DURBAN UNIVERSITY OF TECHNOLOGY
INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE

AN INVESTIGATION OF THE CONDITION OF MAINTENANCE OF FACILITIES AT PUBLIC PRIMARY AND HIGH SCHOOLS IN ALFRED NZO EAST DISTRICT, EASTERN CAPE PROVINCE, SOUTH AFRICA

BAVUYISE GIFT NQAKAZA

Submitted in fulfilment of the requirements for the degree of Master of the Built Environment in Construction Management in the Faculty of Engineering and Built Environment at the Durban University of Technology

SUPERVISOR: DR S.H.P. CHIKAFALIMANI

August 2023

ABSTRACT

Most of the facilities at public primary and high schools in South Africa are in a dilapidated state with little maintenance. Therefore, this study intends to investigate the condition of maintenance of facilities at public primary and high schools in Alfred Nzo East District, Eastern Cape Province. The rationale for the research is the importance of maintenance of facilities at schools to guarantee safe and secure learning environments for the learners and educators. Unfortunately, school governing bodies in have neglected maintenance at schools due to a lack of knowledge about maintaining facilities and inadequate funding. This study will intervene by investigating the condition of facilities and developing recommendations which will support the maintenance of facilities to create good learning environments for learners and educators in order to improve education at Public Primary and High schools in the area. To collect quantitative data, questionnaires were administered to schools in Alfred Nzo East District and the condition of the schools was assessed using a prepared condition assessment tool. Alfred Nzo East District has a total of 218 schools, which were the target population. The schools were clustered into their circuits and schools in each cluster were then randomly sampled to get the required sample of 138 schools, from the target population of 218 schools. Two district officials responsible for school maintenance were sampled to make a total of 140 sample. Upon carefully analysing the collected data, it was established that the school facilities are in a state of disrepair and schools have turned into death traps for the occupants. The cause for dilapidating school infrastructure was found to be poor level of understanding of those people responsible for school infrastructure maintenance, inadequate funding, poor planning and monitoring which cause poor implementation of maintenance. To change the current state collaboration between the role players and capacitation is required, such as school governing bodies, district infrastructure officials and provincial department. Proper allocation of funds and other resources; proper planning and utilisation of existing funds were found to be vitally important. The employment of handymen or women for each school was identified as key to address challenge of poor maintenance of the school facilities.

DECLARATION OF ORIGINALITY

This is to certify that the work in this study is my own and not any other person's, unless clearly acknowledged by citation of published and unpublished sources. I would like to assure you that this work has not been submitted in any form to the Durban University of Technology or any other institution for assessment or any other purpose. Attached here as Appendix H is Turnitin report showing the level of originality which is compliant with DUT requirements.

Submitted by:

Mr Bavuyise Gift Nqakaza Signed: Date: 25 August 2023

25 August 2023

Approved for Final Submission

Supervisor: Dr S.H.P. Chikafalimani Signature:…….. Date……...

Endorsed for Final Submission

Head of Department Construction Management and Quantity Surveying:

Dr. M.C. Mewomo Signature:…….. Date…27.08.2023

DEDICATION

This dissertation is dedicated to the following most important people:

My Mother who passed on due to Covid 19-related diseases. Her support and encouragement in my education was amazing, even though she was illiterate. She managed to raise five children on her own. I am grateful for the love and support she gave me.

My wife, who always encourages me to push forward, no matter how hard it is.

My three kids, no matter how hard things are, they always manage to put a smile on my face.

ACKNOWLEDGEMENTS

There are many people who assisted in the completion of this Master's thesis. Their support and guidance cannot be ignored because without their help the dream of completing this study would have varnished. I thank heavenly Father for touching their hearts so that they are willing to assist.

My Supervisor Dr. Chikafalimani, I have all the reasons to thank you for your kindness, patience, guidance and support. For you to believe that I could do this was very encouraging, and that's what made me push forward. I appreciate that, in your busy schedule you always gave your time to assist me any time I needed your help.

Dr Gill Hendry, the statistician who managed to do a brilliant data analysis that resulted to this study reaching it objectives.

Mrs. Ethel Ross for her assistance with editing of this document.

Working with Avenal Jane Finlayson from the DUT Alan Pittendrigh library was overwhelming and very humbling. Her assistance and guidance contributed a lot in completion of this work.

TABLE OF CONTENTS

ABSTRACT ii
DECLARATION OF ORIGINALITY iii
DEDICATION iv
ACKNOWLEDGEMENTS v
TABLE OF CONTENTS vi
ABBREVIATIONS AND GLOSSARY OF TERMS ix
LIST OF TABLES x
LIST OF FIGURES xi
LIST OF APPENDICES xii
CHAPTER ONE: PROBLEM AND ITS SETTING 1
1.1 Introduction 1
1.2 Research Problem 1
1.3 Aim Of The Study 1
1.4 Study Objectives 1
1.5 Research Questions 1
1.6 Theoretical Framework 2
1.6.1 Concept of facility maintenance 2
1.6.2 Importance of facility maintenance 2
1.6.3 Condition of school facilities 2
1.6.4 Policies governing school maintenance 2
1.7 Conceptual Framework 2
1.8 Methodology 3
1.9 Limitations 3
1.10 Rational of the study 3
1.11 Significance of Study 3
1.12 Structure Of The Study 3
CHAPTER TWO: LITERATURE REVIEW 5
2.1 Introduction 5
2.2 The school facilities 7
2.3 Facilities' maintenance 7
2.4 Types of Maintenance 8
2.5 Condition Assessment 9
2.6 Advantages of condition assessment 11
2.7 Disadvantages of condition assessment 11
2.8 Maintainability 11

2.9 Challenges facing school maintenance 12
2.10 Impact of poor school infrastructure maintenance 13
2.11 Policies and guidelines governing maintenance. 13
2.12 Government Immovable Asset Management Act 14
2.13 The South African Schools Act of 1996 14
2.14 National norms and standards for school funding 15
2.15 Impact of Covid-19 outbreak on school maintenance 17
2.16 Conclusion 18
CHAPTER THREE: RESEARCH METHODOLOGY 19
3.1 Introduction 19
3.2 Study Design 19
3.3 Research Approach 19
3.3.1 Quantitative Research 19
3.4 Target population 19
3.5 Sampling 20
3.6 Inclusion and exclusion criteria 22
3.6.1 Inclusion 22
3.6.2 Exclusion 22
3.7 Informed Consent and Confidentiality 22
3.8 Ethical considerations 22
3.9 Data collection 22
3.10 Data Analysis 22
3.11 Pilot Testing 23
3.12 Research instruments 23
3.12.1 Questionnaire 23
3.12.2 School infrastructure condition assessment tool 24
3.13 Conclusion 24
CHAPTER FOUR: FINDINGS AND ANALYSIS 25
4.1 Introduction 25
4.2 Response rate from questionnaires 25
4.3 Questionnaire Response Result Analyses 25
4.3.1 Questionnaire Section A 26
4.3.2 Section 2 of the Questionnaire 28
4.4 Condition assessment tool analyses 46
4.4.1Administration block 48
4.4.2 Media centres 49

4.4.3 Laboratories 49
4.4.4 Grade R facilities 49
4.4.5 Nutrition centres 50
4.4.6 Classrooms 51
4.4.7 Playing fields 54
4.4.8 Electricity 54
4.4.9 Water 54
4.4.10 Sanitation 55
4.4.11 Fencing 55
4.4.12 Condition of overall maintenance 56
4.5 Conclusion 58
CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS 59
5.1 Introduction 59
5.2 Discussion of the key findings and conclusions under each research objective. 59
5.2.1 To investigate the maintenance and condition of facilities at PPHS in ANED, ECP. 59
5.2.2 To identify reasons for the poor maintenance condition of facilities at PPHS, ANED, ECP. 59
5.2.3 To formulate recommendations for improving the maintenance and condition of facilities at PPHS in ANED, ECD. 60
5.3 Conclusion 61
REFERENCES 62
APPENDIX A QUESTIONNAIRE 68
APPENDIX B CONDITION ASSESSMENT TOOL 72
APPENDIX C LETTER OF INFORMATION 73
APPENDIX D LETTER OF CONSENT 75
APPENDIX E GATEKEEPER'S LETTER 76
APPENDIX F LETTER OF APPROVAL 77
APPENDIX G IREC FULL APPROVAL 78
APPENDIX H TURNITIN REPORT 79
APPENDIX I EDITOR'S CERTIFICATE 82
APPENDIX J STATISTICIAN CERTIFICATE 83

ABBREVIATIONS AND GLOSSARY OF TERMS

ANED	Alfred Nzo East District
PPHS	Public Primary and High Schools
MEC	Member of the Executive Council
SBGs	School Governing Bodies
ECP	Eastern Cape Province
NEIMS	National Education Infrastructure Management System
GIAMA	Government Immovable Asset Management Act
PPEs	Personal Protective Equipment
CMCs	Circuit Management Centres
SF	School Facilities
EFMS	Education Facilities Management Systems

LIST OF TABLES

Table 1: Condition standards for facilities and buildings 9
Table 2: Condition rating and maintenance type 11
Table 3: Past seven years' maintenance funding trends 15
Table 4: Target population in circuits 20
Table 5: Sample size 21
Table 6: Response rate per circuit 25
Table 7: Summary of responses on political factors 29
Table 8: Political factors: factor loading, reliability and variance extracted 31
Table 9: Political factors results of analysis 31
Table 10: Summary of personnel related factors 34
Table 11: Details of the extracted factor are shown 35
Table 12: Personnel factors 36
Table 13: Management factors: factor loadings, reliability and variance extracted 38
Table 14: Management factors result analysis 38
Table 15: Summary table 39
Table 16: Structural and maintenance factors: factor loading, reliability and variance extracted 41
Table 17: Structural and maintenance result analysis 41
Table 18: Structural and maintenance factors summary 42
Table 19: Summary on sustainability and maintainability 45
Table 20: Design and construction factors: factor loadings, reliability and variance extracted. 46
Table 21: Design and construction result analysis 46
Table 22: Condition summary of administration block 48
Table 23: Summary of statistics for classroom blocks 53
Table 24: Summary of condition of playing fields 54
Table 25: Summary of electricity supply 54
Table 26: Summary of water supply 54
Table 27: Summary of available sanitation 55
Table 28: Summary of fencing 55
Table 29: Facility condition correlations 57

LIST OF FIGURES

Figure 1: The cycle of despair 6
Figure 2: Integrated building performance model 6
Figure 3: Property lifecycle 8
Figure 4: Graph showing past seven years' funding trends 16
Figure 5: Map of circuits in clusters 21
Figure 6: Gender response percentages 26
Figure 7: Percentage of responses per age group 26
Figure 8: Break-down of qualifications 27
Figure 9: Percentages of position, profession and experience 27
Figure 10: School facilities for which respondents are responsible 28
Figure 11: School Category or Size 28
Figure 12: Level of SGBs' knowledge about maintenance 33
Figure 13: General performance responses 33
Figure 14: Analysis of management factors 36
Figure 15: Response summary on design stage and sustainability consideration 43
Figure 16: Summary of CMC infrastructure types 47
Figure 17: Summary of school categories 47
Figure 18: Condition summary of the administration blocks 48
Figure 19: Summary of condition of media centres 49
Figure 20: Summary of condition of laboratories 49
Figure 21: Summary of condition of Grade R facilities 50
Figure 22: Nutrition summary 51
Figure 23: Summary of condition of classroom blocks 52
Figure 24: Summary of the overall condition of basic services 56

LIST OF APPENDICES

Appendix A	Questionnaire	68-71
Appendix B	Condition Assessment tool	72
Appendix C	Letter of information	73-74
Appendix D	Letter of Consent	75
Appendix E	Gate keepers' letter	76
Appendix F	District approval	77
Appendix G	IREC full approval	78
Appendix H	Turnitin report	79- 81
Appendix I	Editor's certificate	82
Appendix J	Statistician certificate	83

CHAPTER ONE: PROBLEM AND ITS SETTING

1.1 Introduction

According to the South African Schools Act (1996: 10) general upkeep of facilities at public primary and high schools (PPHS) in South Africa is one of the responsibilities of the Member of Executive Council (MEC) for education in the province. The act empowers the MEC for education to provide a conducive teaching and learning environment at PPHS for the learners and educators. In addition, the act also gives SGBs the authority to implement and monitor facility maintenance work at PPHS, regardless of the fact that maintenance work requires technical knowledge. As a consequence, Mojela (20013: 3) lamented that facilities at most PPHS in South Africa are in a dilapidated state and are hazardous to the users. Collins *et al*. (2021: 181) discovered that schools in rural areas are in unacceptable state of infrastructural decomposition and are not only health peril but also possible death trap. This clearly indicates that school infrastructure in our country is not only dangerous to the future of our children but is also dangerous to the lives of educators and learners. This requires urgent attention so that the future of our children can be save because their future largely depend to the level of education and level of education, they receive depends on the level of the infrastructure available in their schools. This is mentioned because a study by Herath (2022: 401) identified relationships between school performance and its facilities. To avoid further deterioration Lavy (2008: 5) encouraged organisations, including PPHS to regularly conduct routine and unplanned maintenance work, as well as to undertake systematic maintenance of the facilities they are using.

1.2 Research Problem

Several studies have reflected the dilapidated infrastructure in schools around the world, as well as in South Africa, and including schools in the Eastern Cape (Mojela 2013: 4; Richard, 2009: 10; Lavy and Bilbo 2008: 05; Adedeyi and Lamiyan 2001: 68). Yet government pays a lot of money every year for school facility maintenance. It is common to find poorly maintained school facilities that affects delivery of high-quality education to the learners as you would find leaking roof, broken window panes, and broken chalk boards (Mojela 2012: 1255). As poor school infrastructure continues to deteriorate the teaching and learning is affected from time to time and the performance of educators and learners is affected as well. This study intends to investigate the status of school facility maintenance with the aim of identifying positive and negative factors affecting the maintenance of school facilities.

1.3 Aim of the Study

The aim of the study is to formulate recommendations of maintenance requirements at PPHS in ANED, ECP.

1.4 Study Objectives

(a) To investigate the maintenance condition of facilities at PPHS in ANED, ECP.
(b) To identify reasons for the poor maintenance condition of facilities at PPHS, ANED, ECP.
(c) To formulate recommendations for the improvement of the maintenance condition of facilities at PPHS in ANED, ECP.

1.5 Research Questions

(a) What is the maintenance condition of facilities at PPHS in ANED, ECP?

(b) What are the reasons for poor maintenance condition of facilities at PPHS in ANED.ECP?
(c) What are the acceptable recommendations for the improvement of maintenance condition of facilities at PPHS in ANED, ECP?

1.6 Theoretical Framework

1.6.1 Concept of facility maintenance

Allen (1993: 7) considered maintenance as the proper servicing of the equipment, rectification arising from design shortcomings, and replacement of materials or elements necessary as the building is being used. This requires a proper maintenance plan that is underpinned by accurate and reliable information on the current condition and maintenance requirements of the building.

1.6.2 Importance of facility maintenance

Koch *et al*. (n. d: 3) said, in order to prevent accident and incident, it is important to continually assess the physical condition of infrastructure to ensure safety. He emphasised the importance of routine inspections of the property. This assists in predicting future conditions, and would be helpful in investment planning. It also assists in the allocation of limited maintenance resources.

To properly allocate resources it is necessary to have standards for the condition of facilities, based on their occupation or use. Cloete (2001: 69) stated that school buildings need reasonable maintenance conditions. The condition of facilities may be rated as best, good, reasonable, minimum and holding.

1.6.3 Condition of school facilities

Akpan (2001:126) indicated that the maintenance of facilities in our primary and high schools has become a serious problem, with leaking roofs, cracked buildings and windblown structures abandoned for years. Xaba (2012:223) referred to a lack of knowledge and skills, and involvement of general workers in work that requires a qualified person, as the reason for deferred maintenance.

1.6.4 Policies governing school maintenance

The National School Infrastructure Maintenance Guidelines (2010:6) in the Department of Education conducts assessment through the National Education Infrastructure Management System (NEIMS). The policy recognises planned maintenance; unplanned maintenance; rehabilitation; major renovation; minor new work; and replacement as appropriate to address the different conditions and circumstances that characterise maintenance problems in the different provinces. The NEIMS collected data that was used by the Department of Basic Education to develop national guidelines for the general upkeep and maintenance of education facilities. The South African Schools Act (1996:16) allocated the maintenance function to SBGs, regardless of their limited knowledge of FM.

1.7 Conceptual Framework

Cleote (2001:3) stated that the condition and quality of facilities demonstrates public pride, standard of living social values, and behaviour in society. He emphasised that dilapidated and unhealthy facilities depress quality of life and indirectly contribute to antisocial behaviour in society. It is unfortunate that school infrastructure deterioration occurs at time when the economy is not doing well and the social behaviour is not stable. Herath (2022: 401) identified inadequate funding for maintenance work as the cause for dilapidated infrastructure at in our schools. While Nhlapo (2009:48) revealed the cause for poor school facility maintenance as the

lack of knowledge for those involved in the management and implementation of school infrastructure maintenance. This study intends to determine the condition of facilities at PPHS, in ANED, ECP, identify possible solutions to the identified causes for poor maintenance condition and highlight what can be done to improve the condition maintenance at these facilities.

1.8 Methodology

Quantitative approach was used in a bid to attain the research objectives. The endeavour attaining research objectives was made possible by the extensive literature review, use of questionnaire for data collection, condition assessment of the existing school facilities, analysing the collected data and formulation of key recommendations.

1.9 Limitations

- This was only focusing on public primary and high schools in Alfred Nzo East District.
- Only the sampled schools participated.
- The study focused only on the condition of maintenance of school facilities

1.10 Rational of the study

Phakathi (2008:5) reported that condition of facilities for Public Primary and High Schools in Alfred Nzo East District Eastern Cape Province is regarded as the worst when compared to other provinces in South Africa. This was found to very undesirable situation as this affects quality of education offered resulting to reduced performance levels by both educators and learners. This study intends to make recommendations which would support to address the situation by formulating guidelines to improve the maintenance condition of school facilities in the area.

1.11 Significance of Study

The condition and quality of facilities in a community demonstrates public pride, standard of living, social values, and behaviour in society while dilapidated community facilities depress the quality of life and indirectly contribute to antisocial behaviour in society (Cleote 2001:3). A study conducted by Wall (2022:3) revealed that there is lot of infrastructure that is poorly maintain in South Africa that include school infrastructure. Poorly maintained facilities at public primary and high schools have negatively affected the delivery of high-quality education to the learners by disrupting their education delivery sessions for example through leaking roofs, broken windows and broken chalk boards (Mojela 2012: 1255). Nhlapo (2009:48) revealed the cause for poor school facility maintenance as the lack of knowledge for those involved in the management and implementation of school infrastructure maintenance. These challenges can be addressed by the involvement of people with technical know-how of infrastructure maintenance and capacitation of those people entrusted with the role of school infrastructure maintenance. This can improve performance standard of educator and learners as well which will eventually result in better public pride, better standard of living and better antisocial behaviour with reduced poverty line through quality education.

1.12 Structure of the Study

Chapter One: Problem and its setting

This chapter focused on the background, problem statement, aim, objectives, research questions, theoretical framework, conceptual framework, limitations and the structure of the study.

Chapter Two: Literature Review

The literature of the existing studies was reviewed focusing on maintenance, condition assessment to determine maintenance condition, fund of maintenance work at schools, policies governing school infrastructure maintenance work and challenges hindering proper school facility maintenance.

Chapter Three: Research Methodology

This chapter give an explanation of how the research was conducted in terms of data collection tools and methods of data collection.

Chapter Four: Findings and Analysis

This chapter presented research finding of the collected data and analysis of the results.

Chapter Five: Conclusions and Recommendations

This chapter presented conclusions and recommendations based on the identified gap on available literature.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Apartheid policies led to a huge different between the schools for black and white children, where schools for black people were under-resourced, while schools for white people were well-resourced (Gibberd 2007: 1). Khumalo and Mji (2014: 1522) concurred with Gibberd (2007: 1) as they also indicated in their study that African people were barely considered in the development facilities during apartheid. As a result, the development of schools for black people, especially those in rural areas, was neglected, particularly regarding infrastructure. This created a backlog which the current government is still struggling to address. It is unfortunate that after two decades post-apartheid government is still unable to address inequalities due to past policies (Majopelo 2016: 2). Majopelo (2016: 2) observation was that these inequalities are due to inadequate and uneven school resource allocation which mostly affect schools in poor and rural provinces like Eastern Cape, KwaZulu Natal and Limpopo.

Ahmad (2021: 94) thought that all schools should be given adequate facilities and infrastructure this will help learners and educators during teaching and learning process and it make it easier for educators to use different teaching methods and make easier to achieve the desired results. This therefore means that school infrastructure is an essential part of teaching and learning as it enables learners and educators to access resources, tools and services to support teaching and learning. In South Africa, school resourcing remains unbalanced and it favors people in urban areas, while disadvantaging people in rural areas. Moyo *et al*. (2022: 36) noticed that due to rural nature of the Eastern Cape, challenges of low quality education and high poverty and inequality are still experience and that affect the performance of learners from national senior certificate

It is unfortunate that Alfre Nzo District is the poorest district in the province of the Eastern Cape (Westaway 2012: 116). This is very painful because there is a clear identified relationship between school performance and its facilities and infrastructure (Herath 2022: 401). The difference in the performance and pass rate between well-resourced and under-resourced schools indicates the impact of school infrastructure on teaching and learning. When measuring the performance of the province or a school one needs to also look at the resources available to enable teachers and learners to execute their duties to the best of their ability. In addition, education contribute positively to sustainable development by reducing poverty levels, steering economic growth and preventing inequalities and injustice (Fernandez *et al*. 2023). In support to that, Khumalo and Mji (2014: 1524) believed that poverty is caused by a lack of school resources and a scarcity of qualified educators, which results in poor learner performance, leaving them with no qualifications and lacking the necessary skills. Based on this statement, poor school resourcing is the direct cause of poverty. Figure 1 below, indicated the impact of poor school resources on the lives of young people of this country. Poor school resources do not only contribute to the lack of necessary skills required for the development of the country, but they also contribute negatively to degree of poverty the country is facing today.

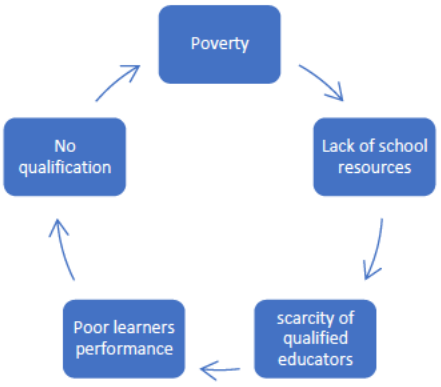

Figure 1: The cycle of despair *Source:* Khumalo & Mji (2014)

Gibberd conducted a study in (2007: 1) to develop a school performance indicator system in South Africa. His study highlighted the need to develop a school infrastructure provisioning approach that would balance the urgent need to address backlogs in basic services, while continuing to improve the quality of educational infrastructure in all schools. This resulted in the development of the integrated performance model, which defined building performance in three areas: infrastructure, programme and people, where the 'infrastructure' should be conducive to support planned activities effectively; and 'programme' refers to the planned activities that should be conducted in the infrastructure which is well maintained. In a school, this includes curriculum activities as well as the preferred model of teaching and learning. People refers to people who are accommodated in the facility; therefore, it should meet standards of comfort and health, and address human right's needs (Gibberd 2007: 2). It should not depress quality of life and indirectly contribute to antisocial behaviour in society but it should demonstrate public pride, standard of living, social values, and good societal behaviour.

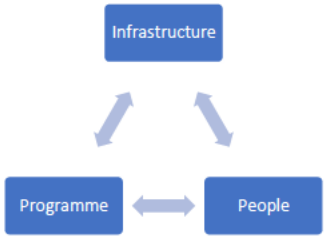

Figure 2: Integrated building performance model *Source:* Gibberd (2007)

The quality of education provided by educators largely depends on several factors, with school facilities being one of the main factors. School facilities (SF) are recognised as one of the problematic factors that hinder quality teaching and learning, as in most schools around the world, schools have infrastructure which is deteriorating. Asiyai (2012: 193) recognised school facilities as the backbone of effective teaching and learning. His understanding of school facilities as the backbone for quality teaching and learning implies that, to sustain an education system, it is very important to maintain its facilities. Several studies have indicated that most school facilities are in dilapidated state, not only in South Africa but also around the world. The study by Richard and Hunter (2009: 10) reported that three-quarters of schools in America needed to spend some money to repair and renovate their school buildings in order to restore them to a good condition. Lavy and Bilbo (2008: 5) stated that three-quarters of schools in the United States needed repairs, renovation and modernization to bring them to an acceptable condition. Adedeji and Olamiyan (2011: 68) revealed that school facilities in rural schools are

in unacceptable state of infrastructural decomposition and are not only a health peril, but also possibly a death trap. Therefore, saving school facilities would not only save the education system, but also the lives of educators, learners and the public.

The entire responsibility to save education, school facilities, and the lives of the schools' occupants has been entrusted to school governing bodies (SGBs) by the South African Schools Act, without considering their competence in facility management. Additionally, Xaba (2012: 216) argued that school facility maintenance is a specialist function and should be performed by a professional maintenance facility and not by school governors. Additionally, Xaba (2012: 223) found in his study that there is high rate of deferred school maintenance due to a lack of knowledge and skills in the workforce used in maintenance work that should be done by a qualified person. Mafukula (2023: 1) discovered that dysfunctional School Governing Bodies (SGBs) and poor financial management are the cause for poor infrastructure in public schools and she identified the need to improve on financial decision, planning and budgeting in order to improve the quality of education.

The fact that school facility maintenance should be done by a qualified person cannot be over-emphasised, as school facilities have a huge impact on the future of the country. Should school maintenance work not be well managed, it might cause building deterioration that might result in financial burdens, and cause legal and other industrial-related conflicts that would affect service delivery (Phathela & Cloete 2018: 286). This argument concludes that poor school building maintenance may lead to poor school governance and poor performance by both educators and learners.

2.2 The school facilities

Before the service can be given to the client, a facility is required in a form of buildings and land. Necessary services are required and all this needs a very high capital investment (Cloete 2002: 33). In the Republic of South Africa (2008: 28) school facilities are buildings, equipment and furniture, and a large budget is earmarked for infrastructure development. For education to be conducted, the Department of Education has to invest in a property where teaching and learning will take place. This can either be in the form of a permanent or temporary facility. Whatever is deemed to be appropriate at that point in time is acceptable. Most importantly, the facility has to meet required statutory standards.

For the school to function properly it requires its facilities to be maintained in a good or acceptable condition. Lack of, or poor, school facilities directly or indirectly hinder the quality of education (Asiyai 2012: 2). He further explains school facilities as the physical or spatial driving force behind the production of good results in teaching and learning, depending on how the school utilizes the available physical resources. Xaba (2012: 216) believed that if school facilities are properly managed, maintained and used, they can provide a conducive teaching and learning environment, while at the same time improving school-community relations and community ownership of the school. In this country (Republic of South Africa, 2008: 28) poor maintenance of these physical resources tends to cause a lot of unnecessary expense for the state's resources.

