



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT

PREDICTION OF FUTURE DEMAND FOR WATER DISTRIBUTION SYSTEMS

**CASE STUDY: NAMAYINGO WATER SUPPLY SYSTEM, NAMAYINGO TOWN
COUNCIL.**

By

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A final year project submitted to the Department of Water Resources Engineering as partial fulfillment of the requirements for the award of Bachelor of Science in Water Resources Engineering at Busitema University.

ABSTRACT

This project focuses on the prediction of future water demand for distribution systems specifically targeting the Namayingo water supply system in Namayingo Town council, Uganda. The growing population and climate variability have led to increasing pressure on water resources, making accurate forecasting crucial for optimizing distribution, ensuring sustainable water supply, and improving infrastructure planning. This research aims to develop a predictive model using Artificial Neural Networks (ANNs) to forecast water demand by integrating real-time data such as weather conditions, population growth, and economic factors. The model will enable water utilities to proactively manage demand fluctuations, reduce inefficiencies, and ensure a consistent water supply. By validating the model through error metrics such as RMSE, MAE, and R^2 , this project will offer a reliable decision-support tool for water resource management. The results of this study will contribute to meeting Uganda's water demand challenges and align with global sustainable development goals related to clean water and sustainable cities.

DECLARATION

I NAGOZERA FRANK hereby declare that the information in this project report is out of my effort and has never been presented to any institute of higher education for any award.

Name.....

Registration No.....

Signature.....

Date.....

APPROVAL

This report on prediction of future demand for water distribution systems has been written under the supervision of;

Name.....

A handwritten signature in blue ink, appearing to be 'S. H. A.', is written over the dotted line for the name.

Date.....

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DEDICATION

I dedicate this report to my family, friends, and the lecturers of Busitema University Water Resources Engineering Department in particular for their continual support, advice and counselling above all their time invested in me. May the good lord continue blessing them.

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LIST OF ACRONYMS

ANNs: Artificial Neural Networks

ARIMA: Auto Regressive Integrated Moving Average

ICR: Independent Component Regression.

LSSVM: Least Squares Support Vector Machine

LSTM: Long Short-Term Memory

MAE: Mean Absolute Error

MAPE: Mean Absolute Percentage Error

MLR: Multiple Linear Regression

MSE: Mean Square Error

NDP: National Development Plan

NSE: Nash Sutcliffe Efficiency

SDG: Sustainable Development Goal

SVR: Support Vector Regression

TFN: Transfer Function Nois

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