,391,895	34,972,816	37,547, 835
Western Cape	47,447,464	51,290,593	55,207,631
TOTAL	**470,286,510**	**508,553753**	**538,471,528**

Inherently the KwaZulu-Natal and Gauteng provinces were allocated higher percentage of the PES in the 2018, 2019 and the 2020 financial years. The amounts allocated in 2018 equates to over R90 Billion per province and this gradually increases every year with the 2020 financial year indicating an amount over R110 Billion rand.

An analysis of the previous financial years, for example, 2015, 2016 and 2017, also indicate the same trend. Therefore if 48% of this revenue must be earmarked for education, the resultant figures for the KwaZulu-Natal province are stated in Table 2.9.

Table 2.9: Amount allocated from the PES for the Education Component (Derived by Author based on Table 2.8)

Financial Year	Education portion of the PES
2018/2019	R47,646,566.88
2019/2020	R50,886,858.72
2020/2021	R53,492,148.96

While the figures in Table 2.9 are not specifically earmarked for building infrastructure only and is utilised to cover a wide range of a province's expenditure related to education, which include personnel costs, administration, teacher education, assessment and education enrichment services, etc, provinces are also allocated various grants. The grant which is allocated to each province, specifically for building infrastructure is termed the Education Infrastructure Grant (EIG). The EIG is a schedule 4 grant and is one which assists in the provision of infrastructure to provinces (Carter, Barberton and Biden; 2017). The strategic goal of the infrastructure grant is to supplement provinces to fund the provision of education infrastructure in line with the regulations relating to minimum norms and standards for public school infrastructure (National Treasury, 2013).

Other special grants include the Schools Infrastructure Backlog Grant (SIGB). The SIGB is a schedule 6a temporary grant which sought to inject money to fund the Accelerated School Infrastructure Delivery Initiative (ASIDI). The ASIDI was created by the Department of Education in order to specifically address and fast track schools in the country which still did not have access to safe structures, including acceptable forms of water and sanitation, years after the intention to provide them was made by the government. These two grants were for the sole purpose of addressing the infrastructure challenges within the provinces, and the funds are specifically controlled by the Department of Education and not allocated to the provinces to utilise as they see fit unlike the DOR (Carter, Barberton and Biden; 2017).

In the year 2017, a total of approximately R19 Billion Rand in conditional grants were allocated to the KwaZulu-Natal Province (KwaZulu-Natal Provincial Treasury, Annual Report, 2017/2018). Conditional grants are allocated for various programmes and sub-programmes, which include, agriculture, arts and culture, basic education, health, human settlements, public works, social development, sports and recreation and transport. Of the R19 billion, approximately R1.9 billion was allocated to the EIG. An analysis of the EIG allocations over the past financial years is indicated in Table 2.10. The education infrastructure grant displays the following actual and projected figures for the education infrastructure grant for KwaZulu-Natal.

Table 2.10: Amount of money allocated from the EIG to the Province of KwaZulu-Natal. (KwaZulu-Natal Provincial Treasury Annual Report 2018/2019, p31 and Division Of Revenue Bill for 2018, 2019 and 2020)

Financial Year (Billion)	**Amount of the education infrastructure grant allocated and spent (Billion)**
2014/2015	R 1,385,785
2015/2016	R 1,978,683
2016/2017	R 2,045,211
2017/2018	R 1,933,146
2018/2019	R 1,866435
2019/2020	R 1,794,644
Total	**R 11,003,904**

The amounts in Table 2.10 represents a substantial budget which has been allocated for education infrastructure grants (R11,003,904 billion) which is over and above money allocated for education infrastructure which can be derived from the PES. Conceptualising these budgets would infer that the substantial infrastructure backlog especially linked to water and sanitation should have been addressed at some point since 1994. The contrary however has surfaced on more than one occasion over the last few decades.

The following findings were noted in a DBE meeting held in 2018:

a) There 23,334 schools in the country and the portion of this number that had challenges with sanitation amounted to 10,661.
b) All schools had some form of sanitation albeit 3,898 still had plain pit latrines and unacceptable sanitation, as the only form of sanitation.
c) Three thousand and forty schools had been provided with a proper form of sanitation (water borne); however, the existing pit toilets were not demolished, mainly due to the demand by the community to retain them as service delivery in the area was unreliable.
d) Seven thousand two hundred and seventy-four schools still required adequate sanitation facilities for Grade R (school entering age) children or disabled children.
e) Two thousand, one hundred and three schools did not have an adequate number of toilet seats for the children enrolled at the school.
f) The major challenges with regards to sanitation was being experienced in the KwaZulu-Natal, Eastern Cape and Limpopo provinces (80-90% of the backlog).
g) The Department of Basic Education stated that the demolition of pit latrines must be a priority. (Minutes of meeting held on 7 November 2018: Sanitation Backlogs in Schools: Department of Education Briefing: Sanitation Technologies and Innovations Water Research Commission Briefing) (Department of Education, 2018).

Equal Education (2019) stated that latest provincial School Infrastructure Reports, show some progress in delivery, but Education Departments are still failing miserably to comply with the 2020 deadline for Norms and Standards for Public School Infrastructure.

The DBE also cited that by the year 2020 all schools which had the archaic pit toilets which did not represent the VIP system, would be abolished. However, the report for the KwaZulu-Natal province noted that as of the year 2019, there were still 1,099 schools which still had plain pit toilets. The number of schools in design (412), ready for construction (553) and in construction (134) represent the total number of 1,099 schools which still had plain pit toilets in 2019 is represented in Table 2.11.

Table 2.11: DBE Implementation plan for the eradication of plain pit toilets (Department of Education, 2019)

No.	District	Design	Ready for Tender	Construction	Completed	Closed and Non-Viable Schools	Total per District
1.	Amajuba	19	8	0	5	7	39
2.	Harry Gwala	36	57	3	45	11	152
3.	ILembe	14	37	33	27	4	115
4.	King Cetshwayo	59	70	2	8	4	143
5.	Pinetown	10	1	28	5	0	44
6.	UGu	39	48	0	9	8	104
7.	UMgungundlovu	20	41	8	23	4	96
8.	UMkhanyakude	67	96	9	10	3	185
9.	Umlazi	2	5	5	3	1	16
10.	UMzinyathi	71	55	10	18	3	157
11.	UThukela	41	28	3	32	5	109
12.	Zululand	34	107	33	42	1	217
Total Number of Schools		**412**	**553**	**134**	**227**	**51**	**1377**

While the norms and standards back log is noted, there are additional challenges which are impeding the provision of basic services to schools. These additional challenges present itself as decreasing budget allocations in nominal terms and/or under spending. Equal Education reported against recent trends in education based on a five-year review from 2015-2019. The trends as noted by Equal Education, (2019) are as follows:

a) Basic education as a portion of the consolidated budget is declining.
b) Allocations to the Department of Education and the Provincial Education Departments compared to actual expenditure reveals patterns of underspending.

The decrease in relation to the budget is related to the real versus nominal terms. The real budget when inflation is taken into account is decreasing year on year. This is indicated in Table 2.12.

Table 2.12: Decreasing education budget in real terms. (Equal Education, 2019)

Rand in Millions	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**2019/20**
Nominal adjusted	21286	22413	22993	23669	24504
Annual % change	8.1%	5.3%	2.6%	2.9%	3.5%
Real	26142	26702	26163	25748	25582
Annual % change	2.8%	-0.9%	-2.0%	-1.6%	-0.6%

Further budget reductions emerged in the year 2020 with the Covid 19 pandemic, Mthethwa and Keightley-Smith (2020) indicated that almost 2000 school infrastructure projects will come to a halt as a result of massive cuts in the Education Infrastructure Grant to support Covid 19 relief.

The budget is said to be cut by R2 Billion and this is over and above the fact that a R1.9 billion cut to the EIG was already announced during the annual budget speech. Mthethwa and Keightley-Smith (2020) in Figure 2.12 provides an indication of the actual budget reduction per province due to the pandemic and the key provided on the figure, indicates that all spheres of infrastructure related to education, i.e. new and replacement projects, upgrades and additions, rehabilitation and refurbishment, maintenance and repairs and renovations will experience budget cuts.

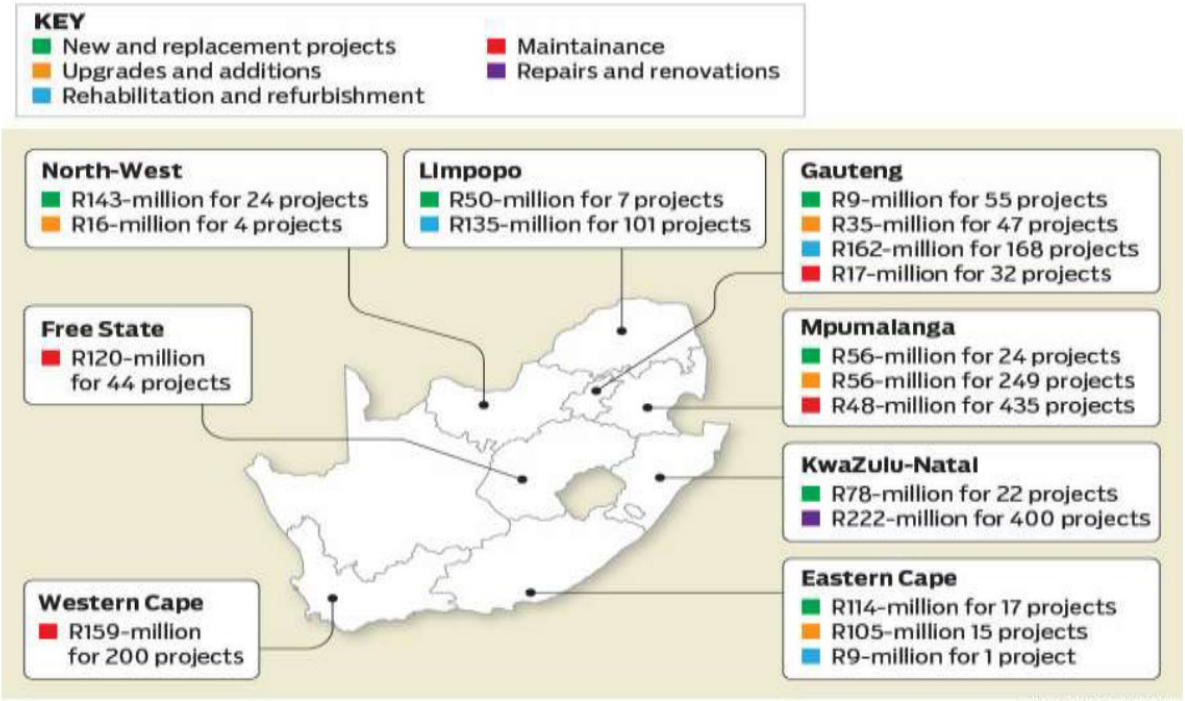


Figure 2.12: Projects affected by the Education Infrastructure Grant Cuts. (Mthethwa and Keightley-Smith, 2020)

With specific emphasis on KwaZulu-Natal, new and replacement projects as well as repairs and renovations will be affected. This represents a budget cut of approximately R300 Million and 422 (400 + 22) projects which will not be implemented as planned. Mthethwa and Keightley-Smith (2020) appropriately states that while the cuts and reallocations are intended to support Covid-19 relief and overall government response to the pandemic they will have far reaching and long-lasting implications for school infrastructure.

As a result, the country was forced to mobilise water tanks and tankers to parts of the country that did not have sufficient clean water. This is based on the World Health Organisation's preferred recommendation for combating the Covid-19 pandemic, i.e., regular hand washing with soap and clean water. This undoubtedly resulted in the haste to provide water to those areas that have still did not have

an adequate clean and or reliable supply. KwaZulu-Natal itself was allocated 4,011 water tanks and 532 water tankers which formed part of the national 18,875 water tanks and 1,316 water tankers, respectively which had to be procured at short notice across the country (South African Government, 2020). One must consider that this merely addresses the water provision. The ablution facilities still remain in a state of disrepair. Figures 2.13 and 2.14 indicate the condition of ablutions in a school in the North Coast Region of Kwa-Zulu Natal, as of 28 August 2020.

Figure 2.13: Ablution facility in the North Coast Region of KwaZulu-Natal (Author s Observations)

Figure 2.14: Ablution facility in the North Coast Region of KwaZulu-Natal (Author s Observations)

The onset of the pandemic has resulted in a clamber of efforts to curb the spread of the virus, especially in schools in the country, which over and above the blatant lack of water and ablution facilities are overcrowded and would not sufficiently permit the practice of social distancing, (Van de Burg and Spaull, 2020).

It is apparent that liberal provisions were provided for some schools in the country. The stark contrast, initiates limited curiosity associated with the differences in the quantity and standard of infrastructure which was previously afforded to government/rural schools because it is understood that these differences are attributed to apartheid. However, the next sections of this study provide a background into the procurement of infrastructure in South Africa and contextualises further, the reasons for the aforesaid minimalist provisions.

2.14 Public infrastructure procurement

Procurement refers to the *"process which creates, manages and fulfils contracts"* (Watermeyer and Phillips, 2020:x). Procurement for government infrastructure, also known as public procurement is the acquisition by government of goods and services from the private sector (Anthony, 2019). Prior to 1994, the criteria which guided the decision making for the procurement of government infrastructure was determined primarily on the building contractor who was able to offer the lowest price to complete the contract. Only where extremely extenuating circumstances pointed to the fact that the building

contractor in question did not have the capability, capacity or experience to successfully conclude the contract was another contractor considered (Bolten, 2006).

To counter this the democratic notion adopted by the South African Government encompassed policies and legislation which focussed on the management of the procurement of goods and/or services in the country. The primary aim being the need to redesign the past procurement landscape. This resulted in Sub-section 217 (3) of the constitution which made allowance for legislation and policies which support procurement. The objective of the legislation apart from ensuring fairness in procurement of construction contracts, also would result in increased economic activity, encouragement of citizens to purchase goods and services from a local sources, stimulation and improvement in competitiveness amongst players in any one industry and the weakening of the differences between the regions of the country. Advantages are also then realized when job creation increased inclusive of jobs for both men, woman, youth and disabled (Bolton; 2006). The enabling legislation for fairness in procurement, included:

a) The Preferential Procurement Policy Framework Act of 2005 (PPPMA) which regulates and provides a basis upon which preferential procurement can be applied,
b) The Public Management Finance Act No. 1 of 1999 (amended by Act 29 of 1999) which governs the use of public funds at national and provincial government level,
c) The Municipal Management Finance Act No.56 of 2003 instituted at a local government and manages the funds at that level.
d) The Broad Based Black Economic Empowerment Act No. 53 of 2000 which regulates black empowerment.
e) Construction Industry Development Board Act No. 38 of 2000, which is regulatory body for the construction industry and which provides guidance on procurement best practices and also establishes a register of contractors who are able to perform selected classes of work within the industry (Anthony, 2019).

While the constitution and its related legislation, policies and procedures did assist in reducing inequality, the extent of the same was vast and progress was therefore slow. Despite the introduction of Section 217 of the constitution which sought to introduce good governance and a preference system into the realm of public procurement, including the formulation of the previously mentioned NDP 2030, the South African government was still not meeting targets for spending on infrastructure. It was noted at a Portfolio Committee Meeting on Public Works and Infrastructure, held on 24 June 2020, that the country is far from reaching its NDP target for public sector expenditure, due to underspending in all spheres of government and State-Owned Enterprises and reduced state implementation capacity.

The national government in 2010 also formed a planning commission committee, to develop a blueprint for the country and its people's development. The NDP 2030 makes reference to the importance of

improving various forms of infrastructure in the country, which includes, telecommunications, water, energy and transport. The plan further reiterates that infrastructure is essential to economic development", and one of the actions of the plan is to eradicate infrastructure backlogs and ensure that schools meet the minimum standards by 2016 (National Development Plan, 2030). The construction industry therefore has a significant role to play in assisting with a countries economic development.

According to Mthethwa and Keightley-Smith (2020) when they specifically referenced education infrastructure, they noted that the inefficiencies span years of poor implementation of infrastructure projects and under-expenditure by provincial departments, which resulted in project delays, cost overruns (which necessitate more budget allocations) and wasteful and fruitless expenditure. The authors also cite, Jane Borman an Equal Education, Parliamentary Officer and Author as saying that "the 2018-2019 Auditor- General's Report found that irregular expenditure in the Kwa-Zulu Natal Department of Education and the Gauteng Department of Education amounted to R1.9-billion and R1.7-billion respectively (Mthethwa and Keightley-Smith, 2020).

2.15 Responsibility for public infrastructure procurement

The construction industry embraces professionals with an in-depth knowledge of the planning and procurement processes of the industry and are therefore equipped to address infrastructure adequately.

The CIDB in its preamble states that *"the construction industry operates in a uniquely project specific and complex environment combining different investors, clients, contractual arrangements and consulting professions. It also recognises that the specialised and risk associated nature of construction places an onus on the public sector client to continuously improve its procurement and delivery management skill in a manner that promotes efficiency, value for money, transformation and the sustainable development of the construction industr*y".

Watermeyer and Phillips (2020) defined procurement as a *"process which creates, manages and fulfils contracts"* (Watermeyer, Phillips, 2020 :x). The International Standards Organisation also defines procurement as a *"succession of logically related actions occurring or performed in a definite manner and which culminates in the completion of a major deliverable or the attainment of a milestone. Processes, in turn are underpinned by methods (i.e., a documented systematically ordered collection of rules and approaches) and procedures which are informed and shaped by the policy of an organisation"* (International Standards Organisation, 2020).

The responsibility for the provision of infrastructure, whether for education, health, social development, housing, roads, transport, etc., was historically the direct responsibility of the respective Provincial Department of Public Works (DPW) (National Treasury Provincial Budget and Expenditure Review Report, 2017:135). Public works, "*encompasses works such as roads, schools and highways carried out*

by the state for the community" (Oxford University Press; 2021) hence it stands to reason those personnel at a Department of Public Works will possess the capability and skill descried by the CIDB and Watermeyer and Phillips (2020) in order to execute works of such nature, i.e., planning for and construction of infrastructure.

Therefore, the protocol for infrastructure development in South Africa, was such that money realised by any specific province, after the Department of Revenue (DOR) process, was principally allocated (decentralised) directly to the Provincial Department of Public Works for the Infrastructure needs of the various spheres of provincial government such as housing and transport). This is known as the Department of Public Works "vote". This however was the modus operandi up to the year 2002 (National Treasury Provincial Budget and Expenditure Review Report, 2017).

The introduction of the Public Management Finance Act of 1999 (PFMA), however changed this procedure and stipulated that any expenditure for a particular provincial department (Health, Education, Human Settlements, etc.,) must be managed by that specific department and become their vote and DPW will therefore no longer be the overall custodian of same (National Treasury Provincial Budget and Expenditure Review Report; 2017). The Department of Public Works, was now no longer a custodian but referred to as just as implementing agent for the various other provincial government departments in order to implement infrastructure projects. (National Treasury Provincial Budget and Expenditure Review Report, 2015).

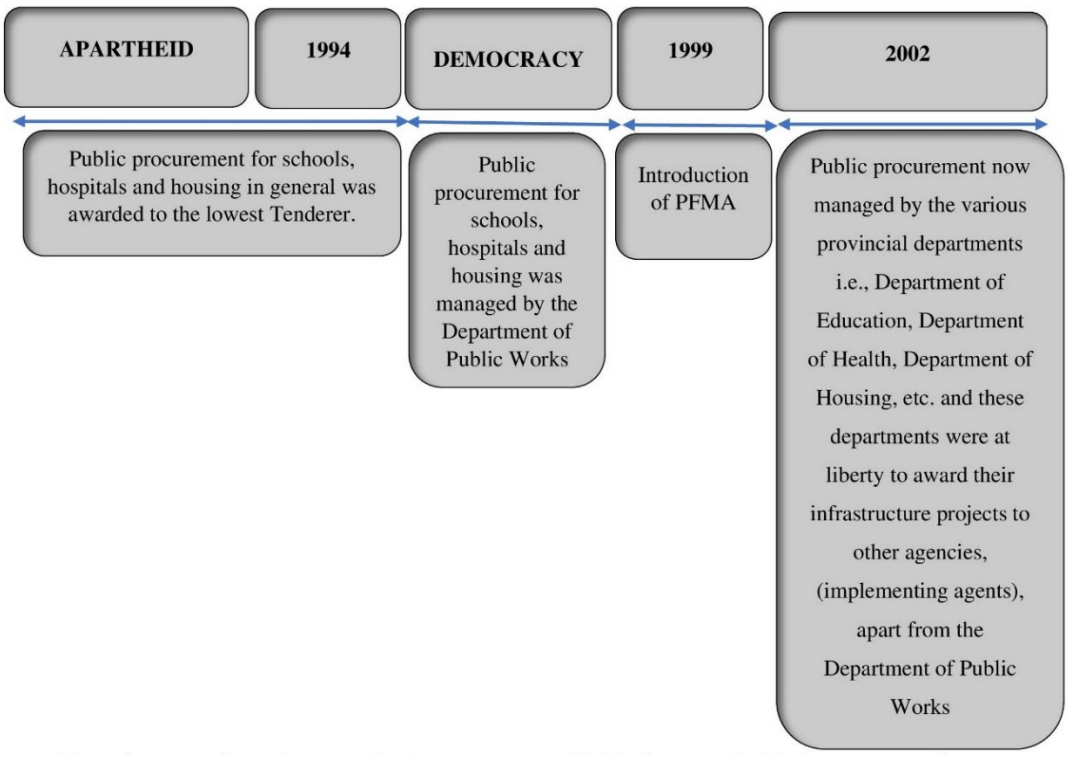


Figure 2.15 Diagrammatic representation developed by the author of this study to explain public procurement responsibility in South Africa

The relevant challenge however, is that government officials from provincial departments such as housing, etc. who have now been mandated at their respective departments (housing, education, etc.) may not have the requisite skills to manage construction projects. Even if they do possess the skills, they may not have the capacity to manage the infrastructure needs of schools as well as continue with other duties within their mandate. "*The lack of technical and project management capacity within the state*" necessitate the employment of professionals who have an in-depth knowledge of the construction industry in order to manage the projects more effectively (Equal Education, 2018:11). According to the Department of Education (2019) government departments are utilising implementing agents merely due to the fact that they (the government department in question) do not have professionals actively involved in the built environment, who possess the skill, capacity, capability and/or know how on the implementation of infrastructure projects. On the other hand, Watermeyer and Phillips (2020) stated that some government departments "fear" procurement and would rather pass on the responsibility for the procurement of resources for infrastructure to another organisation.

It is for this reason that the provincial departments have been utilising the services of implementing agents, to perform this function (Department of Basic Education; 2019:21)

Despite the reforms in public procurement and the introduction of principles and policies which were designed to alleviate or reduce procurement challenges, there still seems to be slow delivery of infrastructure in the country's schools. Ambe, Badenhorst Weiss (2012:250) list the following general procurement challenges in the South African procurement system that hinder Supply Chain Management (SCM) implementation,

a) *"Lack of proper knowledge skills and capacity."*
b) *"Non-compliance with SCM policy and regulation."*
c) *"Inadequate planning and linking to budget."*
d) *"Accountability, fraud and corruption."*
e) *"Inadequate monitoring and evaluation of SCM."*
f) *"Unethical behaviour."*
g) *"Too much decentralisation of the procurement system."*
h) *"Ineffectiveness of the Black Economic Empowerment Policy"* (Ambe, Badenhorst Weiss, 2012:250)

With specific reference to schools and considering that in most instances implementing agents of government are responsible for the provision of school infrastructure, it is worthy to explore if this arrangement also results in the challenges which (Ambe, Badenhorst Weiss, 2012) have reported on. The Implementing Agent and their role and impact on public procurement and education infrastructure will be discussed in the next chapter.

2.16 Summary

This chapter explored the international water crisis and the importance that world leaders and organisations have placed on the need for clean water and adequate sanitation. Of particular context was South Africa and the historic challenges which presented itself in the last few centuries resulting in discord of water provisions in the country, even in the 21st century. The chapter also provided insight into apartheid and the various policies which had to be implemented as well as international commitments which South Africa embarked on. Significant improvement was noted over the years since 1994 where many people in the country were provided with the basic service of water and sanitation. However, the pace of which this delivery was implemented has since lost momentum. The budgets allocation per province was highlighted together with the budgets which are set aside for education, as well as over and above budget specifically for education infrastructure. The current condition of schools in KwaZulu-Natal was explained together with reforms from the provincial Department of Education to ensure that the Norms and Standards for School Infrastructure was fulfilled as well as the subsequent intention to separate the procurement of infrastructure from the conventional Department of Public Works modus operandi and assign this function to implementing agents who have the ability and specific construction related knowledge to plan, execute and manage construction projects. This study intends to explore and understand the relationship, if any, between implementing agents and the sluggish provision of water and sanitation facilities in schools in rural areas of KwaZulu- Natal. The latter will be discussed in Chapter 3.

CHAPTER 3: THE IMPLEMENTING AGENT

3.1 Introduction

The aim of this chapter was to ultimately clarify the role of the Implementing Agent (IA) and to understand what the experience has been, of different organisations and bodies, who have worked with IA's. The chapter provides the reader with an understanding of the enabling legislation and responsibilities of the IA. An explanation surrounding the activities of the IA in the context of procurement, contract and project management is briefly explained together with a brief explanation of the activities completed in the IA and BEP arrangement, in order to further clarify the role of the Implementing Agent. The author also provided insight into the experiences of a BEP, after they have been appointed by an IA as the programme manager and quantity surveyor for a cluster of schools in KwaZulu-Natal. The shorting coming of the IA was further investigated as it related to information provided by bodies such as the Department of Education, as well as the Auditor General of South Africa. Lastly suggestions are put forward, based on recommendations by the above-mentioned and other authors and bodies as it related to possible solutions to alleviate the challenges which are experienced by BEP's, when working with IA's which ultimately will have the effect of fast track service delivery to schools in rural areas.

3.2 Enabling legislation and responsibility of the Implementing Agent

The South African Constitution in Chapter 14, Section 238 enables "Agency" and "Delegation" of the various government departments. This in effect means that an organ of state is allowed to transfer the responsibility of fulfilling certain activities and tasks to other organisations to achieve them on their behalf (The South African Constitution; 1996).The Construction Industry Development Board describes an implementing agent as "*an agent of the Client who is a government department or state-owned enterprise which implements a project on a client's behalf*" (Construction Industry Development Board, 2011).

This new arrangement led to the formation of other smaller enterprises, albeit mainly state owned, who could now compete with DPW (previous custodian of public infrastructure) and who are known as Implementing Agents. (IA's) which include state-owned enterprises, other government departments and even non-government organisations (NGO's). In the context of education infrastructure, these are organisations which are tasked to build and maintain school infrastructure for the Department of Education (DBE) (Equal Education, 2018).The pre-requisite to be an IA for infrastructure was that an organisation, must possess the skill, have the capacity and capability as well as systems in place in order to execute infrastructure projects (Department of Basic Education; 2019).

Service Level Agreements (SLA) were formulated between the IA's and the various provincial departments, (and in this case, it will be specifically between the DBE and the IA), to govern the relationship between the two bodies. The SLA indicates the particulars related to purpose, timeframes, responsibilities of the parties, payments, termination etc. Currently one of the critical role players or service providers involved in the delivery of infrastructure are IA's (Department of Basic Education, 2019).

The role of IA, according to the Department of Education, for education infrastructure is as follows:

a) Plan, manage and roll out the design and delivery of school infrastructure in accordance with the Department of Basic Education's briefing, priorities, medium term budget provisions, mandate, norms and standards policies.
b) Plan and manage the effective procurement within the legislative framework of the required built environment professionals, contractors and suppliers to delivery projects.
c) Provide informed "client" direction to the appointed project managers and design team in the planning, design and implementation of projects.
d) Oversee the commissioning, fine tuning and hand over of completed infrastructure to the custodian.
e) Identify stakeholder base and expectation and manage project risks.
f) Manage socio-economic risks.
g) Oversee the financial management and budgeting requirements for projects.
h) Make the necessary payments to contractors, suppliers and consultants
(Department of Basic Education, 2019)

The IA is supported by a team of Built Environment Professionals (BEP), who they (the IA), in turn appoint and pay separately. The BEP's knowledge in the built environment enables them to manage the project and report back to the IA, who in turn reverts with feedback on the progress of the projects, to the DBE (Department of Basic Education; 2019). Therefore, while the IA is managing the entire infrastructure process, they have to employ professionals to assist them with this process. They therefore, provide the co-ordinating and the liaison with the Department of Education function.

The effectiveness of IA's is managed against key performance indicators which are stated in the SLA and which must be signed off between a government department and the IA. The key performance indicators are:

a) *"Only work authorised in the Client's approved Infrastructure Plan (aligned to approved Asset Management Plans), will be carried out".*
b) *"Policy on termination/cancellation of late completed projects always adhered to".*

c) *"Monthly progress reports always submitted on time".*
d) *"Always appoint consultants within the stipulated time frame".*
e) *"Always award contracts within the stipulated time frame of tender closing dates".*
f) *"Always assess and certify all certificates within 14 (fourteen) days of receiving the invoices".*
g) *"Projects to be delivered according to agreed time, within approved budget and to the required specification and quality".*

(Construction Industry Development Board, 2021).

The use of IA's has in the recent years become general practice and the DBE has also become accustomed to the engagement of IAs for their infrastructure projects in particular. However there have been challenges attached to this arrangement which will be further discussed in this chapter.

3.3 The implementing agent in the context of procurement, contract management and project management

The implementing agent for the procurement and construction of water and sanitation projects is essentially involved in procurement, contract management and construction project management of built environment projects. Procurement, as described by the Construction Industry Development Board (CIDB) indicates that "*procurement forms an integral part of construction projects and occurs at any point in a project cycle where external sources are required to provide supplies and services in any combination or the disposal of surplus plant, equipment and materials and the demolition of redundant buildings and infrastructure*" (Construction Industry Development Board, 2007). The IA is involved in coordinating and sourcing these external sources (contractors) via a procurement (developed by themselves), to provide the required services. Contract management refers to "*the monitoring and control of contractor performance to ensure optimal outcomes for the contract*" (Asian Development Bank, 2021) and construction project management involves directing and organising each part of the project life cycle from inception to completion in order to achieve the projects goals and objectives. Its main aim is to ensure that construction projects are completed on time and within budget, and thereby includes cost control, scheduling, procurement and risk assessments. There must also be consistent and continual interaction with team members, such as Architects, Engineers and Quantity Surveyors to ensure that the project will achieve the outcomes and objectives which was set by any particular client. (Hexagon, 2022). The implementing agent once appointed by the Department of Basic Education performs all the above functions.

The typical processes which are followed by an IA when appointed to provide water and sanitation to schools is as follows:

The IA appoints a team of BEP's (civil engineer, structural engineer, architect quantity surveyor and electrical engineer) for a school or cluster of schools. The BEP's then have the responsibility to instigate

an assessment/evaluation of each school in relation to the current condition relative to water and sanitation. Based on the assessment, an estimated cost to address the deficiencies in the existing water and sanitation situation must be developed. The estimated cost including the BEP's professional fees must be presented to the IA for approval. Once approved a Bill of Quantities (BOQ) is devised by the BEP which sets out all items that potential bidders must price in order to provide the necessary water and sanitation facilities to the school. The main source of water, for which provision is made in the BOQ is the provision of boreholes. Sanitation facilities practically (based on current bulk infrastructure in rural areas) always included the VIP system. The BOQ also makes provision for the awarded contractors' overhead costs and profit which is referred to as the preliminaries costs which is then included in a comprehensive bid document (developed by the IA), which provides guidelines on the skill set required of the bidder who would be able to execute the works and also sets out all terms and conditions of the bid and potential contract. The bid document is then tendered, usually via an invitation in a newspaper or on online platforms to the construction industry for potential bidders to price. A deadline for the bid close is stipulated, after which the BEP is then tasked with the activity of examining/adjudicating the bid offers received. A recommended bidder (supplier) is presented to the IA and if accepted, the implementing agent issues a letter of award to the recommended bidder and construction at the school commences until the stated practical completion and final close out date. The BEP is also paid for the completion of each stage activity (inspection and estimate, production of tender document, adjudication, construction and final close out of the project). This process is illustrated in Figure 3.1

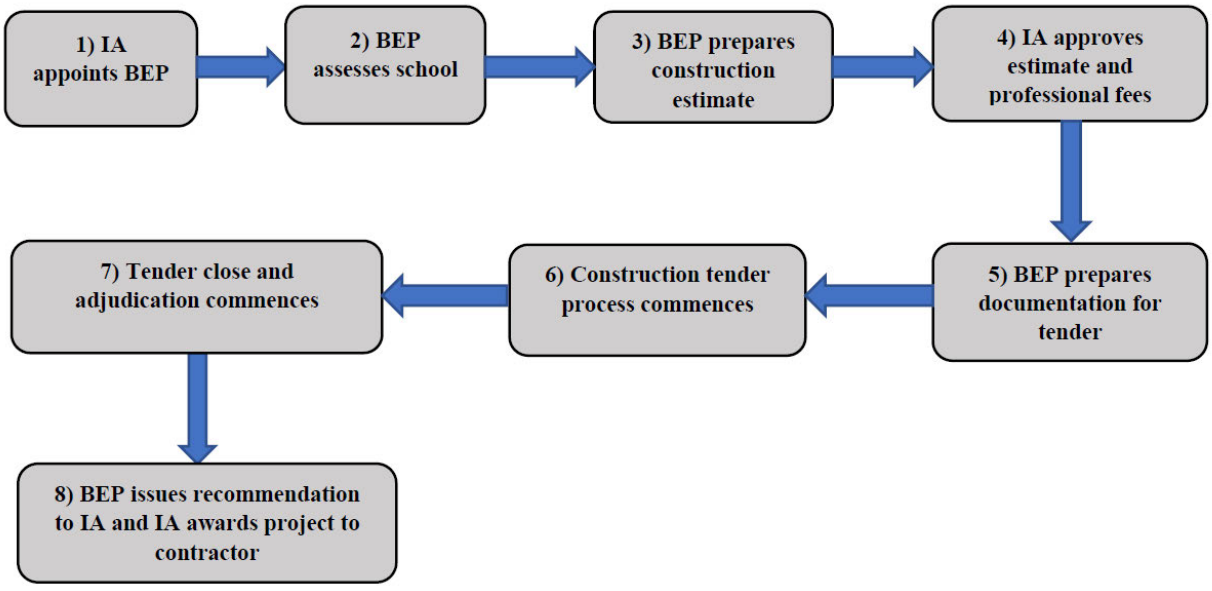


Figure 3.1: Activities executed in the Implementing Agent and BEP Arrangement.

As can be seen, the aspects of procurement, contract and project management are involved in coordinating the above-mentioned process and these processes must be adopted by the IA. This chapter

explored how efficient and effective the IA arrangement has been in ensuring that the context of the above-mentioned notions are adequately put into practice, thereby ensuring that the process of providing water and sanitation to schools progresses effortlessly and is able to fluently achieve the outcome which it set out to achieve.

The author investigated the process outlaid in Figure 3.1 with a BEP who is based in KwaZulu-Natal. This is presented as a desk top study and all information has been provided by the BEP in this regard and has been accepted in good faith. The BEP in question is a Quantity Surveyor. Quantity Surveyors are equipped, based on their training, to be involved in all stages of a construction project (Olanrewaju and Anahve, 2015). Their input in the initial stages of a project is crucial in the initial stages where budget setting is paramount. Seely, 1984 states that quantity surveyors are equipped with numerous skills which ensure the success of construction projects. These skills include, "*feasibility and viability appraisals of construction investments, compilation and documentation of construction contracts, preparation and subsequent analysis of construction contract bids, contractor selection advice and financial management of all construction works as well as construction management, value management and facilities management*" (Seely, 1984). It is for this reason that the Quantity Surveyor had been appointed by the IA to manage the provision of water and sanitation in schools.

Table 3.1 provides information on the total amount of schools (362) for water and sanitation provision, which were assigned to the BEP in the year 2016.

Table 3.1: Statistics related to a school water and sanitation programme from a BEP in the Kwa-Zulu Natal Province, as of August 2020.