2.3 Facilities maintenance

The aim of having a building is to protect its occupant and contents from the inclement weather and it has to meet the basic needs of its occupants (Ahzahar 2011: 250). The purpose of school facilities is to protect learners, educators, non-teaching staff and the public, and the school facilities have to satisfy their needs. In order for the school facility to satisfy its user's needs it

has to be designed, based on the needs of users and then be properly maintained in a in condition acceptable to them. 'Maintenance' refers to any steps taken with the aim of keeping or restoring the facility (a site or building) to an acceptable standard at a manageable cost (Cloete 2000: 4). Newman (2003: 1) considered maintenance as an important repair or alteration work executed with the aim of prolonging the useful life of the facility when it is used for its intended purpose. Akinlolu, Ndihokubwayo and Simpeh (2020: 3) also explained maintenance as a process, or steps taken, to preserve or restore the operation of any process at minimal cost. Based on these definitions, one can say that maintenance is the action undertaken with the intention of ensuring that the system performs safely for a long time without incurring a high cost. It increases the safety and reliability of the system at a very low cost. The aim of facility maintenance is to protect capital investment while providing a better working place for the occupants of the facility. As the facility is subjected to wear-and-tear, there will come a time when maintenance will not be enough to ensure that it continues to protect its users. If the demand for the property still exists then the property will have to be renewed. The renewal process will make the property look as new and its running costs will be reduced.

For a better understanding of property maintenance, it is important to consider the property lifecycle as it will give a picture of where exactly the maintenance work fits into the property life span. In order for the property to exist the need for it must be identified. This is followed by proper planning, with the aim of addressing the identified need. During planning, the core functions of the organization and its organogram have to be taken into consideration. This will influence whether to hire or build the property. The creation of the asset is through either building or hiring. Just after completion it starts to operate and operating costs have to be made available. Maintenance is the focus of this study. It is where life of the property is prolonged and its value is preserved. Maintenance work is continually done, based on asset performance and monitoring. As the property is aging it eventually reaches a time where replacement is required. It can be upgraded in order for it to address its purpose. If it could not be renewed, modernised, or upgraded then it will have to be disposed of. Figure 3 below indicates the property lifecycle.

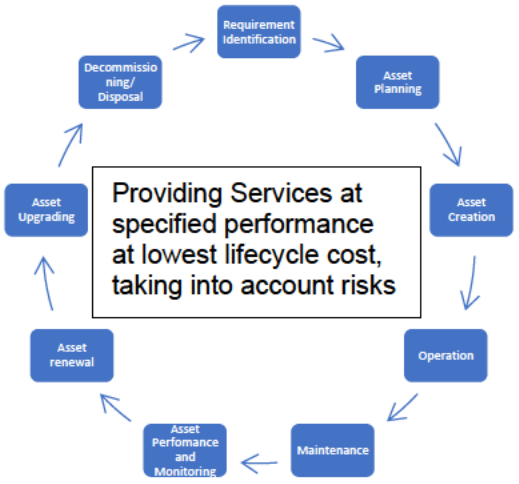

Figure 3: Property lifecycle *Source:* National Immovable Asset Maintenance Management Planning Guidelines (2017)

2.4 Types of Maintenance

Cloete (2001: 10) indicated two types of maintenance, which are planned and unplanned maintenance. Guo *et al*. (2023: 1) On the other side divided maintenance work in three categories which are corrective maintenance, time-based maintenance and condition-based maintenance. The primary purpose of planned maintenance is to reduce frequency of failure

while ensuring proper operation of the facility for the rest of its life. Planned maintenance is both planned preventative and planned corrective maintenance, and planned preventive maintenance also divided into scheduled maintenance and condition-based maintenance. Scheduled maintenance is work executed at specific intervals, scheduled with the aim of preventing failure to the property. Condition-based maintenance is work executed on the basis of knowledge in hand about the condition of the facility. It is done to prevent further deterioration or to prevent failure of the facility. Planned corrective maintenance is the work done after the incident or a failure has occurred. Its purpose is to rectify what went wrong and bring things back to normal. In some instances, it is work done to avoid further damages to the property. Inclement weather is usually the reason for unplanned maintenance. Unplanned maintenance is the work done as result of unforeseen circumstances.

2.5 Condition Assessment

Koch *et al*. (2015: 196) believed that, in order to prevent accidents and incidents, it is essential to continually inspect and assess the physical condition of infrastructure to ensure safety and serviceability. They further emphasised the importance of routine inspection of the property. Ewada *et al.* (2015: 2) shared the idea that condition assessment in the pillar of proper asset management as it reflects current serviceability and failure risk and helps quantify current value. This assists in predicting future conditions, which would be helpful in investment planning. It also assists in allocation of limited maintenance resources. Without fully understanding the condition and standard of maintenance requirements, resources are poorly allocated. Cloete (2001: 69) stated that very few property owners can manage to maintain the property in an ideal (as new) condition all the time. This is due to limited financial resources to execute maintenance work and high maintenance costs. To properly allocate resources, one needs to rate the standard of facilities and buildings, based on their occupation or use. Cloete (2001: 69) mentioned that properties like operating theatres, intensive care units at hospitals, parliament buildings and head offices are properties that require the best possible maintenance at all times. Office building and hospitals require good maintenance. He also stated that school buildings need reasonable maintenance. He continued to say that some buildings can be allowed to be below average, while some are just maintained for statuary regulation compliance. The question is, what constitutes the 'best condition'? Condition standards for facilities may be rated using table 1 below.

Table 1: Condition standards for facilities and buildings

Rating	Condition Standard	Performance Standard
5	Best: Asset to be in best possible condition, only slight deterioration will be acceptable.	Highly sensitive functions with critical uses, like in hospital operating theatres and high-profile public buildings like houses of parliaments.
4	Good: Asset remains in a good operational and aesthetical condition, benchmarked against industry standards for that particular class of asset.	Operations requiring good public presentation and high-quality working environments, like health facilities, modern multi-storey buildings in the CBD.
3	Reasonable: Asset to be in reasonable condition, by fully meeting operational requirements.	Functionally focused asset at utility level like schools
2	Minimum: Condition needs to meet minimum operational requirements	Functions are supplementary only, with a critical operational role like storage.
1	Holding: Condition can be allowed to deteriorate or marginally maintained at minimum cost to comply with statutory requirements.	Functions have ceased, the asset is inoperative or on hold pending disposal, demolition or replacement.

Source: Cloete (2001)

Ewada *et al.* (2015: 2) thought of condition assessment as “a process of systematically evaluating an organisation’s capital assets in order to project repair, renewal, or replacement needs that will preserve their ability to support the mission or activities they were assigned to serve”. His definition is almost the same as Abbott *et al.* (2007: 651) when they also defined condition assessment as the technical assessment of the physical condition of an asset, using a systematic method designed to produce consistent, relevant and useful information which is required to repair, renew or replace. They further noted that condition assessment for built assets should rate the asset’s condition, and determine the risks associated with occupation of an asset that remains in a certain condition. Condition assessment helps identify maintenance work required to restore or retain the property in acceptable condition. Once the required maintenance work is identified, it has to be quantified for easy management, prioritisation and implementation. Quantification may be done by defining the gap between the current condition and the desired condition. The definition of the desired condition depends on the building use. It has been mentioned, above, that the desired condition for a school must be ‘reasonable’. A proper rating system must be used for condition assessment to ensure that the desired condition is met. Abbott *et al*. (2007: 652) pointed to a five-point scale rating as the most effective system, compared to a three-point scale. Table 2 below is five-point scale rating by (Abbott *et al*. 2007: 652)

The condition profile of the building or element is expected to change over time, as all properties starts in Category 5 and end up in Category 1 if maintenance work is ignored. Maintenance rating improves budget calculation as it is well understood that, as the condition deteriorates, maintenance cost increases. Cloete (2000: 1) mentioned that maintenance costs over the lifespan of an asset could be many times more than the original capital cost of the asset, unless maintenance alternatives are considered. This statement implies that if the maintenance cost is high, it is not a wise decision to keep the property.

For the Department of Education, maintenance is usually conducted by qualified and registered built environment professionals, as the department commonly uses professional service providers. The condition of all existing education facilities should be assessed every 5 years (Guideline for Conducting Condition Assessment of Education Facilities 2019: 38). This helps decision makers to prioritise properly so that the money allocated to the Department of Education is spent well.

The guidelines for conducting condition assessment of education facilities (2019: 19) highlighted that one of the challenges the department is facing is inaccurate data on the data bases used. This challenge leads to improper allocation of budget and prioritisation of work, which results in deferred maintenance work. Should the information collected be captured correctly on data bases such as the Education Facilities Management Systems (EFMS) and National Infrastructure Education Management System (NIEMS), used by the department, such information can be very useful and save large amounts of money for the department, as incorrect information may result in inappropriate budget allocation. This will not only save money for the department but the quality of education given to the learners will be preserved and the lives of the occupants will be saved as well.

Table 2: Condition rating and maintenance type

Condition rating	Condition	Action Required	Maintenance type	Description
5	Very good	Planned preventative maintenance.	Normal maintenance	The component or building is either new or has recently been maintained, shows no signs of dilapidation.
4	Good	Condition-based maintenance.		The component or building shows surface wear-and-tear, minor defects, minor signs of dilapidation to surface finishes and requires maintenance. It can be restored with routine scheduled or unscheduled maintenance.
3	Fair	Repairs	Backlog maintenance	Significant sections or components require repair, usually by a specialist. The component or building has been subjected to abnormal use or abuse, and its poor state of repair is beginning to affect surrounding elements. Backlog maintenance work exists.
2	Bad	Rehabilitation		Substantial sections or components have deteriorated badly, suffered structural damage or require renovations. There is a serious risk of imminent failure. The state of repair has a substantial impact on surrounding elements or creates a potential health or safety risk.
1	Very bad	Replacement		The component or building has failed, is no longer operational, dilapidated to the extent that justifies repairs, and requires replacement. The condition of the elements creates safety, health or life risk.

Source: Cloete (2001)

2.6 Advantages of condition assessment

Condition assessment helps maintenance officers understand the condition of the building. It assists in budget calculation. It helps the property owner to understand the property profile so that he can decide what action to take, like selling or renovating. It helps the owner of the property to easily estimate the resale price. By knowing the current building profile and understanding the desired condition, estimates of the required maintenance cost can easily made.

2.7 Disadvantages of condition assessment

It is time consuming and may be very expensive. If not properly done, it may be very misleading. It must be conducted by a specialist. Recommendations are not always implemented due to various reasons; and non-availability of maintenance funds is one of the common reasons.

2.8 Maintainability

When the best performance of the facility is achieved through out the lifespan of the facility at an efficient cost it is known as maintainability. Operational problems of most structures are usually caused by the decisions made at early stages of project implementation (Khalek, Chalhoub and Ayer 2019: 1). Those decisions are either made at the planning, design or works stage, but have an impact on the whole lifespan of the property. Poor design choices can cause maintenance work to be very expensive and time consuming. This challenge can be addressed by the involvement of the facility managers or users at an early stage of the project

implementation. The Department of Education has to look at the real causes of poor maintenance as it may be caused by poor design choices and design shortcomings, or non-involvement of facility users at the design stage, which results into poor maintainability.

Proper application of lifecycle costing techniques to analyse the total cost of the facility at design, construction, operation and maintenance, and decommissioning stage, forms the solid base for the project's success and reduces operating costs throughout the lifecycle of the project by considering maintainability (de Silva 2004: 1244). The primary objectives of applying maintainability are to reduce the projected maintenance costs and time by modifying the design with the aim of simplifying maintenance work; to determine the availability and unavailability of the asset for a certain period; to determine labour hours and to collect all necessary information useful for the future maintenance work (Dhillon 2006: 87). All this information contributes positively to proper maintenance of the facility and guides proper budgeting for maintenance. It is unfortunate that information on lifecycle costing is largely discussed and shared at high level, it is rarely disseminated to the property users where it is very useful. Should this not be addressed, maintenance challenges will escalate and become unmanageable.

2.9 Challenges facing school maintenance

One of the challenges indicated by Xaba (2012: 215) was the level of understanding or knowledge of SGBs on facility management and the level of capacitation of SGBs by the government so that they are capable of executing this very difficult function entrusted to them. According to Akinlolu *et al.* (2020: 4) lack of knowledge by those involved in the maintenance work is a barrier to achieving total quality management of maintenance work. They further stated that this is due to a lack of planning by management, as well as poor management commitment in performing their duties well. Not only the lack of knowledge, but the need for capacitation of SGBs, and poor management commitment, contribute to poor school maintenance; but the non-empowerment and training of educators and learners also affect the level of deterioration of the facility. Overcrowding of the facility causes inappropriate functioning of the facility, as the degree of misuse and vandalism are usually high where the number of occupants is high.

Every facility has its anticipated lifespan, which largely depends on the level of maintenance and care it receives during its lifecycle. During the lifecycle of the facility, it is the responsibility of the maintenance management department to ensure the availability of funds and other resources to keep the facility in a good condition (Mong, Mohamed and Misnsan 2018: 269). Lack of adequate funding for maintenance work results in deferred maintenance work which ends up requiring a huge amount of money to address. This eventually cause the whole facility to deteriorate more quickly than was initially anticipated and the decommissioning process of the facility may take place before the expected lifespan of the facility expires. This is why the South African Education Department (2010:28- 29) indicated that poor maintenance of infrastructure may be very expensive for the country, and may result in unnecessary waste of state resources. According to the act, lack of proper lifecycle management of state assets, equipment and instructional materials is the cause of poor management and facility maintenance.

One of maintenance problems noted by Michael (2012: 06) was that the project team neglect maintainability at the planning, design and construction stages because of their lack of understanding of maintenance costs during the service-life of the facility. By considering maintainability at early stages of the building work, maintenance costs will be kept to a minimum. This not only reduces maintenance costs, but it helps to prolong the actual life of the

building. Building design, the materials used and construction methods have an impact on the maintenance of the facility, which is why maintainability has to considered at an early stage of the build. To ensure the proper utilization of the facility, the users must have copy of the building plans so that they can assist in determining the design use, method of construction used, and materials used.

2.10 Impact of poor school infrastructure maintenance

The purpose of school facility maintenance is to create an environment that is conducive for effective teaching and learning through resource planning, integration and management (General Upkeep and Maintenance 2019: 25). Asiyai (2012: 193) recognised school facilities as the backbone for effective teaching and learning. His understanding of school facilities as the backbone for quality teaching and learning leads to an understanding that to sustain an education system, it is very important to sustain its facilities. Yet a study by Adedeji and Olaniyan (2011: 68) revealed that school facilities in rural schools are in unacceptable state of infrastructural decomposition and are not only a health peril but also possible death traps. This suggests that saving school facilities would not only save the education system, but also save the lives of educators, learners and the public.

Khumalo and Mji (2014: 1524) believed that a cause of poverty is the lack of school resources, and the scarcity of qualified educators, which results in poor learner performance, leaving them with no qualifications and lacking necessary skills. Based on this statement, poor school resourcing and low maintenance of existing facilities is the direct or indirect cause of poverty. When there is a clear evident of the poor operation and maintenance of infrastructure, the quality and reliability of the infrastructure serving the citizens of this country will be inferior and will keep on deteriorating more over time. As result of this, the number of service delivery protests has increased (Wall 2022: 3). He also stressed that the failure of infrastructure may have negative impact on human development, poverty alleviation, addressing inequality, and economic growth.

2.11 Policies and guidelines governing maintenance.

The primary work is to protect financial assets and ensure functionality of the building (Riley & Cotgrave 2005: 47). Maintenance plans, strategies and policies are established by organisations with the aim of prolonging the life of the structure, while maximising the economic and technical effectiveness of the maintenance of the building. Maintenance work is not just about protecting capital investment, it is required by the law to protect the occupants (South African Building Regulations 1977: 14). When the owner of the building ignores maintenance work, he/she is not only violating the rights of the occupants, but he/she is in violation of the law and may be charged for breach of the law (Cloete 2001: 8). That is why, when developing the policy, there is a need to incorporate basic user requirements which focus on the provision of an adequate working environment. Policy development also has to take into consideration the value of the property, as well as the picture that the owner wants to portray to the public, and statutory requirements and standards set out by the law (Cloete 2001: 16). He further recommended that school facilities must maintained to a reasonable standard, which is the rating within the statutory requirements.

The maintenance standard or rating set out by the policy is largely influenced by the status and importance of the property to the owner or organisation. What makes the property important to the owner or the organisation is the importance of the core functions carried out by the occupants (Riley & Cotgrave 2005: 52). The importance of the core functions performed in our school infrastructure cannot be over-emphasized. That is why our school properties must be

kept reasonable at all times, as the future of this country largely depends on the level of education given to the learners; and the environment where teaching and learning is conducted has an impact on education outcomes. It is the responsibility of the owner of the property to keep users satisfied with the condition of the facility they are working on. In this case, the DoBE is responsible for ensuring that teaching and learning take place in a proper environment.

2.12 Government Immovable Asset Management Act

According to the South African Government Immovable Asset Management Act (GIAMA 2007: 8) if the building no longer meets or satisfies occupants' requirements, it becomes surplus to the user. That is why the act emphasises the importance of maintenance to the buildings where services are rendered. The act further indicates that it is the responsibility of the custodian to prepare a lifecycle cost for the asset and to monitor the performance of the asset through condition assessment conducted at least in every fifth year (GIAMA 2007: 12). This act gives the Department of Public Works (DPW), as custodian, the responsibility to conduct condition assessment every five years. Because of the lack of capacity and inadequate funding in the DPW, this exercise has not been conducted well. Condition assessment conducted by the custodian is what gives a clear picture of the required maintenance needs and gives guidance on the estimated maintenance cost. The failure to conduct condition assessment is the reason for inadequate maintenance funding, as budgeting is not influenced by the facts but it is based on assumptions. Proper budgeting for maintenance is largely dependent on the condition of the structure; although budget may not match the identified maintenance needs. Most institutions intentionally reduce their maintenance budget, believing it has no contribution to the economy. By so doing, they ignore the fact that reduction on the maintenance budget causes a huge reduction in the asset value and may lead to frequent breakdowns; reduced production levels; health risks and injuries; or loss of life (National Infrastructure Maintenance Strategy 2007: 4). It is often common to find deferred maintenance work in the public sector properties of the South African government. As a result, the current replacement cost for all provincial health and education facilities is R275 billion, and the provincial governments must spend a minimum of 4% of the replacement cost per annum to maintain their health and education facilities (National Infrastructure Maintenance Strategy 2007: 19). Therefore, for provincial government health and education properties to be in an acceptable condition, provincial governments have to spend R11billion on maintenance each and every year, which is a very large sum of money at time when the country is faced with economic crisis. This indicates that the government officials and the provincial political leaders were not pro-active enough in dealing with maintenance during the times when the economy was doing well.

2.13 The South African Schools Act of 1996

The South African Schools Act (1996: 14) states that SGBs must ensure provision of quality education for all learners at all the schools and they must strive for the school development. A study by Mojela and Thwala (2014: 1253) indicated that better education outcomes are easily achieved in a healthy school environment. This indicates that, for SGBs to fulfil their mandate, they must consider the condition of the school's physical infrastructural resources. Physical infrastructure maintenance will not only help to preserve the value of the structure, but will also improve the wellbeing of the occupants; improve performance; improve learner and teacher attendance; and reduce number of learner dropouts. All these will influence the quality of education offered to our learners.

The control and administration of the school property, buildings and the grounds used by the school is the responsibility of the SGB (South African Schools Acts 1996: 16). This includes the

maintenance and general upkeep of the school's facilities that assist the school to execute its core functions. The failure or lack of capacity of SGBs to execute this function may result in a poor school environment which is unsafe for the occupants and might lead to poor quality education. An unsafe teaching and learning environment poses the risk of injuries and may cause loss of life; and the state is liable for any incident occurring on any of its properties (South African Schools Act 1997: 36). It is very unfortunate that some of government's annual revenue may end up addressing unnecessary claims emanating from unsafe teaching environments that should have been prevented through proactive maintenance management of school facilities.

2.14 National norms and standards for school funding

The South African Constitution (1996: 12) gives the right to every citizen to basic education. That is why the South African Schools Act (1996: 11) indicates that it is the responsibility of the state to fund public schools using public revenue on an equitable basis. The funding at provincial level is largely influenced by provincial spending on education, while it also takes into consideration provincial education needs and resources (Norms and Standards for Funding, 2006: 9). The funding includes new capital infrastructure investment as well as maintenance work. A physical infrastructure investment plan is not only about new capital investment, it incorporates the lifecycle of the investment which must include a maintenance plan. Funding of infrastructure is the responsibility of the MEC for the province, as it is his or her task to ensure that there are enough school places for every child in the province to attend school. It is, therefore, the responsibility of the MEC to ensure adherence to the constitutional right of access to quality education by every learner in the province.

Besides funding of new capital investments and major maintenance, a portion of funds are directly allocated to, or deposited with, each school, which is called the school allocation. The purpose of the school allocation is to maintain physical infrastructural resources, consumables and municipal services. Its objective is to ensure efficient and quality education in public schools (National Norms and Standards for School Funding 2006: 19). The table, below, shows the amount of money spent by the Provincial Department of Education on the school allocation for the maintenance of schools in Alfred Nzo East District.

Table 3: Past seven years' maintenance funding trends

No	Financial year	Amounts
1	2016/17	R2 2016 020.40
2	2017/18	R33 119 721.00
3	2018/19	R37 826 972.40
4	2019/20	R 33 668 960.00
5	2020/21	R28 426 912.80
6	2021/22	R8 497 352.62
7	2022/23	R4 415 023,32
Total amount for seven years		R205 797 922.54

Source: South African Schools Administration and Management System (2022)

Table 3, above, shows that the Provincial Department of Education spent R205 797 922.54 in the past seven years. This is a huge amount of money, which has not been properly accounted for by the schools, districts, or Provincial Department of Education. This is one of the areas that requires serious attention by the provincial leadership, as poor levels of accountability result in the misuse of funds, and fruitless and wasteful expenditure. The mismanagement of funds directly or indirectly affects the poor children in the Eastern Cape Province. As the country is facing difficult times in terms of the economy, proper use of the available resources is very important and is the only way to prevent the country from sinking down further. Misuse of available resources leads to further deterioration of the existing facilities and is putting more pressure on very scarce resources for maintaining school facilities. As South African government tries by all means to source funding for maintenance of public-school facilities the condition of maintenance dilapidates further day by day requiring more funds on top the ones being sourced. Hence it is advised to address maintenance issues urgently to avoid high cost of maintenance.

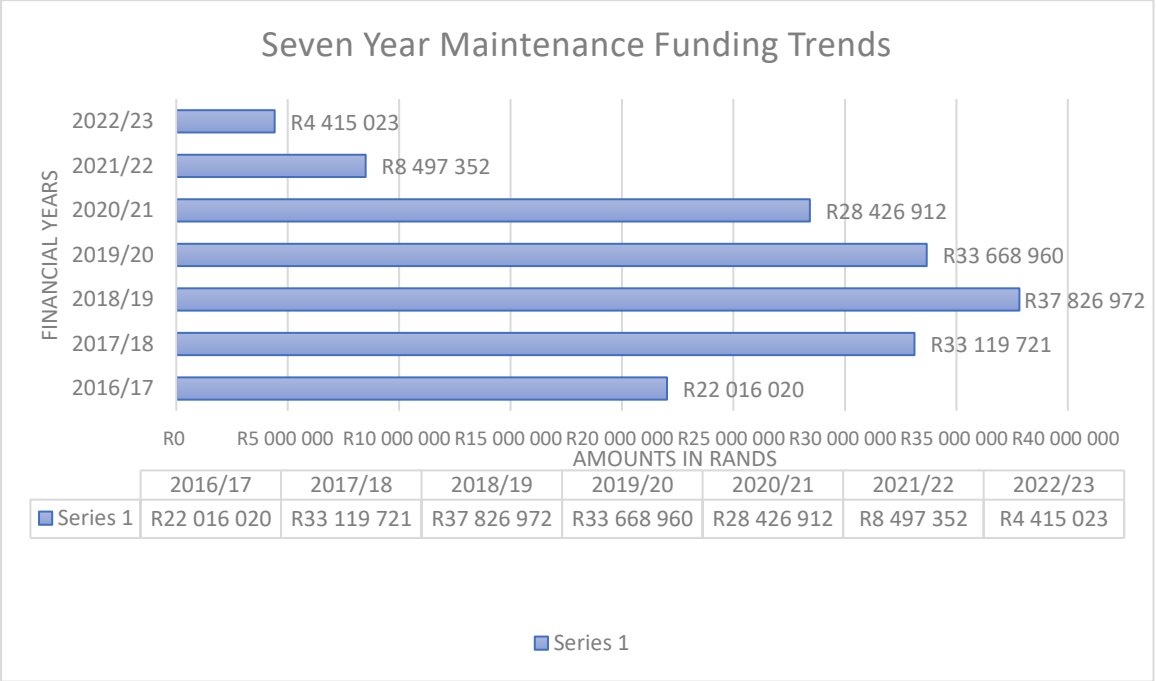

Figure 4: Seven years' funding trends *Source:* South African Schools Administration and Management System (2022)

The chart clearly indicates the decline in maintenance funding, especially when the economy was not doing well. In the 2021/22 financial year there was huge budget cut in all government departments due to the Covid-19 outbreak. The budget cuts resulted in about a 70% decrease in 2021 school maintenance fund allocations. The situation got worse in 2022, where 48% budget cuts were experienced, compared to the 2021 budget. As the maintenance need increases in our schools, the budget cuts are very high. This has had a very negative impact on school facilities' maintenance, as most school were struggling to keep up with maintenance needs due to budget constraints and the one-size-fits-all budget allocation approach. It is known that budget allocation to schools is based on the enrolment: the schools with low enrolment have bigger facilities that had been undermaintained for a very long time, due to this kind of

budget allocation. Now that the country's economy is not doing well, they are suffering even more. This means if government cannot manage the available maintenance funds that are transferred to schools, the situation will only get worse. This will compromise the level of education offered in the country, especially in the rural areas like ANED.

In the determination of school allocation funds, the process takes into consideration national poverty levels, as well as provincial poverty levels. In the allocation process, schools are ranked in quantile levels which indicate the level of affordability and poverty level. Most of the schools in the Eastern Cape Province are ranked in quantile one, which means poverty levels are very high in the province. All schools in ANED are in quantile 1. Figure 1 above, indicated that poverty is the reason for poor education outcomes in the community. As the population in the Eastern Cape remains poor and illiterate, the level of government interventions and investment remains high. By improving the level of education, poverty levels will automatically improve and there will be fewer government interventions and less investment required as the province will be in a position to sustain itself.

