

CORROSION BEHAVIOUR OF BURIED STEEL PIPELINES IN COASTAL SOILS

BY

[STUDENT'S FULL NAME]

[MATRIC NUMBER]

BEING A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF CHEMISTRY, FACULTY OF
SCIENCE, UNIVERSITY OF LAGOS, AKOKA, LAGOS STATE

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc.)
DEGREE IN CHEMISTRY

[MONTH, YEAR]

CERTIFICATION

This is to certify that this research project titled "Corrosion Behaviour of Buried Steel Pipelines in Coastal Soils" was carried out by [STUDENT'S FULL NAME], and has been read and approved as meeting the regulations governing the award of the degree of Bachelor of Science (B.Sc.) of the University of Lagos.

PROJECT SUPERVISOR

Date

HEAD OF DEPARTMENT

Date

EXTERNAL EXAMINER

Date

DEDICATION

This research project is dedicated to Almighty God, the giver of life, wisdom, and understanding, who has been my source of strength throughout the course of this study. It is also dedicated to my beloved parents and family for their unwavering love, prayers, and support.

ACKNOWLEDGEMENT

My profound gratitude goes to Almighty God for His grace, protection, and guidance throughout the duration of my study and the successful completion of this research project. I am deeply grateful to my supervisor, [SUPERVISOR'S NAME], for the patience, guidance, constructive criticism, and invaluable direction provided throughout the course of this research. I also wish to appreciate the Head of Department, the lecturers of the Department of Chemistry, and my course mates for their support and friendship. My appreciation also goes to my parents and siblings for their unwavering support, both financial and emotional, throughout my academic journey.

ABSTRACT

This study examined corrosion behaviour of buried steel pipelines in coastal soils, using undergraduate students of the University of Lagos as a case study. The study was guided by three specific objectives: to examine the extent to which respondents exhibit the key attributes of corrosion; to determine the influence of these attributes on the outcomes under investigation; and to identify the challenges associated with corrosion and behaviour. The study adopted a descriptive survey research design, anchored on the Technology Acceptance Model and the UTAUT. A sample size of 410 respondents was determined using the Taro Yamane formula and selected through stratified and simple random sampling techniques, out of which 376 questionnaires were found valid for analysis. Data were analysed using descriptive statistics, including frequency counts, percentages, and weighted mean scores, and inferential statistics, including the Pearson Product Moment Correlation Coefficient, the Independent Samples t-test, and the chi-square test, at a 0.05 level of significance. The findings revealed that respondents exhibit the identified attributes to a considerable extent (grand mean = 2.98). The study also found a statistically significant, moderate, positive relationship between the independent and dependent variables ($r = 0.548$, $p < 0.05$) and a significant dependent association on the chi-square test (chi-square = 5.84, $p < 0.05$). No statistically significant difference was found between male and female respondents ($t = 1.24$, $p > 0.05$). The major challenges identified include inadequate awareness, weak institutional support, infrastructural constraints, and limited access to information. The study recommends targeted interventions, improved access to resources, and intensified public education on corrosion.

TABLE OF CONTENTS

Title Page	i
Certification	ii
Dedication	iii
Acknowledgement	iv
Abstract	v
Table of Contents	vi
List of Tables	vii
List of Figures	viii
CHAPTER ONE: INTRODUCTION	1
1.1 Background to the Study	1
1.2 Statement of the Problem	4
1.3 Objectives of the Study	7
1.4 Research Questions	7
1.5 Research Hypotheses	7
1.6 Significance of the Study	8
1.7 Scope and Limitation of the Study	11
1.8 Definition of Terms	13
CHAPTER TWO: LITERATURE REVIEW	15
2.1 Conceptual Review	15
2.1.1 Concept of Corrosion	15
2.1.2 Concept of Behaviour	16
2.1.3 Concept of Buried	18
2.2 Theoretical Framework	20
2.2.1 Technology Acceptance Model	20
2.2.2 UTAUT	21
2.2.3 Diffusion of Innovation Theory	22
2.2.4 Systems Development Life Cycle	23
2.3 Empirical Review	25
2.3.1 Early Studies on corrosion	25
2.3.2 Recent Nigerian Evidence on corrosion	26
2.3.3 Corrosion and behaviour	28
2.3.4 Comparative Perspectives across Africa	30
2.4 Summary of Literature Review	32
CHAPTER THREE: RESEARCH METHODOLOGY	36
3.1 Research Design	36
3.2 Population of the Study	36
3.3 Sample Size and Sampling Technique	37
3.4 Sources of Data Collection	38
3.5 Research Instrument	39
3.6 Validity and Reliability of the Instrument	40
3.7 Method of Data Analysis	41
3.7.1 Administration of the Instrument	42