SUMMARY OF NO. OF SCHOOLS WITHIN THE WATER AND SANITATION PROGRAMME AS AT END AUGUST 2020	
TOTAL NO. OF SCHOOLS AS PER LETTER OF APPOINTMENT	**362**
DESCRIPTION	NO. OF SCHOOLS
Schools that have been completed (final account/final completion)	14
Schools currently in construction	179
Schools at tender stage (tender closed and awaiting contract award)	166
Schools awaiting approval of tender document	3

These schools were specifically targeted as part of a programme dedicated to water and sanitation provision in 2016. As can be seen from Table 3.1, as at the end of August 2020 (4 years after the original appointment), many of these schools had not been completed in its entirety.

As indicated in Table 3.1, fourteen, schools have been completed in its entirety since 2016. A substantial number (166) had their budgets approved and had been tendered, however they have not been awarded to contractors thereby implying that these schools are still in the adjudication stage. One must consider that bid prices once submitted are only valid for a specific period of time, which is referred to as the bid validity period, as stated in the bid document. The bid validity is "*the period at which the bidder agrees*

to keep their bid legally binding" and its purpose is for "bidders *to commit to not modify or withdraw their bid for a specific period*" (Lynch, 2021). According to the BEP, these tenders were issued in the year 2017. Government projects usually have a 120-day tender validity period and tenderers are expected to ensure that their offered price remains stagnant for that period of time. Considering the fact that most tenders are not valid as of August 2020 (as they were tendered during 2017-2018), letters need to be solicited from bidders agreeing to an extension of the bid validity period. Should bidder opt to continue with the project based on their original bid amounts, there is a risk that the escalation of construction materials may render them either at a breakeven point or even at a loss on the project at completion. Adversely, should tenderers not agree to the extension of tender validity, the project will have to be re-tendered resulting in abortive and additional cost to the government.

Three schools were still awaiting bid document review and comment from the IA, was submitted for review in 2017 and as of August 2020 the BEP had not received comment/queries or instruction to proceed to the tender stage on same. Once more it must be highlighted that all instructions to proceed further with the process must be received from the IA.

Ultimately the intervening factor is also that only fourteen (3.9%) of schools for this particular BEP had been implemented and completed since the letter of award in 2016 up to August 2020. The average construction period, for projects of this nature is 12 months and all projects could have proceeded simultaneously to ensure that construction commences at approximately the same time. A total of one hundred and seventy-nine (179) schools are in construction, and there were various timelines provided by the BEP, applicable to their start dates. However if it is assumed that the average construction period is 12 months, almost four years have passed since the BEP was appointed thereby implying that by the year 2020, the majority of the schools could have been concluded.

Thus, governments proposed solution to allow for the introduction of IA's, has not necessarily resulted in fast-track service delivery. The short comings of the IA will be discussed in the next section.

3.4 Shortcomings of Implementing Agents

Figures 3.2 and 3.3, indicates two scenarios for school infrastructure/public infrastructure procurement.

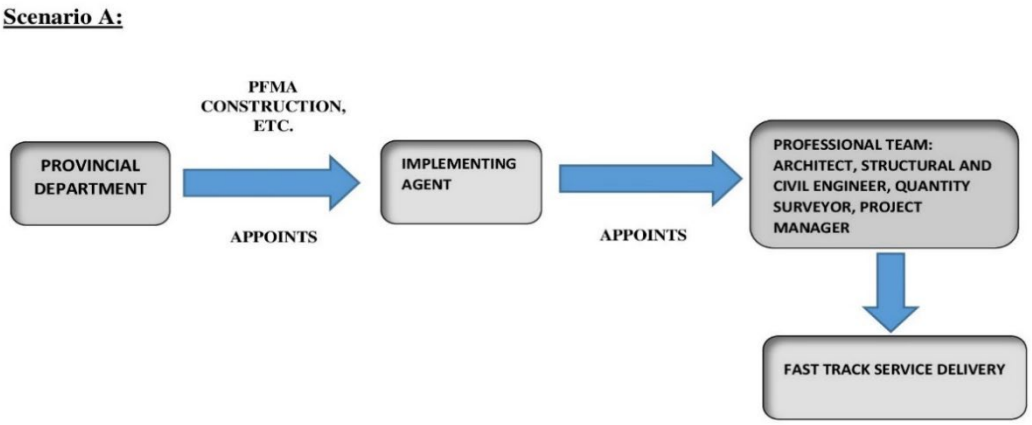


Figure 3.2: Typical scenario of public procurement with implementing agents

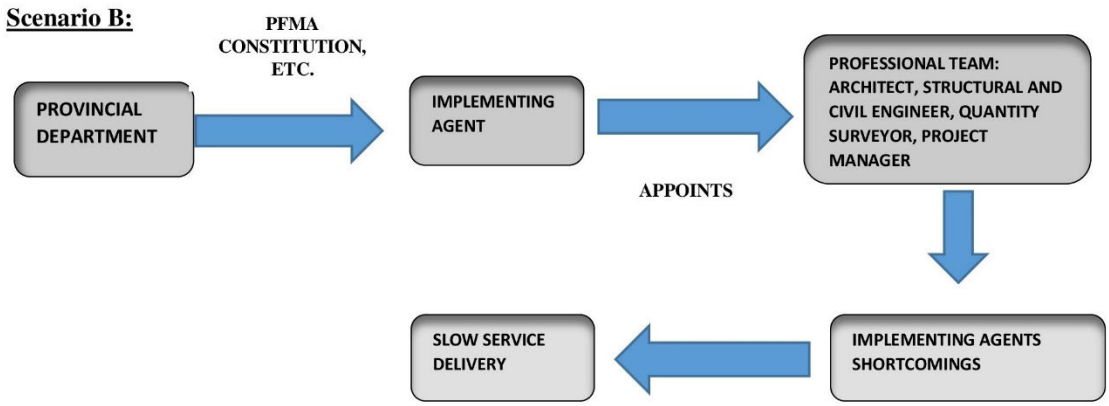


Figure 3.3: Typical scenario of public procurement with short comings of IA

In scenario A (Figure 3.2), the constitution together with PFMA (1999) (discussed in chapter 2, Figure 2.15) hoped to bring transformation and a fair degree of equality into the procurement of public infrastructure. This also meant more job opportunities which can be provided for South Africans with a resultant positive effect on the economy. With the introduction of the PFMA as well as agency and delegation in the constitution, it enabled the development of smaller entities which were termed Implementing Agents, who could now be part of governments infrastructure procurement plan. It would also mean that with more entities (other than just the Department of Public of Works), it will enable faster delivery of public procurement. These entities must possess knowledge and skill in the built environment sector as this was their ultimate focus (Department of Basic Education, 2019). IAs in turn usually appoint individuals from the built environment disciplines which generally include architects, civil, structural and electrical engineers and quantity surveyors.

In scenario B (Figure 3.3), the same scenario is present however, the introduction of the IAs at times brings with it, its challenges/shortcomings which in effect may be slowing down service delivery.

Equal Education, a community and member-based organisation formed in the year 1998 includes past and current learners, teachers and parents of children, who vigorously attests for the right of quality education for children. Quality not only refers to the teaching aspect or the adequacy of teachers and their qualifications, but also includes, the provision of meals and transport or the right to learn in a safe, hygienic and secure environment. Equal Education was also instrumental in the thrust to ensure that the Norms and Standards for School Infrastructure was adequate and ensured that it was gazetted as part of the law so that those responsible could be held accountable (Equal Education, 2018).

Equal Education (2018) highlighted the ultimate condemnation they have in respect of the use of IAs to build school infrastructure as follows:

a) IA's charge exorbitantly high implementing agent fees.
b) Implementing agents are paid by the DBE to implement projects, however this function merely translates to oversight and reporting of the projects as they in turn appoint other professional consultants to execute the actual work.
c) The IA arrangement adds to the total infrastructure budget unnecessarily.
d) Additionally, late payment to contractors, results in cash flow challenges and subsequent delays to projects.
e) The IAs are supposed to have the experience in the built environment and must understand construction and its processes, yet this is not the case.
f) There is inexperience of IA's themselves to manage construction projects.

Over and above the comments from Equal Education, the DBE has also recently been upfront and conceded to the challenges which have been experienced since the decision to employ IAs were taken. This has been demonstrated by the admission of same by the DBE, when they published the "Guideline on the Minimum Requirements for Implementing Agents" in the year 2019. The DBE compartmentalised the IA's challenges which they have experiences into capacity, procurement, planning and institutional challenges. These challenges are illustrated in Figure 3.4

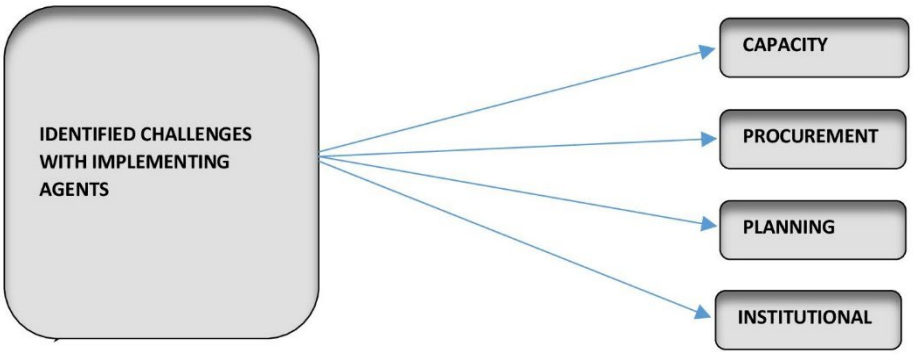


Figure 3.4: Challenges experienced by the DBE when working with implementing agents (Source: Department of Education, 2019).

These are generalised challenges, which that are not directed at any one specific IA or an individual at any IA office, however, provides a good indication of the challenges which have come to the fore.

3.4.1 Capacity

Capacity challenges can be described as follows:

Education infrastructure projects are awarded as clusters to the various implementing agents based on their capacity to implement the clusters. An example of this scenario is illustrated in Figure 3.5

A portfolio of 500 schools is awarded to IA 'x'. The IA then appoints a professional team (BEPs) for the 500 schools. The professional team generally consists of a team of Quantity Surveyors, Electrical Engineers, Architects, Civil and Structural Engineers. The latter constitutes one team (Team A), who may, for example be awarded 100 schools. A second set of professionals may be formed to manage a second set of 100 schools, etc. While the subset of schools to the various BEP's is divided into manageable clusters with many individuals on the professional team, the IA however, only consists of one individual who manages all 500 schools which at times results in overloading of the individual and slows the movement of the projects through the procurement process (Department of Education, 2019).

Figure 3.5: Capacity Challenges when working with implementing agents

3.4.2 Procurement

Procurement and contract management related challenges, stem not only from the poor selections of the contractors who build the infrastructure, but also the professional service providers who are contracted by the IA to perform services for them. In many instances, it was found that the processes for the procurement of either contractors or professional service providers was not fair and transparent or the ability to manage the number of projects allocated to them was not considered, resulting in this case the overloading of the BEP and ultimately resulting in poor performance. There have also been instances when the requirement of the Preferential Procurement Policy Framework Act (PPPFMA) was not stringently applied in respect of decisions on the appointment of contractors or professional service providers. It was also noted that IAs do not have a clear understanding of the contracts which govern construction projects, which in turn leads to the poor implementation of same. There have also been challenges where the IA did not have in place, established norms and practices within their organisations

which govern the approval processes related to budgets, adjudication, tender, final accounts, etc. Alternatively, where these processes have been established, the approval process takes too long to be expedited. The reason for the latter includes the capacity aspect of IA which was discussed previously. (Department of Education, 2019).

3.4.3 Planning

Poor planning of projects results in poor construction management, poor execution and more often than not, this results in a series of variation/changes during the construction period in order to realign the projects to reach its goal. Once the budget for a project has been provided by the quantity surveyor, deviations from the budget should only be considered when it is understood and approved, by both the IA's office and the budget custodian, (the DBE) and it is understood that the deviation results from a change that could not have reasonably been foreseen at the beginning of the project. "*A variation order means the alteration, change, or modification of design, quality or quantity of work, omission, addition or substitution of work. Any addition, deletion, or other revisions to project goals and scopes are considered variations, whether they increase or decrease the project cost or schedule*" (Maarouf and Habib 2011:11). The DOE has reported that in many instances, implementing agents approve additional work on site, without ensuring that the required variation/change orders are approved resulting insufficient funds and ultimately the contractors not being paid. Late payment usually results in a lack of adequate cash flow to purchase the materials needed for the project or to pay construction workers, which has the ripple effect on the project, due to the lack of adequate cash flow (Ansah, 2011)

Additionally, instructions to proceed to the tender documentation and procurement stages of construction are issued to the BEP, without having the proper, complete and adequate documentation in place.

3.4.4 Institutional

Many a times, the offices of the IAs, were not able to locate documentation pertinent to financial information and/or records required to pay contractors or professional consultants. Implementing agents are also required to report to their relevant government departments on a monthly basis, whereby feedback related to the progress of projects, challenges encountered, cash flow predictions, etc., are discussed and solutions must be offered where deviations are evident. The DBE have also noted that this reporting is meagre and does not provide sufficient detail or information in order for them to plan adequately. If cash flow predications are incorrect, any underutilised funds have to be reallocated to other programmes, at times, other than water and sanitation projects (Department of Education, 2019).

3.5 Other findings regarding the Implementing Agent.

The Auditor General of South Africa has also provided reports on the progress of education and health projects in the country and has found that the procurement system for infrastructure projects were not

comprehensive, or where it was, it was not applied effectively. The Auditor General Report (2011) notes that the premise should be, that any procurement system should allow for transparency, accountability and economy with which decisions are made. The Auditor General report finds that, this is not the case. Other findings by the Auditor General of South Africa include:

a) The capacity of building contractors is not checked prior to award of projects, resulting in failure to execute projects successfully.
b) The financial background of contractors is not investigated, resulting in cash flow challenges on site and poor project performance.
c) Approvals to proceed from estimate/feasibility to tender documentation from adjudication to award or to approve variation orders take too long resulting in project time delays.
d) Project management was not effective within the IA's entities, considering that their function was to manage a team of BEP's and report back to Department of Education.
e) The needs assessment of schools which formulates the project scope was not properly conducted resulting in a discrepancy of the documented scope of work in comparison to the intended scope of work.
f) The quality of workmanship on schools are poor, pointing again in the direction of the capability of the contractor which was recommended. Competency reports provided by the tenderers in their tender returnable are not reviewed by the IA.
g) No action is taken by the IA on poor performing BEP's or contractors.
h) Payment of professional fees are delayed resulting in cash flow challenges within the BEP entities.
i) Payments to contractors are delayed resulting in cash flow challenges to contractors and sub-contractors and ultimately delays on site.
j) Late payments to contractors and BEP's create opportunities for the claim of interest under the governance of the relevant building contract. This ultimately results in increased infrastructure costs.
k) Penalties to contractors when levied are inconsistent among contractors.
l) There is a high vacancy rate at the IA entities.

Christopher (2018:9) has also noted reasons why Implementing Agents must be removed from the process of public procurement:

a) The omission of implementing agents to public infrastructure delivery will result in cost savings to government.
b) Implementing agents employ incompetent employees who do not possess the necessary skill and experience to undertake construction projects, albeit that they have the necessary qualifications.

c) Implementing agents create payment delays to contractors which results in subsequential delays to construction projects.
d) Implementing agents turn-around time to respond to queries is too long.
e) Implementing agents inflict tight deadlines on the construction professionals they employ.
f) Implementing agents appoint incompetent contractors, as very little due diligence is provided during tender adjudication.
g) Implementing agents delay approval time of variation orders resulting in sequential delays to the construction project.
h) Certain contractors noted that implementing agents frequently misplace documents.

The challenges which the IA relationship has presented is deserving of consideration, however the IA's themselves are also adamant, that they are also faced with challenges which prevent them from performing competently. Therefore, to adopt a fair and reasonable stance in this study, the challenges which the IA's have also experienced with the DBE, is also presented in this study These will be discussed in the next section.

3.6 Shortcomings of the Department of Education

The challenges which the IA themselves have cited and which they note contributes to their challenges include inter alia:

a) The late transfer of tranche payments from DBE, which results in the IA not having the ability to pay contractors and professional consultants on time.
b) Last minute allocation of project lists with deadlines for implementation, that leave little room for due diligence checks, resulting in inadequate scope definition, etc.
c) Approvals to proceed to the next stage of the infrastructure process takes too long, resulting in the late completion of projects.
d) Impromptu budget cuts, resulting in schools being removed from initial planned project lists.
e) Implementing agent fees are too low and they are therefore unable to fund all their personnel.
f) Documentation management at government departments is ineffective and inefficient. Documentation relating to contracts or drawings relative to schools are often misplaced (Department of Education, 2019).

Based on the reports from the Auditor General in 2011, Christopher (2018), the DBE in 2019, as well as due consideration of the challenges which the IA themselves experience the IA relationship and public infrastructure should be investigated further. The definitive notion, therefore, is that there are still schools in the province which present a dire situation in respect of their existing infrastructure needs, which must still be addressed amidst the challenges that government is facing with IA's. The number of challenges which IAs bring to the equation outweigh the challenges which they experience themselves.

Watermeyer and Phillips (2020) assert that, the delivery of infrastructure must be governed by the Clients procurement and delivery management practices, however there seems to be an evolution to "box ticking" and compliance. Hence procurement officials at Implementing Agents entities, place more emphasis on procedural compliance as opposed to the actual evaluation of building contractors who can execute a construction project effectively.

In this regard there have been proposals which could possibly improve the state of affairs with government and their implementing agents. The rest of this chapter will discuss the possible suggestions to assist with these challenges.

3.7 Suggestions for addressing the challenges experienced with implementing agents

The following suggestions could assist in addressing the challenges which have been experienced with implementing agents:

a) Provincial education departments should be provided with a guideline for the allocation of projects to implementing agents, that is to say the allocation should be based on the capacity and track record of the implementing agent.
b) School governing bodies, teachers and principals must be involved in and have a say at steering committee meetings for relevant projects (Equal Education, 2018).
c) Building contractors who are underperforming, must be placed on a defaulters list, as they too contribute to the school infrastructure backlog and the organisation has also noted that even though implementing agents are aware of defaulting contractors, they continue to award new projects to them and that this notion must be scrutinized so that it does not occur (Equal Education, 2012).
d) Address the skills shortages which will inevitably address the challenges which have been experienced in infrastructure delivery by (DBSA, 2012).
e) Utilising the consulting market more effectively, i.e., employment or advice and assistance of BEP's who have the necessary construction experience and skill to manage infrastructure projects.
f) Mobilising retired engineers. Retired engineers will be able to provide an oversight, training and quality function to support implementing agent offices (DBSA, 2012).
g) Providing bursaries for engineering students. These students will then be employed at the offices of the implementing agent. (DBSA, 2012).
h) Providing coaching and mentoring, especially to employees of implementing agents who possess a qualification but insufficient or no experience (DBSA, 2012).
i) Improving the supply of technical skills for local government occupations (DBSA, 2012)
j) The Department of Education should create Project Implementing Departments whose sole task is to supervise projects. The implementation team should consist of professionally registered

and experienced individuals, who will be able to provide sound advice to the department of education and to enable fast track service delivery. The deployment of external contractors and professionals who will execute the projects is still necessary, however they will report back to the implementation team on a regular basis. It is further noted that to maintain accountability, the Department of Public Works, who since their inception have been responsible for infrastructure delivery must be part of the process and the overall custodian of the infrastructure delivery of the DBE (Christopher, 2018). Christopher (2018) proposes the omission of the implementing agent and the reintroduction of the Department of Public Works.

3.8 Summary

The research question for this study aimed to understand how governments implementing agents are contributing to the achievement of the government's plan to address the backlog in the provision of water and sanitation infrastructure in schools in KwaZulu-Natal. The author presented two scenarios which explained a typical fast track infrastructure procurement approach which was envisaged when the government introduced the implementing agent into the public procurement process and the second scenario was based on the same premise. However, the proposal is that the introduction of the implementing agents is slowing down service delivery. The challenges experienced by the DBE is presented together with that of the other organisations and authors. The challenges which are being experienced thus far are indicative that implementing agents may be a contributing factor to the slow progress of service delivery. This study will determine via input from BEP's whether this these implementing agent challenges are still being experienced and will seek to propose additional solutions from professionals in the industry.

The next chapter continues to explain the research methodology which was adopted for this study.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

This chapter provides an understanding of the research methodology which was selected for this research. It also discusses the ontological and epistemological stance taken by the author which assisted in choosing the appropriate research paradigm and the resultant data collection methods. Further discussions surrounding ethical considerations, validity and reliability of the research is also included in this chapter.

The context for this research is underpinned by the stance that implementing agents (IA)who have been employed by the Government are contributing to the slow pace of the delivery of water and sanitation to rural schools in KwaZulu-Natal. The research adopts an approach that attempts to understand the perspectives of individuals who are employed in the Built Environment and who have worked with implementing agents in the past or were working with them during this research.

4.2 Definition of Research

Rajasekar, Philominathan and Chinnathambi (2006:2) describe research as an "*active, diligent, and systematic process of inquiry in order to discover, interpret and revise facts, events, behaviours and theories*" Research entails studying, analysing, comparing and the observing of phenomena or events in order to reach a purposeful conclusion which aims to provide reasons, predictions and/or relationships amongst different variables (*ibid*).

The commitment to research defines a process which is systematic, governed by a predetermined approach and objective and which entails the utilisation of methods of inquiry, which have been tested for their reliability and validity (Goundar, 2012). Kothari (2004: 20) further reinforces that good research is "systematic' and "logical", "empirical" and replicable. The word systematic research means that the researcher must ensure that specific steps and rules and rules are adhered to when conducting the research. The sequence of conducting research is also very important and the author should ensure that their research follows logical reasoning as far as possible. Empirical refers to the fact that the research is verifiable via observation and replicable indicates that if the research is repeated the same or similar outcome is expected.

4.3 Methodology and methods and its link to research design/paradigms

Methodology is a "*systematic theoretical analysis of methods applied to a field of study*" and in essence it outlines the way in which a research study is to be undertaken (Igwenagu, 2016: 4). An understanding of the various research methodologies will equip the author to finalise their research design, data

gathering tools and data analysis (Goundar 2004). According to Ishak and Alias (2005:326) methodologies comprise of the following four elements:

a) *"Providing an opinion of what needs to be solved,*
b) *defining techniques on what has to be done and when to do it,*
c) *advising on how to manage the quality of the deliverable or products,*
d) *providing a toolkit to facilitate the process"*

The words method and methodology are at times used interchangeably however considering the above description by (Ishak and Alias, 2005), methodology is viewed as the science of studying how research is done scientifically (Kothari, 2004).

Methods, on the other hand describe, how the data required, to arrive at a conclusion of the research, will be gathered. Methods are specific and determined in accordance with the type of research which is being conducted (Kothari, 2004).

Crotty (1998), states that while the methodology of the research must provide an indication of methods which will be utilised to achieve the outcome, there has to be an underpinning concept which seeks to give meaning to, as to why the author believes that a choice of methods will help achieve the outcome.

This underpinning concept leads the author to view the philosophical approach and warranted the author to ask questions related to the nature of reality or the foundation of truth and how the truth can be investigated or examined? When one considers research from this stance, the philosophical approach related to the ontological, epistemological and theoretical aspects/paradigm of research becomes significant and requires more understanding. The side-by-side relationship of the ontological, epistemological, theoretical approach, methodology and methods, is appropriately depicted in Figure 4.1:

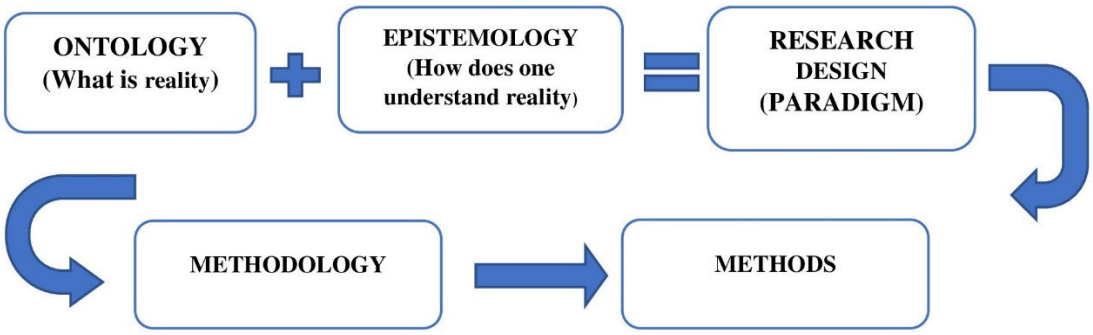


Figure 4.1: Relationship between ontology, epistemology, research design, methodology and methods, (Adapted from Crotty, 1998 and Pretorius ,2018)

4.4 Ontology and Epistemology Explained

Philosophers have always questioned the nature of reality or what is reality? (Pretorius,2018). The reality of any phenomenon can be described as either one single reality, multiple realities or the fact that reality must be debated and/or interpreted in order to understand it's true meaning. The latter, according to Pretorius (2018) represents the ontological stance, whereas epistemology refers to how the author can understand reality (the foundation of truth). Understanding of reality, can be either by measuring it with proven tools or methods and that one must be able to choose which methods will best suit the research to enable a valid and reliable outcome.

There are many epistemological stances, for example, objectivism, constructionism and subjectivism. Objective reality does not rely on the human mind or consciousness for existence. Constructionism refers to an interaction between a subject (human) and an object, which in turn creates the reality. Subjectivism on the other spectrum indicates that there is reliance on the mind (consciousness) for existence (Moon and Blackman, 2017). This research attempted to understand the relationship between the introduction of implementing agents and the impact of water and sanitation service delivery in schools in rural areas of KwaZulu-Natal.

4.5 Theoretical Perspective (Paradigm)

When the researcher combines their ontological and epistemological approaches, the result is a research paradigm. A paradigm refers to the way in which a researcher will approach research and it is governed by a shared set of values, beliefs and cultures which are shared by philosophers/scientists (Antwi and Hamza 2015). There are many different paradigms such as positivism (Antwi and Hamza, 2015; Rehman and Alharthi, 2016), transformative, constructivism (Creswell, 2014), interpretivism (Rehman and Alharthi, 2016) and pragmatism (Saunders, Lewis and Thornhill, 2019).

4.5.1 Pragmatism

This study adopts a pragmatic view. The aim of a researcher who adopts a pragmatic view is to arrive at a solution to a problem, which is practical in nature and considers both objective and subjective information as well as understanding and considering concepts, theories and facts related to the phenomenon (Saunders, Lewis and Thornhill, 2019). Creswell (2003) indicates that with pragmatism, the research problem is solved by utilising whatever methods will solve the problem. In respect of the focus of this research, the author believed that solutions and recommendations to the research problem, could not be derived at by scientific means. The research problem warrants the input and opinions of individuals who work with implementing agents, to provide insight and opinion on whether the author s own observations (that implementing agents are contributing to the slow pace of the delivery of water and sanitation to schools in KwaZulu-Natal) was deserving of consideration. The research tools were directed to professionals in the built environment who had experience with working with implementing

agents. The views of the aforementioned professionals are essentially subjective in nature when questions related to the competency and capacity of the implementing agent was asked. The objective stance was fulfilled when the author enquired on statistics related to the number of schools which were actually implemented and the time period for that implementation. A combination of the objective and subjective information informed the outcomes and recommendations for this research. In pragmatism the author adopts both a positivist and interpretists view. Positivism implies that knowledge is only valid if it is scientifically proven and usually there is a single means to prove its validity. Interpretivism does not support the notion that natural sciences can be utilised to explain reality, but rather that the subject and object are not separate and that the human mind is at liberty to interpret the interaction and socially construct reality (Moon and Blackman, 2017).

4.6 Methodology

Crotty (1998:5), describes methodology and the type of research which will be performed and lists the relevant types as experimental, survey, ethnography, phenomenological, grounded theory, heuristic, inquiry, actions research, discourse analysis, etc. This research is deemed survey research.

Each research methodology, paradigm or theoretical framework permits the use of one or more qualitative or quantitative research methods to obtain solutions or reach a conclusion to the research problem (Singh, 2019). The research methods will be described in the forthcoming sections of this chapter.

4.7 Research Methods

There are three important research methods, quantitative, qualitative and mixed methods.

Quantitative research is a number orientated research and is based on the measurement of a quantity or amount and qualitative research is non-numerical and entails obtaining an understanding via the process of reasoning and the use of words (Goundar, 2004).

Quantitative data can be repeated to improve the outcome, whereas qualitative data utilises words to explain or provide meaning to a situation. The results of quantitative data can be presented in tables and graphs allowing the researcher to visualise the variances amongst variables. The latter is not the case for qualitative data; however, the researcher is able to deduce patterns from the data and form relationships with the patterns. Quantitative data provides definitive answers to explain one's research (what, when and where) however qualitative data serves to explain why (Rajasekar, Philominathan and Chinnathambi, 2006). The latter explanations are presented in Table 4.1 which provides a side-by-side comparison of the two research methods.

Table 4.1:Comparison of quantitative and qualitative data (Rajasekar, Philominathan and Chinnathambi, 2006:9).

Quantitative Data	**Qualitative Data**
Numerical and no use of descriptions and sentences, but rather utilises numbers to draw conclusions	Numbers are not utilised; however, descriptions provide the researcher with themes which can be discussed.
The evidence receive is evaluated	Aims to provide meaning to a situation
Tables and graphs can be utilised to demonstrate data	Themes cannot be presented in the form of graphs and tables.
One can arrive at a conclusion fairly quickly	It opens up the mind and thought processes to explore different ideas
Provides answers to "what", "when" and "where" for decision making	Provides answers to "why" and "how" for decision making.

An extension of the quantitative and qualitative measures is that of a mixed method. Mixed methods incorporates both qualitative and quantitative data in study. According to Kumar (2007:36) "*this approach adds complexity to the design and research process by harnessing the advantages of both qualitative and quantitative research methods*". Mixed methods were chosen for this study so that a broader outcome of responses could be obtained and that answers could be obtained for not only the extent of a problem but also the nature of the problem.

There are various mixed method designs such as the convergent parallel design, exploratory sequential design and explanatory sequential design and this study utilised the convergent parallel design to arrive at the conclusions and recommendations for this research.

In the convergent parallel design approach, qualitative data and quantitative data are collected separately but at the same time and after a separate data analysis process the data is compared to each other and interpreted by the researcher in order to determine whether the data either aligns to or opposes each other (Creswell, 2014).

The characteristics of the convergent parallel design, are that the author allocates equal priority to both qualitative and quantitative data. The data is compared side by side, so that, if quantitative data is presented, information gained from qualitative data will then be utilised to substantiate (cross reference) the quantitative or statistical data. It is utilised to overcome the weaknesses in one method with the strengths in the other. One finds that the narrow quantitative data becomes extended when consideration is given to the open-end qualitative data collection (Creswell, 2014).

Figure 4.2 provides a diagrammatic representation of the convergent parallel design approach.

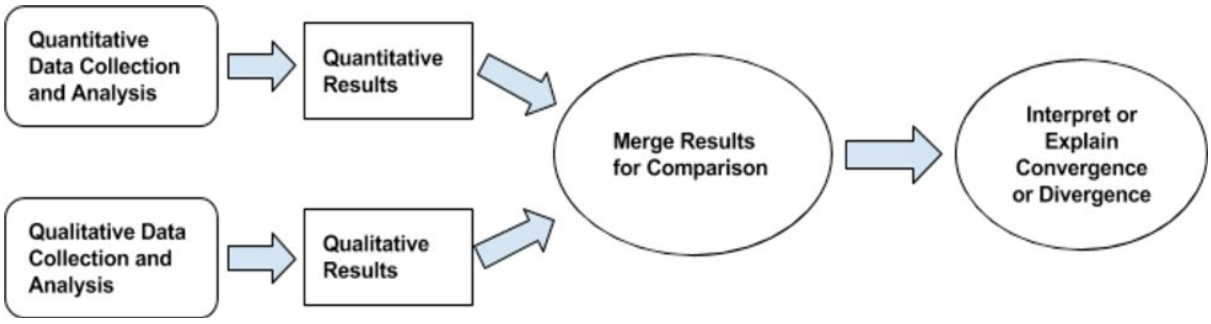


Figure 4.2: Convergent parallel design process. (Creswell and Plano Clark, 2015).

Convergent parallel design was selected because complementary information was collected via a quantitative and qualitative process occurring simultaneously. The questionnaire consisting of Likert scale and open-ended questions and a semi-structured interview was used. The research instruments were directed to participants in the consulting sphere of the construction industry, i.e., engineers, quantity surveyors, architects and construction project managers. This process brought together both types of data which led to the comparison, validation and collaboration of results (Dudovskiy, 2012).

4.8 Data collection instruments

4.8.1 Questionnaires

The use of questionnaires is a quantitative data collection method which offers the advantages of fast-tracked data collection coupled with little or no cost to the researcher. An additional advantage of utilising questionnaires is that the researcher is able to obtain more objective responses. Questionnaires are also advantageous when the sample population is large. Disadvantages present itself, when respondents fail to answer questions and leave them blank or do not understand the question and provide random answers (Dudovskiy, 2012).

There are various types of questionnaires, namely:

a) Open-ended questionnaires - the respondents are able to provide their viewpoints and opinions.
b) Multiple choice questionnaires - the respondents are offered various answers to choose from.
c) Dichotomous questionnaires - these are reflective of yes/no questions.
d) Scaling questionnaires - the respondents rank the available answers based on a Likert scale which represents their level of agreement to the available answer in the questionnaire, for example, on a scale of, 1 - 5 which signifies rankings such as “1” strongly disagree or “5” strongly agree” (Dudovskiy, 2012).

The questionnaire utilised in this study, which can be accessed via the following link: https://forms.gle/nvdxEknyYQPTwFpm9 , comprised of 21 questions (14 Likert scaling questions, 5 questions where the respondent was asked to choose options based on their appointments with IA’s and 2 open ended questions). The questionnaire aimed to assess the fact that implementing agents who are

mainly responsible for the provision of water and sanitation projects, have an impact on the slow delivery of this service to schools in KwaZulu-Natal. The questionnaire was categorised into seven sections: Section 1: Demographics and back ground of the participants, Section 2: Project and Consultant Related Information, Section 3: Awareness of Water and Sanitation Papers, Legislation and Policies, Section 4: The Use of Implementing Agents by the Department of Education, Section 5: Condition of School Infrastructure, Related to Water and Sanitation in Schools in KwaZulu-Natal, Section 6: Challenges experienced by consultants when working with Implementing Agents, Section 7: Possible solutions to the implementing agent Scenario.

The questionnaire was formulated on the online platform Google Forms and emailed to all participants, with a due date for submission. The participants to this survey were also confined to the KwaZulu-Natal province. In order to obtain a list of participants the author utilised the relevant professional bodies as a basis. The required professional as per the author's observations for water and sanitation projects are quantity surveyors, structural and civil engineers, electrical engineers, construction project managers and architects. The aim was to obtain information from all built environment firms who have worked with implementing or were working with implementing agents at the time of this research. The Association of South African Quantity Surveyors (ASAQS) website contains a database of all Quantity Surveying firms in the KwaZulu-Natal province. The Consulting Engineers of South Africa (CESA) website also provided a database of all structural, civil and electrical engineering firms in the KwaZulu-Natal province. However, with regards to Architects, all relevant websites aligned to the Architectural profession in South Africa, did not provide a list of firms, but rather the registration credentials of Architects in their personal capacity. Therefore, in order to obtain name of Architectural firms, the author utilised the latest edition of the *Professions and Projects Register 2018-2019*, which is an editorial listing containing all Architectural firms in the KwaZulu-Natal region. It was noted that all the respective architectural, quantity surveying, electrical engineering and civil and structural engineering firms also engaged project management via the individuals in their company who were professionally registered in this field, therefore a separate database for project management was not specifically required as it would have created duplication of firm names.

The author then had to determine which firms worked with implementing agents and this had to be done by an enquiry via email and subsequently via telephone where no response was received via email. The nature of the research was explained to the firm and if a positive response was received the author had requested email addresses for individuals who could answer the questionnaire. This process is depicted in Figure 4.3.

The statistics and sampling related to Figure 4.3 is discussed later in this chapter.