The white paper gazetted on 24 November 1995 exempted poor parents from paying school fees, and those who can afford to pay fees are charged based on their income. However, this does not exempt poor parents from raising additional resources on top of what the state provides, as this will improve the quality of their children's education (Norms and Standards for School Funding 2006: 10). The act clearly states that SGBs are not required to charge school fees; only parents can decide once the budget is presented to them and the need for fees highlighted.

Norms and standard for funding (2006: 10) indicate that schools in poor rural and urban working communities are in an unacceptable condition and are not well resourced, but they are expected to perform in the same level as well-resourced schools in better environments. Because of this, the norms and standard for school funding were introduced with the intention of addressing the imbalance by stipulating policies for state funding of public schools with more focus on poor communities like the ones in Alfred Nzo East District, Eastern Cape Province. Even though government tries, by all means, to redress the imbalances caused by the former apartheid government, through policies like Norms and Standards for School Funding, the truth is that inequalities between schools in rural, township and urban areas still exist (Mestry and Ndlove 2014: 1).

2.15 Impact of Covid-19 outbreak on school maintenance

School infrastructure provides a safer environment and care for most children. This enables mothers to go to work, knowing very well that their children are in good hands at school (Collins *et al.* 2021: 181). Collins *et al.* (2021: 181) believed that reopening schools for in-person instruction during the Covid-19 lockdown was not only about children's education. It was the government's way of ensuring that a safe environment was available for the learners while their mothers were at work. This opinion applies particularly in cases where schools have good infrastructure which is reasonably maintained. It is inappropriate where school infrastructure is of a poor quality and is poorly maintained. Xaba (2007: 566) considered a safe school as the one which has physical attributes like secured walls; fencing and gates; buildings that are well maintained; and school grounds that are maintained to the required standard.

In order to fight the spread of coronavirus, Covid-19 protocols were introduced. Those protocols presented new infrastructure challenges to school infrastructure and its maintenance. Cleanliness and a high degree of hygiene; sanitizing bays; 1.5m social distancing; and fumigation of classrooms were amongst the requirements (Benfer *et al.* 2012: 2). The required

1.5m social distancing put tremendous pressure on schools who were already experiencing overcrowding in classrooms prior to the Covid-19 outbreak. This situation led to the introduction of platooning in all schools in ANED in order to address overcrowding and allow for the required 1.5m social distance. Overcrowding and social distancing were well managed, compared to the issues of cleanliness and hygiene, as it is not an easy task to properly maintain hygiene in a facility that is not properly maintained.

The outbreak of Covid-19 directly impacted the maintenance of school infrastructure, as the shortage in the supply of materials resulted in a large increase in material costs (Campbell 2021: 2). The increase in material costs had a negative impact on previously-agreed public sector contracts, not only in South Africa but all over the world (Campbell 2021: 2). The demand for construction material was high and the supply failed to meet the demand. As the shortage in products was experienced, there were delays in delivery and this caused an increase in the price of materials (Campbell 2021: 2). Rise (2021: 1) commented that, as people could no longer go on holiday due to the pandemic, they spent their money on renovating their homes and that put pressure on the supply to meet the demand. The construction materials shortage and price increases were exacerbated by unrest in both Gauteng and KwaZulu-Natal in July 2021, as most of products are produced in these two provinces.

In addition to the increase in material costs, the Eastern Cape Department of Education had failed to spend all of its infrastructure budget allocation in the previous years, and this led to an unfavourable situation for the poor in the poorest province in the country (Chamula 2021: 1). He further mentioned that during the pandemic, half a billion rand was re-allocated to the procurement of personal protective equipment (PPE) and this contributed negatively to the infrastructure backlogs the province is facing. The school maintenance budget allocated to each school was also cut as departments experienced budget cuts. The unfortunate condition of school infrastructure in the province is not expected to change soon, as the available budget is not managed well either (Chawula 2021: 1).

2.16 Conclusion

School infrastructure is the backbone for education and the success or failure of the learners largely depends on infrastructure. Infrastructure in a good condition gives hope to the occupants and inspires them to strive for the best results. This is not the case in most of the schools in the Eastern Cape Province, as the condition of the infrastructure in most schools is poor and not conducive to teaching and learning. Most parents regard the school infrastructure as a safe environment for their children, but that is not always the case in schools like those in the Eastern Cape, especially in Alfred Nzo East. Ndamba-Hendric and Steyn (2021: 1) mentioned that learners and an educator had fallen through an unmaintained, dilapidated suspended wooden floor at Baleni Secondary School. This gives a clear picture of the state of school facilities. The situation highlights the attitude the provincial education department has towards its infrastructure maintenance. Should the situation not be addressed in time, more injuries should be expected, even fatalities.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

Pirthiraj (2017: 73) regarded research methodology as a systematically way to solve research problem and the process used by the research to evaluate the research problem. Kothari (1990:1) defined research methodology as way to search for knowledge. He explained it as the art of scientific investigation. How one conducts the investigation is very important, as poor investigation might lead to an incorrect solution to the identified problem. Kothari (1990:1) regarded research as “a careful investigation or inquiry, especially through the search for new facts in any branch of knowledge”. Research methodology is the process used to ensure that a proper solution to the problem being investigated is determined.

This chapter discusses the research methodology, research design and data collection strategy used in this study, as well as the type of data, target population and sample required, to successfully answer the research questions and develop recommendations.

3.2 Study Design

A quantitative research approach was used to determine condition of the maintenance of school facilities in ANE district. The determination of the maintenance condition was only based on an assessment of school facilities in ANE, which was conducted by the researcher; and from the responses to questionnaires which were distributed.

3.3 Research Approach

3.3.1 Quantitative Research

When using a quantitative approach, a sample of the target population is observed or questioned with the aim of producing answers to the research problem, which are presented using numbers and graphs (Pirthiraj 2017: 73). This simply means that all data collected is converted into numbers and used to answer the research questions. A quantitative approach allows the researcher to collect the data that can be presented in numbers and statistics with the aim of determining the quantity or the amount of the phenomenon. The phenomenon will therefore be described in quantities or amounts. The aim of the researcher in using a quantitative approach is to determine the extent of poor maintenance in ANE district Eastern Cape schools. Once the level of poor maintenance has been established, it would be easier to determine the required strategies to address the identified challenges causing poor maintenance of school facilities.

Descriptive quantitative research was used in this study. The questionnaires distributed to school management teams and district officials were designed in such a way that the data collected could be easily transferred into quantitative data. This data was evaluated against the data gathered in the literature review in order to develop conclusions.

3.4 Target population

The target population is where the problem exists and the intervention will be implemented. This study focused on public primary and high schools in Alfred Nzo East District, Eastern Cape Province. In Alfred Nzo East district there are two circuit management Centre’s (CMC) which known as Inland and Coastal. Each CMC has four circuits, which makes the total of eight circuits.

Table 4: Target population in circuits

No	Circuit Name	No. of schools/ circuit	Private schools / circuit	No. of PPHS
1	1	30	3	27
2	2	27		27
3	3	30		30
4	4	24		24
5	5	24	3	21
6	6	32		32
7	7	29		29
8	8	28		28
	Total no of schools 224		**6**	**218**

Source: South African Schools Administration and Management System (2022)

3.5 Sampling

The research participants from which the data is collected are known as the research sample (Mojela 2013: 97). It has to be sufficient representative of the population so that the results obtained can be generalized to the entire population. For the best results, it would be better to investigate the problem in the whole target population. However, that exercise would be too time consuming and expensive. The size for a sufficiently large sample representing the target population was investigated as it is believed that a large sample enhances the quality of the findings on the research topic (Pirthiraj 2017:73). To determine the size of the sample Cochrans sample size formula for categorical data was used:

$$\underline{No} = \frac{(t)^2 * (p)(q)}{(d)^2} = \frac{(1.96)^2 * (5)(5)}{(05)^2} = 384$$

Where
No =Independent of sample size.
t = value of selected alpha level of .025 in each tail total to 196.
(p)(q) = estimate of variance, equals to (5)(5)
D = acceptable margin of error for proportion being estimated at .025.

The total of 384 was bigger than 5% of the total population of 218, so it was adjusted using the following formula:

$$n1 = \frac{no}{(1+ no/population)} = \frac{384}{(1+ 384/218)} = 140. \text{ Therefore } n1 = 140$$

Where n1 is the total sample to represent the population.

Due to the geographical location of ANE district schools, cluster sampling was used as it will save energy, time and budget (Vallee *et al.* 2007: 2). The schools in ANE are clustered into two circuit management centres (CMCs), with each CMC having four circuits. Figure 5 below is the map showing how the circuits are clustered geographically in ANE district.

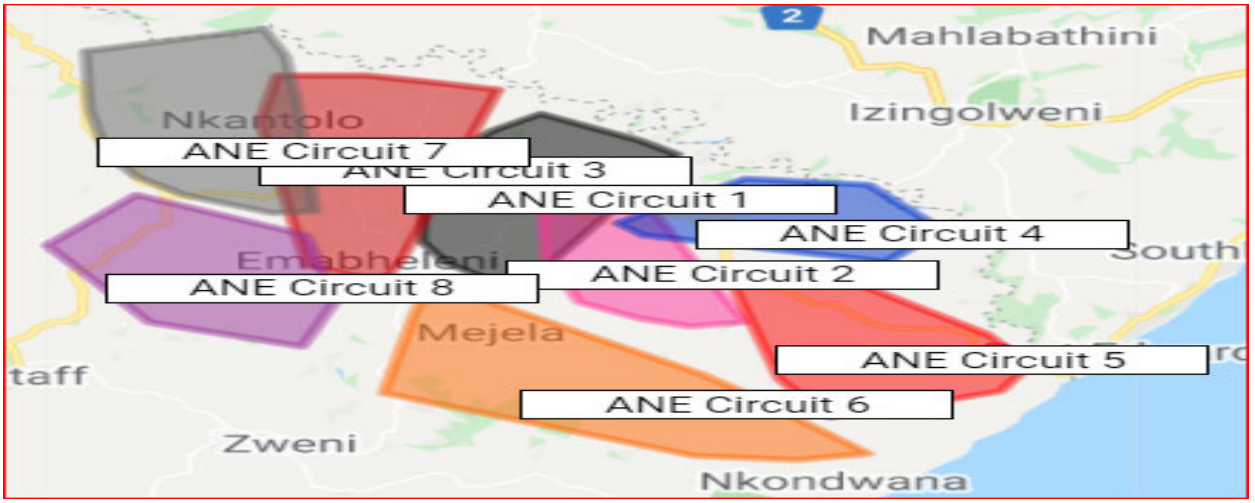

Figure 5: Map of circuits in clusters Source: Data Driven District (2022)

In each of the 138 sampled schools, one school management team member responsible for maintenance were given questionnaires. Two district officials responsible for school maintenance were given questionnaires. The people who took part on this research were only those who were responsible for maintenance work in their schools. The condition of the maintenance in the 138 schools was assessed using the condition assessment tool attached as Appendix B. Table 5 below indicates the size of the sample taken, representing each circuit in the investigation. All circuits were represented fairly. In each cluster schools were randomly selected and that gave each school a possibility of being selected.

Table 5: Sample size

No	Circuit name	No. of PPHS	Sample size per circuit
1	1	27	17
2	2	27	17
3	3	30	18
4	4	24	15
5	5	21	14
6	6	32	20
7	7	29	19
8	8	28	18
District office		2	2
Total		**218**	**140**

Source: Researcher Data (2022)

The above chosen sample assisted the researcher in achieving the research objectives. The first one was to investigate the maintenance and condition of facilities at PPHS in ANED, ECP. The second objective was to identify reasons for the poor maintenance of facilities at PPHS in ANED, ECP. The third objective was to formulate recommendations for the improvement of the maintenance of facilities at PPHS in ANED, ECD.

3.6 Inclusion and exclusion criteria

3.6.1 Inclusion

This study only includes PPHS in ANE District. School principals and SMTs were given questionnaires. District officials responsible for school maintenance were also given questionnaires. The PPHS in ANED were also sampled and the condition of their maintenance was assessed.

3.6.2 Exclusion

Private schools were not included this study. Post-level one educators were also not given questionnaires as their knowledge and understanding of maintenance work may not be relevant.

3.7 Informed Consent and Confidentiality

The researcher administered informed consent forms to all participants before they responded to the questionnaire. The informed consent form is attached as Appendix D. All data collected was kept in a locked drawer to ensure a high level of confidentiality and it was only accessed by the investigating team. All participants were informed that their participation in this study was on voluntary basis. No financial incentive was to be given. They were also told that they had the right to withdraw from the study at any time. This was done to ensure that participation in this study was free and voluntary.

3.8 Ethical considerations

Prior to data collection, the researcher wrote to, and submitted a gatekeepers' letter to, the office of the district director with the request to allow the study to be conducted in the ANE district. The letter requested that the district director allow school management teams to participate in the research. The gatekeepers' letter is attached as Appendix E. The district director gave the researcher a letter of approval allowing the study to be conducted in Alfred Nzo East District. The approval letter is attached here as Appendix F. The application for ethical clearance was also submitted to the institution's research ethics committee for approval and ethical clearance, number 029/22, was granted on the 15 September 2022; and the letter of Full Approval is attached as Appendix G.

3.9 Data collection

This was achieved by ensuring that the reported views were only those of the participants, not the views of the researcher. To ensure proper representation of the investigated problem, quantitative data collection was used as it ensures that the collected data is independent of the expectations of the researcher. This was achieved through the distribution of the questionnaires to the school principals, school management team members and district infrastructure technicians; and the condition of maintenance of facilities at the sampled schools was observed. Information concerning maintenance condition of school facilities was captured using a prepared condition assessment tool.

3.10 Data Analysis

Quantitative data can only be organized and interpreted through the use of statistics. This helps give a true reflection of the investigated problem and enables the presentation of the findings to the affected and interested parties (Pirthiraj 2017: 76). The collected data was analysed using descriptive statistics, with tables and graphs used to describe the data graphically. The

analyses were carried out using SPSS (Statistical Package for Social Science). The inferential analyses were conducted to determine the trends in the data.

3.11 Pilot Testing

The purpose of conducting pilot test is to see if the research will be successful or not. This process helps the researcher to determine whether or not to continue with the main study. It helps the researcher to identify the areas where improvements are required to ensure that validity of the research is achieved. This is achieved by testing data collection tools and data collection processes, as well as ensuring that the collected data will give the best results which will lead to the best possible solutions to the research problems.

In this study, 15 questionnaires were administered to 15 schools and the maintenance condition of those schools was assessed. The school management teams were given a draft questionnaire. After feedback was received, corrections were made to improve the standard of the questionnaire and to ensure that the final draft would give the desired results. Maintenance condition of the 15 public schools was assessed using the prepared maintenance condition assessment tool. The condition assessment tool was then adjusted so that it gives quality results desired.

3.12 Research instruments

3.12.1 Questionnaire

A questionnaire is one of the most important approaches and methods used for primary data collection. It is an instrument or tool used by researchers to collect data and information which is used to answer the research questions (Dalati and Gomex, 2018: 175). A questionnaire should be structured to three phases, which are demographic, administrative and research questions. Demographic questions consist of information relating to the locality, and sociological and geographical factors which incorporate gender; race; nationality; education and other information relevant to the study. The administrative section collects the information which is very important for analysing and studying the different patterns that are useful in identifying possible mistakes in sampling techniques, bias or missing data (Dalati and Gomex 2018: 182). The research questions are used to determine the degree of occurrence, or to determine possible answers to the research questions. It is a useful tool to use when conducting research as it can be cheaper and quicker compared to other means of data collection (Mathers *et al.* 2006: 10). The researcher of this study designed a very short questionnaire which was easy and quick to fill in, with the aim of getting a very high response rate. The questionnaire is attached as Appendix A. The questionnaires were distributed by the researcher to all sampled schools. The questionnaire had two sections. The first section collected demographic data which was general information about the participants which was relevant to the study and the main question. Questionnaires were given to school management team members and district infrastructure officials who are responsible for school maintenance.

The questionnaire consisted of sections, where the first section asked demographic questions, and the second section consisted of five questions which used a Likert-type scale with answers ranging from strongly disagree; disagree; slightly disagree; neutral; somewhat agree; agree; and strongly agree. From Questions One to Eleven the questionnaire asked relevant demographic questions. Question 12 asked about the impact of political factors on school maintenance. Question 13 asked about personnel-related factors that are relevant in school facility maintenance. Question 14 concerned the management factors affecting school maintenance. Question 15 asked about the structural and maintenance aspects of the existing

school infrastructure. Question 16 was about infrastructure planning, design and construction factors. The last question, Question 17, asked for general comments or suggestions that could help to improve the condition of school maintenance.

3.12.2 School infrastructure condition assessment tool

The researcher designed a school infrastructure assessment tool which was used for quantitative data collection. The assessment tool was helpful in determining the existing school infrastructure, its condition and its level of maintenance; as the primary purpose of this research was to determine the maintenance and condition of the school infrastructure in PPHS in ANE district. The school infrastructure assessment tool is attached as Appendix E in this study.

3.13 Conclusion

This chapter gave an overview of how this study was conducted in terms of data collection, ethical implications, confidentiality and anonymity assurance. No participants were harmed or intimidated and they were aware of their right not to participate, or to withdraw any time they wished to withdraw.

CHAPTER FOUR: FINDINGS AND ANALYSIS

4.1 Introduction

The focus of this chapter is to present the findings from the collected data. The data collection was divided into two phases. The first set of data was collected using questionnaires which were given to the school management team members and district infrastructure officials to answer. The second set of data was collected using a school facilities condition assessment tool which was prepared in order to determine the condition of school facilities in the ANE district. Data were collected and analysed in line with the research objectives of this study, in order to answer the research questions.

4.2 Response rate from questionnaires

This section presents the data collected from the study participants and analyses the findings from the questionnaires to uncover the meaning contained in the findings.

Table 6: Response rate per circuit

No	Circuit name (cluster)	No. of PPHS	Sample size per circuit/ cluster)	Number of received questionnaires
1	1	27	17	17
2	2	27	17	17
3	3	30	18	18
4	4	24	15	15
5	5	21	14	14
6	6	32	20	20
7	7	29	19	18
8	8	28	18	18
	District office	4	2	2
Total		**218**	**140**	**139**

Source: South African Schools Administration and Management system (2022)

Out of the 140 questionnaires which were distributed, a total of 139 of questionnaires were collected, giving a response rate of 98%. The response rate was pleasingly high, considering the fact that school management teams are always busy. The higher is the response rate, the better is the reliability of the results. The administered questionnaire consisted of two sections, which were Sections 1 and 2

4.3 Questionnaire Response Result Analysis

The first section collected demographic information like gender; age; qualifications; profession; position occupied; years of experience; type of property; and the school size. Section Two contained questions on political factors; personnel-related factors; management factors; structural factors; and design and construction factors, as these factors usually affect the level of maintenance. Of the 140 questionnaires which were administered to the school management teams and to district infrastructure officials responsible for school infrastructure maintenance, a total of 139 were received back.

4.3.1 Questionnaire Section A

Gender: Figure 6 below shows the percentage representation of both males and females, with 75 males and 64 females were sixty-four, so with 8% more males than females. This indicates that there are more men holding positions in the school management teams in the district.

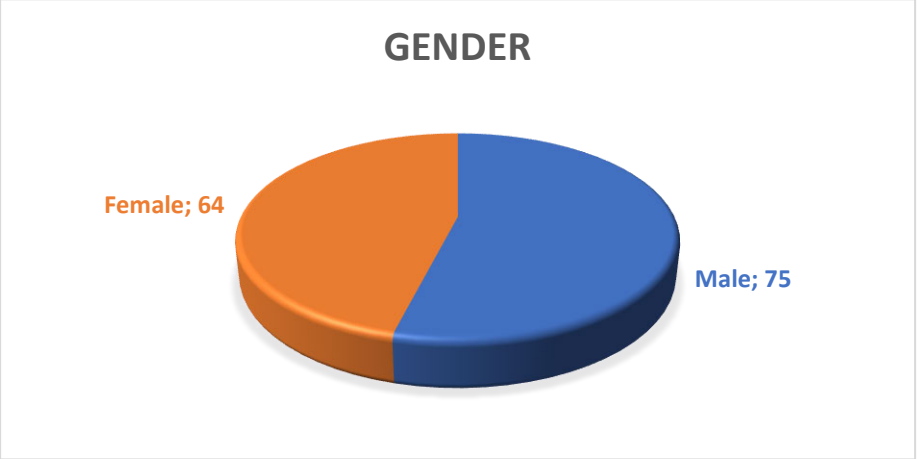

Figure 6: Gender response percentages *Source:* Researcher Data (2022)

Age distribution: Figure 7 below shows the distribution in each age bracket. There were zero participants from age zero to 25; one participant from age 25 to 30; 19 participants from age 31 to 40; 71 from age 41 to 50; and 48 from age 50 and above. The predominant age group is age 41 to 50 with 71 participants (51% of the total), which indicates that most of educators holding positions in school management team will be leaving the education system in about 10 to 15 years. This suggests that, should the Department of Education invest in capacitating these educators on proper school facilities' management, this kind of investment will last about 15 years.

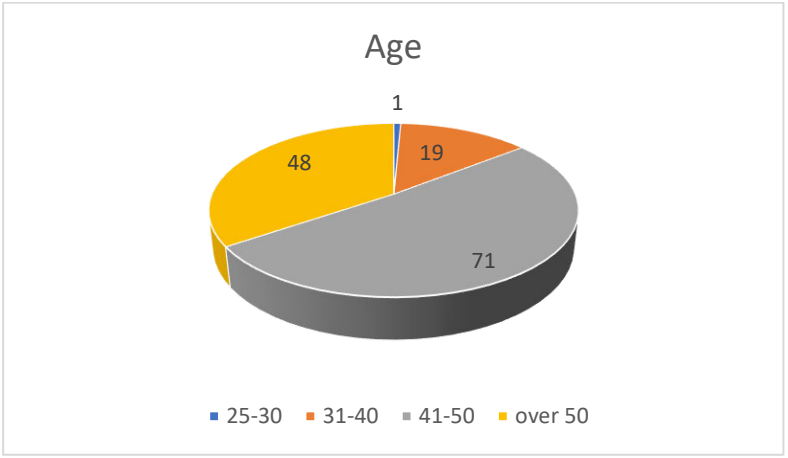

Figure 7: Percentage of responses per age group *Source:* Researcher Data (2022)

Qualification: Figure 8 below, indicates of level of educators in Alfred Nzo East district where there was no educator with matric or less. Ten participants possessed diplomas; 18 participants had post-graduate diplomas; two officials were in possession of B-tech degrees; 87 participants had Bachelor's degrees and 22 participants had post-graduate degrees. This information shows that the level of education of educators in the district is high enough to give learners the quality education they deserve.

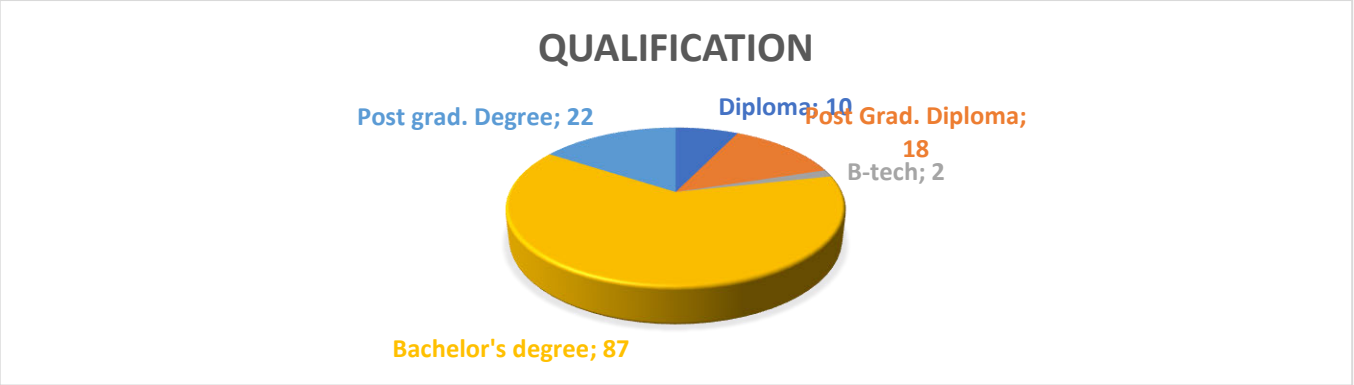

Figure 8: Break-down of qualifications *Source:* Researcher Data (2022)

Professional category: The graph below (Figure 9) shows that 98.6%, which is equal to 137 participants, were educators and only two district support team members filled in the questionnaire.

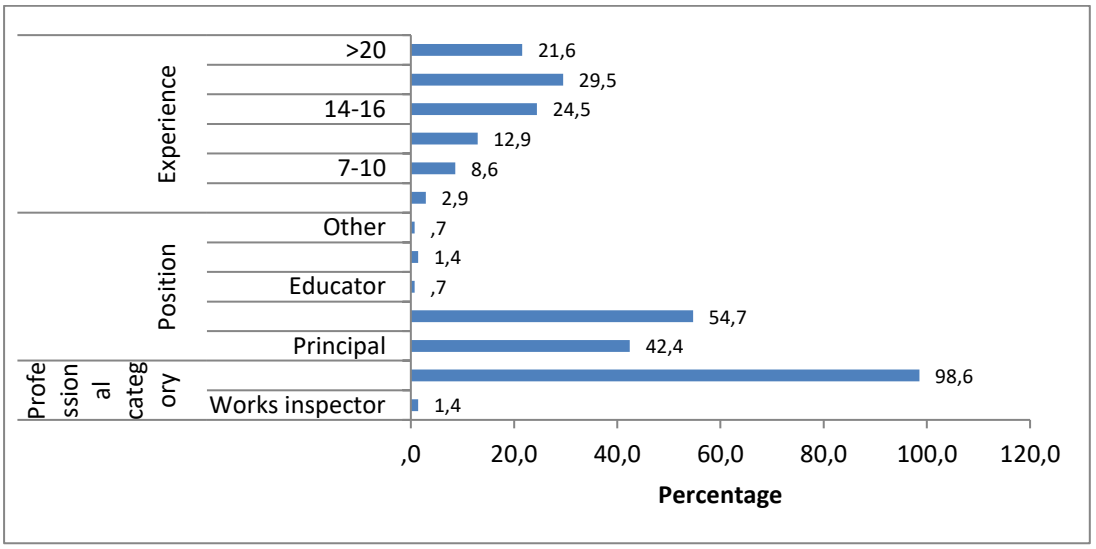

Figure 9: Percentages of position, profession and experience *Source:* Researcher Data (2022)

Position: The above graph (Figure 9) shows exactly who participated in the study in terms of the positions they hold in the school management. This gives a better understanding of maintenance role-players at schools. Where two district support staff responded, only one post-level one educator filled in the questionnaire; 76 school management team members (deputy principals and head of departments/phases) filled in and returned the questionnaires; and 59 questionnaires were filled in and returned by the school principals.

