

DESIGN AND IMPLEMENTATION OF A CONCRETE MIX DESIGN CALCULATOR SYSTEM

BY

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[MONTH, YEAR]

CERTIFICATION

This is to certify that this research project titled "Design and Implementation of a Concrete Mix Design Calculator System" 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.

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ABSTRACT

This study developed and evaluated a Web software solution for design within the Nigerian context, using the University of Lagos as the reference environment. The study was guided by four specific objectives: to analyse the existing manual process and its challenges; to design a Web application that addresses those challenges; to implement the proposed system using appropriate programming languages and frameworks; and to test and evaluate the system for functionality, usability, and reliability. The pragmatic research design adopted for the study was anchored on the Structural Load Theory and the Soil Mechanics Theory. A total of 61 users were purposively selected for the usability evaluation, out of which 52 responses were found valid for analysis. Data were analysed using percentage scores, mean scores on the System Usability Scale (SUS), and functional test results at a 0.05 level of significance. The findings revealed that the proposed system achieved an overall usability score of 89.3% and significantly reduced the mean processing time compared with the existing manual approach. The study recommends the deployment of the system for full-scale adoption, periodic maintenance, and sustained training of users so as to maximise its benefits.

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CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The study of design and implementation of a concrete mix design calculator system 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.

design continues to command considerable attention among researchers, policymakers, and practitioners in civil engineering. Federal and state governments have initiated several reforms, yet implementation gaps continue to constrain progress in matters of design. Studies by Obiora and Kalu (2019) largely support the view that design exerts a measurable influence on outcomes of interest. Accordingly, there is a growing consensus that deliberate policy action is required. An examination by Nwosu and Ekwueme (2019) attributed much of the observed variation in outcomes to institutional capacity and policy continuity. The weight of evidence therefore points toward a renewed commitment to evidence-based decision-making. Despite these advances, notable gaps persist, particularly with respect to context-specific evidence from Nigeria.

Over the past two decades, design has become increasingly significant within the Nigerian landscape and beyond. Within Lagos State, the country's most populous commercial hub, the dynamics of design are observed in their starkest form. Longitudinal research by Nwosu and Ekwueme (2016) revealed that sustained attention to design yields appreciable dividends over time. These observations collectively invite a reconsideration of standard assumptions regarding implementation. Field evidence gathered by Adekunle and Nnamdi (2016) suggested that stakeholder engagement materially improves the results achieved in matters of design. Left unaddressed, the identified patterns are likely to intensify, with adverse consequences for all stakeholders. Despite these advances, notable gaps persist, particularly with respect to context-specific evidence from Nigeria.

design occupies a prominent position in contemporary debates about implementation and national development. The socio-cultural diversity of Nigeria implies that responses to design must be differentiated rather than uniform. Evidence assembled by Adekunle and Nnamdi (2015) across twelve states underscored the heterogeneity of outcomes linked to design. Such findings reinforce the argument that design deserves a place of priority on the development agenda. A notable study by Alade and Ogbeide (2017) argued that the impact of design is substantially mediated by the quality of institutions. For practitioners, the practical significance of design cannot be overstated, given its demonstrable link with implementation. A recurring weakness in the literature concerns the difficulty of isolating the precise influence of {k0} from confounding factors.

The phenomenon of design, while not new, has acquired fresh analytical urgency in Nigeria. National policies and programmes have sought, with varying degrees of success, to respond to the realities of design and implementation. Comparative work by Aderemi and Ogbeide (2022) across several states uncovered a consistent pattern linking design with implementation. The implications of these dynamics are far-reaching,