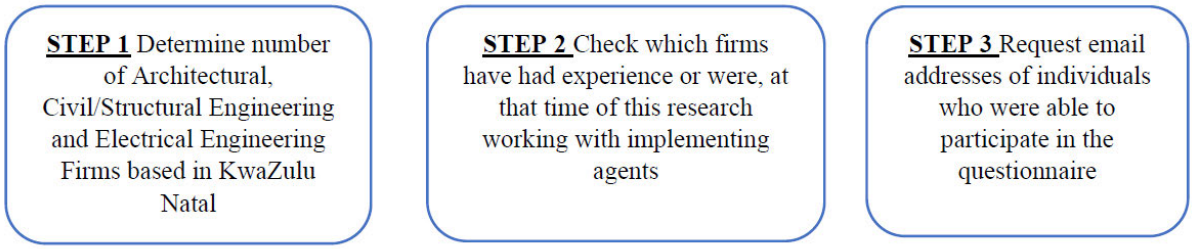


Figure 4.3: Steps to determine built environment firms who are involved with implementing agents

4.8.2 Interviews

Interviews are a qualitative form of data collection, which involves "*conducting intensive individual interviews with a small number of respondents to explore their perspectives on a specific idea*" (Boyce and Neale, 2006:3)

There are various types of interviews, for example, unstructured interviews, semi-structured interviews and structured interviews. In unstructured interviews the author does not prepare a set of defined questions, but rather attempts to choose questions based on their observations or interaction with a particular phenomenon, that is to say that the author develops questions impromptu based on his/her observation or interaction with the respondents. During a semi-structured interview, the author is afforded some flexibility. Even though questions are predetermined prior to the interview, the interviewer is allowed to ask additional questions based on the responses from the interviewee (Kothari, 2004). The purpose of the additional questions is to expand or clarify certain issues which may have emanated during the interview. For structured interviews there is a list of predetermined open-ended questions which enable the respondents to provide feedback based on their opinions and experiences on a specific phenomenon (Kothari, 2004).

The semi structured interview was chosen for this study as it afforded the author flexibility due to the subjective nature of the research. The interview scheduled is included as Appendix B. The author utilised the same basis as the questionnaire to determine participants of the study.

4.9 Sampling

An ideal situation to obtain data for one's research is to be able to obtain data from every item/individual who is able to contribute to a study. However, this is not possible due to various reasons and the main ones being insufficient time and monetary resources. The total number of cases or individuals that a researcher should consider for their research is referred to as a population and it will be necessary for the researcher to obtain a sample from the population in order to reach a conclusion about their research

The first step in the process entails understanding where the author is going to obtain their target population for their research. In the case of this research, the author focussed on Built Environment

companies in the KwaZulu-Natal region. The procedure that the author followed was described in section 4.8.1 of this chapter.

The second step in the research process entails selecting the sampling frame, which is the total number of possible cases within the population who can contribute to the research. Table 4.2 represents the sampling frame. The selection process was described in section 4.8.1. Based on this search, there were a total of 454 firms (quantity surveying, electrical engineering, civil and structural engineering and architectural) in the KwaZulu-Natal province. However 120 of the aforementioned companies had worked with implementing agents. The latter number therefore represents the population who will be able to adequately respond to the survey. All 120 companies from the population form part of the sampling frame.

The third step of sampling involves choosing the sampling technique. Samples infer that information or opinions from the sample are representative of the entire population, therefore the sampling technique is important (Kothari, 2004). There are two main types of sampling techniques, that is to say, probability and non-probability sampling, each with its own sub-divisions. Figure 4.4, depicts the two different sampling techniques together with its subdivisions:

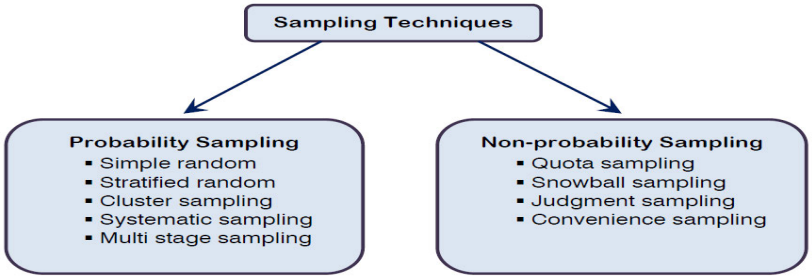


Figure 4.4: Sampling techniques. Source: (Taherdoost 2016:20)

Probability sampling is applicable when there is an equal chance for every item/resource of a population to be part of the sample. The various sub-divisions of probability sampling are simple, stratified, cluster, systematic and multi stage (Taherdoost, 2016).

Non probability sampling is not random and the researcher utilises their judgement in order to determine which individuals will form part of their sample. Examples of non-probability sampling include quota, snowball, judgement/purposive and convenience (Showkat and Parveen, 2017).

The sample technique utilised for the questionnaire was probability sampling, specifically simple random sampling and all firms in the KwaZulu-Natal region who had worked with IAs were chosen for the study. Non -probability sampling was utilised for the interviews, specifically purposive sampling. Purposive sampling enables the researcher to choose participants for their research based on their judgement, as the author is aware that the particular individual will be able to provide insight to meet the objective of the study (Saunders, Lewis and Thornhill, 2007). The author chose senior consultants

(10-20 years' experience in the industry) as they could provide insight into the capacity and capabilities of IAs as well as the impact of the slow pace of water and sanitation on their businesses.

The author conducted interviews with 12 senior built environment professional who have worked with governments implementing agents. A total of 15 professionals were contacted, however only 12 were able to make themselves available due to their busy schedules. The interviews were semi-structured and due to the current Covid-19 pandemic was conducted online via Google Meets, Microsoft Teams and Zoom. The interview consisted of 35 pre-determined questions, however due to the semi-structured nature of the interview the author was afforded some flexibility to add or omit certain questions, depending on the responses which were provided by the interviewee. Gibbs (2007) indicates that qualitative analysis involves awareness of the kind of data that will be received and how that data will be described and explained in the research findings as well as a number of practical activities which must be undertaken in order to process the large amounts and the kind of data which is received. Qualitative data unlike quantitative data does not seek to reduce the amount of data which has been collected but rather expands on the data and the knowledge base (Gibbs, 2007).

Table 4.2: Determination of sample size

Discipline	Quantity Surveying	Architectural	Electrical Engineering	Civil and Structural Engineering	TOTAL
Step 1: Number of firms in the KwaZulu-Natal region based on data retrieved	84	173	62	135	**454**
Step 2: Number of companies who have worked with implementing agents.	24	20	17	34	**120**

4.10 Data Analysis

4.10.1 Quantitative Data Analysis

The process of data collection took 3 months. Questionnaires were emailed to participants in June 2021 and final responses were received on 31 August 2021. During this time, the author also conducted interviews with the BEP's who were selected based on purposive sampling.

The quantitative data collected was analysed using SPSS version 27. Gogoi (2020:2424) indicates that "*SPSS is a software which is widely used for quantitative research methods specially to develop the explanation of social science research into an analytical way*" The decision on which data analysis technique to utilise for quantitative data requires careful consideration (Pallant, 2007). Pallant (2007) indicates that the author can explore the relationships among variables or differences between groups. Data analysis can be divided into two sections, descriptive analysis and inferential analysis. Descriptive analysis involves the study distributions of one variable and inferential analysis involves the testing of

significance, for hypothesis testing to determine with what validity, the data can be used to draw a conclusion (Kothari, 2004). Exploring relationships among variables can be analysed via correlation, partial correlation, multiple regression and factor analysis. Exploring differences in groups can be analysed via T-tests, one way analysis of variance, two-way analysis of variance, multivariate analysis of variance and an analysis of co -variance (Pallant, 2007). This study utilised Factor Analysis. In using factor analysis, there is an assumption that there is an interdependence between one or more or a set of variables and the author attempts to determine what hidden or latent aspect is creating the communality among the variables (Kothari, 2004). Pallant (2004) describes factor analysis, as enabling the researcher to reduce a large scale of items into one or a few factors which are closely related.

The results of the data for this research were presented via Factor Analysis, the Bartletts test of Sphericity and the Kaiser -Meyer-Olkin index. Reliability was tested by utilising the Cronbach's Alpha.

Pearson's Chi-Square test was also utilised which enabled the author to test the significance of a population variance (Kothari, 2004). Rana and Singal (2015:69) indicate that the Pearson's Chi-Square test allows a researcher to test the hypothesis of no association between two or more groups, population or criteria (to check the independence of variables) or to check how the distribution of the observed data fits with the distribution which is expected (goodness of fit test). It is used mainly as a characterisation technique. The goodness of fit test was utilised for this study and it provides an indication of how well the sample data fitted a distribution from a population with a normal distribution, that is to say, does the sample data represent the data one would expect to find in the population or is it skewed. A level of significance is indicated, which is the p-value and according to Kothatri (2007), the level of significance is usually a percentage which is usually 5% (0.05). Where the p-values are less than 0.05 (the level of significance), it implies that the distributions were not similar. That is, the differences between the way respondents scored were significant. The context of Chi-Square is based on the formation of a null and alternative hypothesis. The null hypothesis is the one that the author wishes to disprove and the alternative hypothesis is the one which the research wishes to prove.

4.10.2 Qualitative data analysis

The definition of qualitative data analysis in its simplest form can be described as data analysis which is not numbers orientated or data that is not collected in a laboratory setting (Gibbs 2007). Qualitative data intends to explore social phenomena and attempts to understand the different views of individuals towards any specific social issue. The data analysis and interpretation of qualitative data is therefore not straight forward and entails sifting through the information gathered to identify commonalities to support your research (*ibid*).

Qualitative data was analysed via thematic analysis using NVivo 12. NVivo 12 assisted to organise the data which in turn enabled the author to form patterns or themes which were thereafter further amplified and debated upon.

4.11 Ethical Considerations

Ethics can be defined as a "*method procedure or perspective, for deciding how to act and for analysing complex problems and issues*" (Resnik, 2011:1).

Ethics can sometimes be thought of as common sense, or morality, however if this were the case then ethical issues and disputes should not be a debatable subject as it would be assumed that common sense prevails in situations of doubt. Ethical issues become apparent, as each individual has a different view point or opinion of what is good and what is not, or what is acceptable versus what is not (Resnik, 2011).

Ethics can also be focussed on a particular discipline of study/research and these become norms of conducts which should be adhered to. There are various ethical principles which must be adhered to when conducting research and some of these include, honesty, objectivity, integrity, carefulness, respect for intellectual property, social responsibility, animal care, etc., (Resnik, 2011).

This research study was approved by the UKZN Humanities and Social Sciences Ethical Committee (HSSREC) with protocol reference number, HSSREC/00002088/2020 attached as Appendix A. The author ensured that all sources of information was adequately cited, to ensure that all authors who contributed to this study were acknowledged. In addition, the responses from interview participants and questionnaires were treated with a high degree of confidentiality and anonymity. The choice to participate in the research was also voluntary and this was made known to each participant as part of the informed consent letter which accompanied the questionnaire.

4.12 Validity and Reliability

The process of ensuring that research is valid and reliable, does not only pertain to aspects related to the data collection methods which the researcher intends on utilising. Validity and reliability must be considered, during the literature review chapters, for the data collection instruments and during the data analysis and interpretation (Zohrabi, 2013).

Valid research, implies that it is true and can be utilised by others in further studies. There are various aspects of validity which must be considered when conducting research and these include, content validity, internal validity, utility criterion and external validity. Content validity can be ensured by allowing your research to be analysed by an expert in your field. Internal validity, refers to the degree within which the author maintains focus on exactly what is to be measured in order to achieve the aims and objectives of the study. Internal validity can be conducted via the use of triangulation of data and confirmation of results by respondents and interviewees. The utility criterion, ensures that the researcher

is mindful of the fact that the outcome of their research is useful to others and for future research. External validity refers to the extent to which the research can be utilised to affirm generalisations on other related aspects or topics (Zohrabi, 2013).

This study utilised the convergent parallel design mix methods research process which ensures triangulation of data during the data analysis phase thereby warranting validity of the research. Olsen (2004) describes triangulation of data as *"the mixing of data or methods, so that diverse viewpoints cast light upon a topic".* In this research, the mixing of quantitative (questionnaire) and qualitative (interview), is thought to create endorsement of the study (Olsen, 2004).

In addition, triangulation also signifies the dependability of research results (Merriam, 1998 as cited by Zohrabi, 2013).

Reliability refers to the "*extent to data collection techniques and analysis processing yield consistent findings*" (Saunders, Lewis and Thornhill, 2007:149). Koonce and Kelly (2014) note that once a researcher knows that the research is reliable, it creates a level of confidence in the researcher, that the research is meeting the objectives of the study. A way of determining reliability is to ensure that there is internal consistency with the responses for each or all questions in the questionnaire. If the same result is achieved on a repeated basis, then, it can be inferred that the responses from the participants are reliable (Koonce and Kelly, 2014). Reliability for this research was ensured through the use of Cronbach's Alpha which measures the internal consistency of responses to questions in the questionnaire (Saunders, Lewis and Thornhill 2007). The Cronbach's Alpha for each question was computed via the use of the SPSS software and Alpha values greater than 0.7 and closer to 1 indicate a high degree of internal consistency of the responses to the questions (Pallant, 2007).

4.13 Chapter Summary

This research adopts the pragmatic research paradigm and utilised the mixed method, convergent parallel design process whereby complementary information was collected via a mixed methods process. The choice of methods was a questionnaire and a semi-structured interview, to participants in the consulting sphere of the construction industry in the KwaZulu-Natal region of South Africa. Data was collected from BEPs who had worked or are working with IAs of government who are responsible for water and sanitation provisions at rural schools in KwaZulu-Natal.

The quantitative data was analyses via the use of SPSS version 27 and the qualitative data was analysed via the use of NVivo 12. Factor analysis was the primary statistical technique which was utilised and included the Bartletts test of Sphericity and the Kaiser -Meyer-Olkin index. Reliability was tested by utilising the Cronbach's Alpha. The Chi-square goodness of fit test was also utilised to test the significance level of the questions.

The chapter also highlighted that the research also followed principals of ethics, validity and reliability.

Chapter 5 discusses the findings of the research.

CHAPTER 5: RESULTS AND DISCUSSIONS

5.1 Introduction

This chapter encapsulates and analyses the data which has been gathered via the mixed methods research process described in chapter 4. The data was electronically captured in accordance with the relevant data capture process, i.e., quantitative data was captured and analysed via the Statistical Package for Social Science (SPSS), Version 27 and the qualitative data was captured and analysed via the NVivo 12 software. Inferential techniques include the use of factor analysis and chi square test values. Factor analysis is the process of data reduction. The traditional approach to reporting a result for a chi-square test requires a statement of statistical significance. For factor analysis the author computed the Kaiser-Meyer Olkin measure of sampling adequacy and the Bartletts test for Sphericity together with the Cronbach's Alpha. For chi square a p-value is generated from a test statistic. A significant result is indicated with "$p < 0.05$". The purpose of the analysis was to determine trends in responses from both the descriptive and inferential statistics which were gathered, in order to reach a conclusion regarding the research, as they align to the research objectives. The analysis is represented in both a graphical and narrative form which enables the reader to conceptualise and better understand the findings. The quantitative data is analyzed in the first part of this chapter, followed by the qualitative data. The data is then merged in a triangulation process, which will assist in reaching a proposed solution to the research problem.

5.2 Information pertaining to the quantitative data

5.2.1 Questionnaire Response Rate

Quantitative data was gathered via a structured questionnaire. The questionnaire was developed on the Google forms platform which allowed for the generation of an electronic link, which in turn, was emailed to participants to fill in electronically in their spare time. The questionnaire utilised in this study, comprised 14 Likert scaling questions and additional 5 questions where the respondent was asked to choose options based on their appointments with IA's and 2 open ended questions. The link to access the questions included in the questionnaire is https://forms.gle/nvdxEknyYQPTwFpm9 (the length of the questionnaire was too long to add to the appendices).and can be accessed. The time period for the completion of the questionnaire averaged 25 minutes. The questionnaire aimed to test the concept that IAs who in most instances are responsible for the provision of water and sanitation projects at schools in KwaZulu-Natal, contribute to the slow delivery of this service. The questionnaire was developed by utilising the information which was presented in the literature review of this paper. The sample size for the questionnaire consisted of 52 respondents who have worked with IAs in the past or are currently working with them. The author searched for databases of BEP consulting firms in the KwaZulu-Natal region of South Africa. The firms included in the search, consisted of Quantity Surveyors, Structural and Civil Engineers, Electrical Engineers and Architects. The latter disciplines were the most likely type

of consultants to be appointed for water and sanitation related projects at schools. Very rarely are mechanical engineers appointed as there is generally no air conditioning or ventilation in schools. The database for Civil, Structural, Electrical Engineers and Quantity Surveyors was available online, via the Council of Engineers, South Africa (CESA) website and the Association of South African Quantity Surveyors website (ASAQS). In order to obtain name of Architectural firms, the author utilised the latest edition of the *Professions and Projects Register 2018-2019*, which is an editorial which listing all Architectural firm in the KwaZulu-Natal region. The search was limited to BEP firms in the KwaZulu-Natal province. The author then determined, which one of the firms were at any point, appointed by IAs of the government to facilitate the provision of water and sanitation projects. This was done by emailing and/or calling and enquiring with each professional firm. A total of 120 questionnaires were distributed and 52 were returned, which represented a response rate of 43.3% The questionnaire was categorised into seven sections, namely section one, demographics and background of the participants, section two, project and consultant related information, section three, awareness of water and sanitation papers, legislation and policies, section four, the use of IAs by the DBE, section five, condition of school infrastructure, related to water and sanitation, section six, challenges experienced by consultants when working with IAs, section seven, possible solutions to the implementing agent scenario.

5.2.2 Concepts related to the data analysis of the questionnaire

a) Reliability and Consistency

When analysing data, the author needs to ensure that the information/data is reliable and valid. The two most important aspects to consider are reliability and validity. The latter was also explained in chapter 4. Validity includes content, internal and criterion validity A way of determining reliability is to ensure that there is internal consistency with the responses for each or all questions in the questionnaire (Koonce and Kelly, 2014). Reliability for this research was ensured through the use of Cronbach's Alpha which measures the internal consistency of responses to questions in the questionnaire (Saunders, Lewis and Thornhill, 2007). Koonce and Kelly (2014) indicates that an alpha of at least 0.7 indicates a good level of internal consistency. Awang (2012), indicated that a Cronbach's Alpha of 0.60 or higher provides a reliable measure of internal consistency, whereas a score of 0.70 reveals that the instrument possesses a high reliable standard (Hoque and Awang, 2019). According to Kline (1999), Cronbach Alpha values of below 0.7 can be expected when dealing with psychological constructs because of the diversity of the constructs being measured. Additionally, according to Cortina (1993), it is at time possible to achieve a low Cronbach's Alpha, mainly due to the low number of items within a scale.

b) Factor Analysis

Factor analysis is a statistical technique whose main goal is data reduction (Pallant, 2007). A smaller number of combinations is produced from the original variables. Factor analysis is done only for the Likert scale items. Certain components are divided into finer components (Pallant, 2007)

For the factor analysis, principal component analysis was utilised with Kaiser normalisation and a Promax rotation with a Kappa of 4. Small coefficients were suppressed with an absolute value below 0.5. The factors retained were based on the number of interpretable factors. The results revealed the loadings of each of the items which were extracted via principal axis factoring.

c) The Kaiser-Meyer- Olkin (KMO) measure of sampling adequacy and the Bartletts test of sphericity

The Kaiser-Meyer-Olkin Measure (KMO) of sampling adequacy is a statistic that indicates the proportion of variance in the variables that might be caused by underlying factors (Izquierdo, Olea and Abad, 2014).

Bartlett's test of sphericity tests the hypothesis that the correlation matrix is an identity matrix, which would indicate that the variables are unrelated and therefore unsuitable for structure detection. Small values (less than 0.05) of significance indicate that a factor analysis may be useful with the data. (Izquierdo, Olea and Abad, 2014).

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy value should be greater than 0.50 and the Bartlett's Test of Sphericity significance value should be less than 0.05 (Isa, Saman and Nasir, 2013). The KMO index will vary between the figures 0 and 1 and in order to consider one's data as factorable, the KMO index must be greater that 0.50 (Kaiser, 1974). The higher the index the more adequacy is indicated, (Matore, Khairani, and Adnan, 2019). The Bartlett's test of sphericity, indicates the degree to which the inter-correlations between the variables of a question, produces an identity matrix and thereby the overall significance (Matore, Khairani, and Adnan, 2019). Intercorrelation indicates how similar the variables in the question are in their distribution across the sample. The closer the value is to 0, the greater the significance *(ibid)*.

d) Pearson's Chi-Square Test

Rana and Singal (2020:69) indicate that the Pearson's Chi-Square test *allows a researcher to test the hypothesis of no association between two or more groups, population or criteria (to check the independence of variables) or to check how the distribution of the observed data fits with the distribution which is expected (goodness of fit test)*. It is used mainly as a characterisation technique. The goodness of fit test was utilised for this research and it provides an indication of how well sample data fit a distribution from a population with a normal distribution, that is to say does the sample data represent the data one would expect to find in the population or is it skewed. A level of significance is indicated, which is the p-value and according to Kothari (2004) the level of significance is usually a percentage and is generally 5% (0.05). Where the p-values are less than 0.05 (the level of significance), it implies that the distributions were not similar. That is, the differences between the way respondents scored were significant. The context of Chi-Square is based on the formation of a null and alternative hypothesis.

The null hypothesis is the one that the researcher wishes to disprove and the alternative hypothesis is the one which the research wishes to prove.

5.3 Data Analysis of the questionnaire

5.3.1 Section One: Background information about the participants

This section of the questionnaire sought to help the author determine information about the individuals who participated in the survey, which would in turn provide confidence that they (the individuals) had some knowledge and experience in the built environment.

The demographics and background information of the respondents are indicated in Table 5.1.

Table 5.1: Demographics and background information of the participants

Gender of Participants			
		Frequency	Percent
	Male	42	80.8
	Female	10	19.2
	Total	52	100.0
Number of years of experience in the construction industry			
		Frequency	Percent
	0 - 5 years	10	19.2
	6 - 10 years	9	17.3
	11 - 15 years	13	25.0
	16 - 20 years	7	13.5
	Above 20 years	13	25.0
	Total	52	100.0
Workplace Designation/Profession			
		Frequency	Percent
	Quantity Surveyor	17	32.7
	Construction Project Manager	13	25.0
	Architect	3	5.8
	Engineer	9	17.3
	Partner/Director	9	17.3
	Other	1	1.9
	Total	52	100.0

A total of 42 participants, (80.8%) were male and 10 (19.2%) were female participants.

Approximately 19% of the respondents had between 5 and 10 years of experience, 17.3% had between 6 and 10 years' experience and the majority (63.5%) of the respondents had over 10 years' experience

in the built environment. The latter provides some confidence to the author, as it indicates that the responses to the questionnaire was gathered from experienced individuals in the built environment.

The author was keen on receiving responses from various disciplines as it would provide a well-rounded indication of the experience that different professions had with Implementing Agents. It can be seen from Table 5.1, that there is a fair distribution of professionals who participated. Approximately a third of the sample (32.7%) were quantity surveyors and a quarter of the sample were construction project managers. The representation of architects was however minimal as this discipline represented 5.8% of all participants. The engineering sector formed 17.3% while 17.3% of the participants also indicated that they were partners or directors at their organisations, indicating the seniority.

5.3.2 Section Two: Project and consultant related information

The purpose of this section attempted to understand the information pertaining to:

a) How long ago based on the current date (2021) organisations received the letters of appointments from implementing agents?
b) How many of those projects (as a percentage) have proceeded to procurement and are currently in construction?
c) How many of those projects (as a percentage) have been closed out and professional fees have been paid?
d) The time period after tender adjudication that projects are awarded to contractors?
e) The education districts which projects (schools) were located.

Figure 5.1 indicates that there were significantly different time periods for the allocation of the letters of award from IA's.

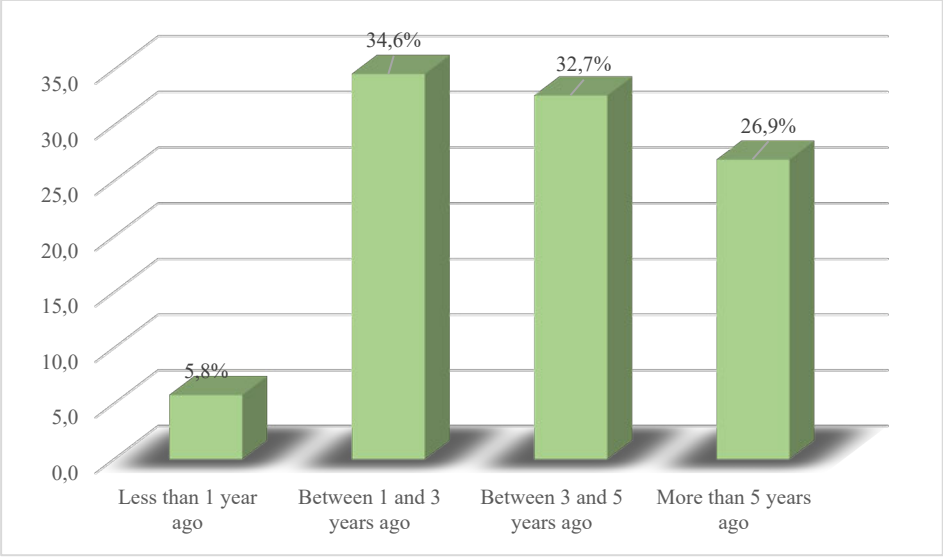


Figure 5.1: Time periods when letters of award received from implementing agents.

Figure 5.1 indicates that the majority (34.6%) of the BEP's had received their award letters at least 1 year ago. A significant percentage (26.9%) of the BEP's had received their letters of appointment 5 years ago. Based on the author s' observations and during independent discussions with BEP's, (during the interviews) when projects such as schools are awarded to BEP's, it is generally in the form of a cluster of schools, which essentially form part of a larger programme, which the IA's is overall responsible to manage. Figure 5.2 graphically explains this scenario.

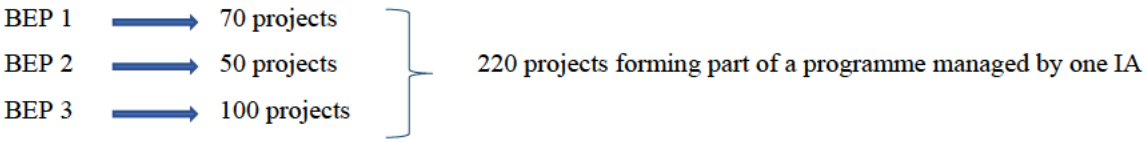


Figure 5.2: Example of appointment of projects by IA's to BEP's

The National Treasury of South Africa defines the commencement of procurement as *"once a need for goods, services or engineering and construction works has been identified and ends when the goods are received, the services or the construction work has been completed"* (South African National Treasury, 2012:3). Considering the latter definition, the procurement of construction project goes through various stages, that is from concept and viability to the construction phase and finally close out.

Bearing in mind that the time periods when the BEP's received their appointments are predominantly at least a year old, Figure 5.3 indicates the percentage of projects (which formed part of a BEP's appointment), which had advanced through the procurement process (described above) and are currently in the construction stage

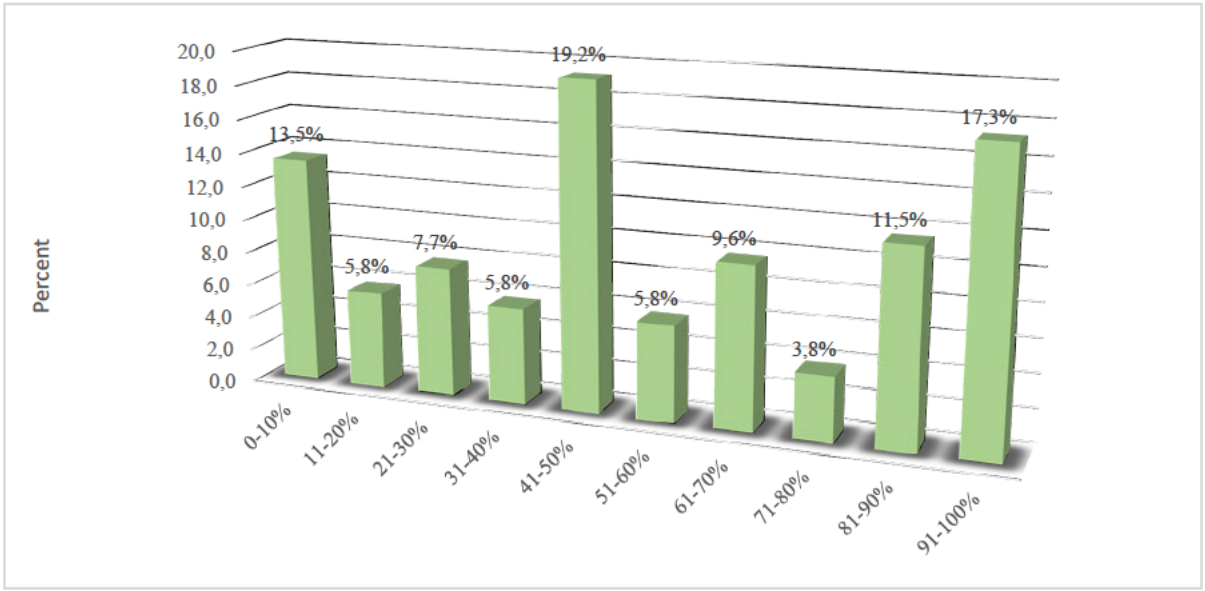


Figure 5.3: The number of projects (%) which have been procured and are in construction

Figure 5.3 further indicates that there is a spread of the number of projects which have advanced through the procurement stages. Fifty two percent of the BEP's note that, only between 41-50% of their number of projects had proceeded to the construction stage. Approximately 17.3% of the BEP's indicated that 91-100% of their number of projects have advanced through the procurement stage and are in the construction stage. These letters of appointments were received by the BEP at least 1 year ago and if one can assume that all projects were urgent, why, are there are still projects which have not advanced in the procurement process.

The similar scenario is presented in Figure 5.4 which provides an indication of the percentage of projects which formed part of BEP's appointment, which have been closed out and for which professional fees have been paid. Approximately twenty- three percent of the BEP's have indicated that only between 0-10% of their projects have been closed out and professional fees have been paid and a mere 11.5% indicate that between 91-100% of their number of projects have been closed out and professional fees have been paid. One has to consider that 26.9% of the BEP's indicated that they received their letters of appointment more than 5 years ago (Figure 5.1), with only 17.3% indicating that nearly all their projects have been procured and are in construction (Figure 5.3)

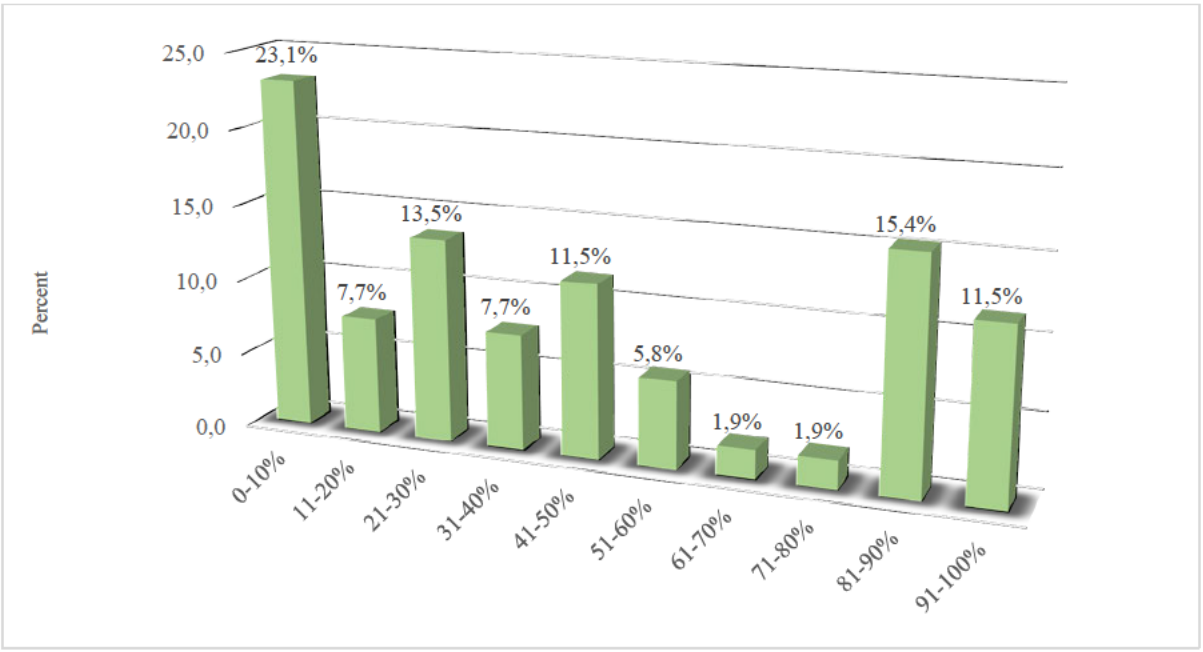


Figure 5.4: The percentage of projects which are closed out and professional fees have been paid.

Figure 5.5 indicates the time period after projects have closed, that the letter of award is issued to recommended tenderers. There was a small percentage (1.9%) of participants who indicated that the latter was longer than 24 months and 7.7% indicated that it was within the tender validity period. The percentage of the participants who indicated that letters of awards were issued within 6 months of the tender validity was 32.7% with a similar percentage (36.5%) indicating that the letters were issued

between 6-12 months of the tender validity expiring. One fifth of the participants (21.2%) indicated that letters of award were issued between a period of 12 to 24 months. Overall, the general trend seems to be, that letters of award are issued after the tender validity period has expired. The purpose of stating the tender validity period in any tender document is to ensure that the tenderers cannot alter their prices during that time period and it also essentially means that their bids are legally binding for that stipulated period of time (Lynch, 2021). Late awards can have a detrimental effect on tenderers, as there is a risk that the effect of escalation in construction material prices could either result in a break even or loss scenario for the tenderer. Certain tenderers may accept late awards due to the lack of work in the industry and they therefore succumb to the knowledge that accepting work will essentially enable them to simply keep their businesses afloat while waiting for a more lucrative projects to surface.

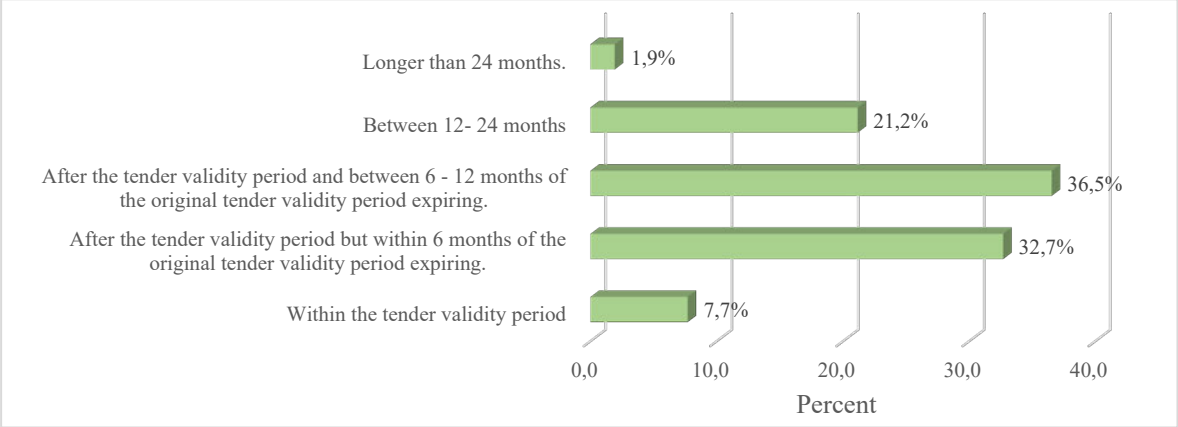


Figure 5.5: The time period that letters of award are issued to recommended tenderers

The above examples represent slow procurement processes. According to the literature review, the DBE noted that even though there established norms and practices with the IA organisation, which govern approval processes, the approval process takes too long to be expedited which indicates that approvals to proceed to tender or approve tender adjudications are often delayed. The Auditor General of South Africa also noted approvals to proceed from estimate/feasibility to tender documentation or from adjudication to award or to approve variation orders take too long, resulting in project time delays.

Figure 5.6 indicates, in which education district in KwaZulu-Natal, the BEP's schools were located.