Experience: The bar graph, above, indicates that, in terms of experience, only four participants with 4 to 6 years' experience responded; there were 12 participants with from 7 to 10 years; 18 respondents with 11 to 13 years; 34 respondents with 14 to 16 years; 41 respondents with 17 to 20 years of experience; and 30 respondents in the last category of 20 years and over.

Facility responsible for: The aim of this category was to establish an understanding of the existing properties that are managed by the participants. The figure, below, shows that only

2.9% of the participants managed hostels; 99.3% managed ordinary school infrastructure; while 2.2% managed public schools on private property. Alfred Nzo East district is dominated by ordinary public schools with few schools with hostels and few schools on private property.

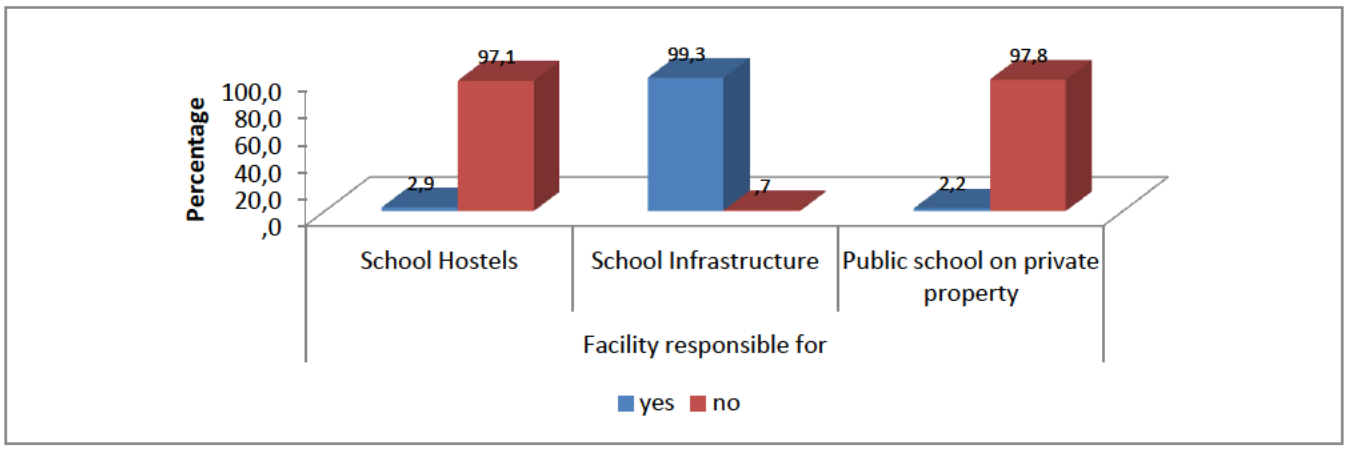

Figure 10: School facilities for which respondents are responsible *Source:* Researcher Data (2022)

Figure 11 below, shows that only five schools are very small, which indicates that these schools are candidates for closure, as these schools seem not to be viable; but due processes have to be followed. There are 35 small schools which receive a small budget, as the funds are allocated based on enrolment in the school. Medium-sized school dominate in Alfred Nzo East district, with 57 schools, and these schools are doing better financially, which can enable them to better afford maintenance. Thirty schools were large schools, while 12 schools were mega schools. Large and mega schools receive much more funding and their school facility maintenance is expected to be far better than at the medium-sized schools.

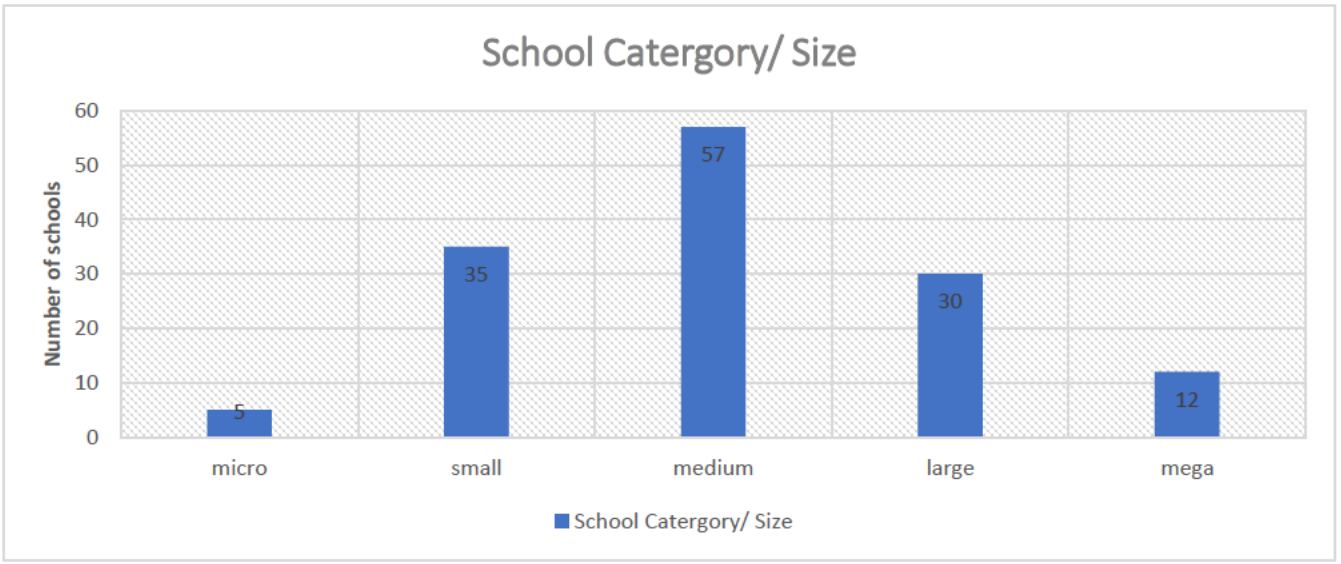

Figure 11: School Category or Size *Source:* Researcher Data (2022)

4.3.2 Section 2 of the Questionnaire

This section analyses the responses from the main questions of the questionnaire. The questionnaire consisted of a seven-point Likert scale, with rating from strongly disagree;

disagree; slightly disagree; neutral; slightly agreed; agree and strongly agree. The seven-point Likert scale gave respondents more choices of items on the scale and it increased the chance of objectively assessing the reality of the people (Joshi *et al.* 2015:398). The scale was used to measure the views, knowledge and understanding of respondents on school facilities maintenance.

4.3.2.1 Political factors

The table 7 below, shows the respondents' opinions on the impact political factors have on school maintenance. It shows the frequency and mean for each question. Both frequency and a mean score are used to determine the significancy

Table 7: Summary of responses on political factors

Item	Responses as Frequency (%)							n	Mean (SD)	t	df	p-value
	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree					
12.1 The funding norms and standards for maintenance affect our ability to do proper school maintenance	22 (15.8)	7 (5.0)	10 (7.2)	3 (2.2)	31 (22.3)	27 (19.4)	39 (28.1)	139	4.81 (2.146)	4.426	138	<.001*
12.2 The economic recession has affected our ability to do adequate school maintenance.	2 (1.4)	1 (.7)	1 (.7)	1 (.7)	20 (14.4)	43 (30.9)	71 (51.1)	139	6.23 (1.086)	24.221	138	<.001*
12.3 The 'one size fits all' budget allocation affects our school maintenance	2 (1.4)	1 (07)	2 (1.4)	2 (1.4)	19 (13.7)	43 (30.9)	70 (50)	139	6.19 (1.129)	22.923	138	<.001*
12.4 Policies governing maintenance affect our ability to do adequate maintenance on the school facilities.	24 (17.3)	7 (5.)	12 (8.6)	23 (16.5)	31 (22.)	42 (30.)	0	139	4.81 (2.235)	4.289	138	<.001*

Source: Researcher Data (2022)

Table 7 above shows that there is significant agreement that school maintenance is negatively affected by funding norms and standards, with the mean score of 4.81. Funding norms and standards currently used by the department allocate a certain percentage of money for each learner; and even maintenance funds are allocated to schools using the same system as suggested by the national Norms and Standards for Funding (1998: 27) that whatever funding system used for school funding should be driven by simple per learner formular. Mestry (2014:3) had a view that despite efforts made like Reconstruction and Development Programme, National School Building Programme and many interventions made, poor rural and urban working-class communities are still suffering because of relatively low levels of funding to historical disadvantaged schools. This therefore really proves that polices for funding that are in place current are good but not effective enough to address inequalities of the past.

This system of budget allocation works well for schools with high enrolment, but it is not working well for schools with low enrolment. The mean score of 6.23 in the table above also reflects significant agreement that the economic recession affected school maintenance work at schools in Alfred Nzo East District. As money loses its value, material prices keep on rising, resulting in schools not being able to purchase quality materials. The mean score of 6.19 indicates significant agreement that the one-size-fits-all budget approach also has an impact on school maintenance. This is due to the fact that schools with high enrolments are funded in the same way as the schools with low enrolments. This has resulted in schools with low enrolments, but which are well-resourced in terms of infrastructure, failing to properly maintain their properties, which is one of the reasons for school infrastructure deterioration at most small schools. Schools with higher learner enrolment are favoured by the system currently used to fund the schools. The last question under political factors asked if the polices governing maintenance affect the school's ability to effectively execute their infrastructure maintenance. On the table above a mean score of 4.81 indicates significant agreement with this statement. According to the South Africa Schools Act (1996:10), school governing bodies have the responsibility to implement and monitor school facility maintenance, regardless of the fact that maintenance work requires someone with a strong technical background. Hence school governing bodies in Alfred Nzo East have neglected their duties to maintain school infrastructure.

Factor analysis was applied in order to identify the groupings, and then Cronbach's alpha was used to ensure that the composite variables formed were reliable. In order to reduce the number of items in this construct, factor analysis with promax rotation was applied to these four items. Two factors were extracted, which account for 76.42% of the variance in the data. As the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) value of .471 was low, the separation/ grouping of the items was sensible, and so the two separate factors were retained. Rotation converged in three iterations. Details of the extracted factors are shown Table 8.

Table 8: Political factors: factor loading, reliability and variance extracted

	Factor	
	1	2
	ECON	POL
12.2 The economic recession has affected our ability to do adequate school maintenance.	.957	
12.3 The 'one-size-fits-all' budget allocation affects our school maintenance	.828	
12.1 The funding norms and standards for maintenance affect our ability to do proper school maintenance		.870
12.4 Policies governing maintenance affect our ability to do adequate maintenance on the school facilities.		.833
Variance extracted	47.16	29.26
Cronbach's alpha	.883	.836

Source: Researcher Data (2022)

The composite variables (ECON and POL) formed by calculating the average of the items included in the factor, show adequate reliability (alpha > .7 –the recognised threshold value).

Table 9: Political factors results of analysis

Construct	n	Mean (SD)	t	df	p-value
ECON	139	6.21 (1.048)	24.894	138	<.001*
POL	139	4.8094 (2.03092)	4.698	138	<.001*

Source: Researcher Data (2022)

Results of the analysis in table 9 show that there is significant agreement that both economic and policy factors affect school maintenance.

4.3.2.2 Personnel-related factors

Table 10 presents the summary of personnel-related factors. The mean score of 4.01 indicates significant disagreement with the statement that the school management teams at schools in Alfred Nzo East are committed to managing and maintaining school facilities. This may be due to fact that the schools receive day-to-day maintenance funds on a yearly basis, but there is no improvement in the condition of school infrastructure maintenance. If the SMTs were committed on maintenance, the little money the schools do receive would make a huge difference. Question 13.2 asked if the school management teams were involved in school infrastructure maintenance. The mean of 3.42 indicates significant disagreement with the statement that school management teams are involved in the management and maintenance of school facilities. Maintenance of any asset is a team effort not a one-man show. Everybody at every level has to play a role in the maintenance of the property. According to Department of Education (1996: 16) school infrastructure is entirely the responsibility of the SGBs. If they could implement their responsibility well that could improve facilities maintenance is schools tremendously. If the people had a sense of ownership, the property could be safe-guarded against vandalism and misuse. When the key role players of school management teams are not committed to, or involved in, the management and maintenance of school facility infrastructure, dilapidation is apparent in most of the facilities. Question 13.3 of the

questionnaire asked respondents if the school employees were trained in the management and maintenance of the school facilities. The frequencies and mean scores in table 10 indicate significant disagreement with the statement that school employees are trained in the management and maintenance school facilities. Training employees on facility maintenance and management helps them understand the importance of the facilities they are using and it helps them understand their impact on their performance. This could help the organisations to spend less on maintenance, as the degree of vandalism would be reduced and misuse would be minimal.

Question 13. 4 asked if the people who are occupying the facilities were satisfied with the condition of the facilities and how those facilities were maintained. The summary table 10 shows a mean score of 2.45, which indicates significant disagreement with the statement. This simply means that most of the school staff, learners and others, are generally not happy with the condition and maintenance of the facilities they are working in. The condition of the working areas directly affects the performance of those working in them. The condition our schools today directly affects the performance of the learners and educators. Wall (2022:3) shared the view that, when there is clear evidence of poor operation and maintenance of infrastructure, the quality and reliability of the infrastructure serving the citizens will be inferior and will keep on deteriorating more over time. As result of this, the number of service delivery protests will increase. Should the infrastructure facilities no longer satisfy the users' needs, it deemed surplus to the user (South African Government Immovable Assets Management Act, 2007:09).

Question 13. 5 asked if the school governing bodies had knowledge and understanding of the technical aspects related to managing and maintaining facilities. The mean score of 2.45 for this question indicates significant disagreement with the statement about SGBs' level of understanding of the technical aspects related to managing and maintaining facilities, as this is one of their functions according to South Africa Schools Act (1996:10). The pie chart (Figure 12), below, indicates that 122 respondents disagree with this statement and this shows that the level of knowledge and understanding of SGBs is very low. Therefore, maintenance might not be neglected because of lack commitment to school infrastructure, but because of the lack of knowledge in managing and maintaining school infrastructure, and SGBs do not know what to do. This is where capacitation is vital in order for the SGBs to full commit themselves to managing and maintaining school facilities, knowing that what they are doing is right. Having doubts may result in them not taking the necessary action on management and maintenance.

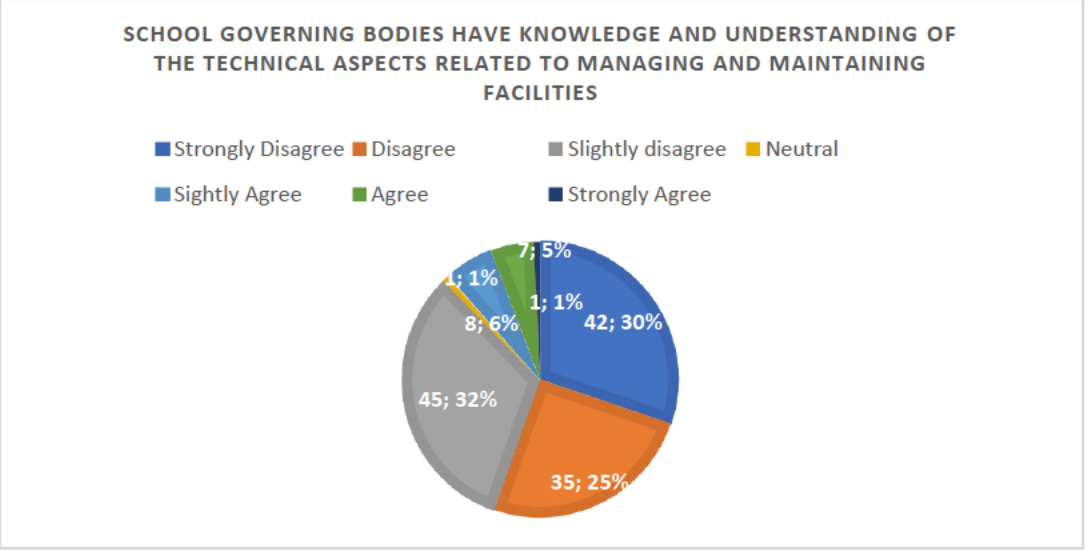

Figure 12: Level of SGBs' knowledge about maintenance *Source:* Researcher Data (2022)

Question 13.6 investigated whether the school principals understand what maintaining facilities is about and what it entails. A mean score of 4.42 shows significant agreement with this statement. Question 13.7 asked if there was good teamwork between the school management team and the school governing bodies. A mean score of 4.66 shows the respondents are significantly in agreement with this statement.

Question 13. 8 asked the respondents if their schools had a capable handyman/general workman. The mean score of 1.40 in table 10 indicates that most schools do not have a capable handyman. This means that schools have to hire people on a daily basis to perform their day-to-day maintenance work and this can be very costly to the schools who have limited financial resources, especially those with low enrolment. This may result in poor school facility maintenance.

Question 13.9 asked the respondents if the staff and learners at schools generally perform well. The pie chart, below, indicates that 69 respondents disagreed with the fact that schools generally perform well. A further eight respondents were neutral about this statement, while 62 respondents agreed that their schools perform well. A mean score of 3.71 indicates that most of the schools are not performing well. This indicates that a lot of the schools are affected by poor maintenance, which impacts on the quality of education offered to the learners.

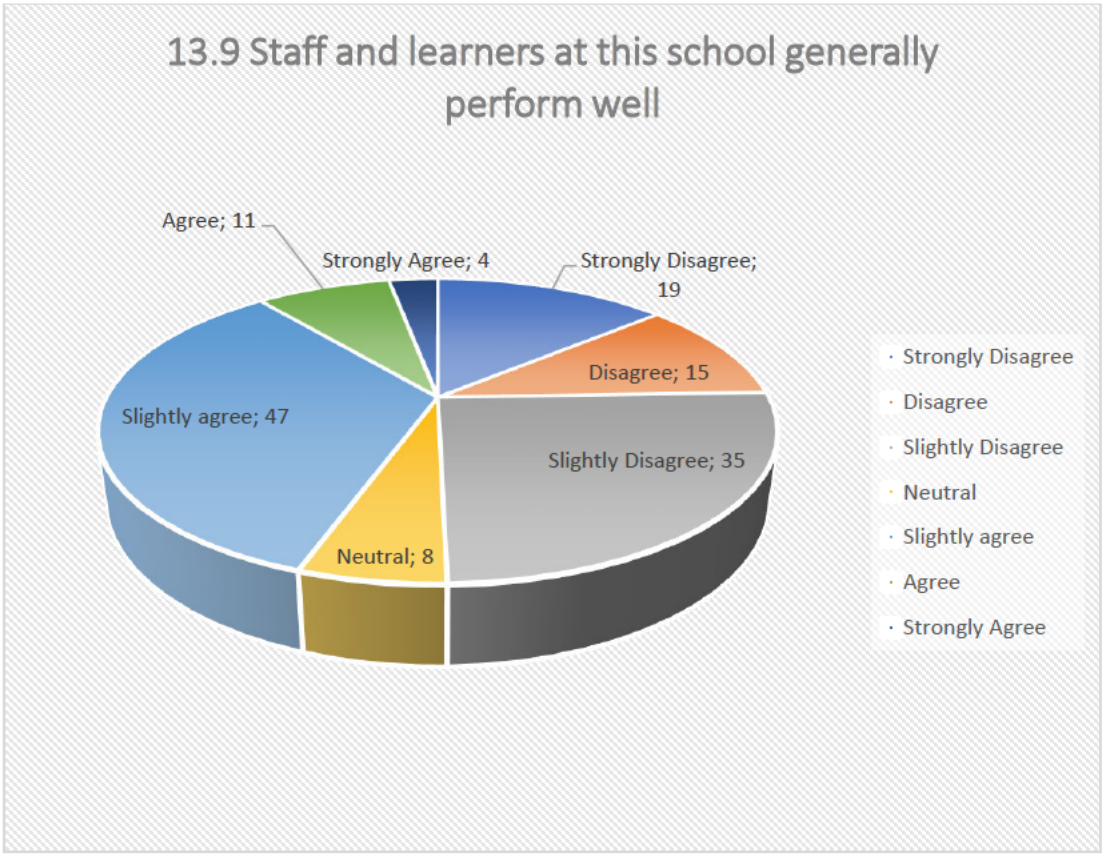

Figure 13: General performance responses *Source:* Researcher Data (2022)

Table: 10 Summary of personnel related factors

Item	Responses as Frequency (%)							n	Mean (SD)	t	df	p-value
	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree					
13.1 The school management team is well committed to managing and maintaining school facilities	20 (14.4)	26 (18.)	20 (14.40)	1 (.7)	18 (12.9)	46 (33.1)	8 (5.8)	139	4.01	.083	138	<.001*
13.2 The school management team is involved in the management and maintenance of school facilities	26 (18.7)	35 (25.)	20 (14.4)	1 (.7)	30 (21.6)	23 (16.5)	4 (2.9)	139	3.42	-3.544	138	<.001*
13.3 Employees are trained in management and maintenance of school facilities	107 (77)	18 (12.)	4 (2.9)	1 (.7)	4 (2.9)	5 (3.6)	0	139	1.50	-24.649	138	<.001*
13.4 As far as I know, the people who use the school facilities (staff, students and others) are generally satisfied with the condition of the school facilities and how they are maintained.	57 (41.0)	27 (19.)	22 (15.8)	3 (2.2)	22 (15.8)	7 (5.0)	1 (.7)	139	2.50	-10.484	138	<.001*
13.5 The school governing body has knowledge and understanding of the technical aspects related to managing and maintaining facilities	42 (30.2)	35	45 (32.4)	1 (.7)	8 (5.8)	7 (5.0)	1 (.7)	139	2.45	-13.041	138	<.001*
13.6 The principal understands what maintaining facilities is about and what it entails	4(2.9)	7 (5.0)	37 (26.6)	3 (2.2)	58 (41.7)	27 (19.4)	3 (2.2)	139	4.42	3.518	138	<.001*
13.7 There is good teamwork between the school management team and the school governing body	3 (2.2)	8 (5.8)	22 (15.8)	2 (1.4)	73 (52.5)	27 (19.4)	4 (2.9)	139	4.66	5.953	138	<.001*
13.8 The school has a capable handyman/general workman	116 (83.5)	14 (10.1)	1 (.7)	0	2 (1.4)	4 (2.9)	2 (1.4)	139	1.40	-25.470	138	<.001*
13.9 Staff and learners at this school generally perform well	19 (13.7)	15 (10.8)	35 (25.2)	8 (5.8)	47 (33.8)	11 (7.9)	4 (2.9)	139	3.71	2.093	138	<.001*

Source: Researcher Data (2022)

In order to reduce the number of items in this construct, factor analysis with promax rotation was applied to these nine items. Items 4 and 9 were dropped because they did not load strongly enough onto any factor. On examination of these items, they are not related to the subject of doing maintenance, so dropping them makes sense. Two factors were extracted, which account for 55.03% of the variance in the data. A Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of .794 and a significant Bartlett's test indicate that the data was adequate for successful and reliable extraction. Rotation converged in 3 iterations.

Table 11: Details of the extracted factor are shown

	1	2
	SUPP	SKILLS
13.1 The school management team is well committed to managing and maintaining school facilities	.863	
13.2 The school management team is involved in the management and maintenance of school facilities	.750	
13.7 There is good teamwork between the school management team and the school governing body	.671	
13.6 The principal understands what maintaining facilities is about and what it entails	.652	
13.3 Employees are trained in management and maintenance of school facilities		.859
13.8 The school has a capable handyman/general workman		.683
13.5 The school governing body has knowledge and understanding of the technical aspects related to managing and maintaining facilities		.604
Variance extracted	40.58	14.46
Cronbach's alpha	.813	.759

Source: Researcher Data (2022)

Figure 0-7 Personnel-related factors: factor loadings, reliability and variant extracted. The composite variables (SUPP and SKILLS) formed by calculating the average of the items included in the factor, show adequate reliability.

Table 12: Personnel factors

Construct	N	Mean (SD)	t	df	p-value
SUPP	139	4.1295	1.123	138	.263
SKILLS	139	1.7842	-25.023	138	<.001*

Source: Researcher Data (2022)

The results of the analysis in Table 12 show that there is significant disagreement that the personnel have adequate knowledge and skills to undertake the school maintenance. There is neither significant agreement nor significant disagreement that there is support from school management for school maintenance.

4.3.2.3 Management factors

Question 14 asked about management factors. This subsection had seven questions. The bar chart below (Figure 14) indicates the mean scores for all 7 questions and the mean score of 1.81 indicates that very few schools have well-prepared maintenance plans. This indicates that most schools are operating without a well-prepared maintenance plan to guide the schools in what they plan to do, when will it be done and how much it is going to cost. If there is not proper plan it is easy to lose focus of the priorities and move to less important issues.

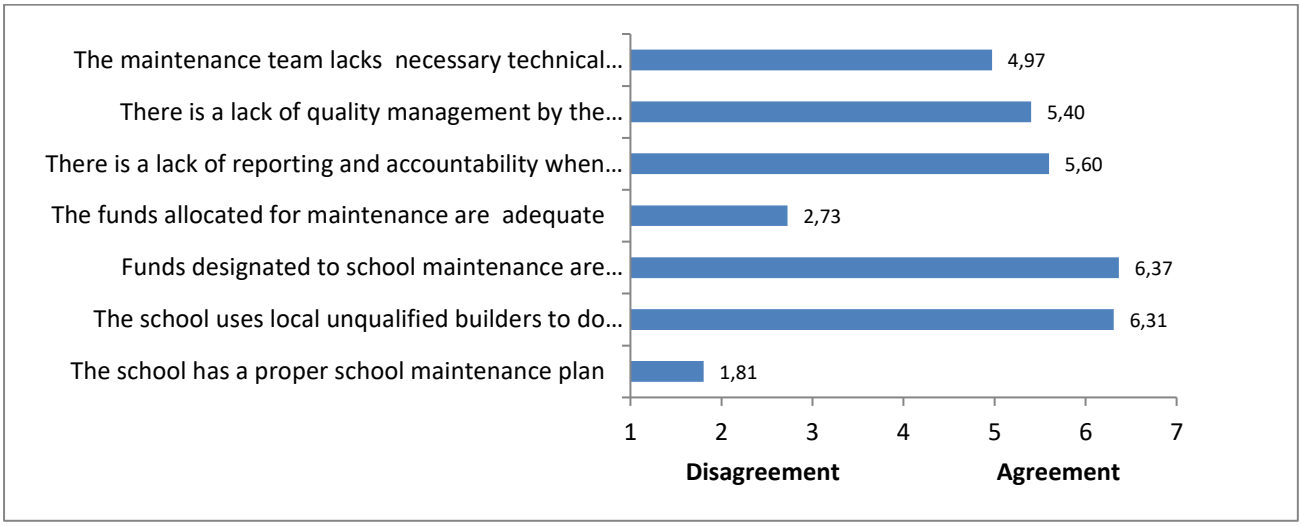

Figure 14: Analysis of management factors *Source:* Researcher Data (2022)

The first question (14.1) in this factor asked the participants if the schools have proper maintenance plans to guide them school infrastructure maintenance. Response of 1.81 mean score clearly indicates significant disagreement with the availability of maintenance plans at schools. Administration and control of any public-school property is the responsibility of the school governing bodies (South Africa Department of Education Schools Act 1996:10). Question 14.2 asked the respondents if they used local, unqualified builders to do maintenance work. The mean score of 6.31 in the above table indicated significant agreement with this statement. Most schools use unqualified local builders to execute maintenance work. Xaba (2012: 216) insisted that school facility maintenance work is a specialist function and should be

performed by a professional. Base on this statement use of unqualified contractors to perform maintenance work in schools cannot be acceptable. Question 13.5, above, indicated that participants are not clear about the management and maintenance of facilities, while this question (14.2) indicates the use of unqualified builders. This simply indicates that, in most cases, maintenance work is managed and executed by people who do not have enough maintenance knowledge and technical know-how. This may lead to the use of incorrect materials, the use of incorrect building methods, and the incorrect prioritization of the maintenance work to be executed. This is why Xaba (2012: 216) insisted that school facility maintenance work is a specialist function and should be performed by a professional facility maintenance person, not lay school governors.

