EIGENVALUE DECOMPOSITION AND ITS APPLICATION TO MARKOV CHAIN ANALYSIS

BY

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[MONTH, YEAR]

CERTIFICATION

This is to certify that this research project titled "Eigenvalue Decomposition and Its Application to Markov Chain Analysis" 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.

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PROJECT SUPERVISOR Date

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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 examined eigenvalue decomposition and its application to markov chain analysis, 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 eigenvalue; to determine the influence of these attributes on the outcomes under investigation; and to identify the challenges associated with eigenvalue and decomposition. The study adopted a descriptive survey research design, anchored on the Polya's Problem-Solving Theory and the Mathematical Modelling Theory. A sample size of 395 respondents was determined using the Taro Yamane formula and selected through stratified and simple random sampling techniques, out of which 361 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 = 3.13). The study also found a statistically significant, moderate, positive relationship between the independent and dependent variables ($r = 0.451$, $p < 0.05$) and a significant dependent association on the chi-square test (chi-square = 6.69, $p < 0.05$). No statistically significant difference was found between male and female respondents ($t = 1.04$, $p > 0.05$). 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 eigenvalue.

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CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The study of eigenvalue decomposition and its application to markov chain analysis 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 eigenvalue as a critical determinant of outcomes in mathematics. In Nigeria, the intersection of eigenvalue and decomposition is conditioned by unique socio-economic, cultural, and institutional factors that differ markedly from Western settings. Longitudinal research by Umeh and Ekwueme (2016) revealed that sustained attention to eigenvalue yields appreciable dividends over time. Such findings reinforce the argument that eigenvalue deserves a place of priority on the development agenda. Findings reported by Nwosu and Olawale (2018) observed that respondents with greater exposure to eigenvalue recorded markedly different results. 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.

Few subjects attract as much policy interest in contemporary Nigeria as the question of eigenvalue. The colonial and post-colonial legacies of the Nigerian state continue to influence contemporary patterns of eigenvalue. Research by Adebayo and Umeh (2021) using mixed methods provided particularly rich insight into the mechanisms connecting eigenvalue and decomposition. For practitioners, the practical significance of eigenvalue cannot be overstated, given its demonstrable link with decomposition. Research by Famuyide and Adeniyi (2021) using mixed methods provided particularly rich insight into the mechanisms connecting eigenvalue and decomposition. For practitioners, the practical significance of eigenvalue cannot be overstated, given its demonstrable link with decomposition. Despite these advances, notable gaps persist, particularly with respect to context-specific evidence from Nigeria.

Debates on national transformation repeatedly return to the role of eigenvalue and its attendant dynamics. Public institutions at the federal, state, and local levels have developed programmes that seek to mainstream eigenvalue into routine governance. Comparative work by Famuyide and Adeniyi (2022) across several states uncovered a consistent pattern linking eigenvalue with decomposition. For practitioners, the practical significance of eigenvalue cannot be overstated, given its demonstrable link with decomposition. Findings reported by Eze and Chukwu (2018) observed that respondents with greater exposure to eigenvalue recorded markedly different results. Accordingly, there is a growing consensus that deliberate policy action is required. Nevertheless, the existing literature is not without its limitations, and several questions remain unresolved.

The relationship between eigenvalue and decomposition has been the subject of sustained academic interest across several disciplines. Federal and state governments have initiated several reforms, yet implementation gaps continue to constrain progress in matters of eigenvalue. Field evidence gathered by Ibrahim and Ekwueme (2016) suggested that stakeholder engagement materially improves the results achieved in matters