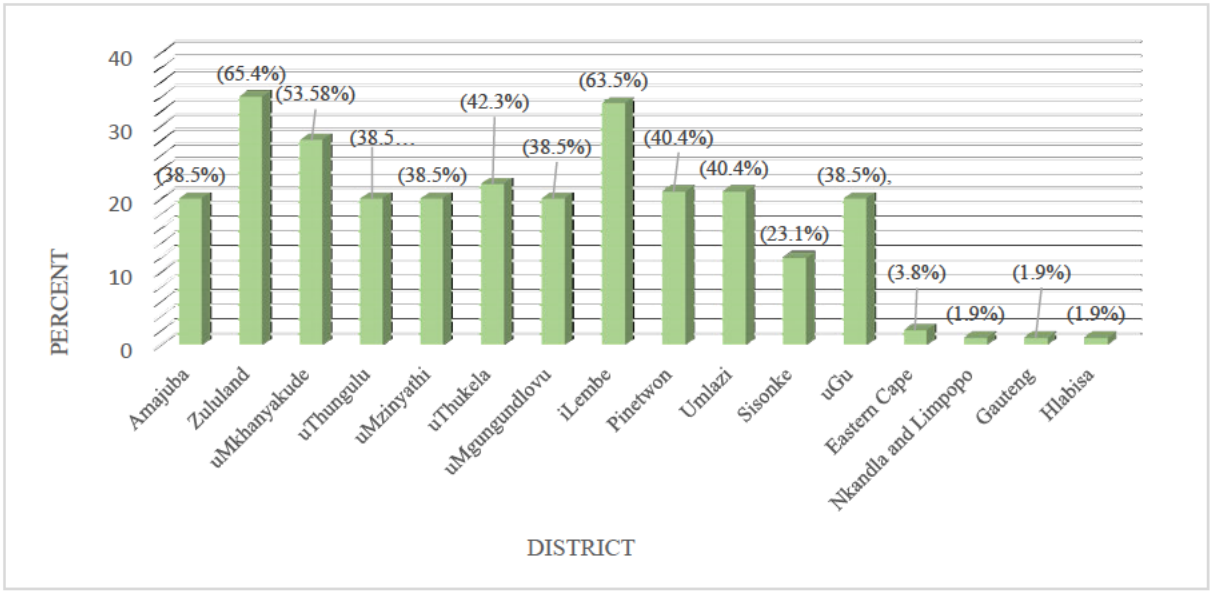


Figure 5.6: Education district in KwaZulu-Natal, the BEP's schools were situated.

The largest percentage (65.4%) of schools was located in the Zululand district of KwaZulu-Natal. Significant and similar percentages (63.5%) and (53.58%) was indicated for the iLembe and uMkhanyakude districts respectively. The uThukela district represented 42.3% of schools. The percentages for the Pinetown and Umlazi districts equated to 40.4% each. The uGu, uMgungundlovu, uMzinyathi, uThungulu and Amajuba districts presented 38.5% of the schools.

The map of the education districts in KwaZulu Natal, provided by the Department of Education which was presented as part of the literature review indicated that the rural areas of KwaZulu-Natal were plagued with poor service delivery. The responses provided by the participants is aligned to the rural areas of KwaZulu-Natal. The highest percentages are for districts in the far north of KwaZulu-Natal, that is Zululand. For other areas such as uMzinyathi and Amajuba, the percentages are lower than Zululand as these areas are more developed in terms of service delivery infrastructure. There is also alignment to Figure 2.11 in the literature review where the Zululand district had the most amount of plain pit toilets in the KwaZulu-Natal district.

5.3.3 Section Three: Awareness of water and sanitation papers, legislation and policies.

The objective of this section was to understand, how aware the sample population was, of the papers, policies and legislation which were introduced at the onset of democracy. Further investigation sought to understand whether the sample population understood what the papers, policies and legislation set out to achieve.

Table 5.2 shows the findings on how aware the participants were of the papers, policies and legislation which were introduced to address the water and sanitation challenge in the country.

Table 5.2: Scoring patterns for awareness of the policies and legislation

		Not aware at all		Slightly aware		Somewhat aware		Moderately aware		Extremely aware		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S11.1	The Reconstruction and Development Policy Framework (RDP)	4	7.7	5	9.6	12	23.1	21	40.4	10	19.2	0.001
S11.2	The White Paper on Water and Sanitation	12	23.1	11	21.2	11	21.2	10	19.2	8	15.4	0.927
S11.3	The Water Services Act, 1997	11	21.2	9	17.3	16	30.8	10	19.2	6	11.5	0.276
S11.4	The National Water Act, 1998	11	21.2	10	19.2	15	28.8	9	17.3	7	13.5	0.496
S11.5	The White Paper on Basic Household Sanitation, 2001	14	26.9	7	13.5	15	28.8	10	19.2	6	11.5	0.180
S11.6	The Strategic Framework for Water Services, 2003	10	19.2	11	21.2	20	38.5	9	17.3	2	3.8	0.003
S11.7	The Millennium Development Goals, 2000	14	26.9	12	23.1	16	30.8	5	9.6	5	9.6	0.039
S11.8	The National Development Plan 2030	12	23.1	6	11.5	15	28.8	12	23.1	7	13.5	0.240

Overall, there are generally lower levels of awareness for all papers, with the exception of the Reconstruction and Development Policy where 40.4% were moderately aware and 19.2% were extremely aware of this policy (S11.1). Twenty-three percent of participants were not aware of the White Paper on Water and Sanitation (S11.2). A similar percentage (21.2%) were not aware of the Water Services Act, 1997 (S11.3) and the National Water Act, 1998 (S11.4). The same trend was noted for the National Development Plan, 2030, where 23.1% were not aware at all of this initiative by government (S11.8).

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher awareness and lower awareness.

The results shown in Table 5.2 highlight that the p-values are less than 0.05 (level of significance) for statements S11.1, S11.6 and S11.7. This implies that the distributions were not similar, that is the way the participants scored were significant. For other statements, the distributions were similar.

An analysis of the lower percentages as it related to higher awareness seems to be related to the number of years of experience the individuals have. There were approximately 20 individuals with 16 years of experience and above, signifying their average age of +-35, therefore being more aware of the papers, policies and legislation which had been introduced.

Table 5.3 displays the scoring patterns for whether the participants understood what the paper, policies and legislation set out to achieve. Overall, there are generally lower levels of awareness for all statements except for S12.1 and S12.4 where participants were aware that approximately 50% of the population in South Africa in 1994 did not have access to safe water supplies and adequate sanitation (S12.1) and that the National Water Act focussed on the right to water services for all (S12.4). Seventeen percent of participants did not know that the short-term goal of the RDP was to ensure that people had between 20-30 litres of water per person and 19.2% of participants were extremely aware of this (S12.2). With regards to the National Development Plan, 2030 (NDP) 9.6% of the participants were not aware of its objective while only 13.5% were extremely aware (S12.9). The NDP is a fairly recent plan by Government therefore it was assumed that more participants will be aware of it. Furthermore only 3.8% of participants were extremely aware that The Millennium Development goal to end extreme hunger and poverty which was achieved by South Africa, while 36.5% were not aware at all (S12.10)

The highlighted p-values are less than 0.05 (level of significance) as shown on Table 5.3. This implies that the distributions were not similar, that is for S12.1 and S12.10. The way the participants scored these items were significant. This can be seen in the high level of awareness for S12.1 and high level of non-awareness for S12.10. The results are shown in Table 5.3. Scoring for all other statements were similar.

The history of water and sanitation was indicated as part of the literature review of this study and provided the reader with an understanding of where and how the challenge emanated. Based on the outcome of this section, it can be generally seen that individuals are generally not aware of the root cause of the problem and the reasons for the introduction of the papers, however considering that they now work in the built environment they have probably been exposed to certain papers or legislature.

Table 5.3: Scoring patterns for the understanding for the papers, policies and legislation

		Not aware at all		Slightly aware		Somewhat aware		Moderately aware		Extremely aware		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S12 1	As of the year 1994, approximately 50% of the South African population did not have access to safe water supplies and adequate sanitation	2	3 8	6	11 5	11	21 2	11	21 2	22	42 3	< 0 001
S12 2	The short-term goal of the RDP was to ensure, 20-30 litres of water per person and this entailed a short distance walk to collect water	9	17 3	9	17 3	9	17 3	15	28 8	10	19 2	0 624
S12 3	The medium-term goal of the RDP increased the aforementioned 20-30 litres to 50-60 litres per person	15	28 8	7	13 5	11	21 2	11	21 2	8	15 4	0 438
S12 4	The National Water Act, 1997 focussed on the right to water services to all South Africans	8	15 4	8	15 4	9	17 3	11	21 2	16	30 8	0 361
S12 5	The Water Services Act, 1998, focussed on water management	7	13 5	11	21 2	14	26 9	12	23 1	8	15 4	0 526

Table 5.3: Scoring patterns for the understanding for the papers, policies and legislation/ continued

S12 6	The Government of South Africa placed emphasis on decentralization of water services and water management and therefore sought comment from the citizens of the country to resolve the water crisis This signified their commitment to democracy	13	25 0	8	15 4	12	23 1	11	21 2	8	15 4	0 729
S12 7	The National Water Act, 1998, stipulated a reserve, i e , the amount of water that needs to remain in rivers to ensure efficient functioning of the ecosystem	10	19 2	14	26 9	11	21 2	11	21 2	6	11 5	0 526
S12 8	The National Development Plan, 2030 recognises the need to provide equitable access to water and sanitation to all citizens by 2030	6	11 5	8	15 4	13	25 0	13	25 0	12	23 1	0 411
S12 9	The National Development Plan, 2030 envisages a South Africa that will understand the importance of water and the role it will play in the economic development of the country	5	9 6	14	26 9	11	21 2	15	28 8	7	13 5	0 124
S12 10	South Africa had met the Millennium Development Goal to eradicate extreme hunger and poverty	19	36 5	16	30 8	6	11 5	9	17 3	2	3 8	0 001

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.821, thereby greater than the recommended value of 0.50 and the Bartletts test of Sphericity reached statistical significance at p=0.000 (p<0.05) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.4.

Table 5.4: KMO and Bartlett's Test for the understanding for the papers, policies and legislation

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.821
Bartlett's Test of Sphericity	Approx. Chi-Square	382.106
	df	45
	Sig.	0.000

Table 5.5 displays the component matrix for the understanding of what the papers, policies and legislation set out to achieve. For factor analysis, principal component extraction (PCA) was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded two factors. All ten items loaded on two separate components respectively.

Table 5.5: Component matrix for what the papers, policies and legislation set out to achieve

Rotated Component Matrix[a]

	S12	Component	
		1	2
S12.1	As of the year 1994, approximately 50% of the South African population did not have access to safe water supplies and adequate sanitation	0.792	-0.052
S12.2	The short-term goal of the RDP was to ensure, 20-30 litres of water per person and this entailed a short distance walk to collect water	0.706	0.520
S12.3	The medium-term goal of the RDP increased the aforementioned 20-30 litres to 50-60 litres per person	0.645	0.562
S12.4	The National Water Act, 1997 focused on the right to water services to all South Africans	0.770	0.425
S12.5	The Water Services Act, 1998, focused on water management	0.769	0.411
S12.6	The Government of South Africa placed emphasis on decentralization of water services and water management and therefore sought comment from the citizens of the country to resolve the water crisis. This signified their commitment to democracy.	0.332	0.839
S12.7	The National Water Act, 1998, stipulated a reserve, i.e., the amount of water that needs to remain in rivers to ensure efficient functioning of the ecosystem	0.150	0.781
S12.8	The National Development Plan, 2030 recognises the need to provide equitable access to water and sanitation to all citizens by 2030	0.776	0.352
S12.9	The National Development Plan, 2030 envisages a South Africa that will understand the importance of water and the role it will play in the economic development of the country	0.764	0.305
S12.10	South Africa had met the Millennium Development Goal to eradicate extreme hunger and poverty	0.211	0.740

Table 5.6 displays how much variance is explained by the factors. PCA technique using principal axis factoring exhibited 6.001 and 1.105 explaining 60.01 and 11.05% of the variance respectively and 71.06% of the total variance.

Table 5.6: Total variance explained for what the papers, policies and legislation set out to achieve

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% Of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.001	60.011	60.011	6.001	60.011	60.011	4.088	40.884	40.884
2	1.105	11.047	71.058	1.105	11.047	71.058	3.017	30.175	71.058
3	0.754	7.543	78.602						
4	0.626	6.264	84.866						
5	0.535	5.349	90.215						
6	0.337	3.373	93.589						
7	0.230	2.297	95.885						
8	0.179	1.786	97.671						
9	0.151	1.513	99.184						
10	0.082	0.816	100.000						

Extraction Method: Principal Component Analysis.

The first component consisted of statements which were related to aspects which the policies hoped to address. Statements, S12.1, indicated that of the year 1994, approximately 50% of the South African population did not have access to safe water supplies and adequate sanitation, S12.2 expressed the short-term goal of the RDP, S12.3 the medium-term goal of the RDP, S12.4 provided an indication of the purpose of the National Water Act 1997, S12.5 explained the focus of the Water Services Act, 1998, S12.8 indicates the goal of the National Development plan and S12.9 the role the that National

Development plan will have on the economy is expressed. This component can be described as the ***"Governments Policy for the Future".***

Component number 2 consisted of items that relate to the strategy of the government, that is S12.6, decentralization of water services and water management, S12.7 the need for a reserve as it related to water resources and 12.10 the fact that the country had me the Millennium Development Goal. The component can be described as the ***"Strategy of the South African Government for water and sanitation"***

The Cronbach's Alpha is 0.924 which is greater than the recommended value of 0.7. This indicates that the items have high internal consistency in responses.

5.3.4 Section Four: The use of Implementing Agents (IA) by the Department of Education.

The objective of this section was to determine whether the BEP's were aware of why the DBE utilises IA's. It also sought to determine what qualities an IA should possess, considering they are acting in the role of project manager.

Table 5.7 shows the findings and scoring patterns for whether the BEP was aware of why the DBE utilises IA's. Responses are linked to higher levels of agreement for all statements. A significant percentage (86.5%) of the participants agreed that service delivery in the form of water and sanitation will lead to growth and development of the South African economy (S13.1). The latter percentage consisted of 28.8% who agreed and 57.7% who strongly disagreed. A large percentage (71.2%) strongly agreed that organisations providing water and sanitation must have in their employ, individuals who possess a skill set aligned to activities and skills in the construction sector (S13.2). A significant percentage (57.7%) of participants also strongly agreed that the DBE utilises IAs based on the notion that they possess the necessary skills and capacity to plan, procure and manage infrastructure projects (S13.5).

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher agreement and lower agreement.

The results are shown in Table 5.7. The highlighted values are less than 0.05 (level of significance). It is noted that all items have p-value less than 0.05 therefore this indicates that the distributions were not similar and the way the participants scored was significant. The literature review of this study provides references from the Department of Education (2019) where it is noted that .in order for an organisation to act as an IA, they must possess the skill, have the capacity as well as systems in place in order to execute infrastructure projects. The Department of Education (2019) also indicates that government departments such as DBE, do not have in their employ professionals who are actively involved in the

built environment, who possess the skill, capacity, capability and know how on the implementation of infrastructure projects, The need to engage IAs are even more emphasised.

Table 5.7: Scoring pattern for use of the implementing agent by the DBE

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S13.1	Service delivery to the citizens of the country, in the form of water and sanitation is one of the key aspects which will lead to the growth and development of the South African economy	0	0.0	1	1.9	6	11.5	15	28.8	30	57.7	< 0.001
S13.2	Organisations providing water and sanitation infrastructure must have in their employ individuals who possess a skill set aligned to activities and skills in the construction sector	0	0.0	1	1.9	2	3.8	12	23.1	37	71.2	< 0.001
S13.3	Generally, individuals at government departments, such as the Department of Basic Education or the Department of Human Settlements, etc., do not possess the obligatory skill that is required to plan, procure and manage infrastructure projects	0	0.0	3	5.8	12	23.1	22	42.3	15	28.8	0.003
S13.4	Generally, individuals at government departments such as the Department of Basic Education or the Department of Human Settlements, etc, do not have the requisite capacity and time to plan, procure and manage infrastructure projects	0	0.0	3	5.8	11	21.2	19	36.5	19	36.5	0.004
S13.5	The use of Implementing Agents by Government Departments is largely based on the notion that implementing agents possess the necessary skill and capacity to plan, procure and manage infrastructure projects	3	5.8	1	1.9	5	9.6	13	25.0	30	57.7	< 0.001

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value for this question was 0.502, thereby greater than the recommended value of 0.50, albeit marginally and the Bartletts test of Sphericity reached statistical significance at $p=0.000$ ($p<0.05$) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.8.

Table 5.8: KMO and Bartletts for the use of the implementing agent by the DBE

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.502
Bartlett's Test of Sphericity	Approx. Chi-Square	70.037
	df	10
	Sig.	0.000

Table 5.9 indicates the component matrix for whether BEP's understood the requirement for an IA. For factor analysis PCA was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded two factors and four items loaded on two separate components separately. Component 13.5 was dropped as it did not load on any of the components.

Table 5.9: Component Matrix for use of the implementing agent by the DBE

Rotated Component Matrix[a]

	S13	Component	
		1	2
13.1	Service delivery to the citizens of the country, in the form of water and sanitation is one of the key aspects which will lead to the growth and development of the South African economy	0.824	0.252
13.2	Organisations providing water and sanitation infrastructure must have in their employ individuals who possess a skill set aligned to activities and skills in the construction sector	0.901	0.165
13.3	Generally, individuals at government departments, such as the Department of Basic Education or the Department of Human Settlements, etc, do not possess the obligatory skill that is required to plan, procure and manage infrastructure projects	0.112	0.847
13.4	Generally, individuals at government departments such as the Department of Basic Education or the Department of Human Settlements, etc, do not have the requisite capacity and time to plan, procure and manage infrastructure projects	0.190	0.879
13.5	The use of Implementing Agents by Government Departments is largely based on the notion that implementing agents possess the necessary skill and capacity to plan, procure and manage infrastructure projects	0.418	-0.354

Table 5.10 displays how much variance is explained by the factors PCA technique using principle axis factoring exhibited 2.180 and 1.240 explaining 43. 60% and 24.80% of the variance and 68.38% of the total variance.

Table 5.10: Total variance explained for the use of the implementing agent by the DBE

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.180	43.597	43.597	2.180	43.597	43.597	1.713	34.257	34.257
2	1.240	24.797	68.394	1.240	24.797	68.394	1.707	34.137	68.394
3	0.960	19.207	87.601						
4	0.382	7.639	95.239						
5	0.238	4.761	100.000						

The items which loaded onto component 1 related to service delivery in the form of water and sanitation and its alignment to the development of the economy (S13.1) and the fact that in order for an organisation to be able to provide water and sanitation infrastructure they must have in their employ individuals who possess a skill set aligned to activities and skills in the construction sector. (S13.2). This component can be described as ***"The importance of ensuring that individuals possess the correct skill to enable infrastructure development".***

Items 13.3 indicating that generally, individuals at government departments, such as the DBE or the Department of Human Settlements, etc, do not possess the obligatory skill that is required to plan, procure and manage infrastructure projects and item 13.4, generally, individuals at government departments such as the Department of Basic Education or the Department of Human Settlements, etc, do not have the requisite capacity and time to plan, procure and manage infrastructure projects loaded on component 2. This component can be described as ***"The mandate of Government departments such as the Department of Basic Education, as it relates to infrastructure development".***

The Cronbach's Alpha for this question was 0.715 which marginally, is greater than the recommended value of 0.70. This indicates that these items have adequate internal consistency in responses.

Table 5.11 provides as indication of which skills BEP's view, as essential to act in the role of a project manager. The scoring patterns for each statement was aligned to higher importance for all statements. A substantial percentage (88.5%) viewed effective leadership to construction team as a very important characteristic (S14.1). A percentage of 90.4% indicated that effective communication was very important (S14.2) and 92.3% indicated that the ability to make decisions was very important (S14.7). To summarise, the above statements as well as understanding construction activities (S14.3), effective time management (S14.4), financial management abilities (S14.5) and accurate and comprehensive reporting to the DBE (S14.6) were viewed as very important characteristics for a project manager.

Table 5.11 Scoring patterns project management skills

		Not Important		Slightly Important		Moderately important		Important		Very important		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S14.1	Effective leadership to the construction team	3	5.8	0	0.0	1	1.9	2	3.8	46	88.5	< 0.001
S14.2	Effective communication to the construction team	3	5.8	1	1.9	0	0.0	1	1.9	47	90.4	< 0.001
S14.3	Understanding of construction project activities and sequencing involved in water and sanitation projects	3	5.8	1	1.9	0	0.0	4	7.7	44	84.6	< 0.001
S14.4	Effective time management	4	7.7	0	0.0	1	1.9	2	3.8	45	86.5	< 0.001
S14.5	Financial management abilities and the understanding of scope, cost, time and quality management	3	5.8	1	1.9	1	1.9	1	1.9	46	88.5	< 0.001
S14.6	The ability to provide accurate and comprehensive reporting to end user departments (DBE)	3	5.8	0	0.0	1	1.9	3	5.8	45	86.5	< 0.001
S14.7	The ability to make decisions and taken decisive action to ensure the successful delivery of projects	3	5.8	1	1.9	0	0.0	0	0.0	48	92.3	< 0.001

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher importance and lower importance.

The results are shown in Table 5.11. All p-values (level of significance) are less than 0.05, this therefore indicates that the distributions were not similar and that their responses were significant. All statements were aligned to higher levels of importance.

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.793, thereby greater than the recommended value of 0.50 and the Bartletts test of Sphericity reached statistical significance at $p=0.000$ ($p<0.05$) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.12.

Table 5.12: KMO and Bartletts test for project management skills

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.793
Bartlett's Test of Sphericity	Approx. Chi-Square	909.836
	df	21
	Sig.	0.000

Table 5.13 indicates the component matrix for the project management skills of individuals who are project managers. For factor analysis principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded one factor. All seven items loaded on a single component/factor.

Table 5.13: Component matrix for project management skills

Component Matrix[a]

	S14	Component
		1
S14.1	Effective leadership to the construction team	0.982
S14.2	Effective communication to the construction team	0.993
S14.3	Understanding of construction project activities and sequencing involved in water and sanitation projects	0.978
S14.4	Effective time management	0.965
S14.5	Financial management abilities and the understanding of scope, cost, time and quality management	0.964
S14.6	The ability to provide accurate and comprehensive reporting to end user departments (DBE)	0.972
S14.7	The ability to make decisions and taken decisive action to ensure the successful delivery of projects	0.992

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Table 5.14 displays how much variance is explained by this factor. PCA technique using principal axis factoring exhibited 6.696 explaining 95.66% of the variance and total variance.

Table 5.14: Total variance explained for project management skills

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% Of Variance	Cumulative %	Total	% Of Variance	Cumulative %
1	6.696	95.655	95.655	6.696	95.655	95.655
2	0.103	1.464	97.120			
3	0.085	1.213	98.333			
4	0.066	0.948	99.282			
5	0.028	0.404	99.685			
6	0.019	0.278	99.963			
7	0.003	0.037	100.000			

All items loaded on one factor, therefore this item will be known as ***"Essential project management skills to take on the responsibility as an IA***

The Cronbach's Alpha for this question was 0.983 which is greater than the recommended value of 0.70. This indicates that the items have high internal consistency in responses.

5.3.5 Section Five- Condition of school infrastructure, related to water and sanitation in schools in KwaZulu-Natal

This section provides the reader with an understanding of the current condition of school infrastructure in rural areas of KwaZulu-Natal, as well as the type of ablutions and drinking water facilities which are generally provided to schools in these areas. Lastly the BEP's opinion of the status quo of water and sanitation facilities at schools in rural areas is reflected.

Table 5.15 indicates the scoring patterns for the infrastructure provisions at schools in rural areas of KwaZulu-Natal. Generally, all statements have received higher levels of responses which are aligned to "agree" and "strongly agree" with the exception of item S15.1 in which 34.6% participants have disagreed that schools in rural areas of KwaZulu-Natal have basic facilities such as ablution blocks and classrooms only (that is, the opposite is true and that they have more than just basic facilities). This question could have been misinterpreted when the author used the word "basic" as in S.15.6 the author asked if buildings such as libraries, workshops, laboratories, etc. are not common in rural schools and 38.5% agreed and 53.8% strongly agreed with this statement. The reference to basic was referring to classrooms and ablution blocks and not extra over facilities such as libraries, workshops, etc.

Participants agreed (28.8%) that schools in rural areas are overcrowded (S15.1), that school facilities are not maintained (S15.3) (42.3%) and that schools were in some instances "makeshift" classrooms built by communities (S15.4) (46.2%). Additionally, 42.3% agreed that in some instances school buildings were structurally unsound (S15.5).

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher agreement and lower agreement.

The results are shown in Table 5.15. All items which are highlighted are less than 0.05 (level of significance), indicating that the distributions for this item was not similar and thereby that their responses were significant. Item S15.2 indicates a chi-square value of greater than 0.05 indicating that the response for this item were similar. S15.2 did not load on any of the components.

Equal Education (2019) indicate the poor condition of the infrastructure at rural schools. The author's own observations were also indicated with pictures in the literature review which confirm that the infrastructure provisions at rural schools in KwaZulu-Natal are meagre and not maintained. Amnesty International (2020) also stated that schools in rural areas did not have extra over facilities such as libraries, laboratories, etc.

Table 5.15: Scoring patterns for the status quo of infrastructure at schools

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S15.1	Schools in rural areas in KwaZulu-Natal have basic facilities, such as classrooms and ablution blocks	5	9.6	18	34.6	9	17.3	15	28.8	5	9.6	0.010
S15.2	Schools in rural areas in KwaZulu-Natal are overcrowded as compared to schools in developed areas of KwaZulu-Natal	0	0.0	8	15.4	15	28.8	17	32.7	12	23.1	0.316
S15.3	School facilities (buildings and playgrounds, etc) in schools in rural areas of KwaZulu-Natal are not maintained	1	1.9	0	0.0	4	7.7	22	42.3	25	48.1	< 0.001
S15.4	Schools in rural areas of KwaZulu-Natal are in some instances "makeshift" classrooms which were built by communities	1	1.9	1	1.9	7	13.5	24	46.2	19	36.5	< 0.001
S15.5	Schools in rural areas of KwaZulu-Natal are in some instances structurally unsound, due the quality of the construction workmanship	0	0.0	0	0.0	7	13.5	22	42.3	23	44.2	0.010
S15.6	Buildings such as libraries, workshops, laboratories and soccer fields are not common in schools in rural areas of KwaZulu-Natal as compared to schools in developed area	0	0.0	0	0.0	4	7.7	20	38.5	28	53.8	< 0.001

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.533, thereby greater than the recommended value of 0.50 and the Bartletts test of Sphericity reached statistical significance at p=0.000 (p<0.05) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.16.

Table 5.16: KMO and Bartletts test for the infrastructure at schools

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.533
Bartlett's Test of Sphericity	Approx. Chi-Square	74.638
	df	10
	Sig.	0.000

Table 5.17 displays the component matrix for the infrastructure provisions for schools in rural areas of KwaZulu-Natal. For factor analysis principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded two factors. Five out of the six items loaded on either one of two components.

Table 5.17: Component Matrix for the status quo of infrastructure at schools

Rotated Component Matrix[a]

	S15	Component	
		1	2
S15.1	Schools in rural areas in KwaZulu-Natal are overcrowded as compared to schools in developed areas of KwaZulu-Natal	0.115	0.831
S15.3	School facilities (buildings and playgrounds, etc) in schools in rural areas of KwaZulu-Natal are not maintained	0.727	0.144
S15.4	Schools in rural areas of KwaZulu-Natal are in some instances "makeshift" classrooms which were built by communities	0.865	0.134
S15.5	Schools in rural areas of KwaZulu-Natal are in some instances structurally unsound, due the quality of the construction workmanship	0.845	0.202
S15.6	Buildings such as libraries, workshops, laboratories and soccer fields are not common in schools in rural areas of KwaZulu-Natal as compared to schools in developed area	0.210	0.802

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Table 5.18 explains how much of variance is explained by these factors. PCA technique using principle axis factoring exhibited 2.459 and 1.003 explaining 49.17% and 20.06% of the variance and 69.23% of the total variance.

Table 5.18: Total variance explained for the status quo of infrastructure provisions at schools

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% Of Variance	Cumulative %
1	2.459	49.171	49.171	2.459	49.171	49.171	2.048	40.962	40.962
2	1.003	20.058	69.229	1.003	20.058	69.229	1.413	28.267	69.229
3	0.798	15.963	85.192						
4	0.537	10.750	95.942						
5	0.203	4.058	100.000						

Extraction Method: Principal Component Analysis.

Component one focussed on maintenance and quality of the construction workmanship and highlighted the fact that school buildings are not maintained and that in instances they are also structurally unsound. Items, S15.3, School facilities (buildings and playgrounds, etc) in schools in rural areas of KwaZulu-Natal are not maintained, S15.4; schools in rural areas of KwaZulu-Natal are in some instances "makeshift" classrooms which were built by communities and S15.5 schools in rural areas of KwaZulu-Natal are in some instances structurally unsound, due the quality of the construction workmanship loaded on this component. This component can be described as ***"Quality of workmanship of school facilities in rural areas".***

Component two dealt with the inadequacies of the current infrastructure in relation to the number of learners who are enrolled. Item S15.1 indicated that schools in rural areas in KwaZulu-Natal are overcrowded as compared to schools in developed areas of KwaZulu-Natal and S15.6 indicated that buildings such as libraries, workshops, laboratories and soccer fields are not common in schools in rural

areas of KwaZulu-Natal as compared to schools in developed area. This component can be labelled as ***"Insufficient school infrastructure facilities at schools in rural areas".***

The Cronbach's Alpha for this item which is 0.719 which is greater than the recommended value of 0.70 albeit marginally. This indicates that the items have a fair degree of internal consistency.

The above statements are supported by the views of Amnesty International (2020), when they noted that buildings have never been renovated since they were built during apartheid. The quality of the buildings has been questioned by Amnesty International, and the fact that they are deteriorating and still contain dangerous materials such as asbestos.

Table 5.19 displays the scoring patterns for the type of ablution facilities for schools in rural areas of KwaZulu-Natal.

Generally higher levels of agreement were indicated for this question. A total of 44.2% of participants agreed that all schools have some form of sanitation, albeit that this "form" was not classified in this question/ meant to be classified in this question (S16.1). The latter must be read in context of S16.2 where 17.3% strongly disagreed and 19.2% disagreed that the bucket system is not utilised at any schools in rural areas anymore, thereby signifying that the "form" of sanitation could actually be that of a bucket system. It was noted by the Department of Education (2013), that bucket system was supposed to be eradicated within 5 years of democracy, however evidence was provided that the bucket system still prevailed in 2019. Fifty percent of participants strongly agree that the VIP System was the most common type of ablution facility (S16.4) and a similar percentage 53.8% strongly agreed that the pit (unimproved system) is still prevalent (S16.3). The latter indicates the current backlog to ensure that the VIP system, which is more hygienic and safer, is provided to all schools. The report from Equal Education in 2019 indicated that VIP ablutions should have been constructed in all schools by the year 2020. However, in 2019, Equal Education reported that 1099 schools in KwaZulu-Natal still had the plain pit toilets. Bester and Austin (2000), has indicated the mechanics of the VIP system lends itself to a more hygienic system. (The VIP is hygienic if maintained regularly).
Additionally, 30.8% agreed and 30.8% of participants strongly agreed that very few schools in rural areas had waterborne sewage connected to the municipal system (S16.5). The lack of services infrastructure was indicated by the White Paper on Water Supply and Sanitation Policy (1994) and highlights that this is the main contributing factor for the lack of waterborne sanitation in rural areas.

Table 5.19: Scoring patterns for the type of ablution facilities in schools

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S16.1	All schools have some form of sanitation	5	9.6	12	23.1	8	15.4	23	44.2	4	7.7	< 0.001
S16.2	The Bucket System is not utilised at any of the schools in rural areas in KwaZulu-Natal	9	17.3	10	19.2	13	25.0	14	26.9	6	11.5	0.411
S16.3	The pit ablution is still prevalent in some schools in rural areas of KwaZulu-Natal	0	0.0	0	0.0	3	5.8	21	40.4	28	53.8	< 0.001
S16.4	Ventilated Pit Ablutions (VIP) are the most common type of sanitation facility which is available to schools in rural areas of KwaZulu-Natal	1	1 9	3	5.8	2	3.8	20	38.5	26	50.0	< 0.001
S16.5	Waterborne Sanitation connected to the municipal system is available, however very few schools have this type of facility	3	5.8	9	17.3	8	15.4	16	30.8	16	30.8	0.017

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher agreement and lower agreement.

The results are shown in Table 5.19. All highlighted items have a significance level less than 0.05, indicating that the responses were not similar. Item S16.2 had a Chi-square of greater than 0,05 indicating the distribution of the responses were similar across all scales.

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.5.12, thereby greater than the recommended value of 0.50 and the Bartletts test of Sphericity reached statistical significance at p=0.000 (p<0.05) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.20

Table 5.20: KMO and Bartletts test for the type of ablution facilities in schools in rural areas

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.512
Bartlett's Test of Sphericity	Approx. Chi-Square	39.936
	df	10
	Sig.	0.000

Table 5.21 displays the component matrix for the type of ablution facilities in schools in rural areas of KwaZulu-Natal. For factor analysis principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below

0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded two factors. All five items loaded on either one of two components.

Table 5.21: Component matrix for the type of ablution facilities in schools in rural areas

Rotated Component Matrix[a]

	S16	Component	
		1	2
16.1	All schools have some form of sanitation	0.851	0.025
16.2	The Bucket System is not utilised at any of the schools in rural areas in KwaZulu-Natal	0.902	0.062
16.3	The pit ablution is still prevalent in some schools in rural areas of KwaZulu-Natal	-0.223	0.658
16.4	Ventilated Pit Ablutions (VIP) are the most common type of sanitation facility which is available to schools in rural areas of KwaZulu-Natal	0.113	0.811
16.5	Waterborne Sanitation connected to the municipal system is available, however very few schools have this type of facility	0.215	0.702

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Table 5.22 explains how much of variance is explained by these factors PCA technique using principle axis factoring exhibited 1.794 and 1.441 explaining 35.89% and 28.83% of the variance respectively and 64.72% of the total variance.

Table 5.22 Total variance explained for the type of ablution facilities in schools in rural areas

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.794	35.890	35.890	1.794	35.890	35.890	1.648	32.956	32.956
2	1.441	28.826	64.716	1.441	28.826	64.716	1.588	31.760	64.716
3	0.847	16.950	81.666						
4	0.558	11.151	92.817						
5	0.359	7.183	100.000						

Extraction Method: Principal Component Analysis.

Items 16.1 indicating that all schools have some form of sanitation and S16.2 indicating that the bucket system is not utilised at any of the schools in rural areas in KwaZulu-Natal loaded on component number 1. The component can be described as ***"Suitability of existing ablution facilities in schools in rural areas".***

Component 2 dealt with the actual type of ablutions in rural schools. Item 16.3 indicating that the pit ablution is still prevalent in some schools in rural areas of KwaZulu-Natal coupled with the fact that VIP ablutions are the most common type of sanitation facility which is available to schools in rural areas

of KwaZulu-Natal (16.4) waterborne Sanitation connected to the municipal system is available, however very few schools have this type of facility (S16.5). This component can be labelled ***"The drive to ensure plain pit toilets are replaced with progressive forms of sanitation at schools in rural areas".***

The Cronbach's Alpha for these components is 0.548 which generally indicates an unacceptable form of consistency amongst responses. This low score for the Cronbach's Alpha could be due to the interpretation of the statements by the different level of respondents or that there were too few items in the scale.

Table 5.23 displays the scoring patterns for the type of drinking water facilities in schools in rural areas of KwaZulu-Natal. Forty-four percent of participants agreed that schools in rural areas have some form of drinking water (S17.1). However, 48.1% agreed and 36.5% strongly agreed that rainwater harvested in tanks is at times utilised as drinking water (S17.2), therefore indicating that this form is unacceptable. A large percentage (55.8%) agreed that municipal tankers supply water to schools (S17.3). On the issue of boreholes, 38.5% of participants did not provide a response (neutral response) as to whether boreholes provide the main source of drinking water (S17.4). Approximately twenty eight percent of participants agreed with the latter. There were higher levels of disagreements when participants responded to the statement pertaining to whether municipal connections provide the main source of drinking water to schools in rural areas (S17.5).