Question 14.3 asked if the funds designated for school maintenance are sometimes used for other activities. The summary in Table 15, below, shows that 128 respondents significantly agreed with the statement that funds allocated for maintenance are sometimes used for other activities, apart from school infrastructure maintenance. As it has been mentioned that school maintenance is most often managed and implemented by people who do not have technical knowledge, this may result in them overlooking maintenance work, thereby deferring maintenance. This suggests that those responsible for maintenance are not held accountable in terms of reporting on how the funds are spent, with no follow-up by those responsible for monitoring maintenance funds.

Question 14.4 asked respondents if the funds allocated to schools were adequate. A total of 111 respondents significantly disagreed that funds allocated to schools are enough to cover maintenance costs. Herath (2022: 401) felt that most schools are unable to provide modern learning and teaching environment because of factors like underfunded maintenance work and not having a comprehensive maintenance strategy. Even though a high number of respondents felt that maintenance funds are inadequate, the reality reflected in responses to Question 14.3 is that maintenance funds are sometimes used for other activities; so, if the funds were used on what they are intended for, there is possibility that funds might be adequate.

Question 14.5 asked if there was any lack of reporting and accountability when it comes to maintenance. A mean of 5.60 shows that respondents agreed that there is a lack of reporting and accountability. Evidence of this is the use of the maintenance funds for some other activities, proving that no one takes accountability for his or her actions.

Question 14.6 asked if the maintenance team lacked the necessary technical expertise. Respondents agreed with this statement, with a mean score of 4.97 showing significant agreement (see summary in Table 15). This finding is worrying for those occupying the facilities, as the situation may not be expected to change soon. The situation will only change once the technical expertise of those responsible for school infrastructure has improved, because maintenance requires people who have a strong technical background. Capacitation of SGBs and all those responsible for maintenance can make a huge difference in school facility maintenance.

Prior to analysis, items 1 and 4 were reverse coded. In order to reduce the number of items in this construct, factor analysis with promax rotation was applied to these seven items. Items 1 and 7 were dropped because they did not load strongly enough onto any factor. One factor was extracted which accounts for 53.68% of the variance in the data. A Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of .758 and a significant Bartlett's test indicate that the data was adequate for successful and reliable extraction. Details of the extracted factors are shown Table 13.

Table 13: Management factors: factor loadings, reliability and variance extracted

	Factor
	1
	MAN
14.6 There is a lack of quality management by the maintenance team.	.858
Q14.1R The school does NOT have a proper maintenance plan	.789
14.5 There is a lack of reporting and accountability when it comes to maintenance funds	.752
14.3 Funds designated to school maintenance are sometimes used on other activities.	.637
14.2 The school uses local unqualified builders to do maintenance work.	.595
Variance extracted	53.68
Cronbach's alpha	.668

Source: Researcher Data (2022)

The reliability of the composite variable (MAN) was improved by dropping item 1 as its correlation with the composite variable was very low (r=.083). By excluding this item, reliability is increased to .800.

Table 14: Management factors result analysis

Construct	n	Mean (SD)	t	df	p-value
MAN	139	5.9191	21.177	138	<.001*

Source: Researcher Data (2022)

The results of the analysis (Table 14) show that there is significant agreement that proper management does not take place in school infrastructure maintenance.

Table 15: Summary table

Item	Responses as Frequency (%)							n	Mean (SD)	T	df	p-value
	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree					
14.1 The school has a proper school maintenance plan	94 (67.6)	17 (12.)	13 (9.4)	2 (1.4)	4 (2.9)	7 (5.0)	2 (1.4)	139	1.81	-17.329	138	<.001*
14.2 The school uses local unqualified builders to do maintenance work.	1 (0.7)	3 (2.2)	0 (0)	1 (0.7)	12 (8.6)	48 (34.5)	74 (53.2)	139	6.31	26.141	138	<.001*
14.3 Funds designated to school maintenance are sometimes used on other activities.	1 (0.7)	5 (3.6)	4 (2.9)	1 (0.7)	5 (3.6)	28 (20.1)	95 (68.3)	139	6.37	21.792	138	<.001*
14.4 The funds allocated for maintenance are adequate	50 (36.0)	18 (12.)	43 (30.9)	2 (1.4)	10 (7.2)	6 (4.3)	10 (7.2)	139	2.73	-8.191	138	<.001*
14.5 There is a lack of reporting and accountability when it comes to maintenance funds	7 (5.0)	1 (0.7)	3 (2.2)	4 (2.9)	43 (30.9)	38 (27.3)	43 (30.9)	139	5.60	12.826	138	<.001*
14.6 There is a lack of quality management by the maintenance team.	7 (5.0)	5 (3.6)	6 (4.3)	0	43 (30.9)	45 (32.4)	33 (23.7)	139	5.40	10.609	138	<.001*
14.7 The maintenance team lacks necessary technical expertise	7 (5.0)	7 (5.0)	4 (2.9)	16 (11.5)	53 (38.1)	35 (25.2)	17 (12.2)	139	4.97	7.641	138	<.001*

Source: Researcher Data (2022)

4.3.2.4 Structural and maintenance factors.

Question 15.1 asked the respondents if there were mud structures at the school. Mud structures are unsuitable and unacceptable for teaching and learning. As seen in table 18, some schools do still have mud structures. The buildings at most schools are either inappropriate, or combination of appropriate and inappropriate, or well-built. This portrays a very clear picture of the work done by the government in eradicating mud structures at schools. As this is reflected in the table 18.

Question 15.2 asked the respondents if there were structures that had been built inappropriately by the community. A mean score of 5.70, and 112 respondents, indicated that schools in Alfred Nzo East are built from inappropriate materials or are community-built structures. Most of those structures are very dangerous to the learners and educators. These types of structure are not easily maintained for various reasons, including the type of materials used, the design of the structure, and the construction method used.

Question 15.3 asked participants if the school structures were aging. A mean score of 5.55 indicates that most of the schools in the area are old. It has been highlighted, earlier, that the maintenance work is managed and implemented by people who do not have technical know-how regarding maintenance. It would be very difficult for them to determine the exact level of aging at the facility, and what necessary steps should be taken, like repairing; renovating; refurbishing or disposing. Only a condition assessment conducted by someone with a solid understanding of maintenance can give a clear guide on what steps should be taken.

Question 15.4 asked the participants if quality building materials are available in the area. The mean score of 6.18 in table 18 below, shows significant agreement with the statement that quality building materials are available in the area, but there is no evidence that quality materials are used when maintaining school facilities.

Question 15.5 asked the participants if the condition of the structures made them difficult to maintain/fix. Of the participants, 93 agreed that the condition of school structures in the area is makes difficult to maintain or fix (supported by the mean score of 4.63). This can be due to the either age; the materials used; the type of structure; vandalism or design shortcomings. Question 15.6 asked the participants if the structures had been vandalised by users or community members. A mean score of 3.53 and 76 respondents indicated significant disagreement with the statement, while 62 respondents were significantly in agreement with the statement and 2 were neutral. Based on these findings, the degree of school infrastructure vandalism in the area is manageable.

Question 15.7 asked participants if there was overcrowding and/or overuse of facilities at the schools. Of the participants, 120 participants were significantly in agreement with the statement, with a mean score of 5.74. Only 19 respondents significantly disagreed that there is overcrowding or overuse of facilities at their schools. One of the reasons for poor school infrastructure maintenance is overcrowding as it makes it hard to clean properly and do day-to-day maintenance in the facility (Amsterdam, 2010:3). As long as the school facilities are overcrowded there will be no proper maintenance at the facility.

Question 15.8 asked respondents if disasters had occurred because maintenance was not done. Of the respondents, 94, and a mean score of 4.61, indicated significant agreement with the statement, while 45 respondents disagreed. Based on these findings. It is clear that deferred maintenance work results in excessive repair costs, which escalates the financial burden on the government when emergency maintenance funding is required.

Question 15.9 asked the respondents if quality materials are used in maintenance work. In answering this question, 122 respondents significantly disagreed that quality materials are used for maintenance in their schools, while 15 respondents were in agreement, and only two were neutral. Based on these findings, most schools are using cheap materials to maintain school infrastructure. This may be due to insufficient funding of maintenance, as highlighted above in question 14.4; or it may be due to the fact that the people who are responsible for maintenance do not possess the necessary technical skills (as indicated in 13.5 above) to execute maintenance work and the use of poor-quality materials is due to a lack of understanding of the value of good building materials. A finding in General Upkeep and Maintenance (2019: 25) was that insufficient funding for maintenance is one of the challenges leading to deferred maintenance work, which results in huge maintenance backlogs. This also contributes to the use of cheap material and cheap labour.

Prior to analysis, items 4 and 9 were reverse-coded. In order to reduce the number of items in this construct, factor analysis with promax rotation was applied to these 9 items. Items 1, 6 and 7 were dropped because they did not load strongly enough onto any factor. Two factors were extracted, which account for 44.14% of the variance in the data. A Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of .741 and a significant Bartlett's test indicate that the data was adequate for successful and reliable extraction. Rotation converged in three iterations.

Table 16 Structural and maintenance factors: factor loading, reliability and variance extracted

	Factor	
	1 STR	2 QMAT
15.5 The condition of the structures make them difficult to maintain/fix	.815	
15.3 The school structure is aging (it has been here for a long time)	.764	
15.2 There are structures that have been built inappropriately by the community	.702	
15.8 Incidents of disaster have occurred because maintenance wasn't done	.509	
Q15.9R Quality materials are NOT used in maintenance work		.577
Q15.4R Quality building materials are NOT available in the area		-.498
Variance extracted	34.79	9.35
Cronbach's alpha	.791	-.839

Moving forward, only factor 1 (STR – measuring the structure and maintenance of the facilities) was used. This composite variable shows adequate reliability.

Table: 17 Structural and maintenance result analysis

Construct	n	Mean (SD)	t	df	p-value
STR	139	5.1223	7.941	1.38	<.001*

Source: Researcher Data (2022)

The results of the analysis (Table 17) show that there is significant agreement that maintenance of the buildings is a challenge due to their structure.

Table 18: Structural and maintenance factors summary

Item	Responses as Frequency (%)							n	Mean (SD)	T	df	p-value
	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree					
15.1 There are mud structures at the school	112 (80)	10 (7.3)	0	1(.7)	0	4 (2.9)	12 (8.6)	139	1.76	-14.314	138	<.001
15.2 There are structures that have been built inappropriately by the community	20 (14.4)	5 (3.6)	1 (.7)	1 (.7)	4 (2.9)	21 (15.1)	87 (62.6)	139	5.70	9.076	138	<.001
15.3 The school structure is aging (it has been here for a long time)	13 (9.4)	6 (4.3)	4 (2.9)	1 (.7)	8 (5.80)	59 (42.4)	48 (34.5)	139	5.55	9.693	138	<.001
15.4 Quality building materials are available in the area	3 (2.2)	7 (5.0)	3 (2.2)	0	8 (5.8)	33 (23.7)	85 (61.2)	139	6.18	17.358	138	<.001
15.5 The condition of the structures makes them difficult to maintain/fix	23 (16.5)	15 (10.8)	7 (5.0)	1 (.7)	20 (14.4)	45 (32.4)	28 (20.1)	139	4.63	3.387	138	<.001
15.6 The structures have been vandalised by users or community members	39 (28.1)	17 (12.2)	20 (14.4)	2 (1.4)	29 (20.9)	19 (13.7)	13 (9.4)	139	3.53	-2.579	138	<.011
15.7 There is overcrowding and/or overuse of facilities at the school	6 (4.3)	10 (7.2)	3 (2.2)	0	16 (11.5)	45 (32.4)	59 (42.4)	139	5.74	12.016	138	<.001
15.8 Incidents of disaster have occurred because maintenance wasn't done	24 (17.3)	13 (9.4)	7 (5.0)	1 (.7)	27 (19.4)	38 (27.3)	29 (20.9)	139	4.61	3.289	138	<.001
15.9 Quality materials are used in maintenance work	78 (54.7)	24 (17.3)	20 (14.4)	2 (1.4)	9 (6.5)	5 (3.6)	3 (2.2)	139	2.07	-14.497	138	<.001

Source: Researcher Data (2022)

4.3.2.5 Design and construction factors

The graph, below, summarises Question 16, showing who were in agreement or disagreement with the statements. The respondents disagreed with the statements showing a mean score below 4; and agreed with the statements showing a mean score above 4.

Question 16.1 asked the participants if, during the design stage, sustainability of the facilities had been considered. Table 19, below, that 34 respondents disagreed, 1 was neutral, and 104 respondents agreed that, at the design stage, sustainability was not considered. Michael (2012:6) highlighted that neglecting sustainability and maintainability at the design, planning and construction stages because of a lack of understanding of maintenance costs during the service life of the facility is one reason for poor maintenance of the facility. The mean score 5.18 shows that 104 participants were significantly in agreement with the statement. This raised concerns as it suggests that, in most cases, maintainability and sustainability were not considered, and this placed increased the demands on the revenue, which is already in short supply.

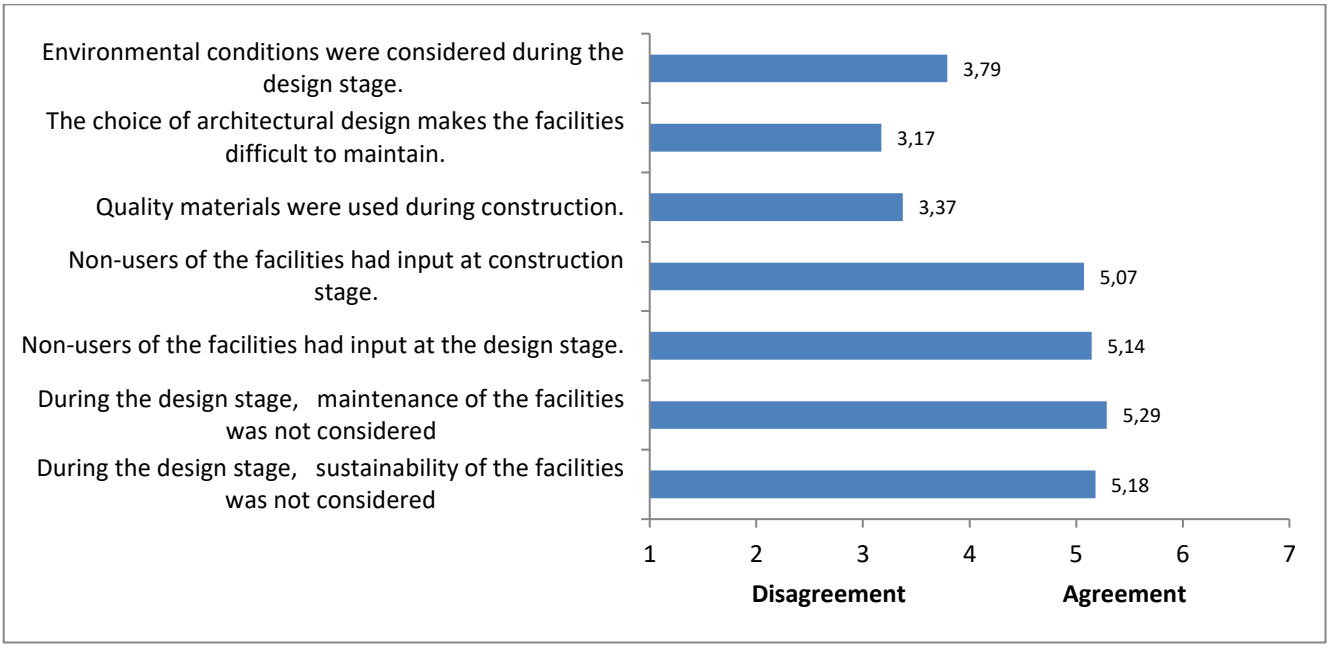

Figure 15: Response summary on design stage and sustainability consideration *Source:* Researcher Data (2022)

Question 16.2 asked participants if, during the design stage, maintenance of the facilities was not considered. Summary Table 19, below, shows that 31 respondents disagreed; one was neutral, and 107 respondents significantly agreed with the fact that maintenance of the facility had not been considered during planning and design stage.

Question 16.3 asked whether the users of the facilities had been involved during the design stge. Non-involvement of users in the design stage of the facility may result in them being unsatisfied with the facility, which may lead to non-use of the facility in a short time; and it may be seen as surplus to the users. In response to the question, a mean score of 5.14 indicates the respondent significantly agreed with the statement.

Question 16.4 asked respondents if non-users of the facilities had input at the construction stage. A total of 35 respondents disagreed with the statement; 2 were neutral, and 102 were in agreement with the fact they were not involved during the construction of their school.

Question 16.5 asked the respondents if good quality materials had been used during construction. A total of 91 disagreed with the statement; 2 were neutral, and 46 participants were in agreement. This indicates that, during the construction of the school facilities, the quality of materials used was inferior. Use of mediocre materials during the construction stage might result in very high maintenance and operational costs.

Question 16.6 asked if the choice of architectural design makes it difficult to maintain the facility. A mean score of 3.14 indicates that the respondents significantly disagreed with the statement. Question 16.7 asked if the environmental conditions were considered during the design stage. A total of 64 respondents significantly disagreed, 9 were neutral, and 66 respondents were in agreement with the statement. A mean score 3.79 shows that a number of participants were of the view that environmental conditions were not considered during the planning stage of the project. The last question of the questionnaire was a qualitative question which asked respondents to give general input on what they thought needed to be done in order to improve the maintenance and condition of facilities at schools in Alfred Nzo East District. Very few responded to this question. Those who responded shared the same feelings, which are contained in following table 19

Table 19: Summary on sustainability and maintainability

Item	Responses as Frequency (%)							n	Mean (SD)	T	df	p-value
	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree					
16.1 During the design stage, sustainability of the facilities was not considered	20 (14.4)	7 (5.0)	7 (5.0)	1 (.7)	16 (11.5)	35 (25.2)	53 (38.1)	139	5.18	8.387	138	<.001
16.2 During the design stage, maintenance of the facilities was not considered	18 (12.9)	8 (5.8)	5 (3.6)	1 (.7)	15 (10.8)	37 (26.6)	55 (39.6)	139	5.29	7.126	138	<.001
16.3 Non-users of the facilities had input at the design stage.	21 (15.1)	9 (6.5)	4 (2.9)	1 (.7)	15 (10.8)	38 (27.3)	51 (36.7)	139	5.14	6.106	138	<.001
16.4 Non-users of the facilities had input at construction stage.	20 (14.4)	11 (7.9)	4 (2.9)	2 (1.4)	15 (10.8)	41 (29.5)	46 (33.1)	139	5.07	5.773	138	<.001
16.5 Quality materials were used during construction.	48 (34.5)	21 (15.1)	17 (12.2)	2 (1.4)	8 (5.8)	21 (15.1)	22 (15.8)	139	3.37	-3.127	138	<.002
16.6 The choice of architectural design makes the facilities difficult to maintain.	52 (37.4)	19 (13.7)	20 (14.4)	3 (2.2)	10 (7.2)	16 (11.5)	19 (13.7)	139	3.17	-4.289	138	<.001
16.7 Environmental conditions were considered during the design stage.	42 (30.2)	13 (9.4)	9 (6.5)	9 (6.5)	23 (16.5)	20 (14.4)	23 (16.5)	139	3.79	-1.060	138	<.291

Source: Researcher Data (2022)

Prior to analysis, items 5 and 7 were reverse-coded. In order to reduce the number of items in this construct, factor analysis with promax rotation was applied to these 7 items. Items 5, 6 and 7 were dropped because they had unacceptably low communalities. One factor was extracted which accounts for 88.85% of the variance in the data. A Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of .804 and a significant Bartlett's test indicate that the data was adequate for successful and reliable extraction. Details of the extracted factors are shown in the table below

Table 20: Design and construction factors: factor loadings, reliability and variance extracted.

	Factor
	1
	DC
16.4 Non-users of the facilities had input at the construction stage.	.965
16.2 During the design stage, maintenance of the facilities was not considered	.965
16.3 Non-users of the facilities had input at the design stage.	.930
16.1 During the design stage, sustainability of the facilities was not considered	.909
Variance extracted	88.85
Cronbach's alpha	.969

Source: Researcher Data (2022)

Table 21: Design and construction result analysis

Construct	n	Mean (SD)	t	df	p-value
Design construction	139	5.1709	6.628	138	<.001*

Source: Researcher Data (2022)

The results of the analysis in Table 21, show that there is significant agreement that there were issues with the design and construction of the facilities.

4.4 Condition assessment tool analyses

The aim of condition assessment is to identify the condition of school facilities in terms of maintenance. To determine the condition of the maintenance for each school's infrastructure, and its elements, a satisfaction score was used which ranged from 1=very unsatisfactory; 2=unsatisfactory; 3=slightly unsatisfactory; slightly satisfactory; 5= satisfactory; and 6= very satisfactory. To indicate the quality of the structure in terms of maintenance, average satisfaction was used. The condition of each structural element, like external walls; internal walls; rainwater goods; doors; electricity; floors; roof coverings; roof timber; ceilings, and windows were assessed.

Figure 16, below, indicates how each circuit management centre (CMC) fared in the assessment. The total number of schools assessed was 139. The figure, below, shows that 47.5% of the schools were from the coastal CMC and 52.5% were from the inland CMC. Out of 139 assessed schools, the structures at 51% were inappropriate; 19% were appropriately or properly built schools; and 28.8% were schools with both inappropriate and appropriate structures. Based on Figure 16, below, Alfred Nzo East district is dominated by inappropriate schools. Inappropriate schools are those schools which were built by the community using

bricks and mortar. These structures may not be exactly the same as mud structures, but there is not much different between the inappropriate and mud structure. This implies that government still has a lot of work to do in order to eradicate inappropriate structures.

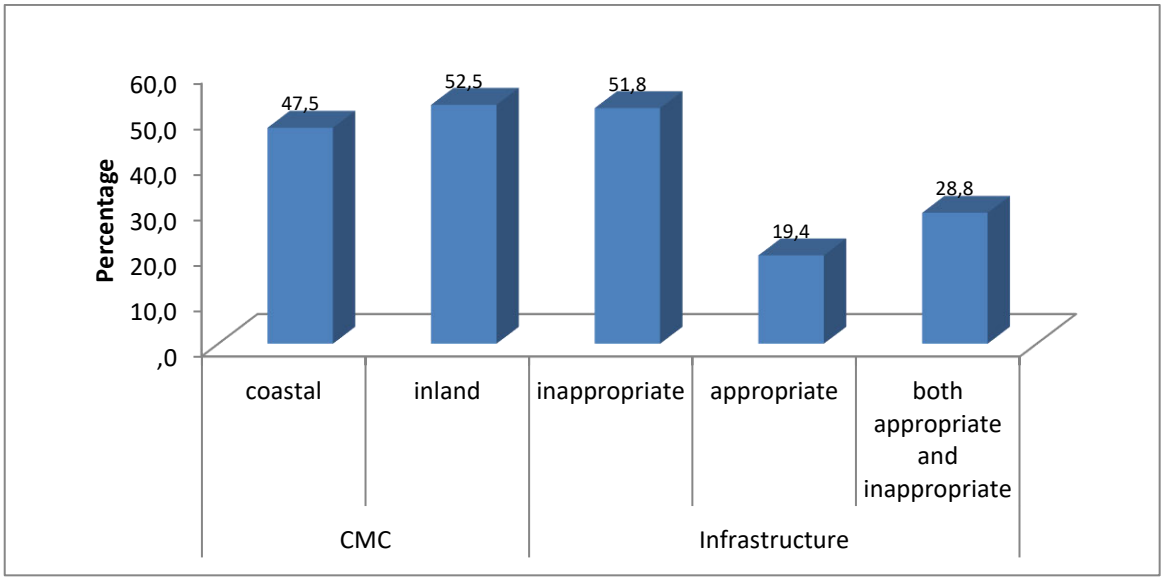

Figure 16: Summary of CMC infrastructure types *Source:* Researcher Data (2022)

Figure 17, below, indicates that most of schools in the district are medium-sized schools. It has been indicated that medium-sized schools receive a fair share of the funding that assists in maintaining the school infrastructure in a fair condition, unlike the small and micro schools.