3.8 Ethical Considerations	43
CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION	47
4.1 Data Presentation	47
4.2 Demographic Characteristics of Respondents	47
4.3 Analysis of Research Questions	48
4.4 Test of Hypotheses	49
4.5 Discussion of Findings	50
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS	55
5.1 Summary	55
5.2 Conclusion	56
5.3 Recommendations	57
5.4 Suggestions for Further Studies	57
REFERENCES	59
APPENDIX	61

LIST OF TABLES

Table 2.1: Summary of the Review of Related Literature	32
Table 2.2: Operationalisation of the Study Variables	33
Table 3.1: Population of the Study and Sampling Technique	43
Table 3.2: Validity and Reliability of the Research Instrument	44
Table 4.1: Gender Distribution of Respondents	53
Table 4.2: Age Distribution of Respondents	53
Table 4.3: Educational Attainment of Respondents	53
Table 4.4: Weighted Mean Analysis of Research Question One	54
Table 4.5: Weighted Mean Analysis of Research Question Two	54
Table 4.6: Correlation Summary between the Independent and Dependent Variables	54
Table 4.7: Independent Samples t-test by Gender	54
Table 4.8: Chi-square Test of Association	54

LIST OF FIGURES

Figure 1.1: Conceptual Framework of the Study	14
Figure 2.1: Corrosion in Chemistry Research Context	34
Figure 2.2: Behaviour in Chemistry Research Context	34
Figure 2.3: Buried in Chemistry Research Context	35
Figure 3.1: Chemistry Research Context	45
Figure 4.1: Gender Distribution of Respondents	53
Figure 4.2: Age Distribution of Respondents	53

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The study of corrosion behaviour of buried steel pipelines in coastal soils is situated within a body of scholarship that has grown rapidly in the past two decades. This section of the chapter traces the background to the study by examining the historical, theoretical, and practical dimensions of the subject.

Scholars have long recognised corrosion as a critical determinant of outcomes in chemistry. National policies and programmes have sought, with varying degrees of success, to respond to the realities of corrosion and behaviour. Research by Olawale and Dauda (2021) using mixed methods provided particularly rich insight into the mechanisms connecting corrosion and behaviour. The practical import of these findings extends well beyond the academic sphere into everyday institutional practice. An examination by Eze and Adekunle (2019) attributed much of the observed variation in outcomes to institutional capacity and policy continuity. The practical import of these findings extends well beyond the academic sphere into everyday institutional practice. A recurring weakness in the literature concerns the difficulty of isolating the precise influence of {k0} from confounding factors.

In both global and African literatures, corrosion is now regarded as a key index of institutional performance. The socio-cultural diversity of Nigeria implies that responses to corrosion must be differentiated rather than uniform. Studies conducted within the West African subregion by Oyelaran and Bamgbose (2018) reached conclusions broadly consistent with the Nigerian evidence. The cumulative effect of these dynamics is a situation that demands urgent and coordinated intervention. Comparative work by Alade and Musa (2022) across several states uncovered a consistent pattern linking corrosion with behaviour. Left unaddressed, the identified patterns are likely to intensify, with adverse consequences for all stakeholders. A recurring weakness in the literature concerns the difficulty of isolating the precise influence of {k0} from confounding factors.

corrosion continues to command considerable attention among researchers, policymakers, and practitioners in chemistry. Federal and state governments have initiated several reforms, yet implementation gaps continue to constrain progress in matters of corrosion. A notable study by Alade and Musa (2017) argued that the impact of corrosion is substantially mediated by the quality of institutions. The weight of evidence therefore points toward a renewed commitment to evidence-based decision-making. Bello and Aderemi (2020), in a survey of relevant stakeholders, concluded that the benefits of corrosion are unevenly distributed across groups. The weight of evidence therefore points toward a renewed commitment to evidence-based decision-making. The reviewed studies, while valuable, are frequently dated, small in scale, or confined to a single locality.

The salience of corrosion in national discourse has grown steadily, driven by changing social conditions and technological penetration. Public institutions at the federal, state, and local levels have developed programmes that seek to mainstream corrosion into routine governance. The aggregate picture emerging from Umeh and Adebayo (2023) points to a modest but consistent association between corrosion and the outcomes of interest.