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher importance and lower importance.

The results are shown in Table 5.23 All highlighted items have a significance level less than 0.05, indicating that the responses were not similar.

Based on the literature review the Department of Education in the Norms and Standards document (2013) indicated that by the year 2019, all schools had some form of drinking water. The form of water, however has not progressed substantially to a municipal correction as vast parts of rural areas do not have the bulk infrastructure in place to support municipal water connections.

Table 5.23: Scoring patterns for the type of drinking water facilities in schools in rural areas

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S17.1	All schools in rural areas of KwaZulu-Natal have some form of drinking water	4	7.7	13	25.0	9	17.3	23	44.2	3	5.8	< 0.001
S17.2	Rainwater harvested in tanks, is at time utilised as drinking water in schools in rural areas of KwaZulu-Natal	0	0.0	1	1.9	7	13.5	25	48.1	19	36.5	< 0.001
S17.3	Municipal tankers, at times supply drinking water to schools in rural areas of KwaZulu-Natal	2	3.8	2	3.8	11	21.2	29	55.8	8	15.4	< 0.001
S17.4	Bore holes provide the main source of drinking water to schools in rural areas of KwaZulu-Natal	1	1.9	10	19.2	20	38.5	15	28.8	6	11.5	< 0.001
S17.5	Drinking water supplied via a municipal connection is the main source of drinking water in schools in rural areas of KwaZulu-Natal	18	34.6	15	28.8	14	26.9	3	5.8	2	3.8	< 0.001

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.555, thereby greater than the recommended value of 0.50 and the Bartletts test of Sphericity reached statistical significance at p=0.000 (p<0.05) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.24

Table 5.24: Scoring patterns for the type of drinking water facilities in schools in rural areas

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.555
Bartlett's Test of Sphericity	Approx. Chi-Square	12.958
	df	3
	Sig.	0.005

Table 5.25 indicates the component matrix for the drinking water facilities in rural schools. For factor analysis, principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded one factor. Three items loaded on a single component. Items S17.2 and S17.3 did not load on any components.

Table 5.25: Component matrix for the type of drinking water facilities in schools in rural areas

Component Matrix[a]

	S17	Component
		1
17.1	All schools in rural areas of KwaZulu-Natal have some form of drinking water	0.822
17.2	Rainwater harvested in tanks, is at time utilised as drinking water in schools in rural areas of KwaZulu-Natal	
17.3	Municipal tankers, at times supply drinking water to schools in rural areas of KwaZulu-Natal	0.625
17.4	Bore holes provide the main source of drinking water to schools in rural areas of KwaZulu-Natal	
17.5	Drinking water supplied via a municipal connection is the main source of drinking water in schools in rural areas of KwaZulu-Natal	0.709

The items which loaded on component one (S17.1) indicates that all schools in rural areas of KwaZulu-Natal have some form of drinking water, (S17.3), Municipal tankers, at times supply drinking water to schools in rural areas of KwaZulu-Natal, (S17.5), Drinking water supplied via a municipal connection is the main source of drinking water in schools in rural areas of KwaZulu-Natal (S17.5). This component can be described as ***"The drive to ensure safe, clean, potable water is provided to rural areas"***

Table 5.26 explains how much variance is explained by the factor. PCA technique using principle axis factoring exhibited 1.569 explaining 52.3% of the variance and the total variance.

Table 5.26: Total Variance explained for the type of drinking water

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.569	52.303	52.303	1.569	52.303	52 303
2	0.865	28.817	81.120			
3	0.566	18.880	100.000			

Extraction Method: Principal Component Analysis.

The Cronbach's Alpha for this item is 0.425 which is unacceptable in terms of the guideline. The low Cronbach's Alpha could be as a result of the interpretation of the statements by the different levels of participants and the low number of constructs within the question.

Table 5.27 displays the scoring patterns for the condition of school infrastructure related to water and sanitation. Generally, statements that confirm the unacceptable condition of ablutions or drinking water facilities, etc. received high levels of agreement. Forty two percent of participants strongly disagreed that the rural schools in relation to their learner enrolment have sufficient ablution facilities (S18.1). Fifty-five percent strongly disagreed that broken or missing ablutions fittings are replaced or repaired

on a regular basis (S18.3). Forty six percent of participants strongly disagreed that schools in rural areas have sufficient potable water (S18.6) and a further 42% also disagreed with this same statement, equating to 88% of the population. There was a high level of agreement that the water tanks which have been provided by Government have either been blown away by strong winds or that they are damaged and have not been repaired (S18.8) (42.3% agreed and 21.2% strongly agreed). Fifty percent of the population agreed and a further 25% strongly agreed that where water was provided via a municipal connection, this connection was not secure or reliable (S18.9).

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher awareness and lower awareness.

The results shown in Table 5.27 indicate that all highlighted items have p values of less than 0.05 which in turn indicates that their distributions were not similar and therefore significant.

Table 5.27: Scoring patterns for the condition of school infrastructure

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S18 1	Schools in rural areas of KwaZulu-Natal have sufficient ablution facilities in relation to learner enrolment figures	22	42.3	18	34.6	9	17.3	3	5.8	0	0.0	0.001
S18 2	Ventilated Improved Pit (VIP) latrines are regularly maintained and emptied	24	46.2	22	42.3	4	7.7	1	1.9	1	1 9	< 0.001
S18 3	Broken or missing ablution fittings are repaired or replaced on a regular basis	29	55.8	21	40.4	1	1.9	1	1.9	0	0.0	< 0.001
S18.4	Structural defects are a common occurrence in ablution facilities, due to poor workmanship in the original construction	2	3.8	3	5.8	15	28.8	20	38.5	12	23.1	< 0.001
S18 5	The vent pipes to pit latrines are broken or damaged, allowing the entry and exit of flies and other pests, which pose a hygiene risk to learners and teachers	1	1.9	2	3.8	7	13.5	26	50.0	16	30.8	< 0.001
S18.6	Schools in rural areas of KwaZulu-Natal have a sufficient supply of potable water	24	46.2	22	42.3	4	7.7	1	1.9	1	1 9	< 0.001
S18.7	Learners in schools in the rural areas of KwaZulu-Natal utilise water collected from water tankers as drinking water	2	3.8	4	7.7	14	26.9	25	48.1	7	13.5	< 0.001
S18.8	Water tanks at schools in the rural areas of KwaZulu-Natal are damaged or have been blown away and have not been replaced	1	1.9	4	7.7	14	26.9	22	42.3	11	21.2	< 0.001
S18 9	Where water stand pipes are provided within the school property, the supply of water, is usually not consistent	1	1.9	2	3.8	10	19.2	26	50.0	13	25.0	< 0.001

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.677 thereby greater than the recommended value of 0.50 and the Bartletts test of sphericity reached statistical significance at p=0.000 (p<0.05) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.28

Table 5.28: KMO and Bartletts test for the condition of school infrastructure

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.677
Bartlett's Test of Sphericity	Approx. Chi-Square	123.088
	Df	36
	Sig.	0.000

Table 5.29 displays the component matrix for the condition of school infrastructure as it relates to water and sanitation. For factor analysis principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa4 Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded two factors. Eight items loaded separately on two components. Only one item loaded on component 3. This component was therefore not considered as at least two items are required to load on each component to be considered.

Table 5.29: Component matrix for the condition of school infrastructure

Rotated Component Matrix[a]

	S18	Component		
		1	2	3
S18.1	Schools in rural areas of KwaZulu-Natal have sufficient ablution facilities in relation to learner enrolment figures	0.626	-0.094	0.066
S18.2	Ventilated Improved Pit (VIP) latrines are regularly maintained and emptied	0.817	0.143	-0.096
S18.3	Broken or missing ablution fittings are repaired or replaced on a regular basis	0.835	-0.099	-0.205
S18.4	Structural defects are a common occurrence in ablution facilities, due to poor workmanship in the original construction	0.025	0.230	0.909
S18.5	The vent pipes to pit latrines are broken or damaged, allowing the entry and exit of flies and other pests, which pose a hygiene risk to learners and teachers	-0.211	0.733	0.350
S18.6	Schools in rural areas of KwaZulu-Natal have a sufficient supply of potable water	0.712	-0.214	0.366
S18.7	Learners in schools in the rural areas of KwaZulu-Natal utilise water collected from water tankers as drinking water	0.221	0.791	-0.106
S18.8	Water tanks at schools in the rural areas of KwaZulu-Natal are damaged or have been blown away and have not been replaced	-0.143	0.700	0.272
S18.9	Where water stand pipes are provided within the school property, the supply of water, is usually not consistent	-0.119	0.736	0.022

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

Table 5.30 explains how much variance is explained by the factors. PCA technique using principle axis factoring exhibited 2.809, 2.118 and 1.022 explaining 31.21%, 23.53% and 11.36% of the variance respectively and 66.10% of the total variance.

Table 5.30: Total variance explained for the condition of school infrastructure

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.809	31.210	31.210	2.809	31.210	31.210	2.392	26.579	26.579
2	2.118	23.530	54.740	2.118	23.530	54.740	2.333	25.918	52.497
3	1.022	11.357	66.097	1.022	11.357	66.097	1.224	13.600	66.097
4	0.738	8.199	74.296						
5	0.600	6.668	80.964						
6	0.591	6.568	87.532						
7	0.506	5.624	93.156						
8	0.367	4.082	97.239						
9	0.249	2.761	100.000						

Extraction Method: Principal Component Analysis.

For component 1 there were 4 loadings, that being, schools in rural areas of KwaZulu-Natal have sufficient ablution facilities in relation to learner enrolment figures (18.1), ventilated improved pit latrines are regularly maintained and emptied (18.2), broken or missing ablution fittings are repaired or replaced on a regular basis (18.3) and schools in rural areas of KwaZulu-Natal have a sufficient supply of potable water (18.6). This component can be labelled ***"Supply and maintenance of water and sanitation facilities at schools in rural areas".***

For component 2 there were also 4 loadings, that being, the vent pipes to pit latrines are broken or damaged, allowing the entry and exit of flies and other pests, which pose a hygiene risk to learners and teachers (18.5), learners in schools in the rural areas of KwaZulu-Natal utilise water collected from water tankers as drinking water (S18.7), water tanks at schools in the rural areas of KwaZulu-Natal are damaged or have been blown away and have not been replaced (S18.8) and where water stand pipes are provided within the school property, the supply of water, is usually not consistent (S18.9). The component can be labelled ***"Ensuring adequate provision of potable water and ablution facilities to learners".***

The Cronbach's Alpha is 0.60 which is acceptable and indicates that there is a fair degree of internal consistency amongst the responses.

5.3.6 Section Six- Challenges experienced by consultants when working with Implementing Agents

This section provides an indication of the challenges that BEP's experience when working with IA's. The question was divided into "characteristics and capacity challenges", "challenges related to the adjudication of contractors tenders", "challenges related to contractors", and "challenges related to the BEP's professional consultancy"

Table 5.31 provides an indication of the characteristic and capacity challenges related to the IA. Approximately five percent of participants strongly agreed that IA's display effective leadership (S19.1) and approximately 3.8% agreed that IAs communicate effectively (S19.2). Thirty two percent of participants disagreed when asked, if IAs understand and initiate time management or have financial management capabilities (S19.4, S19.5). There are substantial responses aligned to "neutral" for example 28.8% of participants were neutral when answering the question about financial management (S19.5) or time management capabilities (S19.4), however the level of disagreement outweighs this.
The statements aligned to high levels of agreement were related to the fact that recently graduated individuals at IA organisations are tasked to manage projects in an effort to reduce overhead cost (19.11) where 38.5% of participants agreed. Approximately forty-two participants agreed that there is minimal transfer of skills or a proper handover of projects when older individuals at IA organisations resign (S19.12). Participants also agreed (42.3%) that individuals at IA organisations are allocated too many projects to manage (S19.13). Approximately forty two percent of participants agreed that even through the FIPDM is a comprehensive tool it is not utilised effectively by the IA (S19.16).

There are significant responses related to "neutral" responses, across all statements, however the levels of agreement or disagreement is generally higher. For example, while 28.8% of participants provided a neutral response for whether the IA understands the FIPDM (S19.15) however a total of 51.9% agreed (25% agreed and 26.9% strongly agreed).

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher agreement and lower agreement.

The results are shown in Table 5.31. The highlighted values indicate a level of significance of $p<0.05$ therefore this indicates that the distribution was not similar and there were either higher levels of agreement or disagreement. Statement S.19.10 and S19.18 however indicate similar distributions.

Table 5.31: Scoring pattern for the characteristic and capacity challenges related to the IA

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S19.1	Implementing agents display effective leadership to the construction team	7	13.5	24	46.2	14	26.9	4	7.7	3	5.8	< 0.001
S19.2	Implementing agents communicate effectively with the construction team	5	9.6	22	42.3	13	25.0	10	19.2	2	3.8	< 0.001
S19.3	Implementing agents understand construction project activities and sequencing involved in water and sanitation projects	5	9.6	16	30.8	14	26.9	14	26.9	3	5.8	0.009
S19.4	Implementing agents understand and initiate time management strategies on projects	5	9.6	17	32.7	15	28.8	12	23.1	3	5.8	0.006
S19.5	Implementing agents in general have financial management abilities	6	11.5	17	32.7	15	28.8	12	23.1	2	3.8	0.004
S19.6	Implementing agents fully understand scope management and report accurately to the Department of Education	6	11.5	14	26.9	20	38.5	8	15.4	4	7.7	0.002
S19.7	Implementing agents fully understand time management and report accurately to the Department of Education	8	15.4	13	25.0	18	34.6	9	17.3	4	7.7	0.028
S19.8	Implementing agents fully understand quality management and report accurately to the Department of Education	7	13.5	15	28.8	18	34.6	9	17.3	3	5.8	0.007
S19.9	Implementing agents have the ability to make decisions and take decisive action to ensure the successful delivery of projects	8	15.4	17	32.7	12	23.1	12	23.1	3	5.8	0.033
S19.10	Implementing agents are generally recently graduated individuals who do not possess sufficient practical knowledge to manage projects	5	9.6	11	21.2	16	30.8	14	26.9	6	11.5	0.062
S19.11	Recently graduated individuals at implementing agent offices are tasked to manage projects in order to reduce the overhead costs of the implementing agent	5	9.6	9	17.3	14	26.9	20	38.5	4	7.7	0.002

Table 5.31: Scoring pattern for the characteristic and capacity challenges related to the IA/continued

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S19 1 2	There is minimal transfer of skills or proper handover of projects, when older and more experienced individuals at the Implementing agent bodies resign or retire	2	3.8	5	9.6	13	25.0	22	42.3	10	19.2	< 0.001
S19. 13	Individuals at Implementing agent bodies are allocated too many projects to manage, which results in ineffective project management	1	1.9	4	7.7	12	23.1	22	42.3	13	25.0	< 0.001
S19. 14	Processes and protocols akin to "box ticking" at implementing agent bodies, hinders the ability to realise the expenditure of budgets, i.e., there are too many processes to complete before a project reaches the tender stage	1	1.9	5	9.6	11	21.2	21	40.4	14	26.9	< 0.001
S19. 15	Implementing agents do not fully understand the Framework for Infrastructure Delivery and Procurement Management (FIDPM) which results in long approval times for procurement and construction processes	3	5.8	7	13.5	15	28.8	13	25.0	14	26.9	0.036
S19. 16	Even though the (FIDPM) may be comprehensive, it is not applied effectively by implementing agents	0	0.0	4	7.7	16	30.8	22	42.3	10	19.2	0.003
S19. 17	The funds allocated to the Department of Basic Education and Implementing Agents are sufficiently utilised within any specific financial year, that is to say, that there are minimal funds left unused at the end of a financial year	13	25.0	16	30.8	13	25.0	7	13.5	3	5.8	0.030
S19. 18	The funds allocated to the Department of Basic Education and Implementing agents are utilised correctly, that is to say, wasteful expenditure is avoided	10	19.2	16	30.8	13	25.0	9	17.3	4	7.7	0.099
S19. 19	The priority list of projects is not always aligned to the budgets which are available at governmental level, resulting in abortive costs in related to the payment of professional consultants' fees and tender costs	3	5.8	3	5.8	9	17.3	25	48.1	12	23.1	< 0.001

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.774, thereby greater than the recommended value of 0.50 and the Bartletts test of Sphericity reached statistical significance at $p=0.000$ ($p<0.05$) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.32.

Table 5.32: Scoring pattern for the characteristic and capacity challenges related to the IA

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.774
Bartlett's Test of Sphericity	Approx. Chi-Square	792.686
	df	171
	Sig.	0.000

Table 5.33 indicates the component matrix of the characteristics and capacity challenge of implementing agents. For factor analysis, principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded four factors. All nineteen items loaded on one of four factors separately.

Table 5.33: Component matrix for the characteristic and capacity challenges

Rotated Component Matrix[a]

	S19	Component			
		1	2	3	4
19.1	Implementing agents display effective leadership to the construction team	0.892	-0.128	0.102	-0.010
19.2	Implementing agents communicate effectively with the construction team	0.835	-0.091	0.161	0.069
19.3	Implementing agents understand construction project activities and sequencing involved in water and sanitation projects	0.818	-0.032	-0.049	0.074
19.4	Implementing agents understand and initiate time management strategies on projects	0.871	0.039	0.024	-0.108
19.5	Implementing agents in general have financial management abilities	0.877	0.022	0.127	0.174
19.6	Implementing agents fully understand scope management and report accurately to the Department of Education	0.908	-0.009	0.066	-0.048
19.7	Implementing agents fully understand time management and report accurately to the Department of Education	0.894	0.021	0.114	-0.141
19.8	Implementing agents fully understand quality management and report accurately to the Department of Education	0.894	0.035	0.068	-0.176
19.9	Implementing agents have the ability to make decisions and take decisive action to ensure the successful delivery of projects	0.808	-0.035	0.111	0.063
19.10	Implementing agents are generally recently graduated individuals who do not possess sufficient practical knowledge to manage projects	0.070	0.858	-0.110	-0.157
19.11	Recently graduated individuals at implementing agent offices are tasked to manage projects in order to reduce the overhead costs of the implementing agent	-0.037	0.882	-0.057	-0.180
19.12	There is minimal transfer of skills or proper handover of projects, when older and more experienced individuals at the Implementing agent bodies resign or retire	0.151	0.759	-0.121	0.278
19.13	Individuals at Implementing agent bodies are allocated too many projects to manage, which results in ineffective project management	0.054	0.675	-0.005	0.284
19.14	Processes and protocols akin to "box ticking" at implementing agent bodies, hinders the ability to realise the expenditure of budgets, i.e., there are too many processes to complete before a project reaches the tender stage	-0.174	0.448	-0.025	0.665
19.15	Implementing agents do not fully understand the Framework for Infrastructure Delivery and Procurement Management (FIDPM) which results in long approval times for procurement and construction processes	-0.149	0.813	-0.007	0.158
19.16	Even though the (FIDPM) may be comprehensive, it is not applied effectively by implementing agents	-0.402	0.592	0.119	0.330

Table 5.33: Component matrix for the characteristic and capacity challenges/continued

19 17	The funds allocated to the Department of Basic Education and Implementing Agents are sufficiently utilised within any specific financial year, that is to say, that there are minimal funds left unused at the end of a financial year	0.129	-0.057	0.931	-0.069
19 18	The funds allocated to the Department of Basic Education and Implementing agents are utilised correctly, that is to say, wasteful expenditure is avoided	0.227	-0.108	0.875	0.065
19 19	The priority list of projects is not always aligned to the budgets which are available at governmental level, resulting in abortive costs in related to the payment of professional consultants' fees and tender costs	0 083	0 041	0 004	0 791

Table 5.34 displays how much variance is explained by the factors. PCA technique using principle axis factoring exhibited 7.321, 3.966, 1.646 and 1.262 explaining 38.53%, 20.87%, 8.66% and 6.64% of the variance respectively and 74.71% of the total variance.

Table 5.34: Total variance explained for the characteristic and capacity challenges

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.321	38.534	38.534	7.321	38.534	38.534	7.088	37.306	37.306
2	3.966	20.872	59.406	3.966	20.872	59.406	3.807	20.035	57.341
3	1.646	8.663	68.069	1.646	8.663	68.069	1.766	9.296	66.637
4	1.262	6.643	74.712	1.262	6.643	74.712	1.534	8.075	74.712
5	0.875	4.605	79.318						
6	0.706	3.714	83.032						
7	0.571	3.005	86.037						
8	0.528	2.781	88.818						
9	0.441	2.320	91.138						
10	0.381	2.006	93.143						
11	0.289	1.522	94.666						
12	0.225	1.183	95.849						
13	0.168	0.886	96.735						
14	0.151	0.796	97.531						
15	0.151	0.794	98.325						
16	0.111	0.584	98.909						
17	0.092	0.483	99.392						
18	0.078	0.412	99.804						
19	0.037	0.196	100.000						

The following items loaded on component 1 (For ease of explanation a table format is presented, due to the number of statements within this question).

Table 5.35: Loadings of items for component 1 (Q19)

S19.1	Implementing agents display effective leadership to the construction team
S19.2	Implementing agents communicate effectively with the construction team
S19.3	Implementing agents understand construction project activities and sequencing involved in water and sanitation projects
S19.4	Implementing agents understand and initiate time management strategies on projects
S19.5	Implementing agents in general have financial management abilities

Table 5.35: Loadings of items for component 1 (Q19)/ continued

S19.6	-Implementing agents fully understand scope management and report accurately to the Department of Education
S19.7	Implementing agents fully understand time management and report accurately to the Department of Education
S19.8	Implementing agents fully understand quality management and report accurately to the Department of Education
S19.9	Implementing agents have the ability to make decisions and take decisive action to ensure the successful delivery of projects

This component can be described as ***"Understanding the key characteristics to qualify as an Implementing Agent for infrastructure projects.***

The following items loaded in component 2:

Table 5.36: Loadings of items for component 2 (Q19)

S19.10	Implementing agents are generally recently graduated individuals who do not possess sufficient practical knowledge to manage projects
S19.11	Recently graduated individuals at implementing agent offices are tasked to manage projects in order to reduce the overhead costs of the implementing agent
S19.12	There is minimal transfer of skills or proper handover of projects, when older and more experienced individuals at the Implementing agent bodies resign or retire
S19.13	Individuals at Implementing agent bodies are allocated too many projects to manage, which results in ineffective project management
S19.15	Implementing agents do not fully understand the Framework for Infrastructure Delivery and Procurement Management (FIDPM) which results in long approval times for procurement and construction processes
S19.16	Even though the (FIDPM) may be comprehensive, it is not applied effectively by implementing agents

This component can be described as ***"Internal organisational challenges which implementing agents need to address"***

Component 3 dealt with expenditure of funding received by the IA and items S19.17 and S19.18 loaded on this component. These items are the funds allocated to the Department of Basic Education and Implementing Agents are sufficiently utilised within any specific financial year, that is to say, that there are minimal funds left unused at the end of a financial year and the funds allocated to the Department of Basic Education and Implementing Agents (IA's) are utilised correctly, that is to say, wasteful expenditure is avoided respectively/

This component can be described as ***"Effective project budget expenditure for water and sanitation projects".***

Component 4 consisted of 2 loadings which included S19.4 the processes and protocols akin to "box ticking" at implementing agent bodies, hinders the ability to realise the expenditure of budgets, i.e., there are too many processes to complete before a project reaches the tender stage and S19.9 the priority list of projects is not always aligned to the budgets which are available at governmental level, resulting in abortive costs in related to the payment of professional consultants' fees and tender costs.
This component can be described as ***"Effective planning for infrastructure projects"***

The Cronbach's Alpha is 0.840 which indicates a high degree of internal consistency of responses for this question.

Christopher (2018) indicates that IA; s employ incompetent employees who do not possess the necessary skill and experience to undertake construction projects, albeit they have the necessary qualification. Table 5.37 displays the project related challenges that BEP's experience with IA's. As indicated in Table 5.37 all responses are aligned to a high degree of agreement. Equal Education (2018) also indicated that IAs are supposed to have in their employ experienced BEP's who understand construction and its processes, but this is not the case.

Table 5.37 displays the scoring pattens for the project related characteristics of the Implementing Agent. Forty-four percent of the participants agreed that IAs prefer to delay decisions in order to avoid accountability (S20.1). A further 17.3% (equating to a total of 61.5% of participants) strongly agreed with this. Twenty-three percent provided a neutral response but the level of agreement outweighs this percentage. Twenty eight percent agreed and twenty once percent of participants strongly agreed that variation orders are issued by IAs without the necessary approvals, resulting in risks to the consultant and contractor (S20.2). A significant percentage (50.0%) of participants agreed and 25% strongly agreed that IAs realize too late in the financial year that project budgets are not spent (S20.3). With regards to the time of the award of projects, it was recorded that 40.04% and 46.2% of participants agreed that projects are awarded months after the needs assessment is complete which can sometimes result in a mismatch between what was audited and what the situation is currently on site (S20.8)

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher agreement and lower agreement.

The results shown in Table 5.37 indicate that all items reflected a $p<0.05$ which indicates that the responses per statement were not similar and aligns to the high levels of agreement per statement.

Table 5.37: Scoring patterns for the project related challenges of Implementing Agents

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S20.1	Implementing agents prefer to delay decisions so as not to be accountable for decisions taken on projects	1	1.9	7	13.5	12	23.1	23	44.2	9	17.3	< 0.001
S20.2	Implementing agents issue instructions to execute variation orders without prior approval, resulting in risks to the consultant and contractor, in the event the variation order cannot be formally approved due to a lack of funds	2	3.8	6	11.5	18	34.6	15	28.8	11	21.2	0.003
S20.3	Realisation by the implementing agent that project budgets have not been spent, occurs too late in the financial year	1	1.9	4	7.7	8	15.4	26	50.0	13	25.0	< 0.001
S20.4	Protracted project approvals also negatively impact learners at schools who do not have sufficient water and sanitation facilities	0	0.0	2	3.8	4	7.7	24	46.2	22	42.3	< 0.001
S20.5	Implementing agents lack accountability to make decisions	0	0.0	3	5.8	12	23.1	27	51.9	10	19.2	< 0.001
S20.6	Implementing agents take too long to approve construction projects, which negatively impacts on the Infrastructure Programme Implementation Plan (IPIP) budgets allocated for any specific year and/or future years	1	1.9	2	3.8	7	13.5	28	53.8	14	26.9	< 0.001
S20.7	Projects have been delayed due to the delay caused by the relevant adjudication committees at implementing agent bodies	0	0.0	2	3.8	11	21.2	22	42.3	17	32.7	0.001
S20.8	Implementing agents at times award contracts months after a need's assessment of schools was conducted	0	0.0	1	1.9	6	11.5	21	40.4	24	46.2	< 0.001
S20.9	There is an inconsistent application of penalties for slow progress of certain contractors	3	5.8	1	1.9	12	23.1	21	40.4	15	28.8	< 0.001
S20.10	Implementing agents do not exercise their right to place defaulting contractors on the defaulters list	1	1.9	3	5.8	9	17.3	19	36.5	20	38.5	< 0.001
S20.11	Implementing agents do not attend site meetings	4	7.7	6	11.5	14	26.9	16	30.8	12	23.1	0.036

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.758, thereby greater than the recommended value of 0.50 and the Bartletts test of Sphericity reached statistical significance

at p=0.000 (p<0.05) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.38.

Table 5.38: KMO and Bartletts test for the project related challenges of Implementing Agents

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.758
Bartlett's Test of Sphericity	Approx. Chi-Square	282.739
	df	55
	Sig.	0.000

Table 5.39 indicates the component matrix for the project related challenges of implementing agents. For factor analysis, principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded three factors. All eleven items loaded on three components separately.

Table 5.39: Component matrix for the project related challenges of Implementing Agents

Rotated Component Matrix[a]

	S20	Component		
		1	2	3
20.1	Implementing agents prefer to delay decisions so as not to be accountable for decisions taken on projects	0.034	0.575	0.479
20.2	Implementing agents issue instructions to execute variation orders without prior approval, resulting in risks to the consultant and contractor, in the event the variation order cannot be formally approved due to a lack of funds	0.050	0.846	0.179
20.3	Realisation by the implementing agent that project budgets have not been spent, occurs too late in the financial year	0.387	0.771	0.002
20.4	Protracted project approvals also negatively impact learners at schools who do not have sufficient water and sanitation facilities	0.881	0.211	0.037
20.5	Implementing agents lack accountability to make decisions	0.426	0.720	-0.017
20.6	Implementing agents take too long to approve construction projects, which negatively impacts on the Infrastructure Programme Implementation Plan (IPIP) budgets allocated for any specific year and/or future years	0.599	0.393	0.353
20.7	Projects have been delayed due to the delay caused by the relevant adjudication committees at implementing agent bodies	0.771	0.086	0.318
20.8	Implementing agents at times award contracts months after a need's assessment of schools was conducted	0.771	0.205	0.229
20.9	There is an inconsistent application of penalties for slow progress of certain contractors	0.221	0.056	0.779
20.10	Implementing agents do not exercise their right to place defaulting contractors on the defaulters list	0.305	0.260	0.672
20.11	Implementing agents do not attend site meetings	0.103	0.019	0.899

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Table 5.40 displays how much variance is explained by these factors. PCA technique using principle axis factoring exhibited 4.898, 1.599 and 1.202 explaining 44.53%, 14.53% and 10.93% of the variance respectively and 69.99% of the total variance.

Table 5.40: Total Variance Explained for the project related challenges of Implementing Agents

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.898	44.529	44.529	4.898	44.529	44.529	2.811	25.554	25.554
2	1.599	14.533	59.062	1.599	14.533	59.062	2.479	22.541	48.094
3	1.202	10.930	69.992	1.202	10.930	69.992	2.409	21.897	69.992
4	0.939	8.535	78.527						
5	0.594	5.395	83.922						
6	0.436	3.961	87.883						
7	0.394	3.586	91.469						
8	0.333	3.031	94.501						
9	0.258	2.350	96.850						
10	0.197	1.793	98.643						
11	0.149	1.357	100.000						

Extraction Method: Principal Component Analysis.

The items which loaded on component 1 dealt with the long approval times which are associated with implementing agents. Item S20.4 indicated protracted project approvals also negatively impact learners at schools who do not have sufficient water and sanitation facilities while item S20.6 dealing with the fact that implementing agents take too long to approve construction projects, which negatively impacts on the Infrastructure Programme Implementation Plan (IPIP) budgets allocated for any specific year and or future years. Item S20.7 indicating that projects have been delayed due to the delay caused by the relevant adjudication committees at implementing agent bodies and item S20.8 noting that Implementing agents at times award contracts months after a need's assessment of schools was conducted. This component can be labelled ***"Impact of delayed project approvals"***

Component 2 consisted of items S20.1, S20.2, S20.3 and S20.5 and these items can be attributed to accountable decision making. The items are, Implementing agents prefer to delay decisions so as not to be accountable for decisions taken on projects (S20.1), Implementing agents issue instructions to execute variation orders without prior approval, resulting in risks to the consultant and contractor, in the event the variation order cannot be formally approved due to a lack of funds (S20.2), realisation by the implementing agent that project budgets have not been spent, occurs too late in the financial year (S20.3) and Implementing agents lack accountability to make decisions (S20.5). This component can be labelled ***"Accountable decisions making by the Implementing Agent.***

Component 3 contained items that related to the contractors who are appointed by the IA and items S20.9, indicated that there is an inconsistent application of penalties for slow progress of certain contractors, S20.10 Implementing agents do not exercise their right to place defaulting contractors on

the defaulters list and S20.11, Implementing agents do not attend site meetings loaded on component 3. This component can be labelled ***"Monitoring of site activities and corrective action for defaulting contractors"***

The Cronbach's Alpha is 0.865 which is higher than the recommended value of 0.70 and indicated a high degree of internal consistency in responses.
The findings of the DBE (2019), noted that even though IA's have established norms and practices, in place, for project approvals, these processes take too long to be expedited. They (DBE) also indicate that variations orders are not approved yet the contractor is given an instruction to proceed on site.

Table 5.41 indicates the challenges to the adjudication of contractor's tenders. As can be seen from Table 5.41 all responses are aligned to a high level of agreement. With regards to the awarding of projects at prices which was not aligned to the approved tender estimate, 34.6% of participants agreed that and 38.5% strongly agreed with this statement (S21.1). The impact of non-completion of projects when awarding projects at lower budgets was agreed by 38.5% and 50% strongly agreed (S21.2). Forty-six percent of participants agreed that there is poor assessment of the capability and track record of contractors (S21.5) and approximately thirty-six percent strongly agreed with this statement. There were responses aligned to neutral for each statement that is, approximately 17.3%, 3.8%, 21.2%, for S21.1, S21.2 and S21.3 respectively, however these percentages are outweighed by the higher levels of agreement.

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher agreement and lower agreement.

The results are shown in Table 5.41 All items indicate a $P<0.05$ and are therefore indicative of the fact that distributions were not similar.

Table 5.41: Scoring pattern for the challenges related to the adjudication of tenders

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S21.1	Implementing agents award contracts at prices which are not aligned to the approved tender estimate, that is to say substantially lower than the project budget	0	0.0	5	9.6	9	17.3	18	34.6	20	38.5	0.008
S21.2	Awarding projects at lower budgets at times results in a contractor who cannot complete the project due to inadequate pricing on their part	0	0.0	4	7.7	2	3.8	20	38.5	26	50.0	< 0.001
S21.3	Implementing agents award too many projects to the same contractor and over capacitation of projects will result in the inability to complete projects on time due to a lack of cash flow and labour resources	1	1.9	4	7.7	9	17.3	22	42.3	16	30.8	< 0.001
S21.4	The capability and track record of the contractor is not adequately assessed at tender adjudication stage	0	0.0	3	5.8	11	21.2	22	42.3	16	30.8	0.002
S21.5	Poor assessment of capability and track record results in poor workmanship on site	0	0.0	1	1.9	8	15.4	24	46.2	19	36.5	< 0.001
S21.6	Poor assessment of capability and track record results in delays on the project, due to the contractor rectifying defective work	0	0.0	1	1.9	8	15.4	21	40.4	22	42.3	< 0.001

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.780, thereby greater than the recommended value of 0.50 and the Bartletts test of sphericity reached statistical significance at p=0.000 (p<0.05) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.42.

Table 5.42: KMO and Bartletts test for the challenges related to the adjudication of tenders

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.780
Bartlett's Test of Sphericity	Approx. Chi-Square	188.437
	df	15
	Sig.	0.000

Table 5.43 indicates the component matrix for challenges related to the adjudication of contractor's tenders. For factor analysis, principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded one factor. All items loaded on a single component/factor.

Table 5.43: Component matrix for the challenges related to the adjudication of tenders

Component Matrix[a]

	S21	Component
		1
21.1	Implementing agents award contracts at prices which are not aligned to the approved tender estimate, that is to say substantially lower than the project budget	0.764
21.2	Awarding projects at lower budgets at times results in a contractor who cannot complete the project due to inadequate pricing on their part	0.739
21.3	Implementing agents award too many projects to the same contractor and over capacitation of projects will result in the inability to complete projects on time due to a lack of cash flow and labour resources	0.764
21.4	The capability and track record of the contractor is not adequately assessed at tender adjudication stage	0.846
21.5	Poor assessment of capability and track record results in poor workmanship on site	0.818
22.6	Poor assessment of capability and track record results in delays on the project, due to the contractor rectifying defective work	0.801

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Table 5.44 displays how much variance is explained by the factor. PCA technique using principle axis factoring exhibited 3.739 and 62.32% of the variance and total variance.

Table 5.44: Total variance explained for the challenges related to the adjudication of tenders

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.739	62.317	62.317	3.739	62.317	62.317
2	0.962	16.029	78.346			
3	0.608	10.127	88.474			
4	0.317	5.276	93.750			
5	0.267	4.443	98.193			
6	0.108	1.807	100.000			

Extraction Method: Principal Component Analysis.

This component can be labelled as ***"Acceptable adjudication of contractors tenders".***

The Auditor General of South Africa (2011) findings indicated that the capacity of the building contractor was not checked prior to the award of projects resulting in failure to execute the projects successfully. They also indicated that the background of the contractors was not checked prior to award.

The Cronbach's Alphas for this component is 0.875 which indicates a high degree of internal consistency of responses.