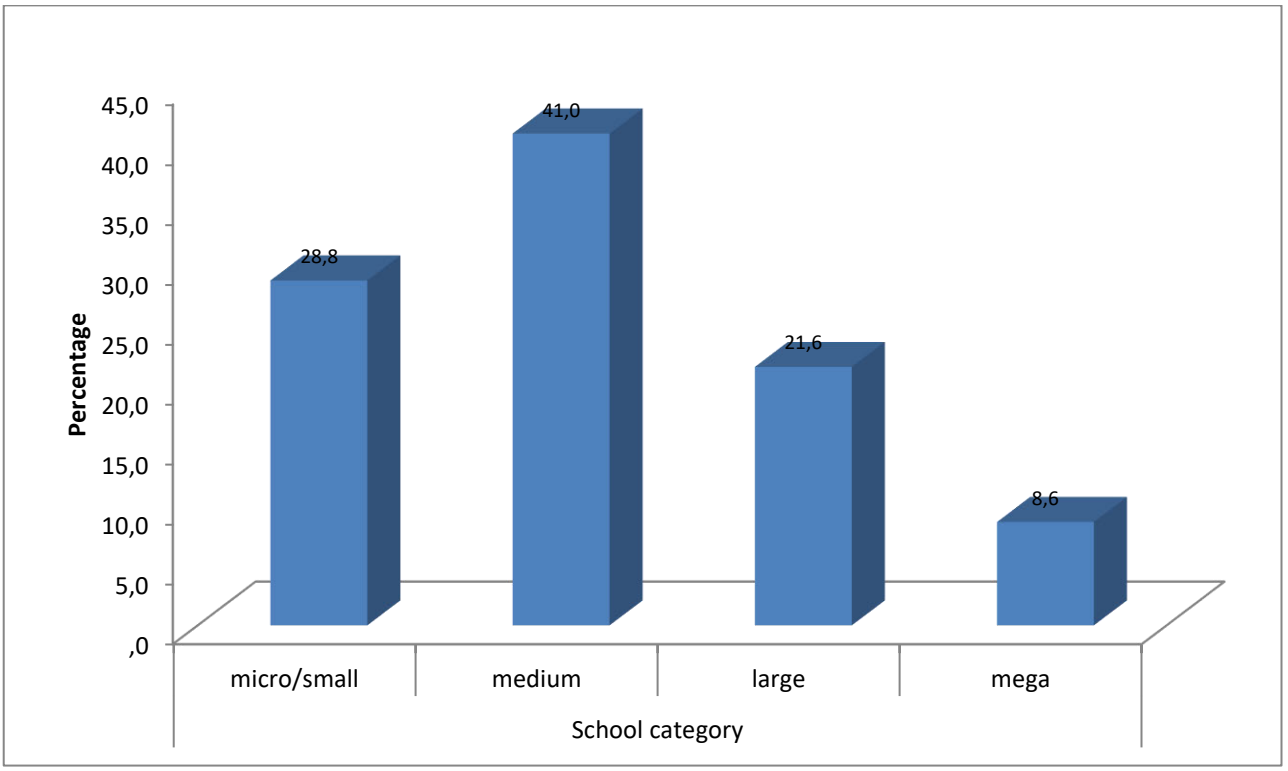

Figure 17: Summary of school categories *Source:* Researcher Data (2022)

4.4.1Administration block

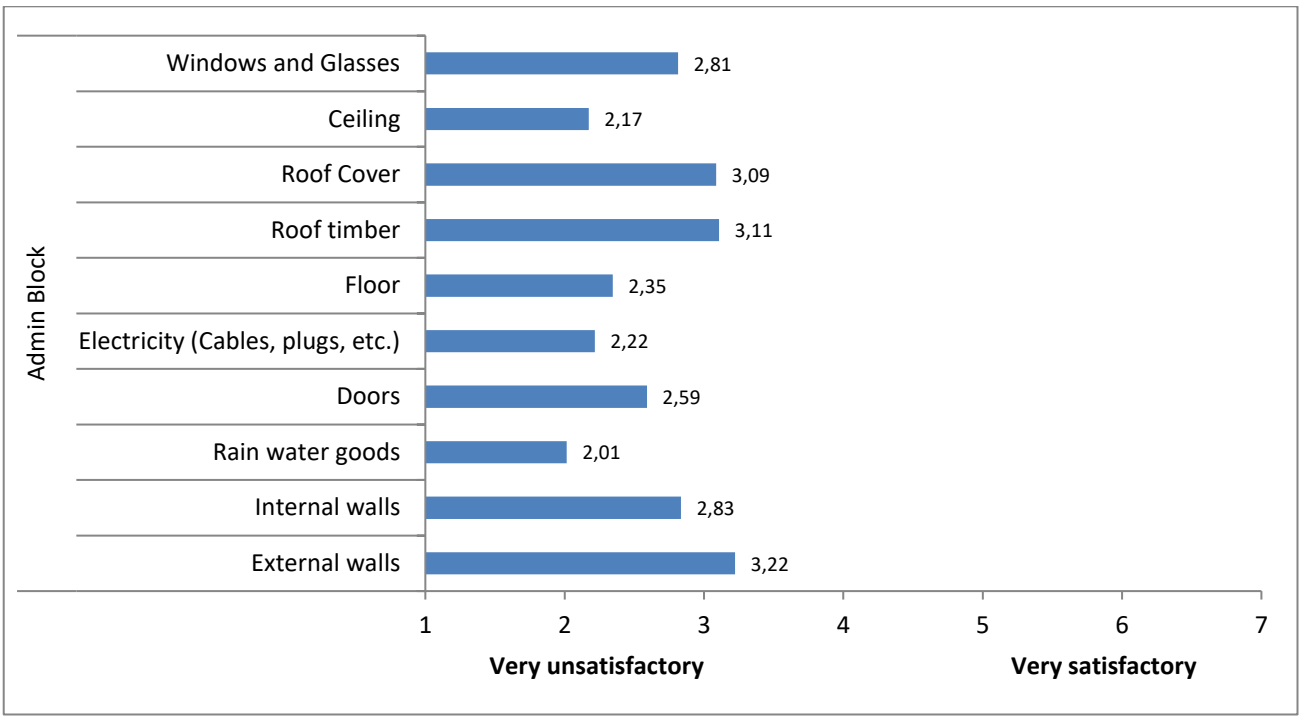

Figure 18: Condition summary of the administration blocks *Source:* Researcher Data (2022)

The above figure shows each of the assessed items for administration blocks and indicates if each item was very satisfactory or very unsatisfactory. Based on figure 18, no item was found to be satisfactory as all scores were below the mean score of 4.

Table 22: Condition summary of administration block

Administration block	n	Mean (SD)	t	df	p-value
External walls	139	3.22	-10.756	138	<.001*
Internal walls	139	2.83	-16.046	138	<.001*
Rainwater goods	139	2.01	-22.163	138	<.001*
Doors	139	2.59	-25.726	138	<.001*
Electricity (Cables, plugs, etc.)	139	2.22	-33.162	138	<.001*
Floor	139	2.35	-29.729	138	<.001*
Roof timbers	139	3.11	-14.624	138	<.001*
Roof covers	139	3.09	-14.615	138	<.001*
Ceilings	139	2.17	-30.281	138	<.001*
Windows and glass panes	139	2.81	-19.493	138	<.001*

Source: Researcher Data (2022)

The above table indicates that all assessed items in administration blocks were significantly unsatisfactory.

4.4.2 Media centres

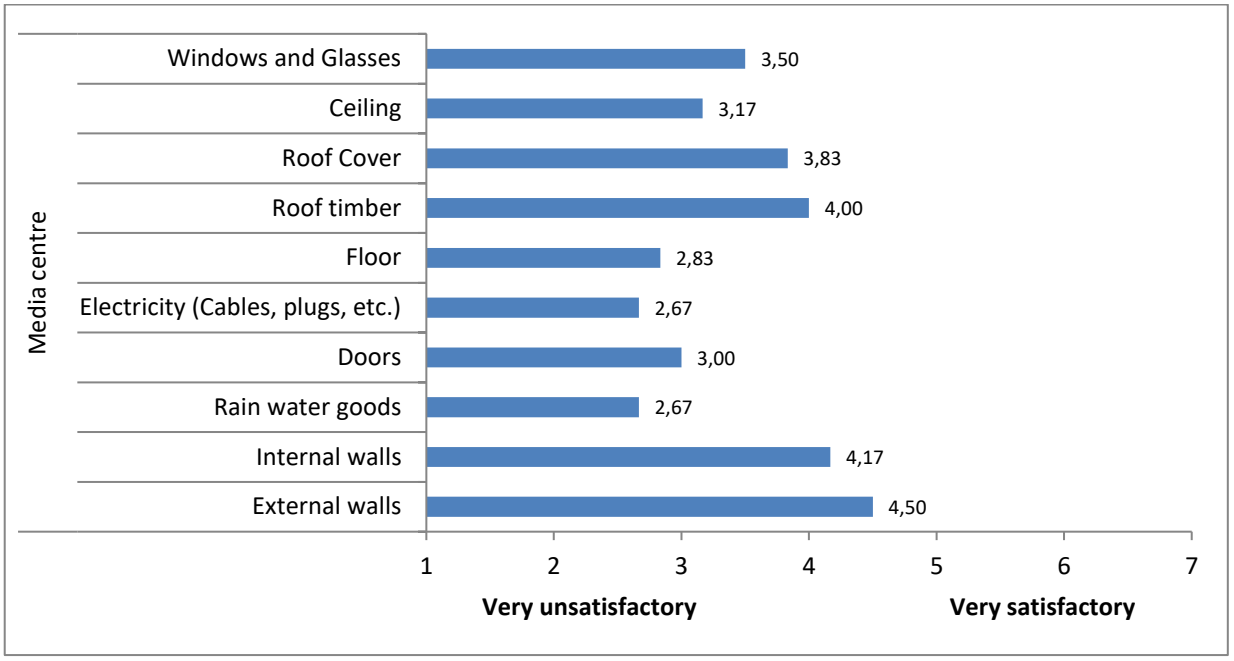

Figure 19: Summary of condition of media centres *Source:* Researcher Data (2022)

Only 6 out of 139 assessed schools had media centres. The above Figure 19 indicates the out of 6 school with media centres, in only one where the external walls were found to be significantly satisfactory. The rest of the items were not satisfactory.

4.4.3 Laboratories

Out of 139 assessed schools, only the 13 schools which had laboratories were assessed. Figure 20, below, indicates that all of the assessed structural items were very unsatisfactory.

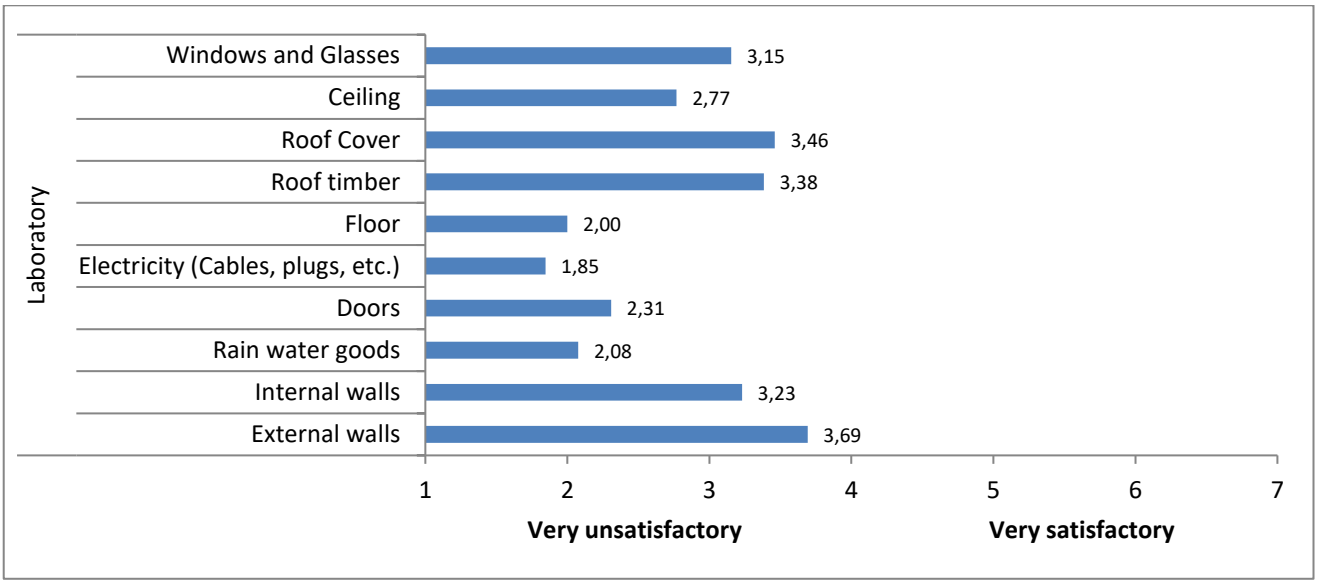

Figure 20: Summary of condition of laboratories *Source:* Researcher Data (2022)

4.4.4 Grade R facilities

The 108 schools with Grade R facilities were assessed. Of the 108 Grade R facilities, none had satisfactory structures. All items were found to be significantly unsatisfactory.

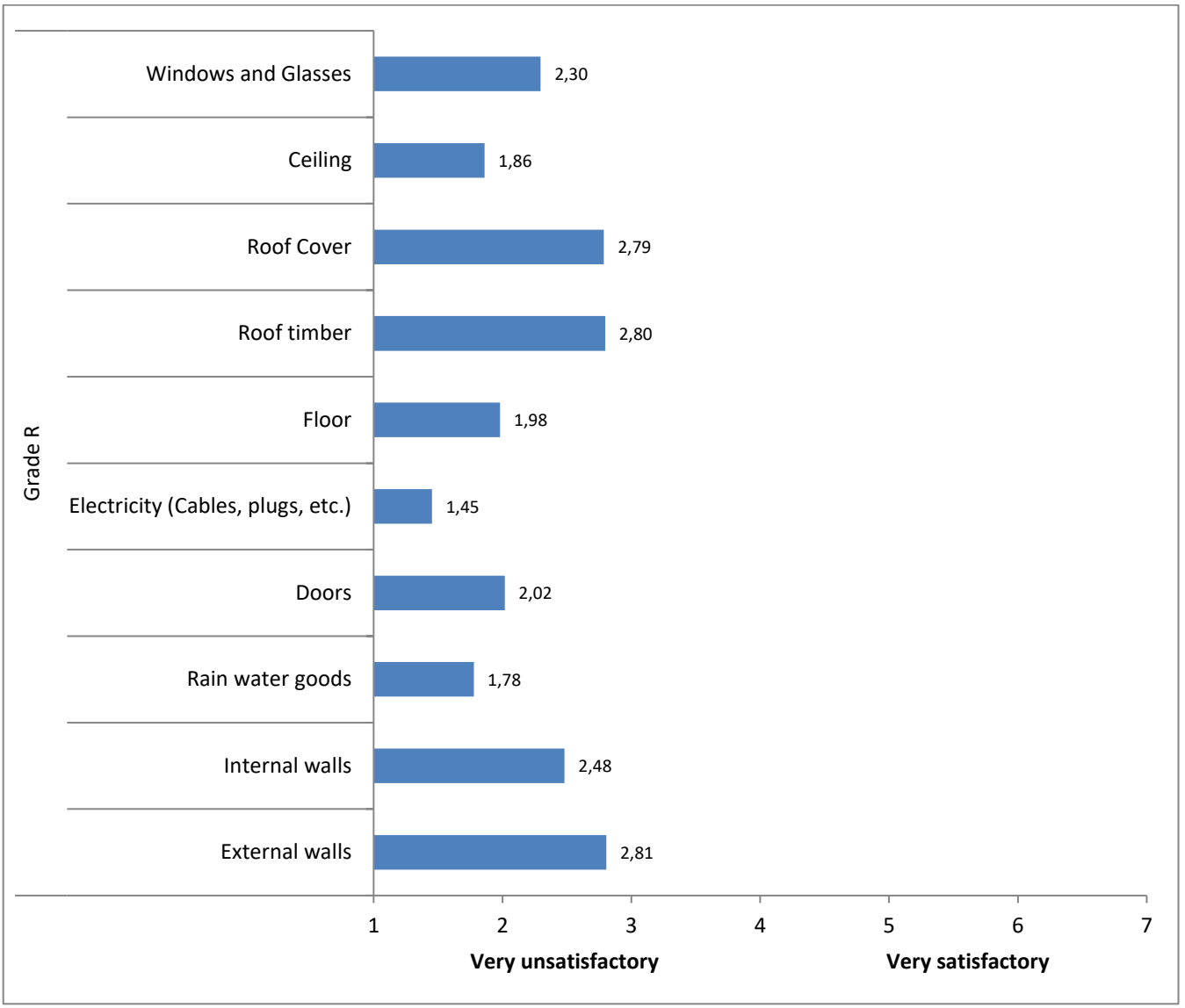

Figure 21: Summary of condition of Grade R facilities *Source:* Researcher Data (2022)

4.4.5 Nutrition centres

All assessed schools had nutrition centres. The graph, below, indicates the maintenance and condition of each building element in the nutrition centres. None of the elements was found to be significantly satisfactory. All building elements obtained a mean score less than 4, with electricity being the worse item with a mean score of 1.91. This indicates that nutrition centres in Alfred Nzo East were not in a good condition. The nutrition centre is where the food for learners is usually prepared on a daily basis. A high level of hygiene is expected in these nutrition centres; without proper maintenance the required standards of cleanliness cannot be achieved. This may cause food contamination which can cause problems for the learners, and can eventually disrupt teaching and learning.

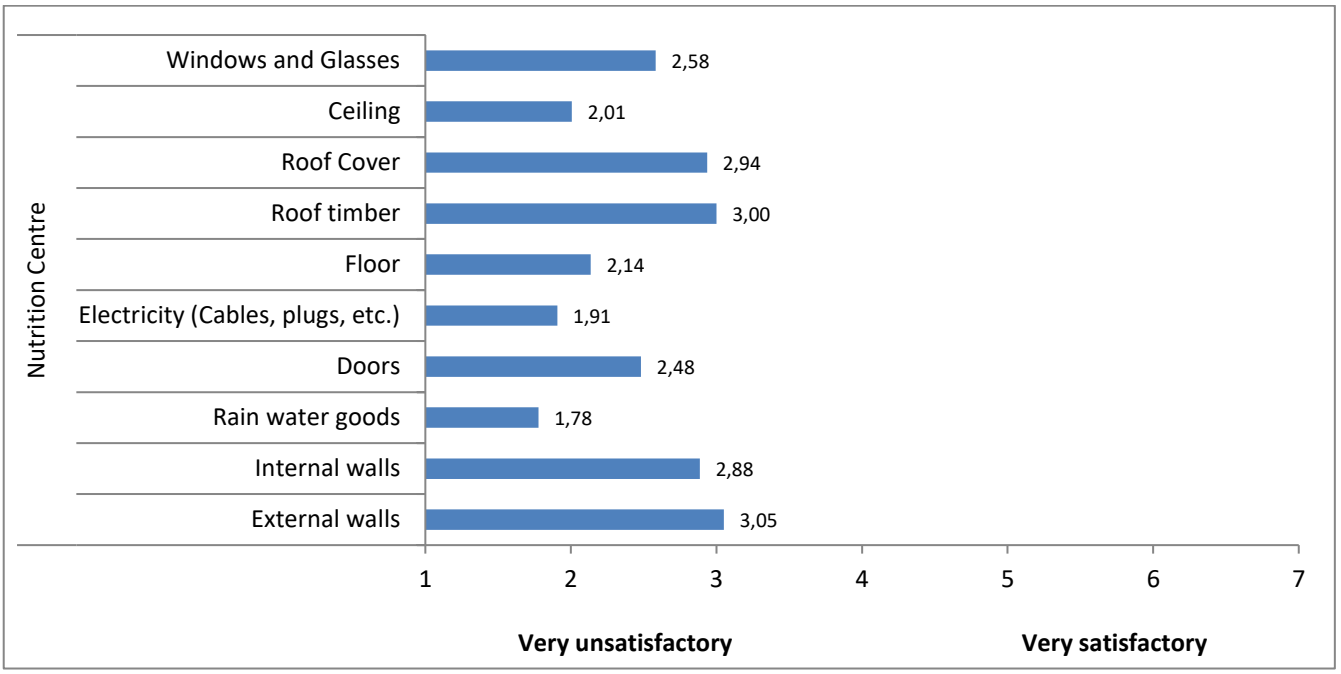

Figure 22: Nutrition summary *Source:* Researcher Data (2022)

4.4.6 Classrooms

The condition of the classroom blocks is summarised in Figure 23 and Table 23, below, as Blocks A, B, C, D, E, F, and G: The classroom is where the core function of education takes places. It is the responsibility of the MEC to ensure that a space, conducive for teaching and learning, is available for all learners in the province (South African Schools Act 1996:10). Figure 4-19, below, shows the results of the analysis of the observations of the condition and maintenance of classrooms. It was noticed that electricity (cables and plugs) was the worst of all elements, with the lowest mean score in all classroom blocks. It is very dangerous to have live electricity cables which are not properly insulated. This is unsafe for the occupants, especially all learners who may not understand the dangers of electricity. None of the classroom blocks were found to be satisfactory. The condition of all classroom blocks was found to be very unsatisfactory. Based on the information in Table 23, teaching and learning is conducted in an environment that is not conducive to teaching and learning, as none of classroom blocks were found to be satisfactory. The people entrusted with the responsibility of ensuring proper teaching and learning in the ANE district have failed to execute the functions entrusted to them by the South Africa Schools Act of 1996.

These findings are in agreement with the statement made by Adedji and Olamiyan (2011: 68) who stated that the school facilities in rural schools are in an unacceptable state of infrastructural decomposition and do not only endanger the health of the occupants, but are also possible death traps. This statement was made back in 2011, but even now the situation remains unaddressed and it is getting worse as time goes by. The lives of those people occupying the school facilities remains unsafe as long as the challenges surrounding school infrastructure maintenance are ignored.

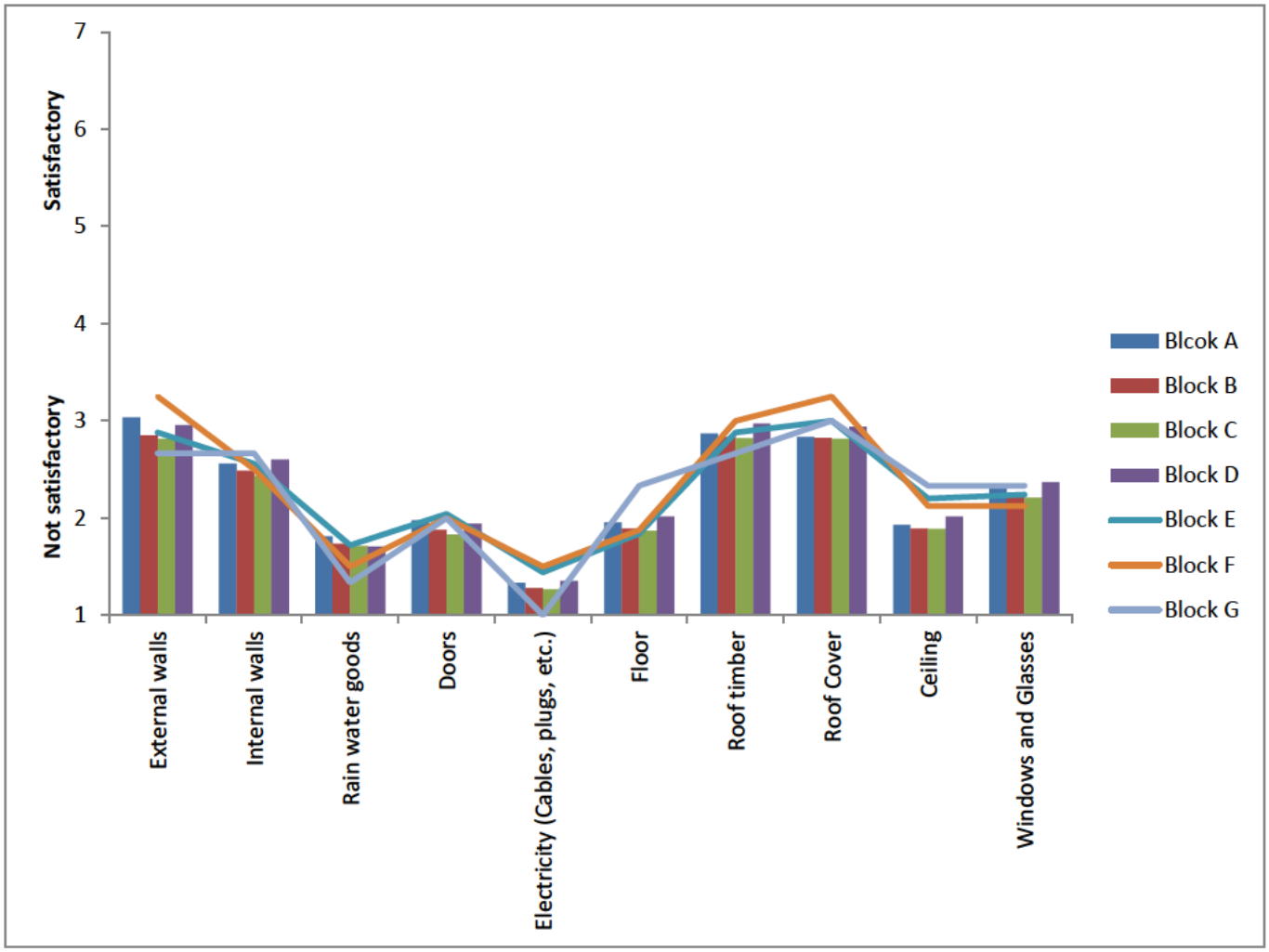

Figure 23: Summary of condition of classroom blocks *Source:* Researcher Data (2022)

Table 23, below, gives the one-sample statistics for all the structural elements, with the mean score for each element in each block. Where the mean score for each block from D to G shows school with good infrastructure maintenance condition and no school has conducive infrastructure for teaching and learning.

Table 23: Summary of statistics for classroom blocks

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Block D_External Walls	68	2.96	.836	.101
Block D_Internal Walls	68	2.60	.775	.094
Block D_Rainwater goods	68	1.71	.774	.094
Block D_Doors	68	1.94	.770	.093
Block D_Electricity	68	1.35	.567	.069
Block D_Floor	68	2.01	.763	.093
Block D_Roof timbers	68	2.97	.914	.111
Block D_Roof cover	68	2.94	.929	.113
Block D_Ceiling	68	2.01	.801	.097
Block D_Windows_Glass panes	68	2.37	.751	.091
Block E_External Walls	25	2.88	.881	.176
Block E_Internal Walls	25	2.56	.651	.130
Block E_Rainwater goods	25	1.72	.542	.108
Block E_Doors	25	2.04	.676	.135
Block E_Electricity	25	1.44	.583	.117
Block E_Floor	25	1.84	.850	.170
Block E_Roof timbers	25	2.88	.833	.167
Block E_Roof cover	25	3.00	.707	.141
Block E_Ceiling	25	2.20	.764	.153
Block E_Windows_Glass panes	25	2.24	.723	.145
Block F_External Walls	8	3.25	1.035	.366
Block F_Internal Walls	8	2.50	.535	.189
Block F_Rainwater goods	8	1.50	.535	.189
Block F_Doors	8	2.00	.535	.189
Block F_Electricity	8	1.50	.535	.189
Block F_Floor	8	1.88	.641	.227
Block F_Roof timbers	8	3.00	.756	.267
Block F_Roof cover	8	3.25	.707	.250
Block F_Ceiling	8	2.13	.641	.227
Block F_Windows_Glass panes	8	2.13	.641	.227
Block G_External Walls	3	2.67	.577	.333
Block G_Internal Walls	3	2.67	1.155	.667
Block G_Rainwater goods	3	1.33	.577	.333
Block G_Doors	3	2.00	.000[a]	.000
Block G_Electricity	3	1.00	.000[a]	.000
Block G_Floor	3	2.33	.577	.333
Block G_Roof timbers	3	2.67	1.155	.667
Block G_Roof cover	3	3.00	1.000	.577
Block G_Ceiling	3	2.33	1.155	.667
Block G_Windows_Glass panes	3	2.33	.577	.333

Source: Researcher Data (2022)

4.4.7 Playing fields

Analysis of basic services: Figure 24 below is the summary of results from the binomial test that was used to determine if a significant proportion of schools had facilities like parking space; playing fields; sanitation; water; electricity, and fencing.

Table 24: Summary of condition of playing fields

Playing fields	Frequency (%)		n	p-value
	Yes	No		
Levelled	2 (1)	137 (99)	139	<.001*
Built properly	2 (1)	137 (99)	139	<.001*
Natural	135 (97)	4 (3)	139	<.001*

Source: Researcher Data (2022)

The above Table shows that a significant 99% of playing fields were not leveled or built properly; and significant 97% of schools indicated that their playing field were 'natural'.

