

BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING AND

TECHNOLOGY

DEPARTMENT OF POLYMER, TEXTILE AND INDUSTRIAL

ENGINEERING

FINAL YEAR PROJECT REPORT

DEVELOPMENT OF A PREDICTIVE MODEL FOR FAILURE

RATES IN PVC PIPES BASED ON PIPE LOCATIONS AND

DIAMETER.

By

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A final year research project submitted to the department of polymer textile

and industrial engineering as partial fulfillment for the award of Bachelor of

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ABSTRACT

This study investigates the development of a predictive model for failure rates in Polyvinyl Chloride (PVC) water distribution pipes using existing data on pipe locations and diameters. Understanding and predicting pipe failures are essential for proper infrastructure management, avoiding water loss, and optimizing maintenance schedules. This study strives to identify statistically significant correlations between pipe locations and diameters, and number of failures encountered. Historical records of failures of PVC pipes, combined with geographical information system (GIS) data on pipe networks and their surrounding environment, will be statistically modeled using modeling techniques such as regression analysis or machine learning algorithms. The predictive model will provide a valuable tool for water utilities to predict high risk pipe sections, there by implementing specific inspections and replacement policies consequently saving on operating costs and improving service quality. The findings of this study conducted in the context of Uganda's water infrastructure will shed light on the specific variables influencing failures in PVC pipes in this country and help advance general knowledge regarding water distribution network asset management.

Key words: Predictive model, ANN, Failure rates, Polyvinyl Chloride (PVC) water distribution pipes, Pipe locations, Pipe diameters, Water loss, Pipe networks, Regression analysis, Machine learning algorithms.

DECLARATION

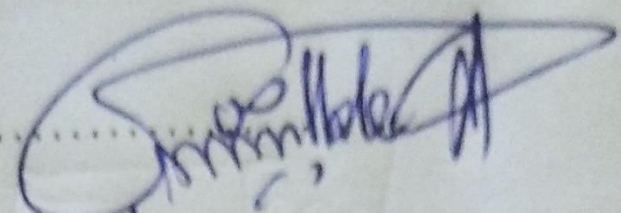
We **NGOLOBE DENIS**, Reg no **BU/UP/2021/0369** and **NASONGO GRACE**, Reg no **BU/UP/2021/0367** hereby declare that this research titled “Development of a predictive model for failure rates in PVC pipes based on pipe locations and diameter” is our original work and has not been published elsewhere.

Signature N. Jeed Date 21/05/2025
Signature NG Date 21/05/2025

APROVAL

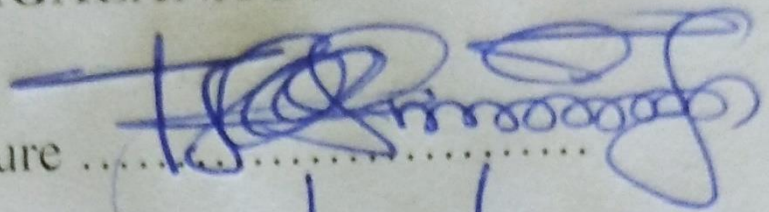
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Signature 

Date 27/05/25

DEDICATION

We dedicate this report to all our supervisors, lecturers, families and friends. Their unwavering support and belief in us have been my constant motivation. We are grateful for their sacrifices that allowed us to pursue this course.

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LIST OF ACRONYMS

ANN Artificial neural network

PVC Polyvinyl chloride

PCA Principal Component Analysis

DDM Data-driven modeling

GIS Geographic Information Systems

PVC-U Unplasticized Polyvinyl chloride

PVC-M Modified Polyvinyl chloride

PVC-O Oriented Polyvinyl chloride

ReLU Rectified linear unit

LR Linear Regression

E.g. Example

EPA Environmental Protection Agency

i.e. That is to Say

NWSC National Water and Sewerage Corporation

SDG Standard Development Goal

UN United Nation

WHO World Health Organization

1.24 REFERENCES

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