Table 5.45 indicates challenges related to contractors. As can be seen from Table 5.45 all responses are aligned to higher levels of agreement. There was an agreement (40.41%) from BEP's that contractors are not paid on time (S22.1) and 36.5% strongly agree with this statement. A total of 90.4% (34.6% agreed and 55.8% strongly agreed) agreed that late payments to contractors result in cash flow challenges (S22.2). Seventy five percent of participants agreed that (34.6% agreed and 40.4% strongly

agreed) that extension of time claims take too long to be approved (S22.4) and once approved the turn-around time to reverse penalties levied to the contractor also takes too long (S22.5). There were neutral responses recorded for each item, however their percentages (19.2%, 7.7%, 17.3%, etc.) for S22.1, S22.2 and S22.3 were outweighed by the higher levels of agreement, which were recorded.

Table 5.45: Scoring pattern for the challenges related to contractors

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S22.1	Payments to contractors are not completed on time	0	0.0	2	3.8	10	19.2	21	40.4	19	36.5	0.001
S22.2	Late payments to contractors result in cash flow challenges with suppliers of materials, interest payments and bad credit records	0	0.0	1	1.9	4	7.7	18	34.6	29	55.8	< 0.001
S22.3	Implementing agents often lose documentation, resulting in duplication of effort when contractors have to re-submit information	0	0.0	6	11.5	13	25.0	20	38.5	13	25.0	0.057
S22.4	Implementing agents take too long to approve extension of time claims, resulting in contractor claims being subjected to penalties for not meeting the Practical Completion date	0	0.0	4	7.7	9	17.3	18	34.6	21	40.4	0.003
S22.5	The turnaround time to reverse penalties after the extension of time is eventually approved takes too long to finalise	0	0.0	2	3.8	17	32.7	15	28.8	18	34.6	0.005

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher agreement and lower agreement.

The results are shown in Table 5.45. All items except S22.3 exhibit values less than 0.05 which indicates that their distributions were significant.

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.691, thereby greater than the recommended value of 0.50 and the Bartletts test of sphericity reached statistical significance at $p=0.000$ ($p<0.05$) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.46

Table 5.46: KMO and Bartletts for the challenges related to contractors

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.691
Bartlett's Test of Sphericity	Approx. Chi-Square	136.799
	Df	10
	Sig.	0.000

Table 5.47 indicates the component matrix for challenges related to contractors. For factor analysis, principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded one factor. All items loaded on one component.

Table 5.47: Component matrix for the challenges related to contractors

Component Matrix[a]

	S22	Component
		1
22.1	Payments to contractors are not completed on time	0.643
22.2	Late payments to contractors result in cash flow challenges with suppliers of materials, interest payments and bad credit records	0.712
22.3	Implementing agents often lose documentation, resulting in duplication of effort when contractors have to re-submit information	0.823
22.4	Implementing agents take too long to approve extension of time claims, resulting in contractor claims being subjected to penalties for not meeting the Practical Completion date	0.892
22.5	The turnaround time to reverse penalties after the extension of time is eventually approved takes too long to finalise	0.833

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Table 5.48 displays the total variance explained by this factor. PCA technique using principal axis factoring exhibited 3.088 explaining 61.76% of the variance and total variance.

Table 5.48: Total variance explained for the challenges related to contractors

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.088	61.757	61.757	3.088	61.757	61.757
2	0.987	19.745	81.502			
3	0.539	10.787	92.289			
4	0.223	4.466	96.755			
5	0.162	3.245	100.000			

Extraction Method: Principal Component Analysis.

This component can be labelled ***"Efficient contact management/ administration".***

The Cronbach Alpha is 0.843 which indicates a high degree of internal consistency of responses.

The Auditor General of South Africa Report (2011) indicated that approvals to proceed from estimate/feasibility to tender documentation, from adjudication to award or to approve variation orders took too long. They (Auditor General, 2011), also indicated late payments to contractors resulting in cash flow contractors. This finding was also indicated by DBE (2019). Christopher (2018), indicated that IAs frequently misplace documentation and shared the same sentiments with regards to the long approval times.

Table 5.49 indicates the questions and results for the challenges related to the BEP's, professional consultancy.

As can be seen from Table 5.49 most responses are aligned to a high degree of alignment. Thirty eight percent of BEP's agreed that IAs place an overbearing reliance on consultants with 34.6% strongly agreeing with this statement (S23.1). Approximately forty two percent agreed and approximately forty-four percent strongly agreed that IAs subject consultants to tight deadlines to meet project budget expenditure (S23.3). With regards to S23.7 while still displaying higher degrees of agreement (25% agree and 25% strongly agree) this statement also received a high neutral response (36.5%) indicating that the process which IAs follow to appoint professional service providers is not fair and transparent. A similar response pattern is seen for S23.8 where a 38.5% neutral response pattern is seen for IAs allocating small capacity firms with a large number of projects. Ninety-two percent of BEP's (42.3% agree and 50% strongly agreed) that late payments result in cash flow challenges and retrenchment of staff (S23.16). In general, neutral responses are seen for all statements, however these percentages (23.1%, 13.5%, 9.6%, etc.) are outweighed by the higher levels of agreement.

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher agreement and lower agreement.

The results are shown in Table 5.49 All items indicate a $P<0.05$ and are therefore indicative of distributions which are not similar.

Table 5.49: Scoring matrix for challenges related to the BEP's, professional consultancy

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S23.1	Implementing agents place and an overbearing reliance on consultants to manage projects and budgets	0	0.0	2	3.8	12	23.1	20	38.5	18	34.6	0.002
S23.2	Implementing agents request that consultants provide feedback to end user departments, mainly because they (the Implementing agent), lack skill or are over capacitated	0	0.0	5	9.6	7	13.5	19	36.5	21	40.4	0.002
S23.3	Implementing agents' subject consultants to tight deadlines to meet project budget expenditure	0	0.0	2	3.8	5	9.6	22	42.3	23	44.2	< 0.001
S23.4	Awarding projects at lower budgets sometimes results in termination of the project	0	0.0	1	1.9	12	23.1	17	32.7	22	42.3	< 0.001
S23.5	Awarding projects at lower budgets sometimes results in the related administrative burden for the consultant to close out the project and appoint a new contractor	0	0.0	1	1.9	6	11.5	21	40.4	24	46.2	< 0.001
S23.6	Implementing agents take too long to approve projects which has a negative effect on cash flow	0	0.0	3	5.8	5	9.6	22	42.3	22	42.3	< 0.001
S23.7	The process the implementing agent follows to appoint professional service providers is not fair and transparent	1	1.9	6	11.5	19	36.5	13	25.0	13	25.0	0.001
S23.8	At times implementing agents allocate smaller capacity firms with a large number of projects	1	1.9	3	5.8	20	38.5	18	34.6	10	19.2	< 0.001
S23.9	Implementing agents often lose documentation, resulting in duplication of effort from consultants	0	0.0	2	3.8	12	23.1	22	42.3	16	30.8	0.001
S23.10	Late award of schools by implementing agents results in additional work for the consultant in order to ensure that the budget is properly managed and not exceeded due to scope changes	0	0.0	1	1.9	9	17.3	24	46.2	18	34.6	< 0.001

Table 5.49: Scoring matrix for challenges related to the BEP's, professional consultancy/ continued

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S23.11	Projects move through fairly quickly from feasibility to tender documentation, only to be delayed prior to the tender advertisement	2	3.8	4	7.7	10	19.2	21	40.4	15	28.8	< 0.001
S23.12	Implementing agents appoint more than one consultant for the same school, ultimately resulting in the termination of one appointment	3	5.8	9	17.3	12	23.1	18	34.6	10	19.2	0.024
S23.13	Sudden termination of consultant appointments by implementing agents has impacts on cash flows and profitability as reliance was placed on the income generation of the project	0	0.0	2	3.8	9	17.3	24	46.2	17	32.7	< 0.001
S23.14	Implementing agents do not pay consultants on time	0	0.0	1	1.9	6	11.5	17	32.7	28	53.8	< 0.001
S23.15	Implementing agents choose which consultants to pay at the end of every month	2	3.8	1	1.9	25	48.1	11	21.2	13	25.0	< 0.001
S23.16	Late payment to consultants results in cash flow challenges and possible retrenchment of staff	0	0.0	1	1.9	3	5.8	22	42.3	26	50.0	< 0.001
S23.17	Consultants are requested by implementing agents to follow departmental guidelines for the design of infrastructure for schools, only for the designs to be refuted prior to tender	1	1.9	4	7.7	17	32.7	17	32.7	13	25.0	< 0.001
S23.18	At site handover implementing agents raise design disputes on standard departmental guidelines	1	1.9	3	5.8	15	28.8	22	42.3	11	21.2	< 0.001
S23.19	Consultants are at times accused of increasing the project scope for their own gain (additional professional fees) when design guidelines are disputed	1	1.9	5	9.6	11	21.2	20	38.5	15	28.8	< 0.001

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.796, thereby greater than the recommended value of 0.50 and the Bartletts test of sphericity reached statistical significance

at p=0.000 (p<0.05) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.50.

Table 5.50: KMO and Bartlett's test for challenges related to the BEP's, professional consultancy

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.796
Bartlett's Test of Sphericity	Approx. Chi-Square	671.252
	Df	171
	Sig.	0.000

Table 5.51 displays the component matrix for challenges related to the BEP's 'professional consultancy'. For factor analysis, principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded four factors. All items loaded on 1 of 4 components separately.

Table 5.51: Component Matrix for challenges related to the BEP's, professional consultancy

Rotated Component Matrix[a]

	S23	Component			
		1	2	3	4
23.1	Implementing agents place and an overbearing reliance on consultants to manage projects and budgets	0.846	0.274	0.189	-0.080
23.2	Implementing agents request that consultants provide feedback to end user departments, mainly because they (the Implementing agent), lack skill or are over capacitated	0.617	0.342	0.333	0.002
23.3	Implementing agents' subject consultants to tight deadlines to meet project budget expenditure	0.660	0.137	0.357	0.371
23.4	Awarding projects at lower budgets sometimes results in termination of the project	0.122	0.213	0.296	0.826
23.5	Awarding projects at lower budgets sometimes results in the related administrative burden for the consultant to close out the project and appoint a new contractor	0.316	0.262	0.289	0.780
23.6	Implementing agents take too long to approve projects which has a negative effect on cash flow	0.709	0.327	0.197	0.285
23.7	The process the implementing agent follows to appoint professional service providers is not fair and transparent	0.218	0.560	0.084	0.387
23.8	At times implementing agents allocate smaller capacity firms with a large number of projects	0.340	0.490	0.208	0.378
23.9	Implementing agents often lose documentation, resulting in duplication of effort from consultants	0.384	0.635	0.100	0.201
23.10	Late award of schools by implementing agents results in additional work for the consultant in order to ensure that the budget is properly managed and not exceeded due to scope changes	0.408	0.176	0.642	0.245
23.11	Projects move through fairly quickly from feasibility to tender documentation, only to be delayed prior to the tender advertisement	-0.040	0.170	0.765	0.261
23.12	Implementing agents appoint more than one consultant for the same school, ultimately resulting in the termination of one appointment	0.151	0.839	0.191	-0.020

Table 5.51: Component Matrix for challenges related to the BEP's, professional consultancy/ continued

	S23	Component			
		1	2	3	4
23.13	Sudden termination of consultant appointments by implementing agents has impacts on cash flows and profitability as reliance was placed on the income generation of the project	0.293	0.248	0.733	0.261
23.14	Implementing agents do not pay consultants on time	0.793	0.056	-0.118	0.250
23.15	Implementing agents choose which consultants to pay at the end of every month	0.229	0.682	0.103	0.164
23.16	Late payment to consultants results in cash flow challenges and possible retrenchment of staff	0.658	0.204	0.327	0.227
23.17	Consultants are requested by implementing agents to follow departmental guidelines for the design of infrastructure for schools, only for the designs to be refuted prior to tender	-0.012	0.670	0.489	0.257
23.18	At site handover implementing agents raise design disputes on standard departmental guidelines	0.137	0.806	0.155	0.110
23.19	Consultants are at times accused of increasing the project scope for their own gain (additional professional fees) when design guidelines are disputed	0.506	0.183	0.706	-0.007

Table 5.52 indicates the total variance explained by these factors. PCA technique using principal axis factoring exhibited 8.903, 1.802, 1.487 and 1.067 explaining 46.86%, 9.48%, 7.83% and 5.61% of the variance and 69.78% of the total variance.

Table 5.52: Total variance explained for challenges related to the BEP's, professional consultancy

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.903	46.860	46.860	8.903	46.860	46.860	4.125	21.710	21.710
2	1.802	9.484	56.344	1.802	9.484	56.344	3.857	20.301	42.012
3	1.487	7.825	64.169	1.487	7.825	64.169	3.010	15.840	57.851
4	1.067	5.613	69.782	1.067	5.613	69.782	2.267	11.931	69.782
5	0.924	4.861	74.643						
6	0.867	4.561	79.205						
7	0.629	3.308	82.513						
8	0.568	2.987	85.500						
9	0.508	2.673	88.172						
10	0.410	2.155	90.328						
11	0.377	1.982	92.310						

Table 5.52: Total variance explained for challenges related to the BEP's, professional consultancy continued

12	0.327	1.720	94.031						
13	0.302	1.592	95.623						
14	0.239	1.258	96.881						
15	0.185	0.973	97.854						
16	0.148	0.778	98.631						
17	0.108	0.566	99.197						
18	0.089	0.467	99.664						
19	0.064	0.336	100.000						

Extraction Method: Principal Component Analysis.

The items which loaded on component 1 related to the relationship between the consultant (BEP) and the IA. The items which loaded on component 1 are S23.1, Implementing agents place and an overbearing reliance on consultants to manage projects and budgets, S23.2, Implementing agents request that consultants provide feedback to end user departments, mainly because they (the Implementing agent), lack skill or are over capacitated, S23.3 Implementing agents' subject consultants to tight deadlines to meet project budget expenditure, S23.6 Implementing agents take too long to approve projects which has a negative effect on cash flow, S23.14 Implementing agents do not pay consultants on time and S2316 late payment to consultants results in cash flow challenges and possible retrenchment of staff and S23.15- Implementing agents choose which consultants to pay at the end of every month This component can be labelled as ***"Reliance on the Built Environmental Professional and non-payment of professional fees"***

The items which loaded on component 2, comprise statements which deal with the internal administration of the IA as well as that of the BEP. Item S23.7 which indicated that the processes which the implementing agent follows to appoint professional service providers is not fair and transparent, while item S23.8 indicated that at times implementing agents allocate smaller capacity firms with a large number of projects, item S23.9 noted that Implementing Agents often lose documentation, resulting in duplication of effort from consultants, item S23.12 noted that Implementing agents appoint more than one consultant for the same school, ultimately resulting in the termination of one appointment, item S23.17 indicated that consultants are requested by implementing agents to follow departmental guidelines for the design of infrastructure for schools, only for the designs to be refuted prior to tender and S23.18 at site handover implementing agents raise design disputes on standard departmental guidelines. This component can be labelled "***Transparency in the appointment and management of built environment professionals"***

Items 23.10, 11, 13 and 19 loaded on component 3 and these items dealt with the award of schools and professional fee cash flows of the BEP's. The items are accordingly the late award of schools by implementing agents results in additional work for the consultant in order to ensure that the budget is properly managed and not exceeded due to scope changes, the fact that projects move through fairly quickly from feasibility to tender documentation, only to be delayed prior to the tender advertisement, the sudden termination of consultant appointments by implementing agents has impacts on cash flows and profitability as reliance was placed on the income generation of the project and the fact that consultants are at times accused of increasing the project scope for their own gain (additional professional fees) when design guidelines are disputed. This component can be labelled *"**Timeous award of projects to enable Built Environment Professionals' to realise cash flows for their business operations"***

Component 4 consisted of 2 items which was focussed on the budget at which the IA awards projects. Item S23.4, awarding projects at lower budgets sometimes results in termination of the project and S23.5 awarding projects at lower budgets sometimes results in the related administrative burden for the consultant to close out the project and appoint a new contractor. This component can be labelled *"**Alignment of project award value as per the Built Environment Professionals' estimate"***

The Cronbach Alpha for these components is 0.932 indicating a high degree of internal consistency in responses.

This section dealt with the challenges which Built Environment Professionals experience when working with IAs. Equal Education (2018) indicated that although IAs are paid by DBE to implement projects, this function, however merely translates to an oversight and reporting, as they appoint BEP's to execute the actual work. The Auditor General of South Africa (2011) made specific mention of the late payments of professional fees and the resultant impact on BEP's cash flow.

5.3.7 Section Seven: Possible solutions to the Implementing Agents scenario.

This section attempts to provide possible solutions to the IA challenge the BEP was asked to rate their agreement on certain possible solutions proposed by Christopher (2018) and Equal Education (2018) There were also two open ended questions where the BEP was requested to provide examples of any further challenges which they may have experienced. The BEP was also requested to provide other possible solutions which may assist in alleviating the current challenges with IAs.

Table 5.53 indicates the responses from the participants as they relate to possible solutions to the IA scenario. All responses are aligned to higher levels of agreement. Approximately fifty-three percent of participants agreed that Provincial Education Departments should award projects to IAs based on their

track record and capacity (S24.1) Approximately eighty-two percent of participants agreed that infrastructure reports need to be made public (34.6% agree and 48.10% strongly agree) (S24.2). Ninety-six percent of participants agreed (34.6% agreed and 61.5% strongly agreed) agreed that strict action must be taken against defaulting contractors (S24.4). Item S25.5 which related to the use of professional built environment consultants only instead of IAs received a 26.9% response for "agreed" and 42.3% for strongly agreed. There was however a 25% neutral response for the latter statement as well. A large percent (84.6%) agreed that Implementing Agents should utilise retired professionals to train and mentor recently graduated individuals at IA organisations (S24.9) (30.8% agreed and 53.80% strongly agreed.

To determine, whether the scoring patterns per statement were significantly different, per option, a Chi-Square goodness-of-fit test was done. The null hypothesis claims that similar number of respondents scored across each option for each statement. The alternative states that there is a significant difference between the levels of higher agreement and lower agreement.

The results are shown in Table 5.53 All items indicate a $P<0.05$ and are therefore indicative of distributions which are not similar.

Table 5.53: Scoring patterns for possible solutions to the Implementing Agent scenario

		Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi Square p-value
		Count	%	Count	%	Count	%	Count	%	Count	%	
S24.1	Provincial Education Departments should allocate projects to implementing agents based on their capacity and track record	0	0.0	2	3.8	4	7.7	18	34.6	28	53.8	< 0.001
S24.2	Allow for infrastructure reports and reporting tools to be made available to the public so that implementing agents can be held accountable	0	0.0	6	11.5	3	5.8	18	34.6	25	48.1	< 0.001
S24.3	Include school principals, governing bodies and teachers in project steering committees to ensure that there is transparency and accountability, especially when school projects take too long to be approved or are removed from procurement lists	1	1.9	4	7.7	5	9.6	23	44.2	19	36.5	< 0.001
S24.4	Implementing agents must take strict action against contractors who do not perform and must place them on defaulters lists so that additional projects are not awarded to them	0	0.0	0	0.0	2	3.8	18	34.6	32	61.5	< 0.001
S24.5	Only utilise the services of professional consultants for construction projects and remove the implementing agent from the supply chain management process	0	0.0	3	5.8	13	25.0	14	26.9	22	42.3	0.003
S24.6	The Department of Basic Education should create project implementing/infrastructure departments whose sole task is to supervise construction projects	2	3.8	2	3.8	10	19 2	20	38.5	18	34.6	< 0.001
S24.7	The above-mentioned implementing/infrastructure departments of the Department of Basic Education must consist of registered and experienced professionals who have worked in and have sufficient experience in the built environment	2	3.8	0	0.0	5	9.6	18	34.6	27	51.9	< 0.001
S24.8	Based on the concept of the above-mentioned implementing/infrastructure department, the Department of Basic Education should then appoint professional consultants who report to their implementing infrastructure department	0	0.0	2	3.8	10	19 2	19	36.5	21	40.4	0.001
S24.9	Implementing Agents should consider mobilising retired professionals to assist, train and mentor recently graduated individuals at implementing agent bodies	1	1.9	0	0.0	7	13 5	16	30.8	28	53.8	< 0.001
S24.10	Consideration should be given to the introduction of study modules at University and Technikon level which provide an understanding of public sector procurement and supply chain management	0	0.0	0	0.0	6	11 5	20	38.5	26	50.0	0.002

The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO test) value was 0.705, thereby greater than the recommended value of 0.50 and the Bartletts test of Sphericity reached statistical significance at p=0.000 (p<0.05) thereby favouring the factorability of the correlation matrix. These values indicate that factor analysis was useful for the data. The values are indicated in Table 5.54

Table 5.54: Scoring patterns for possible solutions to the Implementing Agent scenario

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.705
Bartlett's Test of Sphericity	Approx. Chi-Square	279.464
	df	45
	Sig.	0.000

Table 5.55 provides the component matrix for possible solutions to the implementing agent scenario. For factor analysis principal component extraction was used with Kaiser Normalisation and Promax rotation with Kappa 4. Small coefficients were suppressed with an absolute value below 0.5. The factors returned were based on the number of interpretable factors. The Eigen-value-greater than-one criteria yielded three factors. All ten items loaded on three components separately.

Table 5.55:Component matrix for possible solutions to the Implementing Agent scenario

Rotated Component Matrix[a]

	S24	Component		
		1	2	3
24.1	Provincial Education Departments should allocate projects to implementing agents based on their capacity and track record	0.238	0.087	0.843
24.2	Allow for infrastructure reports and reporting tools to be made available to the public so that implementing agents can be held accountable	0.092	0.621	0.588
24.3	Include school principals, governing bodies and teachers in project steering committees to ensure that there is transparency and accountability, especially when school projects take too long to be approved or are removed from procurement lists	0.062	0.729	-0.029
24.4	Implementing agents must take strict action against contractors who do not perform and must place them on defaulters lists so that additional projects are not awarded to them	0.008	0.399	0.725
24.5	Only utilise the services of professional consultants for construction projects and remove the implementing agent from the supply chain management process	0.330	-0.021	0.723
24.6	The Department of Basic Education should create project implementing/infrastructure departments whose sole task is to supervise construction projects	0.872	0.153	0.220
24.7	The above-mentioned implementing/infrastructure departments of the Department of Basic Education must consist of registered and experienced professionals who have worked in and have sufficient experience in the built environment	0.946	0.022	0.143
24.8	Based on the concept of the above-mentioned implementing/infrastructure department, the Department of Basic Education should then appoint professional consultants who report to their implementing infrastructure department	0.800	0.370	0.195
24.9	Implementing Agents should consider mobilising retired professionals to assist, train and mentor recently graduated individuals at implementing agent bodies	0.159	0.748	0.123
24.10	Consideration should be given to the introduction of study modules at University and Technikon level which provide an understanding of public sector procurement and supply chain management	0.210	0.781	0.323

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Table 5.56 provides an indication of the total variance explained by these factors. PCA technique using principal axis factoring exhibited 4.475, 1.641 and 1.176 which explains 44.75%, 16.41% and 11.76% of the variance respectively and 72.92% of the total variance.

Table 5.56: Component matrix for possible solutions to the Implementing Agent scenario

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.475	44.749	44.749	4.475	44.749	44.749	2.544	25.443	25.443
2	1.641	16.413	61.162	1.641	16.413	61.162	2.416	24.155	49.599
3	1.176	11.760	72.922	1.176	11.760	72.922	2.332	23.324	72.922
4	0.788	7.884	80.806						
5	0.543	5.429	86.235						

Table 5.56: Component matrix for possible solutions to the Implementing Agent scenario/continued

6	0.465	4.647	90.882						
7	0.358	3.577	94.459						
8	0.287	2.873	97.332						
9	0.191	1.907	99.239						
10	0.076	0.761	100.000						

Extraction Method: Principal Component Analysis.

The items which loaded on component one indicated that the DBE should manage their infrastructure without the IA. These items pertain to S24.6, S24.7 and S24.8 that is the Department of Basic Education should create project implementing/infrastructure departments whose sole task is to supervise construction projects, the above-mentioned implementing/infrastructure departments of the Department of Basic Education must consist of registered and experienced professionals who have worked in and have sufficient experience in the built environment and based on the concept of the above-mentioned implementing/infrastructure department, the Department of Basic Education should then appoint professional consultants who report to their implementing infrastructure department, respectively.

This component can be labelled as ***"Internal management of infrastructure by relevant Government Department"***

The items which loaded on component two was aligned to retaining the IA, however there should be more transparent processes involved, that is S24.2 allow for infrastructure reports and reporting tools to be made available to the public so that implementing agents can be held accountable and inclusion of school principals, governing bodies and teachers in project steering committees to ensure that there is transparency and accountability, especially when school projects take too long to be approved or are removed from procurement lists (S24.3) and it also included the items related to sufficient training of the IA so that fast track service delivery was possible. The items related to training are S24.9 and S24.10. This component can be labelled as ***"Transparency of reporting and training and development of graduates at Implementing Agents Offices".***

The items which loaded on component three included S24.1, Provincial Education Departments should allocate projects to implementing agents based on their capacity and track record, S24.4, Implementing agents must take strict action against contractors who do not perform and must place them on defaulters lists so that additional projects are not awarded to them and the fact that DBE should only utilise the services of professional consultants for construction projects and remove the implementing agent from the supply chain management process (S24.5) This component can be labelled as ***"Inability of the Implementing Agents to manage public procurement and the introduction of the BEP to manage this instead"***

The Cronbach Alpha is 0.850 which indicates a high level of internal consistency of responses.

5.3.7 Section Eight: Other challenges experienced by Built Environment Professionals when dealing with Implementing Agents and possible solutions to these challenges.

This section contained two questions where respondents were able to provide their opinion and additional comments in respect of their (the BEP), challenges when working with IA's. A total of 38 additional comments were received from the BEP's. The items listed were not covered by the questionnaire and are quoted verbatim as per the response from the BEP. Many comments were repeated, and therefore not all 38 comments needed to be included as part of this list.

The question was as follows:
Please indicate any further challenges you have experienced or are experiencing when working with implementing agents on your specific projects
The following comments/opinions were made/shared:

1) *Politics and corruption are majorly influencing service delivery negatively for water and sanitation projects in KZN.*
2) *Implementing Agents Drive a Political Agenda instead of Addressing Service Delivery Needs.*
3) *More community-based facilitation needs to take place prior to commencement of construction.*
4) *A common challenge is that there does not appear to be an overall register of implementation at schools that is inclusive of work done by all implementing agents, which leads to duplications, confusion etc.*
5) *IAs should not allow SGB participation at site meetings. The Planner from the end user department must be held responsible for updating end users and SGB members.*
6) *IA's do not respond effectively and timeously to the business forums that affect the continuity of construction work on sites.*
7) *IA's must present themselves to the end users, department representatives and SGB's before site handover to present the approved scope of work etc so that there are no disputes once the site is handed over.*
8) *IA's that have head office and regional office presence often lend itself to high fragmentation of communication channels and display reluctance to take the onward ownership of the programme.*
9) *High level of employee turnover in the IA offices which provides more frustration when consultants to re- communicate the historical tracking of the relevant projects.*

10) *Un-cooperative and arrogant IA representatives especially those that were previously consultants in the private sector which are now employed in the public sector.*

11) *Local communities disrupt projects in order to demand a percentage of the work be subcontracted to them. The government should advertise ECDP programme more and be more efficient in resolving the local community disputes.*

12) *Currently, Implementation Agents that are used, are by and large set-up and structured similarly to that of a governmental organization, i.e., there exists a strong culture of protocol reporting & compliance over delivery & goals.*

13) *Some IA's have preference for certain contractors and often develop personal relationships with contractors.*

14) *Implementing agents insist that consultants are paid based on contractor's progress on site. This is a challenge because it is not financially viable for consultants to provide the same services without any additional fee.*

15) *They do not appreciate the necessity and cleanliness of the ablution facility as if implemented the children will learn to be clean and responsible individuals going forward.*

16) *Too many projects issued to same Consultants.*

The following topics were derived from the opinions/comments mentioned in the previous question:

1) Approval processes are too long.
2) Poor contract administration, loss of documentation, lack of filing.
3) Lack of communication or miscommunication with DBE or the BEP.
4) Lack of financial management skills.
5) Lack of leadership skills.
6) Inability to manage risk.
7) Lack of understanding of construction methodology or built environment experience.
8) Non-attendance at meetings.
9) Insufficient capacity at the IA organisation to deal with the number of projects which need to be implemented.
10) Too much reliance on the BEP for interpretation of the contract.

The next question poses possible solutions for the Implementing Agents challenge as recommended by the participants in this survey. A total of 37 suggestions were received and these will be grouped according to the topic that they represent. The question was as follows:

Please indicate any other possible solutions, which you think may enable the fast-tracked delivery of water and sanitation facilities to schools in KwaZulu Natal. The following opinions/comments were noted

1) Increase the use of technology in order to track progress on site, uploading of documentation, etc. This will ensure that all parties are up to date at all times.
2) Employ more capable resources at IA organisations.
3) Adopt different forms of contract which can result in faster procurement times.
4) Issue tenders which enable appointments for a database as opposed to projects. Thereafter choose contractors from a database instead of tendering each project, which will ultimately save time.
5) DBE to ensure that teams of BEP's are available on a database for maintenance and for new. construction and ensure that these BEP's are constantly engaged.
6) Allow for a turnkey approach for water and sanitation projects.
7) All project managers at IA offices must be professionally registered.
8) Prevention of corruption and fraud.
9) Performance incentives should be introduced, so that projects will be rolled out at a faster pace.
10) Appoint private consultants instead of IA's.
11) Underperforming IA's must not be reappointed by the DBE.
12) Allow the BEP to conduct the tender adjudication.
13) The DBE and IA must attend all site meetings.
14) There should be a wider call for Implementation Agents across both Private and Public sectors.
15) Create a unit which is responsible for co-ordination of the work of all implementing agents to ensure efficiencies in the value chain.
16) Appointments for Implementing Agents, Contractors and Consultants should be based on merit with work spread equitably in the market.

The above comments/opinions from the BEP's are indicative of that there are many shortcomings which need to be addressed. The solutions which have been proposed are deserving of consideration. Not many BEP's have advised that the IA should be removed completely, possibly because the mandate that the IA has, is from Government. However, the BEP's do provide plausible solutions which can assist in ensuring that service delivery is fast tracked.

The next section explains the qualitative data analysis in detail.

5.4 Qualitative Data Analysis

5.4.1 Introduction

The qualitative data for this research was filtered through and collated with the NVivo 12 software. Ishak and Alias (2005), indicate that considering qualitative data is unstructured and in-depth in meaning, the use of the NVivo software will enable one to easily manage and sort data for analysis. Therefore, it is a data management tool and does not analyse data (Ishak and Bakar, 2012).

A total of 12 participants were interviewed for this aspect of the research. The participants were professionals in the built environment sector in the KwaZulu-Natal region. The participants, included Architects, Civil and Structural Engineers, Quantity Surveyors, Construction Project Managers and Electrical Engineers. The selection of the sample was based on non-probability sampling, specifically purposive sampling.

5.4.2 Demographics

Twelve interviews were conducted. Eleven of the twelve interviewees were male and one was female. Two of the interviewees had between 5 to 10 year's experience in the built environment industry. One interviewee had between 10- and 15-year's experience in the built environment industry. Two interviewees had between 15 to 20 year's experience, six had between 20 to 25 years experience and one interviewee had more than 25 year's experience in the Built Environment. This provided some confidence to the author, considering the fact that the Government had only introduced IAs in 2002, which meant that the majority (10 out of 12) of these interviewees had sufficient experience working with IAs for the supply of water and sanitation. The senior status of the majority of interviewees asserted more confidence, as these individuals were able to answer questions related to how the shortcomings of the implementing agent has affected the operations of their business. With regards to the designation of the interviewees, there was representation from all the required designations, mentioned previously, that is there was one Structural Engineer, one Electrical Engineer and one Architect. There were also four Quantity Surveyors, three project managers and two Civil Engineers. The aim was to conduct an interview with all disciplines so that a well-rounded understanding is obtained of each discipline's viewpoint. All of the above is reflected in Table 5.57.

Table 5.57: Interview Demographics

Description	No. of Respondents
Gender of Respondents	
Male	11
Female	1
Race Group	
African	3
Indian	6
White	2
Coloured	1
Age of Respondents	
25 – 35 years	2
35 – 45 years	3
45 – 55 years	6
55 – 65 years	1
Work Place Designation	
Structural Engineer	1
Project Manager	3
Civil Engineer	2
Architect	1
Quantity Surveyor	4
Electrical Engineer	1
Number of years of Experience	
5 – 10 years	2
10 – 15 years	1
15 – 20 years	2
20 – 25 years	6
25 + years	1

5.5 NVivo Analysis

The NVivo process enabled the development of specific themes for this research. Figure 5.7 provides an indication of the themes which were formulated during the qualitative data process.

Figure 5.7: Themes identified during the NVivo process

5.5.1 Awareness of the water and sanitation challenge in South Africa

The questions surrounding this theme, attempted to understand whether the interviewees were aware of how and why (the origin) the water and sanitation challenge in South Africa had arisen and their awareness of the policies which were introduced by the South African Government, in order to address these challenges. It also sought to determine the interviewees opinion of whether the correct approach was adopted by the government in order to address this challenge, as well as their opinion on the current situation of water and sanitation situation in the country as a whole. The latter can be described as sub-themes of the main theme which is indicated in Figure 5.8.

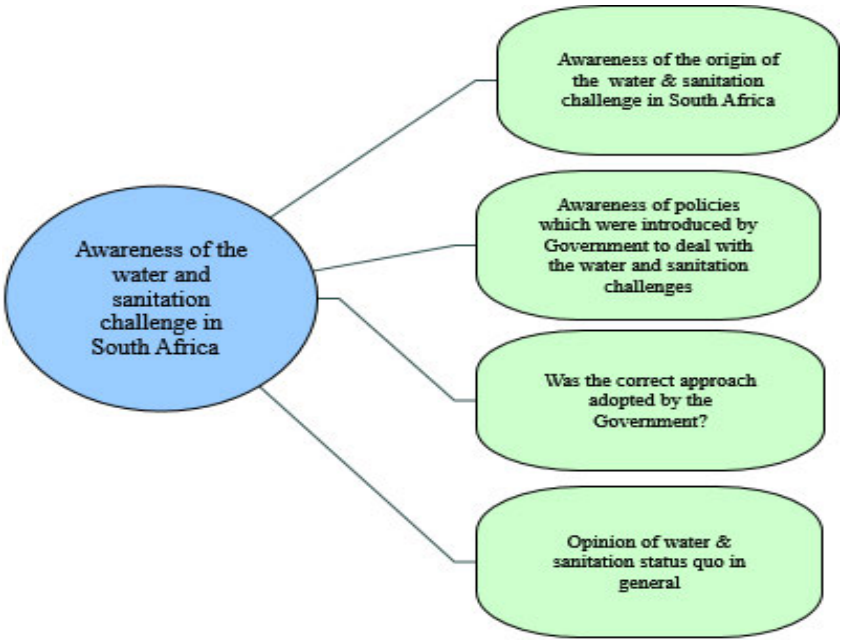


Figure 5.8: Awareness of the water and sanitation challenge in South Africa

5.5.1.1 Awareness of the origin of the water and sanitation challenge in South Africa

Eight of the interviewees did not know how far back in South African history the water and sanitation situation had originated. This group of interviewees assumed that it was merely a consequence of the apartheid government and four of the interviewees added that corruption at government level was to blame. Interviewee one indicated that the *"The water and sanitation challenge in South Africa is due to the mismanagement and corruption which occurs within government departments"*. The latter statement was also shared by interviewee two and three and the following statements were made, by interviewee two *"I am not sure exactly when the problem started, but I assume that it is a result of apartheid. It is also fraud and corruption now",* interviewee three noted that, *"The water and sanitation situation which our country is facing is because the ANC government is full of corruption. I pay for my water and other people get it for free",* Interviewee four stated the following, *"No, I am not aware of how far back the situation dates, however I assume it is because of the apartheid regime"*. One interviewee was acutely aware of the water and sanitation challenge and indicated that they were well aware that the problem was not a consequence of apartheid. This interviewee stated *"The challenge is one, which people of this country cannot conceptualise. I remember reading an article about how the people of this country have been suffering for centuries. This water challenge is related to greed. It started a long time ago"*. This interviewee was the most senior of the sample.