4.4.8 Electricity

Table 25: Summary of electricity supply

Electricity	Frequency (%)		n	p-value
	Yes	No		
Electricity Municipality	2 (1.44)	137 (98.57)	139	<.001*
Electricity Eskom	134 (96.4)	5 (3.6)	139	<.001*
Electricity Solar Panels	4 (2.88)	135 (97.13)	139	<.001*
Electricity other	0 (0)	139 (100)	139	<.001*

Source: Researcher Data (2022)

Table 25, above, is the summary of the electricity supply to schools. Out of 139 schools assessed, only two schools were supplied by the municipality; 134 schools were connected to the Eskom grid; and only 4 schools were using solar panels. All assessed schools were connected to some form of electricity supply.

4.4.9 Water

Table 26: Summary of water supply

Water	Frequency (%)		n	p-value
	Yes	No		
Water Municipality	13 (9.36)	126 (90.65)	139	<.001*
Water Borehole	18 (12.95)	121 (87.05)	139	<.001*
Water Tanks	138 (99.28)	1(0.72)	139	<.001*
Water other	138 (99.28)	1(0.72)	139	<.001*

Source: Researcher Data (2022)

The table 26, above, shows that 13 schools were connected to municipal water reticulation; 18 schools had boreholes; and 138 schools had water tanks for rainwater harvesting. This shows that all schools had access to water as a basic requirement for every school. The National Development Plan aims to ensure that by 2030 all schools have access to a clean and reliable water supply.

4.4.10 Sanitation

Table 27: Summary of available sanitation

Sanitation	Frequency (%)		n	p-value
	Yes	No		
Municipality Sewer	0 ()	139(100)	139	<.001*
Package plant system	1(0.71)	138(99.28)	139	<.001*
VIP	77(55.40)	66(47.48)	139	<.001*
Pit	56(40.3)	83(59.71)	139	<.001*
Flush	6(4.32)	133(95.68)	139	<.001*

Source: Researcher Data (2022)

The above table is the summary of sanitation available in the area, where only one school had a package plant system; 77 schools had ventilated improved toilets; 56 schools had pit toilets; and there were only 6 schools with flush toilets. The provision of sanitation at education facilities is part of the National Development Plan. The plan aims at ensuring that 90% of people have access to proper sanitation by 2030.

4.4.11 Fencing

Table 28: Summary of fencing

Fencing	Frequency (%)		n	p-value
	Yes	No		
Stock fencing	44(31.65)	95(68.84)	139	<.001*
Welded mesh	84 (60.87)	55 (39.57)	139	<.001*
Palisade	1 (0.71)	138 (99.28)	139	<.001*
Clearview	11 (7.9)	128 (92.08)	139	<.001*
Block work	0 (0)	139 (100)	139	<.001*

Source: Researcher Data (2022)

Safety in schools remains one of the top priorities for the government, and fencing is of one of the ways of providing security in schools. Table 28, above, shows that 31.65% of the schools assessed had a stock fence; 60.87% had welded mesh; 1% had a palisade fence; and 11% had Clearview fencing. The number for 44 schools with stock fences is very high, as the security in these schools will be compromised.

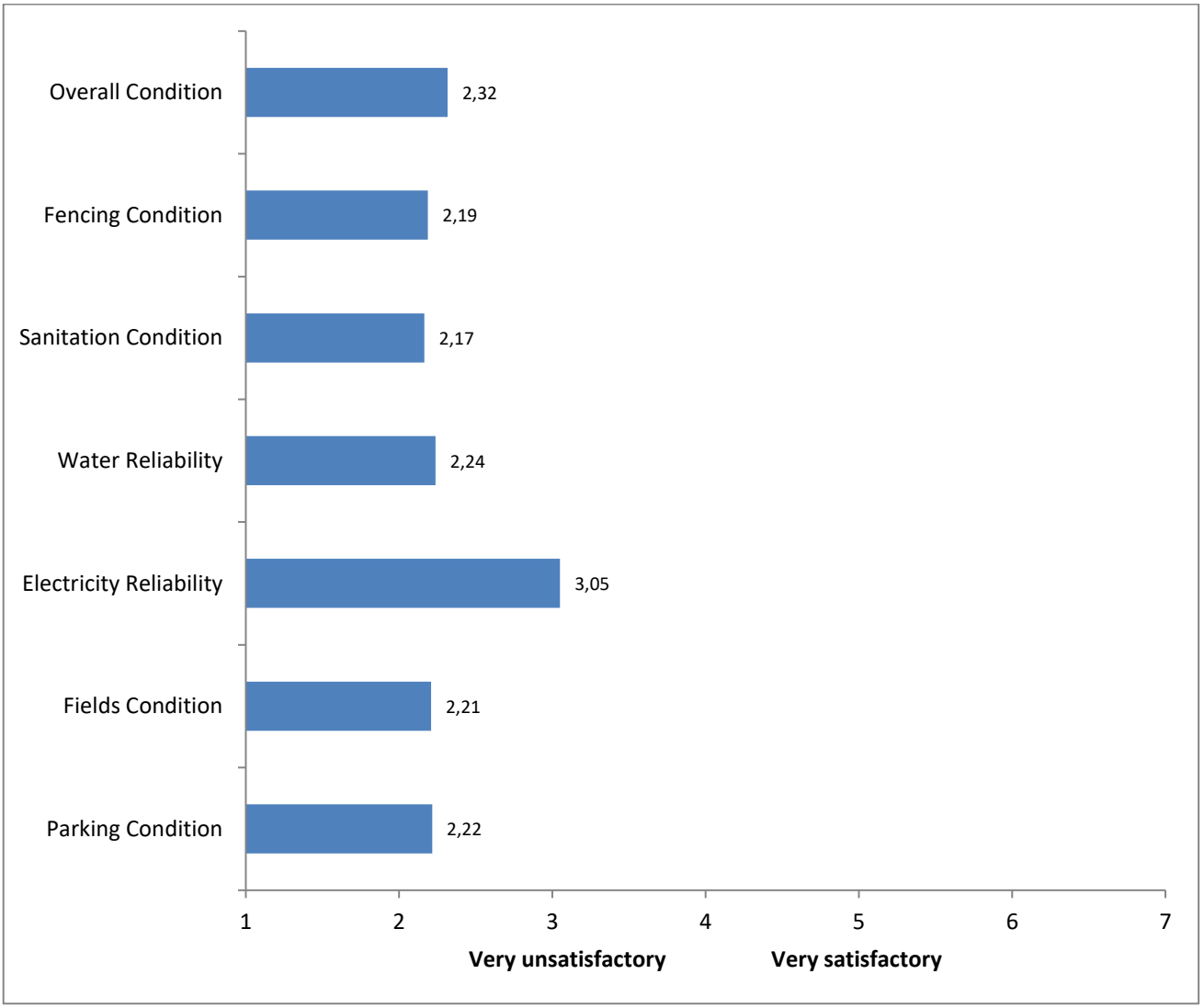

Figure 24: Summary of the overall condition of basic services *Source:* Researcher Data (2022)

The above Figure gives the summary for each of the assessed services, with the mean score for all services indicating that none of these services were in an acceptable condition. Should the service be in a less than acceptable condition, it cannot render the good service expected by the users and will fail frequently, which can be very disruptive to the users. The mean score for parking was found to be 2.22; for playing fields it was 2.21; for electricity it was 3.05; for water reliability it was 2.17; and for fencing it was 2.19.

4.4.12 Condition of overall maintenance

The assessment of the overall condition of the school facilities in the area was determined to have a mean score of 2.32. This indicates that school facilities in the area are poorly maintained and in a poor condition.

Table 29: Facility condition correlations

		ECON	POL	SUPP	SKILLS	MAN	STR	DC
AVE_administration	Pearson Correlation	.024	.077	.272**	.030	-.043	-.070	-.056
	Sig. (2-tailed)	.776	.365	.001	.725	.615	.414	.510
	N	139	139	139	139	139	139	139
AVE_Media	Pearson Correlation	.109	.358	.216	.751	-.656	-.111	-.750
	Sig. (2-tailed)	.837	.486	.682	.085	.157	.834	.086
	N	6	6	6	6	6	6	6
AVE_Lab	Pearson Correlation	.166	.212	.339	.458	-.131	.264	-.542
	Sig. (2-tailed)	.588	.488	.257	.115	.668	.383	.056
	N	13	13	13	13	13	13	13
AVE_Grade R	Pearson Correlation	.060	.070	.189*	.010	.047	-.129	.004
	Sig. (2-tailed)	.535	.471	.050	.919	.626	.183	.967
	N	108	108	108	108	108	108	108
AVE_Nut	Pearson Correlation	.069	.139	.198*	-.069	-.001	.014	-.064
	Sig. (2-tailed)	.416	.102	.019	.423	.988	.872	.457
	N	139	139	139	139	139	139	139
AVE_Classrooms	Pearson Correlation	-.020	.110	.237**	.022	-.020	-.040	.064
	Sig. (2-tailed)	.814	.197	.005	.797	.812	.641	.454
	N	139	139	139	139	139	139	139
Parking_condition	Pearson Correlation	-.008	.046	.080	-.060	.105	-.067	.028
	Sig. (2-tailed)	.922	.593	.346	.485	.217	.430	.740
	N	139	139	139	139	139	139	139
Fields_condition	Pearson Correlation	-.012	.040	-.006	-.050	.100	.008	.019
	Sig. (2-tailed)	.888	.637	.944	.563	.239	.927	.828
	N	139	139	139	139	139	139	139
Electricity_reliability	Pearson Correlation	-.012	.034	-.119	-.019	.083	.056	.068
	Sig. (2-tailed)	.886	.689	.163	.828	.330	.513	.429
	N	139	139	139	139	139	139	139
Water_reliability	Pearson Correlation	.049	.117	.122	.053	-.029	.029	-.109
	Sig. (2-tailed)	.568	.169	.152	.532	.730	.735	.202
	N	139	139	139	139	139	139	139
Sanitation_condition	Pearson Correlation	.041	.066	.164	.016	-.018	.051	-.038
	Sig. (2-tailed)	.633	.441	.053	.850	.830	.551	.654
	N	139	139	139	139	139	139	139
Fencing_condition	Pearson Correlation	.051	.071	.051	-.090	.125	.000	-.035
	Sig. (2-tailed)	.547	.407	.554	.294	.141	.996	.679
	N	139	139	139	139	139	139	139
Overall_condition	Pearson Correlation	.053	.062	.213*	.029	.014	.085	.064
	Sig. (2-tailed)	.536	.468	.012	.736	.870	.318	.452
	N	139	139	139	139	139	139	139

Source: Researcher Data (2022)

Table 29, above, shows the correlation of the condition of the facilities with the factors contributing to poor maintenance. Pearson's correlation test was applied. Based on the correlation results, it seems that better, or more, support from the management team is significantly correlated or associated with higher satisfaction regarding the condition of administration blocks (r=0.272, p=0.001); Grade R facilities (r=0.189, p=050); nutrition centres (r=0.198, p=0.019); classrooms (r=237, p=005) and overall condition (r=0.213, p=0.012).

4.5 Conclusion

This chapter presented analyses of the survey data collected which was presented and analysed using descriptive statistics. Demographic data information of participants was present and also analysed. The whole collect data was presented in tabular form including charts and figures used to give more meaning to the data and its relevance to the discussed literature. A link was created on questionnaire data and condition assessment data to establish the impact of the identified questionnaire factors on the current condition of school maintenance.

In conclusion, there were several factors identified affecting the maintenance of school facilities, as such recession; a one-size-fits-all budget approach; and lack of knowledge of maintenance work by the people managing and monitoring maintenance work. The analysis highlighted the necessity for the government to consider more capacitation of the school governing bodies and the strengthening of monitoring strategies.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The purpose of this chapter is to re-examine the aim and objectives of the study and make recommendations for improving the condition of maintenance of school facilities. This would improve the performance levels at the school in the area; save the school infrastructure from further deterioration; and save the lives of those occupying the school facilities, as the school facilities have been identified as possible death traps (Adedeji and Olamiyan 2011: 68). The aim of the study was to draw up recommendations for the maintenance requirements at PPHS in Alfred Nzo East District, Eastern Cape Province. The primary objectives of the study were: -

- to investigate the maintenance and condition of facilities a PPHS in ANED, ECP;
- to identify reasons for the poor maintenance of facilities at PPHS, ANED, ECP; and
- to formulate recommendations for the improvement of maintenance of facilities at PPHS in ANED, ECD.

5.2 Discussion of the key findings and conclusions under each research objective.

5.2.1 To investigate the maintenance and condition of facilities at PPHS in ANED, ECP.

5.2.1.1 Structures and maintenance factors

It was discovered from the findings that very few schools are mud structures, but most school buildings in the district are unsuitable and those structures are aging. This suggests that those schools are not easily maintained, or the maintenance costs are very high and unaffordable. This then calls for urgent consideration of the provision of major renovations for these schools to address the current state of deferred maintenance.

5.2.1.2 Personnel-related factors

The findings under the above heading highlighted that users of the school facilities were not happy with the maintenance condition of the schools. It was also found that the performance of both teachers and learners is affected. As the condition of these facilities keeps on deteriorating, it is obvious that the performance of the occupants keeps on declining and the value of the facilities also keeps declining. To boost the morale, self-confidence and the performance of those people using school facilities, proper implementation of day-to-day maintenance and monitoring has to be improved by ensuring adequate funding for day-to-day maintenance and proper management of maintenance work.

5.2.2 To identify reasons for the poor maintenance condition of facilities at PPHS, ANED, ECP.

5.2.2.1 Management Factors

Findings highlighted that most of the schools do not have a maintenance plan in place. This is to say, the schools only attend to maintenance work that is visible and they only respond or react to what is obvious. The schools are not proactive in dealing with maintenance, and they should have a well-documented maintenance plan clearly stating the school's approach to day-to-day maintenance, emergency maintenance and urgent maintenance needs. All schools should have a maintenance plan which includes a budget and cashflow projection that would assist the schools to identify the shortfall on the budget in order to develop supplementary budget strategies and help prioritise maintenance work properly.

The use of unqualified local builders was identified as one of the challenges that results in the inferior maintenance work due to poor workmanship. Hiring of unqualified local builders occurs

because even those people who are hiring local builders do not understand the importance of maintenance and they do not see the value in maintenance. This has resulted in the use of cheap materials and cheap labour that leads to poor maintenance work. SGBs should take school infrastructure maintenance very seriously, consider the use of qualified builders, and use material of a reasonable price and quality to maintain school facilities.

The survey's finding reflected that 128 respondents agreed that the funds allocated for maintenance work were sometimes used for other activities. The survey also highlighted that funds for maintenance are inadequate. It would not be easy to agree with both statements, especially as funds are inadequate, yet are used for other activities. It is impossible to even determine the shortfall, because to do that one would need to identify the amount of funding being used for other activities. The South African Schools Act (1996: 25) says school governing bodies at public schools must make it their responsibility to supplement the resources given to the school by the state in order to improve the quality of education provided by the school. SGBs are, therefore, expected to see to it that whenever a shortfall is experienced in maintenance funds, they attend to it. This could be a very worrying finding for the government, as the existing infrastructure is decaying and funding for maintenance is difficult to access, following the budget cuts over the past two years.

To address the situation, the schools have to utilise maintenance funds on maintenance-related activities only. Should there be a shortfall in funding, SGBs must play their role of ensuring that they supplement whatever resources are allocated to the school. This can only be possible once the SGBs clearly understand their responsibilities and are capacitated to execute them optimally. Reporting and accountability can be improved once the role players are aware of their responsibilities. This is one of the challenges faced by the Department of Education when it comes to maintenance.

There is evidence that schools are not involved in the planning, design and construction of their schools and they are just given what the planners think the schools requires. This is another cause of the for poor maintenance, and it can be easily improved by the involvement of end users right at the initiation stage of the project.

5.2.3 To formulate recommendations for improving the maintenance and condition of facilities at PPHS in ANED, ECD.

5.2.3.1 Financial challenges

Adequate funding and utilisation of the available funds remains a challenge and a hindrance to proper school maintenance. Should this challenge be ignored further, infrastructure challenges will increase. At this time, the national economy is not doing well, and things are getting worse. This is a time where the country needs to look at the existing fiscal policies in order to adjust them to accommodate the current economic recession. This should eventually result in the development of funding norms or supplementary budget strategies for school infrastructure maintenance that would address the current identified challenges, such as the 'one-size-fits-all' budgeting approach which is the case, currently. By having a supplementary budget strategy, small schools which are disadvantaged by the currently funding approach could fund their maintenance successfully and the schools will be able to use materials of a reasonable quality.

5.2.3.2 Overcrowding

Most of schools assessed were overcrowded, so their facilities were over-utilised, and proper cleaning, hygienic standards, and other day-to-day maintenance activities were not easily executed. Where there is over-utilisation of the facility, there is an increased likelihood of failure of the facility, which can be deemed surplus to the user as it no longer successfully delivers its core functions for the user. Addressing overcrowding in schools would help to address maintenance challenges and improve the performance of both learner and educators.

5.2.3.3 Planning

It has been proven, based on the findings, that there is no proper planning by those responsible for school maintenance. Evidence for this from the findings is that very few schools have a proper maintenance plan in place. Working without a plan may lead to incorrect prioritization of maintenance, which can result in fruitless expenditure or in the implementation of unnecessary work. A comprehensive plan is the key to the proper implementation and monitoring of maintenance and can be key to controlling the quality of maintenance work; judicious spending; considering health and safety during implementation; proper cost control and monitoring; and accountability.

5.2.3.4 Monitoring

The South African Schools Act entrusts school governing bodies with the responsibility of managing and implementing maintenance work, without considering the fact that their understanding of facility management is minimal; yet maintenance work requires someone with solid knowledge of facility management. To mitigate against further damage cause by this challenge, proper capacitation of SBGs in facility maintenance is very important. To successfully implement maintenance, SGBs must work closely with the district infrastructure officials, as they are available and their services are free. This would create a very solid maintenance team that is equipped with technical expertise and leadership capabilities.

5.2.3.5 Personnel

The Department of Education has infrastructure officials who are based in the district and they are doing an excellent job in assisting schools in the provision of infrastructure and its maintenance. However, it seems that the working relationship between the schools and district infrastructure officials is not functioning well. This study proposes the strengthening of these working relationships and clarification of the roles and responsibilities of all those involved. In order for the district to effectively support schools, a full staff complement is required. This also includes employment of a handyman or woman at each school to ensure that day-to-day maintenance is implemented successfully.

5.3 Conclusion

This study has determined the condition and maintenance of public and primary schools in Alfred Nzo East District in the Eastern Cape. The factors causing poor school infrastructure maintenance have been highlighted. Recommendations based on the key findings have been made, with improvements suggested in planning and monitoring; ensuring full staff complements; and strengthening the working relationship between SGBs and district infrastructure officials to address the SGBs' lack of expertise in facility management. Proper implementation of the above recommendations will foster proper school facility maintenance in Alfred Nzo East District that will enhance teaching and learning, resulting in quality education offered by highly motivated professionals.

"The state is liable for any damage or loss caused as a result of any act or omission in connection with any educational activity conducted by a public school and for which such public school would have liability" (South Africa, Department of Education 1996: 36)

REFERENCES

Abbott, G, R., Mc Duling, J. J., Parsons, S. and Schoeman J.C. 2007. Building Condition Assessment: a performance evaluation tool towards asset management. In*: CIB World Congress 2007*. Cape Town, 14-18 May 2007. South Africa: Construction for development, 649-662. Available: http://hdl.handle.net/10204/1233 (Accessed 10 September 2020).

Adedeji, S.O. and Olaniyan, O. 2011. *Improving the condition teachers and teaching in rural schools across African countries: Fundamentals of teacher education development,* Ethiopia: Addisa Ababa. Available: http://icqnecd.ministry-education.govmu.org/English/Documents/Fundamental%20series%202.pdf (Accessed 23 August 2022).

Ahmad, M. 2021. Management of facilities and infrastructure in schools. 10(1): 93-105. Available: https://uia.e-journal.id/akademika/article/1348 (Accessed 29 July 2023).

Ahzahar, N., Karim, N.A., Hassan, S. H. and Eman, J. 2011. A study of Contributing factors to building failures and defects in construction industry. Procedia Engineering. 20(162) 249-255.

Akinlolu, M., Ndihokubwayo, R. and Simpeh, F. 2020. TQM implementation challenges: a case study of a building maintenance. International journal of productivity and quality management, 29(3): 355-371.

Akpan, C.P. 2001. Strategies for Sustainable Management of School Physical facilities in the 21st Century. International Journal of Education Administration, Planning and Research. 1(1): 125-135

Allen, D. 1993. What is Building Maintenance. *Facilities,* 11: 3. Available: http://dX.doi.org/10.1108/EUM0000000002230 (Accessed 8 September 2020).

Awade, A., Zayed, T. and Alka, S. 2015 Space Based Condition Assessment Model for Buildings: *Case study for Education- Buildings,* 29(1): 1-12.

Asiyai, R. I. 2012. Assessing school facilities in public secondary schools in Delta state, Nigeria. *An international multidisciplinary journal*. 6(20): 192-205. Available: http://dx.doi.org/10.4314/afrrev.v6i2.17 (Accessed 18 July 2021).

Ayala, X. G. and Elder, J.P. 2011. Qualitative method to ensure acceptability of behavioural and social intervention to the target population. *Journal of Public Health Dentistry,* 71(1): S69-79. Available: https://doi.org/10.1111/j.1752-7325.2011.00241.x (Accessed 25 January 2021).

Benfer, A. E., Viahou, D., Marissa, Y. L., Walker-Wells, E., Pottenger jr, J. L., Gosalves, G. and Keene, D. E. 2021. Eviction, health, inequity and the spread of covid 19. Housing policy as a primary pandemic mitigation strategy. *Urban Health*, 98:1-12 Available: https://doi.org/10.1007/s11524-020-00502-1 (Accessed 12 February 2022) .

Brannen, J. 2005. The entry of qualitative and quantitative approaches into the research process. *International journal of social research Methodology,* 8(3): 173-184. Available: https://www.tandfonline.com/doi/pdf/10.1080/13645570500154642 (Accessed 04 February 2020).

Campbell, J. 2021. Public sector contracts affected by rising building material cost. Available: https://www.bbc.com/news/uk-northern-ireland-58070738 (Accessed 20 September 2021).

Cloete, C.E. 2001. *Principles of Property Maintenance*. South Africa: South African Property Education Trust.

Chawula, L. 2021. Eastern Cape schools continue to face infrastructure challenges. Available: https://www.careersportal.co.za/news/eastern-cape-schools-continue-to-face-infrastructure-challenges (Accessed 22 March 2021).

Cloete, C.E. 2002. *Introduction of facilities Management.* South Africa: South African Property Education Trust.

Collins, C., Ruppanner, L., Landivar, C. L. and Scarborough, J. W. 2021. Gendered consequence of a weak infrastructure of care. *School reopening plans and parents employment during covid 19 pandemic*, 35(2): 180-193. Available: https://doi.org/10.1177/08912432211001300 (Accessed 25 January 2022).

Corti, L., Day, A. and Backhouse, G. 2000. Confidentiality and Informed Consent: Issues for Consideration in the Preservation of and Provision of Access to Qualitative Data Archives. *Qualitative Social Research*, 1:7. Available: https://doi.org/10.17169/fqs-1.3.1024 (Accessed 25 January 2021).

Dalati, S. and Gomez, M. J. 2018. Surveys and Questionnaires. Modernising the academic teaching and research environment, Springer: 175-186. Available: https://doi.org/10.1007/978-3-319-74173-4_10 (Accessed 14 February 2021).

Dickerson, D.E. and Ackerman, P.J. 2016 Risk-based Maintenance Management US public school facilities. *International Conference on Sustainable Design, Engineering and Construction,* 145:685-692. Available: https://doi.org/10.1016/j.proeng.2016.04.069 (Accessed 04 February 2020).

Damba-Hendrik, N. and Steyn, D. 2021. *Eastern Cape parents build their own school/ Baleni near Xolobeni is raising funds to build classrooms and other facilities*. Available: https://allafrica.com/stories/202106300875.html (Accessed 02 August 2021).

Dhillion, B. S. 2006. *Maintainability, maintenance and reliability for engineers*. Boca Raton: CRC Press. Available: https://doi.org/10.1201/978120006780 (Accessed 21 March 2021).

Dulaimi, F. M., De Silva, N., Ling, F. Y. Y. and Ofori, G. 2004. Improving Maintainability of buildings, in Singapore: *Building and Environment*. 39(10): 1243- 1251. Available: https://doi.org/10.1016/j.buildenv.2004.02.011 (Accessed 14 March 2021).

Ewada, A., Masce, T. Z. and Masce, S. A. 2015. Space based condition assessment model for buildings. *Case study of education buildings,* 29(1): 1-12.

Fernandez, F., Correl, J., F., D'Ayala, D. and Medaglia. 2023. A decision making framework for school infrastructure improvement program, structure and infrastructure engineering. Available: https://doi.org/1080/15732479 (Accessed 29 July 2023).

Herath, N., Duffield, L. and Zhang, L. 2022. Public school infrastructure ageing and current challenges in maintenance, 29(2): 401-419. Available: https://www.emerald.com/insight/1355-2511.htm (Accessed 29 July 2023).

Junyong, I. 20017. Introduction of a pilot study. *Korean journal of Anesthesiology*, 70(6): 601-605. Available: https://doi.org/10.4097/kjae.2017.70.6.60 (Accessed 22 August 2021).

Koch, C., Geagieva, K., Kosireddy, V., Akinci, B. and Fieguth, P. 2015. A review on computer vision-based defect detection and condition assessment. *Advanced Engineering Informatics,* 29(2): 196-210 Available: http://dx.doi.org/10.1016/j.aei.2015.01.008 (Accessed 04 February 2020).

Kothari, C. R. 1990. Research Methodology: *Methods and Techniques*. New Delhi: New Age International.

Kamper, G. 2008. A profile of effective leadership in some South African High-Poverty Schools. *South African Journal of Education,* 28: 1-18. Available: http://www.scielo.org.za/pdf/saje/v28n1/v28n1a01.pdf (Accessed 25 January 2021).

Khalek, I. A., Chalhoub, J. M. and Ayer, S. K. 2019. Augment reality for identifying maintainability concerns during design. *Advances in civil engineering*, February/March:1-12

Khumalo, B. and Mji, A. 2014. Exploring education perceptions of the impact of poor infrastructure on learning and teaching in rural South African schools. *Mediterranean journal of Social Sciences,* 5(20):1521-1532. Available: https://www.richman.org/journal/index.php/mjss/article/3888 (Accessed 28 March 2021)

Gibberd, J. 2007. South Africa's school infrastructure performance indicator system. *PEB Exchange Programme on Education Building*, PEB Exchange 2007/6: 1-6. Available: https://dx.org/10.1787/183018365366 (Accessed 18 March 2021).

