**INITIAL TITLE:** ENHANCING CREDIT RISK MANAGEMENT IN TANZANIA BANKING SECTOR USING MACHINE LEARNING TECHNIQUES

**IMPROVED TITLE:** ENHANCING CREDIT RISK MANAGEMENT OF COMMERCIAL BANKS IN TANZANIA USING PREDICTIVE MODELING TECHNIQUES.

**Reasons for Improvement:**

1. The Machine learning Techniques: This title is broader, using the term “Machine Learning Techniques. So, Machine learning encompasses a wider range of methods beyond just prediction, such as classification and clustering. The Use of Machine Learning Techniques implies a more holistic approach that may involve various machine learning methods beyond predictive modeling.

**While:**

* The Predictive Modeling Techniques: This title explicitly highlights the use of predictive modeling techniques. It clearly communicates that your research will be centered around developing models to predict credit risk in the Tanzania Banking sector. So, the term Predictive Modeling Techniques provides a more detailed insight into the methodology you will employ, making it clear that the primary objective is to build models for predictive credit risk.

2. Tanzania Banking Sector: This term is to broader, why?. Because Tanzania Banking Sector has much broader categories. Such categories are : Commercial Banks, Development finance banks, Community banks, Cooperative Banks, Microfinance institutions, credit unions, Islamic banks.

**While:**

* Tanzania Commercial Banks: it means we have narrowed it to more specific category of Banking Sector in Tanzania. So, the focus is for Commercial Banks such as CRDB, NMB, Barcklays Bank Tanzania, Standard Charted Bank Tanzania etc).

**CHAPTER ONE : INTRODUCTION**

**1.1 General Introduction**

Financial institutions play a crucial role in the functioning of any economy, akin to the vital function of blood arteries in the human body. Much like how blood vessels transport essential nutrients throughout the body, financial institutions channel financial resources for economic growth from depositories to areas where they are needed (Shanmugan and Bourke, 1990). Among these financial institutions, commercial banks stand out as key contributors, serving as significant providers of financial information to the broader economy.They assume a particularly vital function in developing economies, especially in situations where borrowers lack access to capital markets (Greuning and Bratanovic, 2003). There is empirical support indicating that efficiently operating commercial banks contribute to the acceleration of economic growth, whereas poorly functioning ones hinder economic advancement and worsen poverty levels (Barth et al., 2004).

Commercial banks (CBs) encounter various risks that can be classified into three main categories: financial risks (where credit risk, or CR, is a significant component), operational risks, and strategic risks (Cornett and Saunders, 1999). These risks exert varying impacts on the performance of CBs, with credit risk, in particular, having severe consequences that can lead to bank failures (Chijoriga, 1997). In both matured and emerging economies, there has been a noticeable rise in significant banking issues over the years. Researchers have delved into the causes of these problems, identifying numerous factors (Chijoriga, 1997; Santomero, 1997; BrownBridge and Harvey, 1998; Kimei, 1998; Basel, 1999, Basel, 2004).

Credit-related challenges, particularly weaknesses in credit risk management (CRM), emerge as major contributors to banking difficulties. Given that loans often represent a substantial portion of credit risk, typically surpassing the equity of a bank by 10-15 times (Kitua, 1996), the banking sector becomes vulnerable to challenges when there is even a slight deterioration in loan quality. The origins of poor loan quality can be traced back to the information processing mechanism. BrownBridge (1998) noted that these issues are particularly acute in developing countries, often manifesting at the loan application stage (Liuksila, 1996) and escalating during the loan approval, monitoring, and control stage, especially when there are gaps or weaknesses in CRM guidelines related to policy and strategies/procedures for credit processing.

In response to these challenges, the utilization of predictive modeling techniques emerges as a critical tool in enhancing credit risk management for commercial banks.Predictive modeling offers a data driven approach to risk assessment, allowing for more accurate predictions and proactive management strategies (Author et al, Year).By leveraging advanced analytics and modeling methodologies, commercial banks can strengthen their ability to identify and mitigate credit risks, ultimately contributing to the overall stability and sustainability of the banking sector in Tanzania.

**1.2 Statement of the Problem**

Effectively managing credit risk stands as a paramount concern for commercial banks, given its profound implications on financial stability and profitability. The conventional approaches to credit risk management, predominantly reliant on manual processes and simplistic statistical models, exhibit shortcomings in capturing the intricate dynamics inherent in credit portfolios. The inadequacies of traditional credit scoring models necessitate a paradigm shift towards more sophisticated methodologies.This research identifies the critical need to address the limitations of existing credit scoring models through the integration of advanced predictive modeling techniques, specifically leveraging machine learning. The inadequacies of conventional models become evident in their limited capacity to adapt to the complexity of modern financial landscapes. As financial institutions navigate through intricate credit portfolios, the study aims to enhance credit risk management practices by exploring alternative data sources, incorporating economic effects, and prioritizing model explainability.

**1.3 Objectives**

**1.3.1 Main Objective**

The main Objective is to significantly  enhance  credit risk management practices within commercial banks operating in Tanzania through the strategic application of advanced  Predictive modeling techniques.

**1.3.2 Specific Objectives**

1. To build a comprehensive dataset for model development by collecting historical credit data from Tanzanian banks, including loan performance, borrower information, and relevant financial indicators.
2. To develop predictive models for credit risk management using machine learning techniques.
3. To evaluate the performance of the predictive models in terms of accuracy.

**1.4 Research Questions**

To meet the specific research objectives, the study will aim to answer the following questions:

1. What are the key components and variables needed in constructing a comprehensive dataset for credit risk management of commercial banks ?
2. How can machine learning techniques be effectively applied to develop predictive models for credit risk management?
3. What criteria and metrics are appropriate for assessing the performance of predictive models in the context of credit risk management?

**1.5 Significance of the Study**

The significance of this study is multifaceted, addressing critical issues within the Tanzanian banking sector and contributing to the broader field of credit risk management.

Advancement of Credit Risk Management Practices: This research holds paramount importance in enhancing credit risk management practices within commercial banks in Tanzania. By leveraging advanced predictive modeling techniques, the study aims to introduce a paradigm shift from traditional approaches, which have exhibited limitations in adapting to the intricate dynamics of credit portfolios. The strategic application of machine learning promises to bring about a significant improvement in the accuracy, efficiency, and adaptability of credit risk assessment.

Risk Mitigation and Financial Stability: The utilization of predictive modeling techniques serves as a proactive measure for identifying and mitigating credit risks. By developing robust models, commercial banks can navigate the challenges posed by credit-related difficulties more effectively, ultimately contributing to the overall stability and sustainability of the Tanzanian banking sector.

Contribution to Academic Research: The study contributes to the academic field by addressing gaps in existing credit scoring models and proposing innovative solutions. By exploring the integration of machine learning techniques, alternative data sources, and economic factors, the research expands the knowledge base in credit risk management, potentially paving the way for further advancements in the field.

**1.6 Scope of the Study**

This study will focus on advancing credit risk management practices within the Tanzanian banking sector through the strategic application of predictive modeling techniques. The scope of the study includes the following key components: The primary geographical focus is on commercial banks operating within Tanzania. The study will delve into the unique characteristics and challenges present in the Tanzanian banking sector . The study will analyze historical credit data, emphasizing loan performance, borrower information, and relevant financial indicators. The temporal scope will be determined by the availability of data, with an emphasis on capturing patterns and trends relevant to contemporary credit risk management practices.And the predictive modeling techniques that will be used in this study are, Logistic Regression, Decision Trees, Random Forest, Support Vector Machines, and Long short-Term Memory.