All interviewees knew that water and sanitation was a challenge in 1994, however at least 6 of them did not realise that at least half of the population did not have these services. They had assumed that the lack of water and sanitation was confined to the rural areas of the country. The fact that 15.9 million people

of a population of 39 million did not have water and sanitation was relayed to the interviewee so that they could understand the enormity of the problem.

5.5.1.2 Awareness of policies introduced by the government

A fair number of interviewees were aware and acknowledged the strengths of the various papers and policies which the government had introduced in order to address the water and sanitation challenge. The comment from one interviewee was *"I am aware of the papers. I have not studied them, but I am of the opinion that while it helped back then, now we have a different culture, one of stealing, so those papers are actually being insulted. The government today is just stealing from the people, they not referring to papers anymore"* Interviewee two stated, *"I do know about the policies but either way there has to be maintenance"*. Interviewee three indicated *"I am fully aware of the reconstruction and development policy, even though I was still in school at the time. However, being a Civil Engineer I know about the National Water Act and the Water Services Act"*. Three of the interviewees noted that while there was the express intent in the papers and legislation to provide water and a form of sanitation to the people, there was blatant lack of maintenance of the facilities which were provided. The following statements were made, interviewee five, *"I am fully aware and the government must be applauded. It is a pity though, because the intellect that was invested is such a waste now. Why didn't they just keep the momentum and ensure that maintenance is a priority"*. Interviewee eight stated, *"Yes, I know these papers but what is the point? They didn't maintain anything. The Government was charging us but what did they do with the money"*. Interviewee eleven stated, *"Yes, I know what the Government had to do. I know the Water Services Act. I know the Millennium Development goals. It is just sad that today we still have that problem. South Africa's biggest problem is maintenance. We lack maintenance. The Government has the foresight to see this, but why are they not doing anything about it"*. This interviewee also agreed, that, had maintenance been a key priority as well, it would have placed the country in a better stead to cope with the impending years, when there were plans to, further develop the water infrastructure. Interviewee nine indicated that *"I work with municipalities often. I am aware of these papers, but there is too much corruption now and all the money invested is wasted, because I am winning tenders to fix the infrastructure which was not maintained"*. Therefore, while the interviewees all acknowledged the fact that a significant amount of effort was invested to address the problem, the fact that maintenance of the infrastructure was not priority, subject to fraud and corruption or not accommodated, these efforts were essentially in vain.

5.5.1.3 The approach by Government

Six of the interviewees applauded the government for the efforts invested and the manner in which they had approached the water and sanitation challenge, that is by ensuring that the voice of the people was taken into consideration via the introduction of White Papers. The author had to explain some of the policies to those who had not heard about them before or were not aware of what the papers' purpose

was. The author also explained that the resultant policies ensured that a possible solution was provided for almost all water and sanitation situations on the ground. Interviewee three noted that "*I appreciate that they did not make decisions without consulting the citizens".* That being said, two of the interviewees queried why, even minute plans were not enforced 27 years ago (1994 which was when democracy was achieved in the country), to ensure that there was a certain degree of water and sanitation infrastructure introduced into rural areas of the country. Their rationalisation stemmed from the fact that while it is an expensive activity, it could have been programmed in increments over the past 27 years to realise benefits at current day. The following was stated *"Why couldn't infrastructure planning for rural areas commence 27 years ago, even in small manageable packages which would have seen fruition at current day".* To add to the latter statement, one interviewee queried why the drilling boreholes for water, did not play a significant part of the provision of water for the people of rural communities. The interviewee added that a feasible borehole would be able to provide communities water for many years and during those years, other more permanent forms of water infrastructure could have been introduced. Other comments which were noted from interviewee two was *"I agree that the correct approach was taken, however why were their plans so stretched out. The fact that; they know it was going to take a long time to achieve equality is the reason why there was a lack of momentum at the beginning. If tighter targets were infringed by the Government under the guidance of Nelson Mandela, we could have achieved a lot more".* Another interviewee, did not agree with the fact that government agreed to allow some people to be exempt from water tariffs and argued that even payment of an insignificant amount, would have removed the sense of entitlement which many citizens have today. The following was stated, *the consultation process is appreciated but there is always a sense of reasonableness which must be applied, as not all demands of people can be met. This will result in entitlement".* This interviewee also cited the fact that; at his various visits to sites, he is made aware of illegal water connections. The notion in the community regarding the illegal connection is that *"why should they pay for water when others are not, so they rather steal it*". The lack of payment for a service will only result lack of funds for maintenance in the long term. The comment which was made was *"I don't believe that certain people must be exempt from paying for water and sanitation services, based on their past. This will result in entitlement and others who are paying will be frustrated by the process. Those people that are less advantaged should still pay for water and sanitation but possibly their tariff could be reduced* "The express intent as indicated in the RDP paper was that, funding for the short, medium and long terms goals of the policy (RDP) with the foresight of maintaining in the infrastructure in the long run was, earmarked to be received via the implementation of water tariffs, that is the users of water will be responsible for payment of any water utilised which was over and above, that which government deemed free for use for each person. The question, that must be asked is, what then, happens to the money which has been collected thus far. Considering that so much infrastructure still requires maintenance? According to the way some of the interviewees have answered, it means that their opinion is that,

Government is taking too long to address the challenges which were brought about, prior to and as a result of apartheid.

5.5.1.4 Opinion of the water and sanitation status quo in general

These questions sought to understand what the BEP's opinion was of the water and sanitation status quo. Eleven of the interviewees agreed that the problem which the government had to address related to water and sanitation, was immense, therefore they were comfortable to state that the government had achieved a significant feat when they ensured that there was some form of water and sanitation provision for the citizens of country, albeit that this provision did not necessarily mean that each citizen had water piped to their individual homes. However, in general the interviewees were not happy with the progress to date and the current status quo. Some of the comments which were received were, interviewee one noted, *"They were too slow. Why are people in rural areas still having difficulty in obtaining water or sanitation",* interviewee two noted, "*We are currently in a pandemic and the lack of clean water is shocking. More needed to be done". It is sad that people did not have water during this time"* this statement was also shared by interviewee six who stated that, *"The pandemic said it all. The news was just fill of reports about the lack of water in areas that needed it. Therefore, while they did their best, currently there is too much politics to deal with"* and interviewee three noted that. *"The fact that the president is still talking about water in his state of the nation address means that the process has been too slow".* Three interviewees noted that they were not happy with the progress of government and how they had handled the water and sanitation crisis in the country. This interviewee stated, "*Not enough was done. My parents still live on the farms of the rural areas. It is difficult. Our situation is not bad but I see it when I drive back home. People don't have adequate water or sanitation provisions, yet this is the one thing that they are promised just prior to an election".* This was also shared by interviewee seven and ten who stated*, "I don't think that it is acceptable that we have people in the 21st century who struggle to get water and hygienic sanitation. While government says it is a priority, the numbers of people without this, speaks for itself* and *"I am not happy to conclude, that enough was done. We need to see actual change, not just before an election".* Interviewee four indicated that corruption is the reason that the country is still stagnant in this sphere. This interviewee stated, *"I know it's a huge exercise but I think that without corruption, more could have been done. There are many people who are still struggling for water today. Their numbers are probably small in relation to the population, so they don't make the headlines*" The mismanagement and wastage of water was also raised by interviewee eight who stated that *"Water is wasted. Even the management of water today is very bad. If there is a burst municipal pipe in my area, the municipality takes ages to fix it and all that while water is being wasted".* Therefore, in general the stance was that while the problem may have been insurmountable in 1994, many years have passed since then, therefore it is unacceptable that people of the country still struggle to obtain water and adequate sanitation. Van be Burg and Spaull (2020), had indicated that the onset of

the pandemic resulted in a clamber of efforts to curb the Corona virus, especially in schools in the country.

5.5.2 Status quo of water and sanitation situation in schools in KwaZulu-Natal

This question undertook to understand the interviewees opinion, specifically on the current water and sanitation condition at schools in the rural areas of KwaZulu-Natal. The author also tried to determine whether the interviewees deemed that the water and sanitation infrastructure provision at schools was sufficient. These themes are represented by Figure 5.9

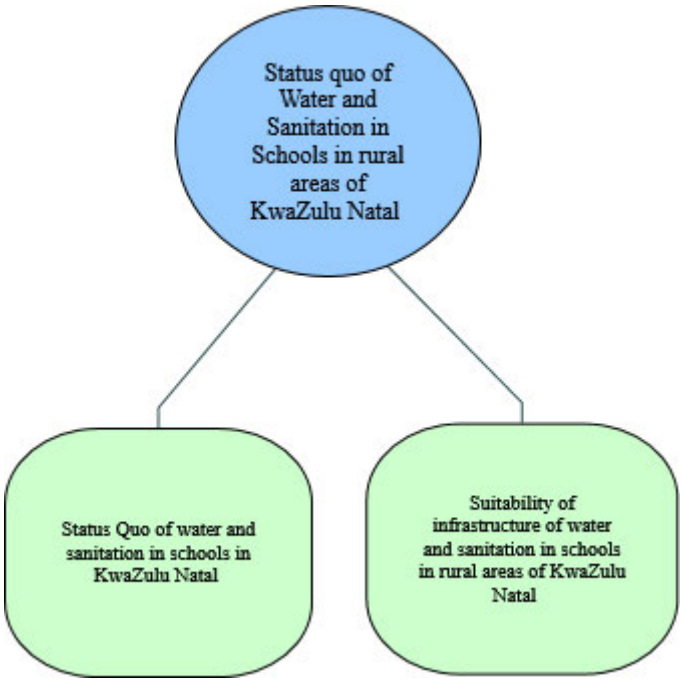


Figure 5.9: Status quo of water and sanitation at schools in rural areas of KwaZulu-Natal

5.5.2.1 Status quo of water and sanitation

All interviewees noted that the condition of the water and sanitation facilities was not favourable. One interviewee utilised the word *"appalling",* to describe the current conditions. Another interviewee said that *"the conditions were unacceptable; however, nothing will be done about it because, no government official, nor their children or grandchildren have to utilise such terrible facilities".* Another interviewee said on other projects, *"we build ablutions with finishes such as tiles, ceilings, paint and mirrors*". Some of these children will sadly never be accustomed to that *"luxury"*. Some of the other comments which were received are indicated on Table 5.58. The responses have been tabulated as the comments are pertinent and assists in understanding how each individual views the status quo of water and sanitation at schools in KwaZulu-Natal.

Table 5.58: Reponses regarding the status quo of water and sanitation at schools in KwaZulu-Natal

Interviewee	Responses
Interviewee 01	*"The ablution facilities are not maintained. The pit is not emptied at all, resulting in unhygienic and dangerous conditions for the learners".*
Interviewee 02	*"The ablution facilities do not provide a degree of privacy for the learners".*
Interviewee 03	*"Both learner and teacher ablutions are in a state of degradation and represent unhygienic conditions". Where is the maintenance. There is definitely budget set aside for this?*
Interviewee 04	*"There are insufficient number of ablution facilities for the number of children and teachers who attend the school".*
Interviewee 05	*"There are some instances where the ablution facility is not structurally stable and/or the pits are collapsing".*
Interviewee 06	*"Children drink water from water tanks which simply harvest rain water. This water is not treated". I sampled the water which the school children drink, I became sick the day after".*
Interviewee 07	*"Children do not have water to wash their hands after they have used an ablution".*
Interviewee 08	*"Schools may be serviced by water tankers from the municipality; however, this service is very inconsistent and therefore not reliable".*
Interviewee 09	*"Some schools do not have pit toilets or the existing pits are full, therefore the school has opted to hire portable toilets which are also not maintained resulting in the same conditions, as if there was a VIP ablution.".*
Interviewee 10	*"Considering that when I visit the schools, I steer clear of the ablution facilities, due to the terrible smells means that the school ablutions are appalling".*
Interviewee 11	*"The toilet is never clean. Teachers and learners have the same toilet. It is sad that the children of today are still going through what I went through when I was young. When is it going to end"?*
Interviewee 12	*"The conditions are not safe from a health perspective as well as safety"*

The above comments, align to reports from organisations such as Equal Education, Auditor General of South Africa and from the Department of Basic Education where complaints about school infrastructure was received. Van de Burg (2020) also indicated that schools were overcrowded when he was reporting on the efforts to ensure schools had sufficient water to manage the Corona virus. The minutes of a DBE meeting in 2018, had indicated that at least 10661 schools had challenges with sanitation and 3898 schools still had plain pit toilets. The fact that the interviewees are still reporting the same issues regarding the lack of clean toilets, water, etc in 2021, means that the situation is either not being sorted out or if it is being attended to, the pace is unacceptable.

5.5.2.2 Suitability of the type of infrastructure provision.

Considering the limited plumbing/ bulk services infrastructure in the rural areas of KwaZulu-Natal, nine interviewees indicated that VIP toilets and water tanks present an acceptable form of water and sanitation for the school children and teachers. The other three participants were adamant that the government should consider developing a plan of action which will set in motion the transition from VIP ablutions to water borne sewerage. One participant, stated that the *"Department of Education must consul the Integrated Development Programme (IDP) for each municipality prior to making a decision regarding the type of infrastructure which will be constructed at the various schools because installing VIPs without consultation means that there might be a clash later when water borne infrastructure is introduced into the area or vice versa"*. An IDP is a master plan for an area which provides overall framework for development within a municipality." The IDP addresses the short, medium and long terms goals of local government and seeks to address the poorly planned, underdeveloped and racially divided towns which were created as a result of apartheid (City of Johannesburg, 2018)

5.5.3 The Implementing Agent

These questions served to determine whether the participants were aware of how the implementing agent was introduced into the public sphere and the basis of their appointment. These questions resulted in three sub-themes, i.e., the origins of the implementing agent, the basis of their appointment and the importance of infrastructure for economic development. This is illustrated in Figure 5.10.

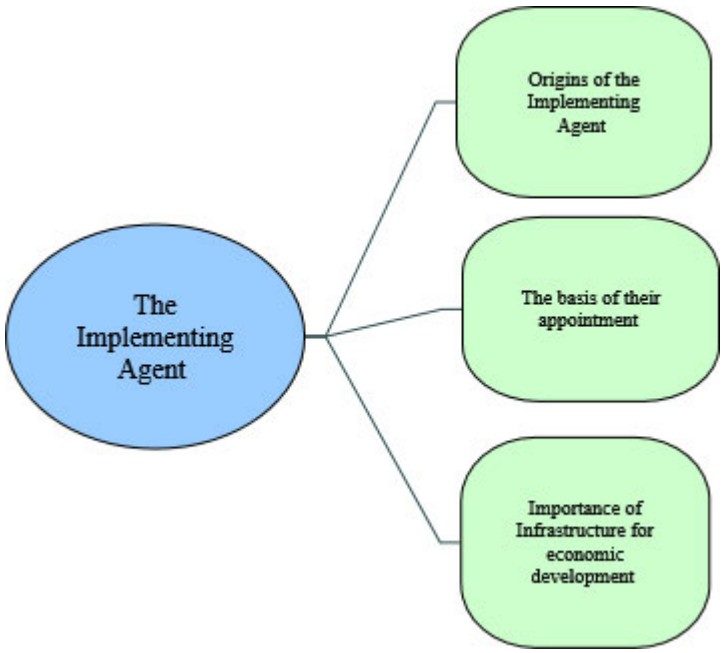


Figure 5.10: The Implementing Agent

5.5.3.1 The origins of the implementing agent and the basis of their appointment

Only one interviewee indicated that they were aware of the origins of the implementing agent and the other eleven of them assumed that it was merely an extension of government. Interviewee one indicated

that *"I am not sure why there was a need to introduce them as, as a Professional in the construction industry, I will be able to perform the same function"*. The association with government was clear when interviewee three stated that *"The Implementing Agents that I am used to working with are basically Government organisations, so I am not sure why there is a need to create the specific distinction between the Implementing Agent and Government"*. Interviewee two noted, *"The Implementing Agent is essentially an extension of Government; therefore, the Government is basically enriching themselves*". Interviewee four stated, *"Implementing Agents seem to be required just to perform a programme management function. I am not sure what decisions resulted in the introduction of the Implementing Agent. I assume that there is a possibility that Government needed an oversight function"* Interviewee five stated "*I did not realise that they were only introduced recently. I thought that they were always part of the process.* Therefore, the notion of Implementing Agent was not clear to all in the sample The introduction of the Public Management Finance Act of 1999 and its implications and resultant introduction of the IA was explained to the interviewees. The author emphasised the fact that, in the case of the Department of Education, they did not have individuals whose sole responsibility was infrastructure development/ repairs/ maintenance at their departments and hence the need to employ IAs was a requirement. In response to the latter, six interviewees were adamant that this is not the case and that in recent years, the Department of Health, Education, Housing, etc. are employing Built Environments Professionals. The latter is a fact; however, this is a recent trend, probably in responses to the shortcomings of the Implementing Agents.

The basis of the appointment of Implementing Agents was also explained to the interviewees, that is that Implementing Agents are appointed on the basis of their technical skills, capacity, capability, etc. This statement was met with the comments mentioned in Table 5.59.

Table 5.59: Responses to the basis of the appointment of the Implementing Agent

Interviewee	Responses
Interviewee 01	*"That being said, there is definitely a gap in technical skills, etc. which is not being met, as these agents at times don't seem capable".*
Interviewee 02	*"Your statement is acknowledged; however, I do not agree with it. They lack important skills to manage construction projects. They receive guidance from us"*
Interviewee 03	*"The performance agreements, if in place need to be reviewed as they currently not meeting this expectation".*
Interviewee 04	*"The individual at Implementing Agent (name withheld) is good, he knows what he is doing, but he is overworked. He has in excess of maybe 400 schools, they are not all at the same stage of the procurement process, which will make management even more complicated".*
Interviewee 05	*"The Implementing Agent I work with does not live up to those standards"*

Table 5.59: Responses to the basis of the appointment of the Implementing Agent / Continued

Interviewee 06	*If there are standards in place, then nobody is monitoring it, because the standards are not met.*
Interviewee 07	*How is it possible that if there are standards, that implementing agents are not fired?*
Interviewee 08	*Very few Implementing agents that I have worked with display this. There are a few good ones but this will not make a difference if the majority have a bad reputation.*
Interviewee 09	*Skill, capability, etc is debatable, because there are some employees at the IA who can do their jobs, but the bottom line is that they take too long to get the job done.*

The DBE (2019) indicated that in relation to capacity, there are too few Implementing agents, yet they are tasked to manage a substantial number of projects, resulting in ultimate failure of the projects. Ambe, Badenhorst-Weiss (2012), noted that the procurement challenges in South Africa are as a result of the lack of proper knowledge and skills as well as capacity, non-compliance with supply chain management policies and procedures, lack of accountability, inadequate monitoring and evaluation of supply chain management, unethical behaviour and fraud and corruption,

5.5.3.2 The importance of infrastructure for economic development

While the fact that infrastructure development in any country is a dominant topic at governmental level, the purpose of this question was to understand whether the BEP's agreed that the construction of ablutions and provision of water facilities deserved the same priority and also how that importance is cascaded and understood by government. All BEP's agreed that infrastructure development was extremely important. Interviewee one noted that *"The construction of toilets and water infrastructure, no matter how small it seems, in the bigger scheme of things, provides income generation for my business and essentially for the country. The government has to continuously invest in this aspect otherwise we are always going to be backward"* Another interviewee indicated *"School infrastructure development is very important and must not be seen separately from that of other income generating infrastructure which is also required".* Interviewee six indicated that *"To reduce absenteeism at schools and thereby create a well-educated society, we must focus on infrastructure development at schools"* Interviewee seven added that *"I agree that infrastructure development is important and ablution facilities are needed to enable children to attend school. Learners must be viewed with more importance".* Five BEP's placed emphasis and anticipation on the president's state of the nation address each year, in order to understand how and where infrastructure budgets will be spent especially for big projects likes damns, roads, etc. The comment from interviewee two was *"Infrastructure development is our lifeblood. The SONA each year is an important stepping stone to understand how much is going to be invested in infrastructure and I think that investment in schools is paramount to assist in developing the economy"* On the aspect of water and sanitation, there was general consensus that, this aspect even though far removed from income generating infrastructure such as dams, roads, stadiums, special

economic zones, etc, was also very important and will contribute to infrastructure development in the long run. Two BEP's also mention the notion that emphasis must be placed on the children or youth of any country in order for the country to grow and progress. The comments which were received were *"I attended a school in the rural areas. The children are using the same facilities that I used, which is unacceptable. We have to invest in school infrastructure and uplift and motivate our children. By not doing so, the government will never be able to create a society which feels empowered to change the course of the country"* and *"The investment in the youth essentially means the investment in the country. People in government must not be so short sighted. They need to ensure that the budgets for school infrastructure is utilised efficiently"*. Mandela (1995) stated *that "education is a great engine of personal development. It is through education that the daughter of a peasant can become a doctor, the son of a mine worker can become the head of the mine, that the child of a farm worker can become the president of a great nation.*

5.5.4 Challenges experienced with Implementing Agents

This segment of the interview sought to determine and explore the working relationship between the BEP and the IA. Questions related specifically to whether or not the consultant experienced challenges with this relationship. Various sub-themes were developed during this interview segment.

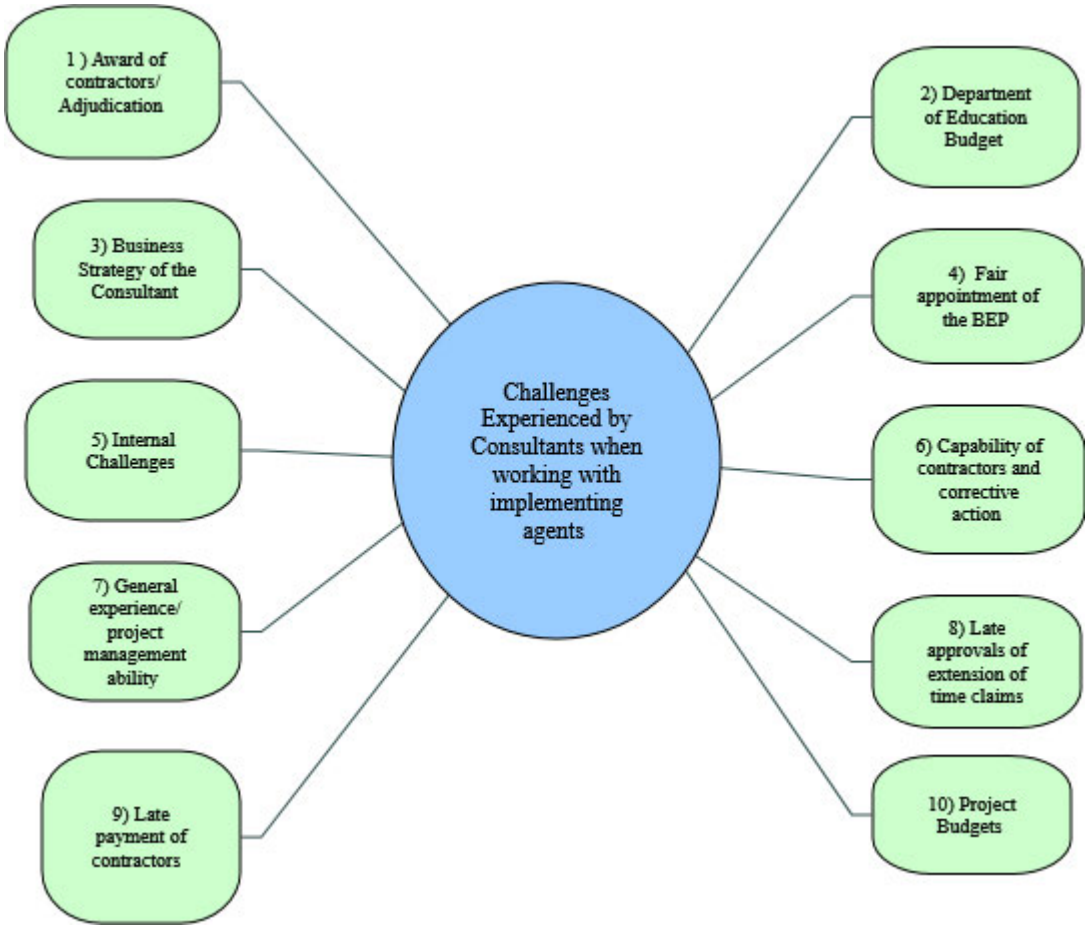


Figure 5.11: Challenges experienced with implementing agents

5.5.4.1 Award of contractors/contractor adjudication

The interviewees generally were not satisfied with the time period that contractors tenders were adjudicated and awarded. Ten of the interviewees indicated that projects were awarded to contractors after the validity of the tender price had expired. In general, a tenderer is expected to reserve the price of their tender for a specific period, which is determined and agreed by each implementing agent. Typically, this time period is 120 calendar days. For the majority of cases, this award may be extended to, between 3 to 9 months. This in effect translates to a tenderer bearing the risk of any pre-contract escalation of construction materials after the expiry of the tender validity period. Interviewee two indicated that "*Generally, we went longer than the validity period for projects to be awarded."* The fact that tenderers must be requested to extend their validity was also expressed as a concern, with one interviewee noting that *"Projects are awarded long after the validity period. I am not sure if they even request extensions of tender validity as, we are not party to those discussions*". Another interviewee stated *"I haven't had many projects that have been awarded within the tender validity period. There seems to be no urgency".*The late award of tenderers as described, also negatively affects the BEP's, cash flow of professional fees, based on the construction period: For example, at worst case a BEP can assume that, at least by the end of the tender validity period an award of a contractor will be concluded. At which point the construction stage commences, which in turns triggers the completion of a stage deliverable, linked to a claim for professional fees. The BEP can accordingly charge for completion of the stage deliverable and thereafter can cash flow professional fees over the construction period. However, without the certainty of knowing when the Contractor will be awarded, the BEP cannot cash flow reasonably accurately. The Auditor General of South Africa (2011), indicated that approvals to proceed from estimate to tender documentation, from adjudication to award or to approve variation orders take too long resulting in project time delays. The Auditor General of South Africa, (2011), also indicate that project management is not effective within the Implementing Agent organisations.

A comment shared by five of the interviewees, indicated that, employees at the offices of implementing agents lack passion, motivation and will power to complete their activities. An example provided by one the interviewee was that, "A*s a professional consultant (BEP), my income is dependent on my output, therefore there is a high degree of willingness to complete any task. If stage deliverables, as defined in my professional fee gazette are not completed timeously, I lose the opportunity to claim professional fees and sustain my businesses*. However, the opposite scenario exists with that of implementing agent. The participant made the following statement: "*if my salary is guaranteed no matter how I perform on a monthly basis, then there is no need for me to fast track any task*" Another comment which was received, noted that *"There is no haste to get the job done. It is a typical government scenario, where work stops at 4pm, no matter the urgency. This translates to a lack of passion".* Another interviewee raised the concern about their business operations stating that' *"Projects are almost never awarded*

within the tender validity period. We also have to plan business operations and the prolonged award period makes it extremely difficult for us to do this".

Two interviewees had indicated that the above-mentioned scenarios were more prevalent with some implementing agents and not others. *"Some people who work for IA's do their job; it would be unfair to label all of them with a bad reputation" "I do agree that the pace is slow, however recently when working with Implementing Agent (name withheld). I have noticed that they are trying to fast track the process. I hope that this will be the strategy moving forward and it helps me to claim fees accordingly".*

Other comments which were received include *"I have had experience where I waited 2 years before an appointment was made to a Contractor. The work required at these schools are deemed urgent, therefore why do they take so long to award".*

The fact that meetings to make decisions to award tenders are only scheduled once a week or at times every fortnight was also raised, with one interviewee indicating *"There is no priority placed on the awarding tenders. Their Bid Adjudication meetings are scheduled once a week and if they get to my projects at that meeting, then I am lucky, if they don't I have to wait another week. There is a lack of accountability*".

The plight of the learners and children was also brought up by interviewee nine who stated that *"If these Implementing Agents knew exactly what hardships the children face, then maybe there will be some movement. It is pointless putting my company under pressure to produce estimates and prepare tender documents if everything is slowed down after the tender closes".* Interviewee ten also stated *"I wish they had to use these ablutions. If that were the case, they would make sure that contracts are awarded quickly".*

The fact that the BEP has been distanced from the adjudication process was also highlighted with the interviewee stating *"The process is too slow, maybe we should get involved again, however I noticed in recent years and especially after the pandemic, they have excluded the Built Environment Professionals completely from the adjudication process"* Two interviewees indicated that in the recent years there is little transparency regarding the adjudication of tenders. The participant added that oftentimes and of recent, consultants are merely requested to perform a financial analysis on the awarded tenderer, which is in stark contrast to the notion in the previous years where the appointed professional consultant will be a part of the rigorous adjudication process. This places a heavy burden on the consultant, as the rationale for the choice of tenderer, determines the success of a construction project and the general trend by IAs is that, the lowest tenderer is awarded the job. The participant added that: "*the lowest tenderer is recommended for award, despite our recommendation to the IA, to re-evaluate same*".

5.5.4.2 Department of Education budget

This question sought to understand what the interviewees opinion was, on the amount of money which was allocated to the education portfolio, of each province, and considering the backlog of water and sanitation, whether, in their opinion the money had been spent prudently. The interviewees were presented with budget figures, in order to inform the question and their answers.

Eight participants, whilst acknowledging the substantial amount of money made available for education, questioned the consistent roll-over of funds to the next financial year. The latter has various assumptions attached to it, however one participant indicated that, "*Every year there is a roll over or giving back of money. That means that they don't need it or don't know how to use it*" Four participants agreed that fraud and corruption plays a huge part. Considering the high back log versus the large amount of money available, one interviewee indicated *"there must be an element of fraud and corruption at play".*

Another concern which was raised was that every school is initially seen as a priority, which means that the BEP is tasked to assess the schools to provide estimates of cost, only to find that the budget allocation for the year is insufficient. The comments which were indicated by the interviewees were. *"The amount of money is sufficient, if they were still not sorting out the back log of the past".* Interviewee two indicated a similar comment, *"The budgets for education seem substantial but where it is going? There is too much fraud and corruption in this country*". Another comment received was *"The money seems sufficient and there are infrastructure grants to compensate as well, but the situation at schools is still so bad".* The reliance on the BEP in relation to budgets was also mentioned by interviewee when who stated *"As a quantity surveyor, I assist the Implementing Agent with reporting of financial aspects. Year on year money remains unspent at the end of the financial year. Usually at the end of a financial year, we are rushed to prepare tender documents so that awards can be made. This is because the expenditure needs to be shown to National Treasury"* The roll-over of money or re allocation of it to other programmes was a concern with one interviewee stating *"Money is rolled over every year or they put us under pressure to spend towards the end of the year".* Corruption was also highlighted by the interviewees and one noted, *"There is too much corruption in this country. The Government must consider the livelihood of the children first. I think that the amount of money allocated in sufficient, but the wrong people are managing it".* Another comment received was *"The budget is enough. I believe that our country is rich. We need the right people managing the money and there will be progress".* The priority list of schools in relation to budget available was also raised, *"With the budgets that are available, the IA or DBE need to ensure that it is aligned to the school list". They tend to want to address 100 schools but have only been allocated budget for 50. That puts me as a consultant in a backfoot, as my planning is interrupted".* The comments therefore are representative of a mix of opinions, however in general, it seems as if, even if the BEP is of the opinion that the budget is sufficient, they argue that it is not being utilised properly to realise a benefit at school level

5.5.4.3 Business strategy of the built environment professional.

The interviewees agreed that once appointed for any project and in this case for projects related to water and sanitation, they develop cash flows of professional fees so that they can manage their operations. With regards to specifically water and sanitation, four interviewees indicated that the large amount of professional fees which can be realised from projects of this nature allowed them to strategise so that they could perform better on the projects and also hopefully secure/win more projects from the IA. Some of the strategies included:

a) The purchase of vehicles to facilitate quick and easier transportation to sites which are mainly situated in rural areas and where the road networks are not developed.
b) Employed additional staff.
c) Rented accommodation in rural areas to accommodate staff.
d) Purchased or entered into contracts to provide communication data for their staff members (3G cellular phone network coverage).
e) Purchased iPads or mobile devices to ensure efficiency of their staff on site.

The above-mentioned strategies indicated that they placed significant reliance on the income that these appointments would bring to their businesses. However, this has been met with frustration when income to substantiate the above purchases was not realised due to:

a) The late award of tenders,
b) Cancelling of tenders,
c) Prolonged adjudication of contractor's tenders
d) Late payment of professional fees
e) Prolonged construction period due to delays as a result of incompetent contractors,
f) Duplicate appointments of both consultants for the same project.

Two of the interviewees indicated that, they no longer place too much emphasis on planning for these projects due to their past experience and that they only plan once they know with certainty that the projects will proceed to construction. The responses received from the interviewees included, *"Our company has become accustomed to the way Implementing Agent (name withheld) works. We no longer place reliance on the fact that fees will be received timeously, however we constantly follow up. Our company has lower overheads costs and this is possibly the reason that we have been able to stay afloat"* and *"We used to place reliance of professional fees from Implementing Agents however, if we receive an appointment for say 200 schools, we do not cash flow the professional fee, until such time we know that the school will be implemented".* A significant time frame was indicated by one interviewee who noted that *"We are currently waiting for five years to be paid on one of the Implementing Agents projects, hence we do not tender for Government projects anymore".* Late payment of professional fees was shared by the interviewees, with one stating that *"Very seldom are we paid on time. This is the norm*

at the moment". Another comment which was received was, *"We now do rely on the fees generated by projects with Implementing Agents yet we had invested a significant amount of time and money to ensure that we as a company are efficient. However, of recent, we sometimes wait one year to be paid".*

The BEP's noted that late payment of professional fees had many consequences, which included inter alia the following:

a) Retrenchment of staff.
b) Short time implemented on employees to save on salary costs.
c) Inability to pay suppliers.
d) Closing down of businesses, in extreme circumstances.

The Auditor General of South Africa (2011), indicated that the late payment of professional fees results in cash flow challenges for professional entities and that late payment is a common occurrence When the BEP was asked if they have stopped work based on non-payment of professional fees, nine of the participants indicated that they did not stop work, as they did not want to jeopardise the client/consultant relationship. They were forced to utilise professional fees from other projects to continue with their business operations. One participant, indicated that they did stop work and are currently pursuing the legal route. Those who did not stop work, albeit concerned for the client/consultant relationship, rather opted to curb certain professional services in order to save on company expenses.

5.5.4.4 Fair appointment of the built environment professional

The interviewees were asked whether they felt that the adjudication process of BEP's was fair and transparent. In addition, the work allocation in terms of IA responsibility versus BEP responsibility was discussed. There was a mix of responses in this regard, with some interviewees indicating that the process of appointment of BEP's was generally fair, while others indicating that they have appealed the awards of other BEP consultants. The comments received were, *"We have challenged some IA's and it turned out that they actually were correct in the way they adjudicated our tender. However, their criteria for award are very stringent"* as opposed to *"I don't think that their adjudication process is fair all the time as there are numerous instances where I priced lower, yet I was not awarded",* another comment was, *"I don't agree on the way that projects are awarded. I have not challenged the IA yet, but there were a few occasions when my tender was the lowest, yet I was not awarded".*

The fact that the IA is accustomed to appoint the BEP's that they are familiar with was also a comment which was received. The comment was "*I do not think the process is fair as there are so many consultants who can't display the same capacity in terms of resources or even experience, yet they seem to have more work from the IA".* Another comment included, *"IAs appoint those BEP's that they are familiar with. It is a known fact that some IA's take bribes"*

5.5.4.5 Internal challenges

The interviewees were asked about whether graduate individuals at IA offices contributed to the challenges which they are currently experiencing. There was general consensus about this, but it was also met with a degree of understanding in respect of the fact that these individuals are still learning and could not be blamed for the situation. The comments which were received included, *"We work with many graduates at IA offices, who don't necessarily understand the job yet, however we have assisted to ensure that there is minimal delay on the project".* In general, the agreement was that graduates are not sufficiently trained in the job, and interviewee two noted that *"Generally, the graduates don't receive the guidance they require".* Therefore, was agreement that these graduates should be offered more training to ensure that skills transfer occurs to enable them to fast track the process. Interviewee four noted *"There must a training in place from senior IAs so that these graduates are not blamed for the delays and shortcomings"* Interviewee three noted that *"We understand the concept of graduates and can accept that they are still learning, however we need to find a balance so that projects are not delayed"* Christopher (2018), asserts this when it was noted that Implementing Agents employ incompetent employees who do not possess the necessary skill and experience to undertake construction projects, albeit that they have the necessary qualifications

5.5.4.6 Capability of contractors and corrective action

This question sought to determine the capability of contractors which IAs appoint and whether corrective action is instituted when contractors default on projects.