Guo, Z., He, R., Tian, Z., Wang, Y. and Zuo, M. 2023. Condition based maintenance optimization for multi-component systems considering prognostic information and degree working efficiency: *Reliability Engineering and System Safety*. Available: https://doi.org/10/1016/j.ress.2023.109167 (Accessed: 28 July 2023).

Lavy,S. and Bilbo, D. L. 2009 Facilities maintenance management practises in large public schools, Texas. *Facilities Maintenance Management.* 27(1/2): 5-20. Available: https://doi.org/10.1108/02632770923054 (Accessed 18 March 2021).

Leedy, P.D. 2010. *Practical Research: Planning and Design.* 9th edition. New York: Kevin Davis.

Mafukula, S. A. 2023. Exploring the functionality of financial management system in public schools of Malangeni circuit, Eastern Cape Province. M.Ed., University of South Africa.

Mathers, N., Fox, N. and Hunn, A. 2007. *Surveys and questionnaires: trends and development support unit*, Sheffield: Trends RDSU.

Mestry, R. 2014 Acritical analysis of the National Norms and Standards for School Funding Policy: *Implication for social justice and equality in South Africa*, Available: https://ema.sage.com/content/early/2014/08/14/1741143214537227 (Accessed 29 August 2023).

Mestry, R. and Ndhlovu, R. 2014. The implication of the national norms and standards for school funding policy on equity in South African public schools. South African Journal for education, 34(3): 11-25. Available: http://www.sajournalofeducation.co.za (Accessed 17 February 2020).

Michael, C. Lin. 2012. *Maintainability of facilities for building professionals*. Singapore: World Scientific.

Moyo, C., Mishi, S. and Ncwadi, R. 2022. Human capital development, poverty and income in the Eastern Cape province: *Development Study research*, 9(1): 36-47. Available: https://doi.org/10.1080/21665095.2022.2032236 (Accessed 29 July 2023).

Muhammad, B., Muhammad, T. A. and Muhammad, A. 2008. Reliability and Validity of Qualitative and Operational Research Paradigm. *Section Peer Reviewed Articles*, 4(1): 35-45. Available: https://doi.org/10.18187/pjsor.v4i1.59 (Accessed 16 February 2020).

Mojela, T. W. 2013. Assessment of the effectiveness of Public-School Infrastructure Maintenance System in Gauteng Province. M-Tech Construction Management, University of Johannesburg. Available: https://ujdigispace.uj.ac.za (Accessed 12 December 2020).

Mojela, T. W. and Thwala, W. D. 2014. Maintenance of Public-school infrastructure in South Africa. *International symposium on advancement of construction management and real estate*, 127: 1253-1261. Available: https://doi.org/10.1007/978-3-642-35548-6_127 (Accessed 17 September 2022).

Mong, S.G., Mohamed, F.S. and Misnan, S.M. 2018. Key strategies to overcome cost overruns issues in building maintenance management. *International journal of engineering and technology*, 7(2): 26-273.

Newman, I. and Ridenour, C. 1998. *Qualitative-Quantitative Research Methodology. exploring the interactive Continuum*. Florida. Educational Leadership Faculty Publications. Available: https://ecommons.udayton.edu/cgi/viewcontent.cgi?article=1121&context=eda_fac_pub (Accessed 25 January 2021).

Newman, A. 2003. Structural renovation of Buildings methods: *Details and designs examples*, New York: Mc Graw Hill.

Nhlapo, V. A. 2009. A whole-school approach to facilities maintenance. PhD., North-West University: Vaal Triangle.

Peoria, A. 2018. Eastern Cape mud schools progress stalls. Available: https://mg.co.za/article/2018-05-04-00-eastern-cape-mud-school-progress-stalls/ (Accessed 16 February 2020).

Phakathi, B. 2018. *Eastern Cape schools are Worst in South Africa for Poor Infrastructure*. Available: http://www.businesslive.co.za/bd/national/education/2018-05-25-eastern-cape-schools-are-worst-in-sa-for-poor-infrastructure/ (Accessed 16 February 2020).

Phathela, V. A. and Cloete, E. C. 2018. The impact of Government Immovable Asset Management Act on department of public works, South Africa: International journal of Real Estate and Land Planning, 287-291.

Pirthiraj, A. 2017. Factors affecting motivation of first year students in the department of construction management and quantity surveying at Durban University of Technology. Master's Degree in Management Sciences, Durban University of Technology.

Riley, M. and Cotgrave, A. 2005. The Technology of refurbishment and maintenance: Construction technology. Illustrated. New York: Palgrave Macmillan. Available: https://books.google.co.za/books?id=HzR2GwAACAAJ (Accessed 14 November 2021).

Richard, C. and Hunter, E. D. 2009. The public-school infrastructure problem: Deteriorating Building and Deferred maintenance: *Facilities/ environmental issues*, 75 (2): 10-14.

Satyendra, P. A. P. and Patnaik, S. 2014. Establishing Reliability and Validity in Qualitative Inquiry: A Critical Examination. *Journal of Development and Management Studies,* 12(1): 5743-5753. Available: https://www.researchgate.net/profile/Satyendra_Pandey2/publication/266676584_ESTABLISHING_RELIABILITY_AND_VALIDITY_IN_QUALITATIVE_INQUIRY_A_CRITICAL_EXAMINATION/links/543779b40cf2dc341db4d7fb/ESTABLISHING-RELIABILITY-AND-VILIDITY-IN-QUALITATIVE-INQUIRY-A-CRITICAL-EXAMIATION.pdf (Accessed 25 January 2021).

South Africa, Department of Basic Education. 2018. *Green Paper on Guidelines for general upkeep and maintenance of education facilities*. Pretoria: Government Printer. Available: https//www.education.gov.za/Portas/0/Documents/Publications/General%20upkeep%20and%20Maintenance%20218.pdf?ver=2018-09-17-105447-213/ (Accessed 25 January 2020).

South Africa, Department of Education. 1996. *South African Schools Act 84 of 1996*. Cape Town: South African Post Office. Available: https://www.gov.za/sites/defualt/files/gcis-document/201409act48of1996.pdf (Accessed 17 February 2020).

South Africa, Department of Basic Education. 2010. National School Infrastructure Guidelines. Pretoria: Department of Basic Education.

Schools hit by strong winds not fixed in the Eastern Cape province. 2019. Available: http://www.sabcnews.com/sabcnews/schools-hit-by-strong-winds-not-fixed-in-the-eastern-cape/ (Accessed 16 February 2020).

South Africa, Department of Basic Education. 2010. *National Maintenance Policy Act,1996 (27 of 1996) National Norms and Standard for School Funding*. Government Gazette 19347: 12 October. Cape Town. Government Printers.

South Africa, Department of Basic Education.1998. National *Norms and Standard for Funding act*. Government Gazette 2362: 12 October. Cape Town. Government Printers.

Wiles, R., Crow, G., Sue, H. and Vikki, C. 2008. Qualitative and Quantitative Research methodology. *International Journal on Social Research Methodology*, 11(5): 417-428. Available: https://doi.org/10.1080/13645570701622231 (Accessed 25 January 2021).

Vallee, J., Souris, M., Fournet, F., Bochaton, A., Mobillion, V., Peyronnie and Salem, G. 2007. Sampling in health geography: reconciling geographical objectives and probabilistic methods. An example of health in Vientiane. *Emerging Themes in Epidemiology,* 4(6): 1-8. Available: https://doi.org/10.1186/1742-7622-4-6 (Accessed 17 September 2022).

Xaba, M. 2012. A qualitative analysis of facilities maintenance-a school governance function in South Africa. *South African Journal of Education*, 32(2): 215-226. Available: https://doi.org/10.15700/saje.v32n2a548 (Accessed 25 January 2021).

Xaba, M. 2007. An investigation into the basic safe and security status of schools' physical environment. *South African Journal of Education*, 26(4): 565-580. Available: https://doi.org/10.15700/saje.v32n2a548 (Accessed 25 January 2021).

Westway, A. 2012. Rural poverty in the Eastern Cape Province: *Legacy of apartheid or consequence of contemporary segregationism,* 29(1)115-125.

APPENDIX A QUESTIONNAIRE

DUT DURBAN UNIVERSITY OF TECHNOLOGY

QUESTIONNAIRE

Questionnaire no:…….

Research Topic: An Investigation of the Condition of Maintenance of Facilities at Public Primary and High Schools in Alfred Nzo East District, Eastern Cape Province, South Africa.

Section 1: DEMOGRAPHIC DATA

1. Your gender

Male	Female

2. Your age

Under 25 years	25 - 30 years	31 - 40 years	41-50 years	Over 50 years

3. Your highest formal qualification

Some schooling	Matric certificate	Diploma	Postgrad diploma	B-Tech	Bachelor's degree	Postgrad degree	Other (specify)

4. Which of the following professional categories do you belong to? (Select ONE option only)

Architect	Builder	Works Inspector	Community Development Worker	Engineer
Quantity Surveyor	Construction Manager	Project manager	Educator	Health Care worker

If you do not belong to any of the above professional categories, how would you classify your profession?

_____

5. Your position in the school

School Principal	School management	Educator	Support staff	Trainee/ Intern	Other (specify)

9. Indicate your actual years of experience in the School Facilities Maintenance Management

0-3 years	4-6 years	7-10 years	11-13 years	14-16 years	17-20 years	More than 20 years

10. Which of the following facility types are you responsible for? (Tick all that apply)

10.1 School Hostels	
10.2 School Infrastructure	
10.3 Public school on private property	

11. In which category does your school fall?

Micro (0-135 learners)	Small (136-310 learners)	Medium (311 -620 learners)	Large (621-930 learners)	Mega (More than 930 learners)

SECTION 2:

Answer the following questions with regard to what happens at YOUR school

12. Indicate your agreement with the following statements:

Political factors	Strongly Disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
12.1 The Funding Norms and Standards for maintenance affect our ability to do proper school maintenance							
12.2 The economic recession has affected our ability to do adequate school maintenance.							
12.3 The 'one size fits all' budget allocation affects our school maintenance							
12.4 Policies governing maintenance affect our ability to do adequate maintenance on the school facilities.							

13. Indicate your agreement with the following statements:

Personnel-related factors	Strongly Disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
13.1 The school management team is well committed to managing and maintaining school facilities							
13.2 The school management team is involved in the management and maintenance of school facilities							
13.3 Employees are trained on management and maintenance of school facilities							
13.4 As far as I know, the people who use the school facilities (Staff, students and others) are generally satisfied with the condition of the school facilities and how they are maintained.							
13.5 The school governing body has knowledge and understanding of the technical aspects related to managing and maintaining facilities							
13.6 The Principal understands what maintaining facilities is about and what it entails							
13.7 There is good teamwork between the school management team and the school governing body							
13.8 The school has a capable handyman/general workman							
13.9 Staff and learners at this school generally perform well							

14. Indicate your agreement with the following statements

Management factors	Strongly Disagree	Disagree	Slightly disagreed	Neutral	Slightly agree	Agree	Strongly agree
14.1 The school has a proper school maintenance plan							
14.2 The school uses local unqualified builders to do maintenance work.							

14.3 Funds designated to school maintenance are sometimes used on other activities.							
14.4 The funds allocated for maintenance are adequate							
14.5 There is a lack of reporting and accountability when it comes to maintenance funds							
14.6 There is a lack of quality management by the maintenance team.							
14.7 The maintenance team lacks necessary technical expertise							

15. Indicate your agreement with the following statements

Structural and maintenance factors	Strongly Disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
15.1 There are mud structures at the school							
15.2 There are structures that have been built inappropriately by the community							
15.3 The school structure is aging (it has been here for a long time)							
15.4 Quality building materials are available in the area							
15.5 The condition of the structures make them difficult to maintain/fix							
15.6 The structures have been vandalised by users or community members							
15.7 There is overcrowding and/or overuse of facilities at the school							
15.8 Incidents of disaster have occurred because maintenance wasn't done							
15.9 Quality materials are used in maintenance work							

16. Indicate your agreement with the following statements:

Design and construction factors	Strongly Disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
16.1 During the design stage, sustainability of the facilities was not considered							
16.2 During the design stage, maintenance of the facilities was not considered							
16.3 Non-users of the facilities had input at the design stage.							
16.4 Non-users of the facilities had input at construction stage.							
16.5 Quality materials were used during construction.							
16.6 The choice of architectural design makes the facilities difficult to maintain.							
16.7 Environmental conditions were considered during the design stage.							

Do you have any comments or suggestions on how to implement or improve the maintenance of school facilities?

……

……

……

The data provided in this questionnaire will be strictly confidential. Thank you for your contribution towards improvement of South African school's maintenance condition.

APPENDIX B CONDITION ASSESSMENT TOOL

Assessment No:…..CMC**:** Coastal / Inland **Circuit No**:…

Infrastructure Type: Mud/ Inappropriate/ Appropriate/ Combination of appropriate and inappropriate

School size: Small/ Medium/ Large/ Mega school **School Enrolment**:…….

	Condition of building elements to be measured using the following scale: 1=Very unsatisfactory, 2=Unsatisfactory, 3=Slightly unsatisfactory, 4=Slightly satisfactory, 5=Satisfactory and 6=Very satisfactory.									
Property	**External walls**	**Internal walls**	**Rain water goods**	**Doors**	**Electricity (Cables, plugs, etc.)**	**Floor**	**Roof timber**	**Roof Cover**	**Ceiling**	**Windows and Glasses**
Administration block										
Media centre										
Laboratory										
Grade R facility										
Nutrition Centre										
Classrooms blocks	**External walls**	**Internal walls**	**Rain water goods**	**Doors**	**Electricity (Cables, plugs, etc.)**	**Floor**	**Roof timber**	**Roof Cover**	**Ceiling**	**Windows and Glasses**
Block A										
Block B										
Block C										
Block D										
Block E										
Block F										
Block G										

Parking Bay	**Covered**		**No. of Bays**	**Condition (Using above scale)**
	Yes	No		

Playing Fields	**Leveled**		**Properly Built**		**Natural**		**Condition (Using the above Scale)**
	Yes	No	Yes	No	Yes	No	

Electricity	**Municipal**		**Eskom**		**Solar Panels**		**Other**		**Rate level of Reliability (using the above scale)**
	Yes	No	Yes	No	Yes	No	Yes	No	

Water	**Municipal**		**Borehole**		**Tanks**		**Other**		**Rate level of Reliability (Using the above scale)**
	Yes	No	Yes	No	Yes	No	Yes	No	

Sanitation	**Connected to Municipal Sewer**		**Package Plant system**		**VIP Toilet**		**Pit Toilet**		**Flush System**		**Condition (Using the above scale)**
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	

Fencing	**Stock Fencing**		**Welded mesh**		**Palisade**		**Clear view**		**Block work**		**Condition (Using the above scale)**
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	

Overall school condition (based on above assessment)

Very unsatisfactory	Unsatisfactory	Slightly unsatisfactory	Slightly satisfactory	Satisfactory	Very satisfactory

APPENDIX C LETTER OF INFORMATION

LETTER OF INFORMATION

Title of the Research Study: An Investigation of the Condition of Maintenance of Facilities at Public Primary and High Schools in Alfred Nzo East District, Eastern Cape Province, South Africa.

Principal Investigator/s/researcher: Bavuyise G. Nqakaza. **Qualifications:** BTech: Construction Management

Co-Investigator/s/supervisor/s: Dr SHP Chikafalimani. **Qualifications**: PhD (Real Estate) (UP)

Brief Introduction and Purpose of the Study: The importance of maintenance of facilities at schools is to ascertain safe and secured learning environment for the learners and educators. Unfortunately, School Governing Bodies in Alfred Nzo East District have neglected maintenance at schools due to lack of facilities maintenance knowledge and inadequate funding. This study will intervene by investigating maintenance condition of facilities and develop recommendations which will support maintenance of facilities to create good learning environment for learners and educators in order to improve education at Public Primary and High Schools in the area.

Greeting: Dear Sir/ Madam. Hoping this letter finds you well.

I am a registered third year student at Durban University of Technology doing Masters Degree in Built Environment. I am interested in becoming a fully-fledged researcher.

I humble invite you to participate in the research study am conducting on school maintenance.

What is Research: Research is the system used to develop or discover new knowledge that can be useful in the improvement on the existing knowledge.

You are therefore requested to contribute in the discovery of the new knowledge by answering a very short questionnaire. During your participation in this study, you will have all the time you need to ask questions get answers prior your participation. You will have enough time to discuss your involvement in this research with your family and friends. You will not be pressured to take sudden decisions. You can respond to this request at later stage. Filling the questionnaire will take about fifteen minutes of your time. Should you feel uncomfortable in the process with what ever reason you will have right to withdraw yourself in this research study at any given time although it is my best interest to work with you all way to the completion of data collection.

Outline of the Procedures: This study intends to investigate condition of maintenance of facilities at Public Primary and High Schools (PPHS) in Alfred Nzo East District (ANED), Eastern Cape Province (ECP). The rationale of research is due to the importance of maintenance of facilities at schools to ascertain safe and secured learning environment for the learners and educators. From 218 school's public primary and high schools in Alfred Nzo East District, 138 schools will be sampled, one school management team member and 2 Departmental officials responsible for maintenance will be given questionnaires which will be distributed by the researcher. During the process you will be expected to answer a very short questionnaire which will take you about fifteen minutes of your time to complete.

Risks or Discomforts to the Participant: No injuries can be expected from this study either physically or emotionally.

Explain to the participant the reasons he/she may be withdraw from the Study: Should the research project be the discontinued due to what every unforeseen circumstance your participation will have to be discontinued also. You can withdraw from the study should get ill, adverse reaction, etc. In case where the researcher experiences non-compliance on you the researcher will have to withdraw you from participants list. Prior withdrawal from study due to whatever reason, the reason or cause for withdrawal will be discussed with you so if there is a solution to cause for withdrawal can be implemented

Benefits: Your participation in this research will be on voluntary bases and no remuneration benefit for your involvement in this research. You reserved the right to withdraw from this study at any time you feel you can no long carry on participating. However, your participation is very important as it will give better understanding of the challenges facing schools' maintenance and contribute on the formulation of recommendations for proper schools' maintenance.

Remuneration: You will be participating on this study voluntarily without expecting any form of remuneration or reimbursements

Costs of the Study: This study will only you 15 minutes of your time only. You will not be expected to cover any cost in a form of monetary value.

Confidentiality: The tools to be used for data collection do not allow collection of your name or record name on the form. This will provide high level of confidentiality anonymity and will ensure that collected data cannot be traced back to you. All data collected will keep on lockable storage where will be accessed by the research team only and will be used for the purpose of this study only. All data will be shredded after five years when it is not long needed.

Results: You will have access to completed research as it will be available to all those interested on it through online publications and Durban University of Technology libraries. The results of the study will be made available to you upon request.

Research-related Injury: This study will not expose you to any physical or emotional injuries. Your personal information will be protected.

Storage of all electronic and hard copies including tape recordings: All collected data material will be kept in a lockable storage for five years. Only research team will have access to the stored data and will be chopped finely when no longer needed. (How, where, who has access, security measures in place, duration of storage, fate of the data at the end of the study, etc.)

Persons to contact in the Event of Any Problems or Queries:(Supervisor and details) Please contact the researcher: Bavuyise G Nqakaza, mobile Number 0762464398, my supervisor: Dr. Samuel HP Chikafalimani, Tel: 0313732416 or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

APPENDIX D LETTER OF CONSENT

CONSENT

Full Title of the Study: An Investigation of the Condition of Maintenance of Facilities at Public Primary and High Schools in Alfred Nzo East District, Eastern Cape Province, South Africa.

Names of Researcher/s: Bavuyise G Nqakaza

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Bavuyise G Nqakaza, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: 029/22,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature/Right Thumbprint**

I, Bauyise G Nqakaza herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Bavuyise G Nqakaza	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

APPENDIX E GATEKEEPER'S LETTER

GATEKEEPER'S LETTER

Faculty of Engineering and Built Environment

Department of Construction Management and Quantity Surveying

Date: 02 September 2022

Dear **District Director**

This is to humble request you to allow schools in your district to participate in a research study conducted by Bavuyise Gift Nqakaza and his research committee from the Durban University of Technology. The research title is **An Investigation of the Condition of Maintenance of Facilities at Public Primary and High Schools in Alfred Nzo East District, Eastern Cape Province, South Africa.**

The school management team responsible for maintenance will be requested to complete a questionnaire that will take only 15 minutes of their time and there will be no remuneration or stipend for their participation as it will be on voluntary basis. As a volunteer on this study, they will have a right to withdraw at any time.

High confidentiality of all record information received from respondents will be highly maintained and no identifying information will be required. Participation in this study will not expose any one in any kind of risk. This will be conducted as the approval by the Institutional Review Board of Durban University of Technology.

This study will be very useful in the improvement of teaching and learning environment as the formulated recommendations will contribute in the improvement of maintenance conditions of school facilities.

If you have any questions regarding the survey, please contact the under signed. Your participation is appreciated.

Student: Bavuyise G. Nqakaza

Student no: 20055838

Contact Details: 0762464398

Supervisor / Promote: Dr. Samuel HP Chikafalimani

Contact Details: 0313732416

APPENDIX F LETTER OF APPROVAL

Province of the
EASTERN CAPE
EDUCATION

ALFRED NZO EAST DISTRICT OFFICE

Alfred Nzo East District Site no 09, Old Bziana Village, Bizana, 4800, Private Bag X504, Bizana, 4800 REPUBLIC OF SOUTH AFRICA: Enquiries: **Mrs. Z. Khuzwayo . Tel: 0392510063. Email:** Zoleka.khuzwayo@ecdoe.gov.za
Website: www.ecdoe.gov.za

TO : CHAIRPERSON OF RESEARCH ETHICS REVIEW COMMITTEE (DURBAN UNIVERSITY OF TECHNOLOGY)

FROM : ACTING DISTRICT DIRECTOR ALFRED NZO EAST (ANE)

SUBJECT : APPROVAL FOR MR. BG NQAKAZA TO CONDUCT RESEARCH AS REQUESTED ON SCHOOL INFRASTRUCTURE MAINTENANCE CONDITION IN ANE

RESEARCH TOPIC : An Investigation of the Condition of Maintenance of Facilities at Public Primary and High Schools in Alfred Nzo East District, Eastern Cape Province, South Africa.

DATE : 05 SEPTEMBER 2022

The request for approval to conduct research has reference.

My office appreciates Mr. BG Nqakaza's interest to conduct research in schools within our district as we believe his finding and recommendations will go a long way in assisting our education cause in the district and relevance to the entire province.

It always excites us to host scholars as they add value to our operations. We commit to give him all the support within our capacity to execute his research study.

To this end I register the department approval for him to conduct his study and sample schools in our district as requested on the request dated 02 September 2022. The chosen topic that he is investigating is real a topic issue in the department as such results of his study will be of interest to the sector.

Mr. Nqakaza has been cautioned to observe all COVID-19 protocols when accessing our schools. We shall wait with interest to receive results of the study. My office wishes to inform you that the request has been accepted.

I wish you Mr. Nqakaza a successful study and completion of the research.

Best regard

05.09.2022

Mrs. Z. Kh...
Acting District Director (ANE)

Date

growth education

Title

NDP 2030

APPENDIX G IREC FULL APPROVAL

Institutional Research Ethics Committee
Research and Postgraduate Support DDUT-IREC torate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

15 September 2022

Mr B G Nqakaza
Private Bag X504
Bizana
4800

Dear Mr Nqakaza

An Investigation of the Condition of Maintenance of Facilities at Public Primary and High Schools in Alfred Nzo East District, Eastern Cape Province, South Africa.
Ethical Clearance number IREC 029/22

The DUT-Institutional Research Ethics Committee acknowledges receipt of your final data collection tool for review.

We are pleased to inform you that the data collection tool has been approved. Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the DUT-IREC acknowledges receipt of your gatekeeper permission letter.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the DUT-IREC according to the DUT-IREC Standard Operating Procedures (SOP's).

Please note that any deviations from the approved proposal require the approval of the DUT-IREC as outlined in the DUT-IREC SOP's.

Yours Sincerely,

Prof J K Adam
Chairperson: DUT-IREC

APPENDIX H TURNITIN REPORT

Mr BG Nqakaza Dissertation

ORIGINALITY REPORT

5%	5%	2%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	hdl.handle.net Internet Source	1%
2	Submitted to University of KwaZulu-Natal Student Paper	1%
3	www.builtcare.co.za Internet Source	1%
4	sajim.co.za Internet Source	<1%
5	Submitted to Regenesys Business School Student Paper	<1%
6	erepository.uonbi.ac.ke:8080 Internet Source	<1%
7	ulspace.ul.ac.za Internet Source	<1%
8	Submitted to Mancosa Student Paper	<1%
9	Submitted to University of Pretoria Student Paper	<1%

10	he02.tci-thaijo.org Internet Source	<1 %
11	pt.scribd.com Internet Source	<1 %
12	"The Education Systems of Africa", Springer Science and Business Media LLC, 2021 Publication	<1 %
13	ir.cut.ac.za Internet Source	<1 %
14	www.aamcog.com Internet Source	<1 %
15	link.springer.com Internet Source	<1 %
16	www.sahrc.org.za Internet Source	<1 %
17	Gwala, Nomfundo. "Female Primary School Principals' Experiences of Instructional Leadership", University of Johannesburg (South Africa), 2022 Publication	<1 %
18	Mudau, Lutendo Ernest. "School Management Teams' (SMTs) Response to Covid-19: A Functional Stupidity Perspective", University of Johannesburg (South Africa), 2022 Publication	<1 %

19	www.repository.smuc.edu.et Internet Source	<1 %
20	Berg, Tanya Van Den. "Learning Support Strategies for Adolescent Learners with Mild Autism Spectrum Disorder in Mainstream Schools", University of Johannesburg (South Africa), 2022 Publication	<1 %
21	Submitted to University of Cape Town Student Paper	<1 %
22	upetd.up.ac.za Internet Source	<1 %

Exclude quotes	On	Exclude matches	< 20 words
Exclude bibliography	On		

APPENDIX I EDITOR'S CERTIFICATE

ETHEL ROSS

English language editing and proofreading

21 November 2022

To whomever it may concern:

This letter serves to confirm that I worked as the proofreader and language editor on Bavuyise Gift Nqakaza's Master's thesis:

An Investigation into the Condition of Maintenance of Facilities at Public Primary and High Schools in Alfred Nzo East District, Eastern Cape Province, South Africa.

In no way did I change the content.

Yours faithfully

Ethel Ross (BA Hons; H Dip Ed)

Email: clanross1@icon.co.za Tel: 083 954 5412

APPENDIX J STATISTICIAN CERTIFICATE

Gill Hendry B.Sc. (Hons), M.Sc. (Wits), PhD (UKZN)
Mathematical and Statistical Services

Cell: 083 300 9896
Email: gillhendrystats@gmail.com

---

21 November 2022

Re: Assistance with Statistical aspects of the study

Please be advised that I assisted Bavuyise Nqakaza (Student number 20055838), who is currently studying for an MBE: Construction Management at DUT, with the statistical aspects of his data.

Yours sincerely

Dr Gill Hendry
Private Consulting Statistician