Eight interviewees expressed concern in this regard, one stated that there was *"little consultation with them when the tenderer was appointed and there were instances where the calibre of the contractor was to the detriment of the project".*

One interviewee indicated that as part of the South African perspective, where there has been a history of inequality, they have accepted that *"there will be a need to empower contractors who will need assistance and our business is willing to provide this assistance"* This interviewee, did however state that they were not compensated by the IA, for the time that they had invested in this regard.

Other interviewees stated*: "the contractor did not know how to structure an extension of time claim, it was a frustrating process"* Another interviewee noted, "*The industry has become inundated with entry level contractors, who are often awarded projects, yet they do not understand construction methodology sufficiently or they cannot interpret the building contract properly. This adds time, to when I try to resolve issues with the contractors".* The effect that the calibre of contractors had on the quality of the workmanship was noted by interviewee five, who stated *"The industry has become inundated with entry level contractors, who are often awarded projects by IAs, yet they do not understand construction methodology sufficiently or they cannot interpret the building contract properly.".* Another interviewee noted that *"The quality of the workmanship is questionable. There have been numerous instances when I have asked contractors to redo work on site because their workmanship is so bad".* Interviewee

number ten also commented and stated *"Contractors should be awarded based on the track record. This is something that we cannot verify as we do not form part of the adjudication team".*

The added burden on the BEP was also raised, when one interviewee noted that *"There are contractors who perform badly and we have to try to assist to get the project back on track, yet these contractors are appointed again on other projects by the IA. There are no lessons learnt".* Interviewee seven also added *"I at times have to assist on construction management with the Contractor, just to ensure that the project does not fail".*

Another interviewee indicated that: *"While the functionality criteria included as part of the adjudication process was designed to provide equal and fair opportunities for all, it was not adhered to by the IA, which at times enabled many incompetent contractors to enter the system"* Interviewee two indicated *"I don't think the Agents check the financial standing of the contractors who are appointed. Many a times we are faced with contractors who do not have money to sustain the project, while awaiting their first payment".* A quantity surveyor expressed concern that they should be part of the process of selecting contractors but they are not consulted. The comment received was *"Of recent the consultant team is seldom consulted to form part of the adjudication team. Only the final Bill of Quantities is handed over to me as the Quantity Surveyor so that I can check the marker relatedness of the rates".*

Another interviewee indicated that Implementing Agents allow their acquaintances to win tenders. The comment received in this regard was *"The IAs appoint the contractors they know which also enables them to enrich themselves". This happens all the time to the detriment of the project as these contractors are not experienced".*

In terms of corrective action for projects which have been delayed as a result an incompetent contractor, penalties can be charged as a contractual implication and DBE (2019) notes, defaulting contractors should be placed in a "default contractors list" in order to prevent future appointments. DBE has indicated that this is rarely the case yet it should happen. All BEP's also agreed that certain contractors received multiple projects even though they perform poorly. The Auditor General of South Africa (2011), noted that the quality of workmanship at schools is poor and that competency reports which are requested from each tenderer are not reviewed thoroughly when the adjudication of the tenderer is conducted.

5.5.4.7 General experience in terms of project management ability

The responses when asked about the general project management experience of IA's are indicated on Table 5.60. The aspects of effective leadership, communication, ability to manage time, cost, quality and scope as it related to project management and the skill of an implementing agent was discussed.

Table 5.60: Responses to the general/project management experience of the implementing agent.

Interviewee	Responses
Interviewee 01	*"There are certain individuals at the Implementing Agents Offices which are very good at their jobs and have a passion to ensure that the needs of the school children are addressed. However, there are too few of them working for the Implementing Agents. More passionate and experienced individuals are required".*
Interviewee 02	*"Most of the individuals who work at Implementing Agents and who have the title project manager are not professionally registered. They are managing a team of Built Environment Professionals, which by the way also includes a Principal Agent or Project Manager who understands construction procurement. These Implementing Agents rely on us for project management.*
Interviewee 03	*"There is generally a lack of experience of the individuals. I find that most of the time, the Implementing Agents appoint junior individuals to manage the project and there is no training provided to these individuals".*
Interviewee 04	*"These Implementing Agents do not perform project management functions. The Built Environment Professionals does the work and they perform reporting function to the Department of Education".*
Interviewee 05	*"There is a general lack of skill and passion from Implementing Agents. There are certain individuals within the Implementing Agents Office who do make an effort, however this is not enough". The aspects of project management are very rarely displayed by the IA. They rely on us to solely manage the project.*
Interviewee 06	*"The individuals involved at the Implementing Agents office lack proper experience and exposure to the Built Environment and hence are not able to manage projects properly".*
Interviewee 07	*"They do not manage projects effectively especially in respect of time management. They take too long to make decisions, possibly for fear of accountability". With regards to other important aspects of project management such as quality and cost control, that is my responsibility. I have not seen that from the IA.*
Interviewee 08	*"The Implementing Agent I worked with, tried to assist with all my queries and attended site meetings, but it was evident that he was not provided with proper guidance for this position. He also had too many projects as part of his portfolio, considering his limited experience".*

In general, the comments indicate that there is a lack of confidence in the level of general or project management experienced of an Implementing Agent. Badenhorst, Weiss (2012), indicated that the Implementing Agents have a lack of knowledge skill and capacity and that accountability, fraud and corruption is part of the procurement challenges in South Africa. The latter was confirmed by Christopher (2018).

5.5.4.8 Late approvals of extension of time claims

All interviewees complained that any extension of time claim (EOT) which was submitted to IA's were subject to long approval times. The contract period is seldom considered and results in penalties being imposed on Contractors contractually yet, unnecessarily.

This results in frustration to the contractor and BEP. Figure 5.12 indicates this process flow. The penalties which have to be levied on the Contractor leads to cash flow problems and with insufficient cash flow, the contractor is not able to purchase materials to continue with work on site and eventually work on site will stop.

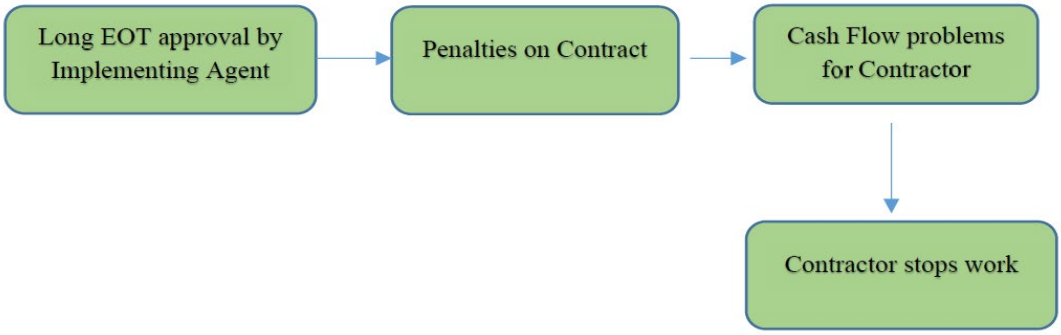


Figure 5.12: Effect of long approval times for extension of time claims

This process has become frustrating to BEP's as well, as in an endeavour to complete the project they are faced with a substantial amount of administration work to ensure that extension of time claims is approved. Interviewee one indicated, *"Extension time claims are seldom approved timeously. There has to be a formal sitting of the committee at the IA office in order for this to be done. As far as I know this meeting only happens once a week. There are a too many projects to approve"*. The frustration from the BEP was further amplified when one interviewee stated that the IA loses the EOT documentation. The comment was, "*As a consultant I consolidate the claim and submit for approval. Often this documentation is not reviewed until the very last minute, when additional information is required. This results in delays in approval. They often lose the documentation and I have to re-submit"*. The administration burden was also raised as the BEP has to consistently follow up with the IA in order to ensure that the penalties can be avoided, the comment received was*, "We constantly following up with the IA for approvals as we want to avoid penalties being imposed on the contractors.* The concern regarding penalties and the long time period for EOT approval, was explained by interviewee four, who stated that*, "We have to issue payment certificates for new work executed on a monthly basis and the value of the new work versus the penalty amount levied will eventually result in a reduced or negative payment to the contractors which has a major impact on the Contractor's cash flow and progress on site.*

Christopher (2018) mentioned the long approval times and loss of documentation by the IA which ultimately result in consequential delays in projects. The Auditor General of South Africa (2011), indicated that the penalties which were levied to the contractors were inconsistent.

5.5.4.9 Late payments to contractors

All participants agreed that contractors are often paid late. The BEP's advised there are instances when the contractor makes an effort to continue with the work on site, however this is dependent on how long payments remain outstanding and there are other instances where the contractors are not able to continue with work on site due to financial reasons and they are forced to stop work. Extension of time claims then become necessary, of which approval itself is usually delayed as explained in the previous section. Figure 5.12 is then repeated for this scenario. The comments received included, "*This is a common occurrence. It then becomes our problem to continuously follow up.,* Interviewee two stated *Late payments are so frequent that it results in added financial implications because the contract period is prolonged.* The effect that late payments has had on contractors was amplified when interviewee three indicated that *There are certain contractors who have opted not to tender on projects when implementing agents are involved because they were subjected to late payments in the past.* On the agenda of transformation and the need to provide work for all contractors, one interviewee noted, *Late payments to contractors are a huge problem. It is ironic that the Government is encouraging emerging contractors, yet they constantly pay late. These contractors will not manage the financial burden that this creates".* On the same issue of emerging contractors, another interviewee indicated that, *"Contractors are always paid late. The difficult part is that most of the contractors are emerging and cannot afford to institute legal action. If this was the case, I am sure it will solve the problem"* One interviewee indicated that *Late payments occur all the time. The arrangement for water and sanitation projects is such that the contractor is to price for the hire of mobile chemical toilets as an interim measure while VIP ablutions are being built. Non-payment to the contractor essentially means non-payment to the supplier of the mobile chemical toilet. The toilets are subsequently removed from site and then the learners have no ablution facility at all". As* to whether this is an ongoing or ad-hoc scenario, interviewee five indicated that at times contractors are not paid for months at a time. The comment received was *Contractors are often paid late. This is not just for one payment, but for numerous payments. The confusing part though, is that when the IA does eventually pay, they settle the most recent outstanding payment invoice and not the initial one/s. This mean that there is a lack of organisation in their systems as well".* Interviewee six has become so accustomed to late payments that they have developed a tracking schedule of same. This interviewee stated *There are so many contractors that have not been paid for work done on site that my organisation actually has a late payment tracking schedule in place and we try to follow up with the IA, as this has an effect on our business too".* From a different angle, a comment which was made by interviewee eight, understood that the IA awaits payment from DBE first, in order to pay contractors and BEP's, therefore indicating that BEP's are not always to

blame, however this interviewee was still not compassionate to the IA's cause and stated that *"The IA always blames late payment on the Department of Education, stating that they are awaiting a batch payment from them. This may be a fact, however there is still too much of disorganisation with these implementing agents"* Interviewee ten also stated the following,' *Much blame for late payments is directed to the Education department and the fact that fund has to be re-allocated to schools for their Covid 19 relief action. While this may be a fact, it does not explain the numerous other times when contractors were paid late. It seems that budgeting is even a problem"* One interviewee indicated that late payments to contractors also affected their businesses. The comment received was, *"Late payment to the contractors affects me as well, as the professional, as no work on site means that I cannot claim professional fees. Currently some contractors are waiting 4 months for payment.* Late payment was noted by Christopher (2018), DBE (2019) and the Auditor General (2019)

5.5.4.10 Possible Solutions

Solutions to the problem, ranged from removing the IA from the procurement process to acknowledging that the built environment will not be able to alleviate their presence in the built environment. The fact that they should be removed was shared by 5 of the BEPS. They believed that the BEP must take on the responsibility of public procurement. Another solution which was recommended by one BEP was that the processes for extension of time claims needs to be shortened. The comments which were received included the following from interviewee one, "*The IA should be removed, it will enable faster service delivery".* Interviewee 2 also stated that*, "We perform the functions of an IA on a daily basis. We have the required skill and are motivated to ensure that the work will get done".* With regards to keeping the IA, interviewee four stated that *"Reduce the number of functions which the IA has direct responsibility over. For example, the process of EOT approval should be split between the IA and the BEP especially where no additional cost is involved to the contractor"* Another interviewee stated that *"The guidelines for the requirement to be an IA must be reviewed, so that stricter entry requirements are met."* In order to safe guard their organisation, interviewee six stated that *"I don't think that government will get rid of IA's. We just have to be strategic, in how we tender, so that we don't lose profit in the process".* Lastly one interviewee stated that *I don't think that we can overcome the situation unless there are some serious interventions from the Government. The IA is part of Government so there is not much that we can do to change the situation.*

Heale and Forbes (2014:98) define triangulation in research *as the use of one or more approaches to researching a question.* The combination of more than one method of research data collection will result in either converging, complementing or contradicting data (*ibid*) This study utilised convergent parallel design as described in Chapter 4.

5.6.1 Triangulation of the study

In the convergent parallel design approach, qualitative data and quantitative data are collected separately but at the same time and after a separate data analysis process the data is compared to each other and interpreted by the researcher in order to determine whether the data either aligns to or opposes each other (Creswell, 2014). This is the triangulation process.

Table 5.61 displays the triangulation process for the qualitative and the quantitative data which was collected for this research process. As is reflected in Table 5.61 there is alignment with the quantitative and qualitative data which has been gathered for the study. As can be seen from Table 5.61, the quantitative and qualitative data aligns with one another. Based on the findings from both the quantitative and qualitative data, it can be inferred that, the shortcoming of the IA's and the challenges which are being experienced by BEP's, (even if the IA has an explanation for same) has caused a certain degree of frustration in the procurement of water and sanitation infrastructure for schools in KwaZulu-Natal. Therefore, it can be deduced that the IA has had a negative impact on the water and sanitation delivery to schools in KwaZulu-Natal.

Table 5.61: Triangulation of the Study

Research Question	Sub-theme developed as a result of factor analysis	Quantitative	Qualitative
Research Question 1: Strategies and policies which the South African Government introduced and applied since democracy in order to address the water and sanitation inequalities which have been created as a result of apartheid	• Governments policy for the future • Strategy of the South African Government for water and sanitation	This aspect of the questionnaire sought to explore the participants understanding of the papers, policies and legislation which the South African Government introduced, in order to conceptualise and address the water and sanitation challenge in the country. It was found that there was a mix of participants who were aware of the literature and those who did not. However, overall, many of the participants were not fully aware of the exertions of Government, or if they were aware, they did not understand the technicalities of the documentation which was put forward.	The objective of the questions in the interview, were also designed to understand whether the interviewee understood and was able to conceptualise the root cause of the problem as it related to water and sanitation. The general outcome was the same as the questionnaire, where the interviewees had a brief understanding and were aware of the challenge, but were not fully aware of the exertions of Government. That being said, there were interviewees who were able to fully explain their understanding as it related to the literature.

Research Question	Sub-theme developed as a result of factor analysis	Quantitative	Qualitative
Research Question 2: Why has the Department of Basic Education utilised Implementing Agents to enable the delivery of water and sanitation provision in schools in rural areas of KwaZulu-Natal	The importance of ensuring that individuals possess the correct skill to enable infrastructure development	• The links of service delivery and growth of economy • Skill set required for in order to execute infrastructure projects.	Consensus was received from the BEP that the provision of water and sanitation will contribute to economic development in the long run. A comment received in this regard was *"School infrastructure development is very important and must not be seen separately from that of other income generating infrastructure which is also required".*
	The Mandate of Government Departments such as the Department of Basic Education, as it relates to infrastructure development	• Lack of infrastructure skills of DBE were not necessarily acknowledged as the BEP was of the opinion that DBE employs BEP's. (However, it was explained that the latter was the case when the IA was initially introduced. Subsequently and of recent, it has been a trend by DBE to employ BEP's, possibly due to the shortcomings of the IAs.) • Agreement that the that DBE did not have the time and capacity	• The participants did not agree that DBE did not have skill in built environment projects (As noted in quantitative, this is a recent trend). • The fact that DBE had to cede the infrastructure responsibility was viewed, more as a requirement by national government which the DBE was acceding to. • A comment which was received was *"I am not sure why there was a need to introduce them as, as a Professional in the construction industry, I will be able to perform the same function".*

Research Question	Sub-theme developed as a result of factor analysis	Quantitative	Qualitative
Research Question 2. Continued: Why has the Department of Basic Education utilised Implementing Agents to enable the delivery of water and sanitation provision in schools in rural areas of KwaZulu-Natal	Essential project management skills to take on the responsibility of an Implementing Agent.	• Leadership • Communication • Time management • Understanding construction methodology • Financial management • Accurate and comprehensive reporting to DBE • Ability to make decisions	Interviewees did not view all IAs as having the requisite skill to manage construction projects. A comment received was: *"That being said (regarding skills etc), there is definitely a gap in technical skills, etc. which is not being met, as these agents at times don't seem capable".*
Research Question 3: Current status of water and sanitation in schools in rural areas in KwaZulu-Natal even with the introduction of Implementing Agents	Quality of workmanship of school facilities in rural areas	• School facilities not maintained • In some instances, "make-shift" classrooms built by the community • School facilities structurally unsound	Consensus amongst the BEP's that the condition of school facilities as well as that of the water and sanitation facilities in schools in Kwa-Zulu Natal are not adequate for the learners. Some comments received included *"The ablution facilities are not maintained. The pit is not emptied at all, resulting in unhygienic and dangerous conditions for the learners"* *"There are insufficient number of ablution facilities for the number of children and teachers who attend the school".* *"Children drink water from water tanks which simply harvest rain water. led the water which the school*
	Insufficient school infrastructure facilities at schools in rural areas	• Overcrowded classrooms in rural areas • Rural schools do not extra over facilities, such as libraries, laboratories, etc	
	Suitability of existing ablution facilities in schools in rural areas	• A form of sanitation is present • The use of the bucket system	
	The drive to ensure plain pits toilets are replaced with progressive forms of sanitation at schools in rural areas	• Plain pit ablution is still existing • VIPs are the most common type of ablution • Waterborne sewerage is available however in very few schools	

Research Question	Sub-theme developed as a result of factor analysis	Quantitative	Qualitative
Research Question 3 Continued: Current status of water and sanitation in schools in rural areas in KwaZulu-Natal even with the introduction of Implementing Agents	The drive to ensure safe, clean, potable water is provided to rural areas	• A form of potable water is available • Municipal tankers supply water • Drinking water via a municipal connection	• Consensus amongst the BEP's that the condition of school facilities as well as that of the water and sanitation facilities in schools in Kwa-Zulu Natal are not adequate for the learners. Some comments received: • *"The toilet is never clean. Teachers and learners have the same toilet. It is sad that the children of today are still going through what I went through when I was young. When is it going to end"?* • *"Schools may be serviced by water tankers from the municipality; however, this service is very inconsistent and therefore not reliable".*
	Supply and maintenance of water and sanitation facilities at schools in rural areas	• Insufficient number of ablution facilities • Non maintenance of the VIP toilets • Ablution fittings are broken or missing • Supply of potable water	
	Ensuring adequate provision of potable water and ablution facilities to learners	• VIP vent pipes broken or damaged • Water from rainwater tanks utilised for drinking • Water tanks are damaged or blown away • Municipal water not reliable	
	Quality of workmanship of school facilities in rural areas	• School facilities not maintained • In some instances, "make-shift" classrooms built by the community • School facilities structurally unsound	
	Insufficient school infrastructure facilities at schools in rural areas	• Overcrowded classrooms in rural areas • Rural schools do not extra over facilities, such as libraries, laboratories, etc	

Research Question	Sub-theme developed as a result of factor analysis	Quantitative	Qualitative
Research Question 3 Continued: Current status of water and sanitation in schools in rural areas in KwaZulu-Natal even with the introduction of Implementing Agents	Suitability of existing ablution facilities in schools in rural areas	• A form of sanitation is present • The use of the bucket system	• Consensus amongst the BEP's that the condition of school facilities as well as that of the water and sanitation facilities in schools in Kwa-Zulu Natal are not adequate for the learners.
	The drive to ensure plain pits toilets are replaced with progressive forms of sanitation at schools in rural areas	• Plain pit ablution is still existing • VIPs are the most common type of ablution • Waterborne sewerage is available however in very few schools	
	The drive to ensure safe, clean, potable water is provided to schools in rural areas	• A form of potable water is available • Municipal tankers supply water • Drinking water via a municipal connection	
	Supply and maintenance of water and sanitation facilities at schools in rural areas	• Insufficient number of ablution facilities • Non maintenance of the VIP toilets • Ablution fittings are broken or missing • Supply of potable water	
	Ensuring adequate provision of potable water and ablution facilities to learners	• VIP vent pipes broken or damaged • Water from rainwater tanks utilised for drinking • Water tanks are damaged or blown away • Municipal water not reliable	

Research Question	Sub-theme developed as a result of factor analysis (Quantitative)	Quantitative	Qualitative
Research Question 4: Challenges experienced by professionals when working with Implementing Agents in the delivery of water and sanitation to schools in rural areas of KwaZulu-Natal?	Understanding the key characteristics to qualify as an Implementing Agent for infrastructure projects	• Leadership • Communication • Understanding of construction project activities • Time management • Financial management • Scope management • Accurate reporting to DBE • Quality management • Decision making ability	General lack of skill was noted by the BEP's. Some comments received were: *"Most of the individuals who work at Implementing Agents and who have the title project manager are not professionally registered. They are managing a team of Built Environment Professionals, which by the way also includes a Principal Agent or Project Manager who understands construction procurement. These Implementing Agents rely on us for project management.*
	Internal organisational challenges which implementing agents need to address	• Training and development and skills transfer of graduates • Allocation of projects • Understanding and applying the FIPDM	Agreement that BEP utilise graduates who are not sufficiently trained in their jobs. A comment received *"There must a training in place from senior IAs so that these graduates are not blamed for the delays and shortcomings*
	Effective project budget expenditure for water and sanitation projects	• Utilisation of funds to ensure funds not reallocated to the next financial year	The BEP's concur that funds are not utilised effectively. BEP's have noted that the money is sufficient and some BEP's mention fraud/ corruption

Research Question	Sub-theme developed as a result of factor analysis (Quantitative)	Quantitative	Qualitative
Research Question 4 Continued: Challenges experienced by professionals when working with Implementing Agents in the delivery of water and sanitation to schools in rural areas of KwaZulu-Natal?	Effective planning for infrastructure projects	• Ensure priority list projects are aligned to budgets available	The BEP agree that planning of projects in relation to the budget available, needs to be a priority "*Every year there is a roll over or giving back of money. That means that they don't need it or don't know how to use it*"
	Impact of delayed project approvals	• Long approval processes impact learners and budgets	The effect of the long approval processes was emphasised in the discussions about extension of time claims and the impact that it has on the contractor and the BEP.
	Accountable decisions making by the Implementing Agent.	• Take responsibility for decisions • Budget spend to be effective • Non approval of variation orders	The BEP also concurred with these statements and comments has been indicated previously, refer
	Monitoring of site activities and corrective action for defaulting contractors.	• Defaulting contractors to be placed on defaulters list	BEP's confirms the stance that contractors who do not perform on projects should be placed on a defaulters

Research Question	Sub-theme developed as a result of factor analysis (Quantitative)	• Quantitative	Qualitative
Research Question 4 Continued: Challenges experienced by professionals when working with Implementing Agents in the delivery of water and sanitation to schools in rural areas of KwaZulu-Natal?	Acceptable adjudication of contractor's tenders	• Awarding at budgets aligned to estimate • Awarding too many projects to one contractor • Appointment of competent contractors to alleviate delays and poor workmanship	There was consensus that the IA takes too long to adjudicate and award tenders to contractors. A comment received was; *"Projects are awarded long after the validity period. I am not sure if they even request extensions of tender validity as, we are not party to those discussions*". Another interviewee stated *"I haven't had many projects that have been awarded within the tender validity period. There seems to be no urgency".*
	Efficient contract management/administration	• Payments to contractors not done on time • Loss of documentation • Long periods to approve extension of time claims	There was consensus that the IA do pay contractors late. A comment received was stated *Late payments are so frequent that it results in added financial implications because the contract period is prolonged.*
	Reliance on the BEP and non-payment of professional fees	• Reduce over reliance on BEP • Fees are not paid on time • Tight deadlines • Long time periods to approve projects	The BEPs agree that the IA tasks them to perform some of their functions.

Research Question	Sub-theme developed as a result of factor analysis (Quantitative)	• Quantitative	Qualitative
Research Question 4 Continued: Challenges experienced by professionals when working with Implementing Agents in the delivery of water and sanitation to schools in rural areas of KwaZulu-Natal?	Transparency in the appointment and management of built environment professionals	• Fair and transparent procedure to be followed • Awarding too many projects to smaller firms Appointing more than one BEP for the same school.	The BEP's agreed that in certain instances the process of awarding projects to BEP's was not fair and transparent.
	Timeous award of projects to enable Built Environment Professionals to realise cash flows for their business operations	• Reduce project delays to enable BEP to manage their operations	There was an overwhelming response from the BEP that project delays must be minimised.
	Alignment of project award value as per the Built Environment Professionals estimate	• Award projects at recommended budget not substantially lower	This was mentioned previously.
Research Question 5 Continued: How can the challenges be overcome to enable the fast-track delivery of water and sanitation to schools in rural areas in KwaZulu-Natal?	Internal management of infrastructure by relevant Government Department Transparency of reporting and training and development of graduates at implementing agent offices. Inability of the Implementing agent to manage public procurement and the introduction of the BEP for this process.	• DBE should manage their own infrastructure	Many of the responses received from the BEP included removing them from the public procurement sphere. Other BEP's acknowledged that they will not be removed by government therefore they have to develop ways of working with them, to ensure continuity of work without compromising their business operations

This chapter provided insight from the BEP, with regards to their experiences and opinions of working with IA's. It is clear that generally, the IA lacks the requisite skill and capacity to manage infrastructure projects.

The general project management characteristics amongst the IA's is also weak. The status quo of the water and ablution facilities was provided, which indicated that these facilities are still in a poor condition. The challenges which the BEP's experience, when working with IA was also investigated. The BEP was also provided the opportunity to provide their own opinion on the latter. The next chapter concludes this study, based on the findings of this research and provides recommendations for further research or papers.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The purpose of this chapter was to consolidate all the findings in relation to the research questions and objectives. This chapter also provided an overview of the research and data analysis which was utilised in this study.

6.2 Literature review summary

The state of basic service delivery in South Africa is a topic that has been widely debated, however it has never been completely resolved. The country has just concluded its local government election where service delivery promises were key to garner votes. The country is also currently in the midst of the Covid-19 pandemic, which has resulted in the level of inequality being brought to the fore as the haste to obtain clean water is a now more of a priority. Inequality however has not only reared its head as a result of the pandemic or local government elections and this study's primary objective was to focus on the inequality in schools as it relates specifically to water and sanitation. The study was only concentrated in the KwaZulu-Natal province.

The literature review provided the reader with an understanding of how old (historic) the inequality issue is, in South Africa and where the root cause of the water and sanitation problem emanated. The history of South Africa in relation to water and sanitation was discussed to provide context to the problem. This, however, is preceded by an understanding that clean water and adequate sanitation is viewed as a global crisis and one which has been adopted by the United Nations. The country's' move to the democratic society since 1994, had resulted in significant improvements in relation to the percentage of the population who have now been afforded clean water and sanitation. However, considering that it has been many years since democracy, the water and sanitation situation at schools has seen little improvement, with deaths being reported in pit latrines, as recent as the year 2014. The literature review provides an understanding of the current situation at schools in KwaZulu-Natal. The literature review also provides an understanding of public procurement and the ultimate responsibility for infrastructure provisions as a whole to enable water and sanitation delivery. As was discussed in the literature review, the latter was previously the responsibility of the national and provincial Department of Public Works. The introduction of the Implementing Agent was discussed as well as the shift by the Department of Education to utilise Implementing Agents to provide infrastructure to their schools. The shift was as a result of the introduction of the Public Management Finance Act of 1999. The role of the Implementing Agent was defined by the National Treasury of South Africa.

The main aim of the decision to include IAs was to fast track the delivery of water and sanitation to schools, considering that there was a wider pool of organisations that now had this responsibility. However, this approach did not necessarily improve the situation at schools. Current day observations

indicate that ablution facilities are in appalling conditions, have not been maintained or adequate facilities are not available. Potable water is in form of rainwater harvested from rainwater tanks or from municipal tankers who deliver water to schools. If municipal water is available the supply is, most of the time, not reliable.

The aim of the study explored if the Implementing Agent were a potential reason for the slow delivery of water and sanitation to schools in KwaZulu-Natal. The challenges which organisations such as the Department of Basic Education had/are experienced with Implementing Agents is documented and complaints from other organisations such as Auditor General of South Africa is also recorded.

This study aimed to investigate the experiences of Built Environments Professionals, such as Quantity Surveyors, Architects and Engineers, in order to determine whether the IA could be a potential reason for the poor water and sanitation delivery at schools in KwaZulu-Natal.

6.3 Research methodology adopted

A pragmatic paradigm was utilised for this study, A combination of quantitative and qualitative data, that is mixed method research was utilised for this study. The results from both methods were then merged via the triangulation and the convergent parallel design approach. A survey questionnaire and semi structured interview were chosen as the data collection tools. The quantitative data was analysed utilising survey/questionnaire data from 52 BEP's who have worked with Implementing Agents. Semi structured interviews were conducted with 12 BEP's who have worked with Implementing Agents.

Based on the comments from the BEP's there is sufficient evidence which points to the fact that the Implementing Agents arrangement has resulted in the slowing down of service delivery of water and sanitation to schools in rural areas of KwaZulu-Natal.

6.4 Research problem

Water and sanitation is a constitutional right in South Africa, yet 27 years after democracy learners at schools, particularly in KwaZulu-Natal do not have safe and reliable water and sanitation facilities.

The main aim of the study was to analyses the feedback received from BEP's who have worked with implementing agents in order to understand if the short comings/ challenges experienced with Implementing Agents are a potential reason for the slow delivery of water and sanitation facilities to schools in KwaZulu-Natal.

6.5 Findings

Table 6.1: Research Question 1 and Objective

Research Question	Research Objective
What strategies and policies have the South African Government introduced and applied since democracy in order to address the water and sanitation inequalities which have been created as a result of apartheid?	To determine what strategies and policies the South African government introduced and applied since democracy in order to address the water and sanitation inequalities which have been created as a result of apartheid?

According to the literature review, the Government of South Africa has implemented various policies, papers and legislation, in order to address the water and sanitation challenge in South Africa. Over and above this, they had the foresight to plan for the future, in respect of preserving the country's water resources. Based on the feedback from the interviews and questionnaire, many of the participants of both interviews and questionnaire were not aware of the policies or the specific workings of these policies.

Table 6.2: Research Question 2 and Objective

Research Question	Research Objective
Why has the Department of Basic Education utilised Implementing Agents to enable the delivery of water and sanitation provision in schools in rural areas of KwaZulu-Natal?	To understand why the Department of Education utilised implementing agents as opposed to performing this function on their own?

The literature review section indicated that the need for the Implementing Agent was a result of the PFMA Act of 1999 which ensured that expenditure for infrastructure projects was to remain within the ambit of the relevant government department which, in this case is the Department of Basic Education (DBE). In the past, it was not necessarily the norm for DBE to employ BEP's therefore resulting in a lack of built environment/infrastructure related skills to enable their own infrastructure developments. It was due to the latter and the notion in the South African constitution which allowed Agency and Delegation of a responsibility, that the need to engage Implementing Agents became necessary by DBE. The findings from the questionnaire indicated that BEP's agree that any individual involved in the built environment must have the requisite skill and knowledge to successfully execute these types of projects. The participants in the interview also agreed with the latter statement, and indicated that the skill level is not always up to standard that is required for construction procurement and its processes. The participants in both the questionnaire and interviews aired their views and opinions on the characteristics of a project manager considering that an Implementing Agent essentially act in the role of project

manager when implementing these projects and there was general consensus that project management skills were lacking in that of the IA.

Table 6.3: Research Question 3 and Objective

Research Question	Research Objective
What is the current status of water and sanitation in schools in rural areas in KwaZulu-Natal even with the introduction of Implementing Agents?	To explore the current status of water and sanitation in schools in rural areas in KwaZulu-Natal even with the introduction of Implementing Agents?

The participants in both the questionnaire and interview generally agreed that the condition of infrastructure provisions at schools in rural areas was poor. The conditions of ablutions and the quality of the workmanship or the reliability of clean, adequate drinking water at schools was confirmed to be insufficient. The literature review of this study also provided evidence from organisations such as Equal Education or the Auditor General of South Africa, who have noted the various occurrences of inadequate facilities.

Table 6.4: Research Question 4 and Objective

Research Question	Research Objective
What are the challenges experienced by professionals when working with Implementing Agents in the delivery of water and sanitation to schools in rural areas of KwaZulu-Natal?	To determine what are the challenges experienced by professionals when working with Implementing Agents in the delivery of water and sanitation to schools in rural areas of KwaZulu-Natal

The participants in both the questionnaire and interviews expressed their unsatisfied viewpoint when the implementing arrangement was mentioned. The literature reviews provide evidence from the Department of Education themselves who had reported unsatisfactory findings in respect of the way the Implementing Agent carries out their tasks for DBE. There was a high degree of agreement which pointed to the fact that skills were lacking, such as leadership, time management, accountability, understanding of construction activities, etc. There was general consensus that approval processes take too long which results in contractor and consultant frustration as both parties are now at risk of loss of profit.

Table 6.5: Research Question 5 and Objective

Research Question	Research Objective
How can the challenges be overcome to enable the fast-track delivery of water and sanitation to schools in rural areas in KwaZulu-Natal?	To propose solutions to the challenges to enable the fast-track delivery of water and sanitation to schools in rural areas in KwaZulu-Natal?

The literature review for this section provided recommendations from organisations such as Equal Education as well as Christopher (2018) who have recommended the removal of the IA from the public procurement process. This recommendation was also provided by the participants of the interview and questionnaire. However, it was also acknowledged that the Implementing Agent has been mandated by Government, therefore there should be a drive to ensure that the shortcomings of the Implementing Agent can be adequately addressed so that fast track service delivery can be enabled.

Based on the findings of this research, the author acknowledges that while the inclusive aim of the Government is to create more job opportunities for their people, which will go a long way to dispel the notion of apartheid, there has also been a disconnect and misalignment in recent years, where inefficiencies in the procurement processes are being overlooked. Therefore, while the IA arrangement can remain in place, there needs to be a mindset change which addresses comprehensive economic growth (and not just job creation, in particular for the IA), and there needs to be stricter control measures which recognises the need to employ and appoint competent organisations to fulfil the duty of water and sanitation provision in the country.

6.6 Recommendations for future research

Further research should be performed on:

a) The effect of late payment to contractors, by the Implementing Agent, when working on projects for the provision of water and sanitation to rural schools.
b) The effect of late payment of professional fees to Built Environment Professionals by Implementing Agents.
c) The process and protocols required at Implementing Agent organisations that result in long approval times for extension of time claims
d) Budgeting tools for the DBE and IA which must ensure that sufficient budgets are set aside for each financial year, thereby alleviating late payments to either BEP's or contractors.
e) The socio-economic effect of poor water and sanitation facilities at schools in rural areas.

6.7 Chapter Summary

This chapter provided an understanding of the literature review, the research problem and objectives as well as the findings of the research study. The research questions and objectives were highlighted. The study fulfilled its objective and the conclusion which can be derived from this is that the introduction of the IA has had a negative impact on the delivery of water and sanitation to schools in rural areas of KwaZulu-Natal.

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APPENDIX A

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

04 February 2021

Ms Serisha Sirputh (202500898)
School Of Engineering
Howard College

Dear Ms Sirputh,

Protocol reference number: HSSREC/00002088/2020
Project title: Understanding the reasons for poor water and sanitation delivery in schools in KwaZulu-Natal
Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 14 October 2020 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid until 04 February 2022.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,

[redacted]

Professor Dipane Hlalele (Chair)

/dd

Humanities and Social Sciences Research Ethics Committee
Postal Address: Private Bag X54001, Durban, 4000, South Africa
Telephone: +27 (0)31 260 8350/4557/3587 **Email:** hssrec@ukzn.ac.za **Website:** http://research.ukzn.ac.za/Research-Ethics
Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville