THE CRITICAL SUCCESS FACTORS INFLUENCING THE ADOPTION OF THE WAREHOUSE RECEIPT SYSTEM IN KENYA: A CASE STUDY OF NAKURU COUNTY

WANGANGA DANIEL MBUGUA

NUMBER: 148360

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT FOR THE AWARD OF THE DEGREE MASTER OF BUSINESS ADMINISTRATION OF STRATHMORE UNIVERSITY

MAY 2025

DECLARATION

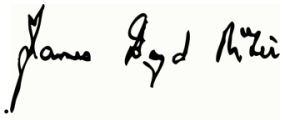
I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

Wanganga Daniel Mbugua

21st, May, 2025

Approval

The dissertation of **Wanganga Daniel Mbugua** was approved by the following:



Dr James Boyd McFie

Strathmore Business School.

21st, May, 2025

Dr. Ceaser Mwangi

Executive Dean

Strathmore University Business School.

Prof. Bernard Shibwabo

Director, Office of Graduate Studies

Strathmore University Business School.

ACKNOWLEDGEMENTS

Completing this dissertation was made possible through the unwavering support of numerous individuals, to whom I owe my deepest gratitude. First and foremost, I thank Almighty God for sustaining my health and granting me the perseverance to undertake this academic journey.

I am profoundly indebted to my supervisor, Dr. James B. McFie, whose expertise, patience, and invaluable guidance shaped this work from inception to completion. His mentorship has instilled in me the virtues of academic rigour, excellence and resilience.

I extend my appreciation to Strathmore University for fostering an intellectually stimulating environment that nurtures scholarly growth. My sincere thanks also go to my colleagues in the School of Business, industry contacts, Njoro farmers and close friends whose insights and encouragement fortified my resolve.

Above all, I acknowledge my family, whose unconditional love, forbearance, and sacrifices created an enabling environment for this achievement. Their unwavering belief in me was my steadfast anchor even during the most challenging phases.

ABSTRACT

Agriculture is central to Kenya's economy, particularly for smallholder farmers, who often struggle to access credit due to stringent collateral requirements. Using title deeds as collateral puts their land at risk. The Warehouse Receipt System (WRS) presents a promising solution enabling farmers to secure loans against stored commodities. However, WRS adoption in Kenya has been limited and hindered by challenges such as a lack of awareness of the WRS, price volatility, high transaction costs, and logistical inefficiencies. This study explores WRS adoption among Kenyan smallholder farmers, focusing on barriers and critical factors for success. Employing a case study conducted in Nakuru County, it uses a mixed-methods approach, combining quantitative surveys with qualitative insights from Key Informant Interviews (KIIs). The findings reveal that low awareness, price speculation, and logistical hurdles discourage adoption, while farmers voice the need for stricter regulations, financial incentives, and improved infrastructure. Key success factors are grouped into four dimensions: stakeholder collaboration (involving government, private sector, and farmer capacity-building), organisational structure (emphasising a robust WRS Council/Secretariat and efficient stakeholder management), industry dynamics (including policy harmonisation, market access, and political support), and technological advancements (notably blockchain and mobile banking). These solutions can help small farmers solve their problems and give them more confidence. By using digital tools, farmers can get easier access to loans. This shows how important it is for everyone involved to work together to improve the WRS in Kenya. The study offers policy recommendations to strengthen regulations, improve warehouse access, broaden financial inclusion, and leverage technology for greater efficiency, contributing to the discourse on agricultural finance, market linkages, and sustainability for smallholder farmers.

Keywords: Warehouse Receipt System, Management, Collateral for Farmers, Critical Success Factors, post-harvest losses, Price Speculation

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

AGRA	-	Alliance for a Green Revolution in Africa
CSFs	-	Critical Success Factors
EAGC	-	East Africa Grain Council
FAO	-	Food and Agriculture Organisation
FGDs	-	Focus Group Discussions
GOK	-	Government of Kenya
KIs	-	Key Informants
KOMEX	-	Kenya Commodity Exchange
NCPB	-	National Cereals and Produce Board
WRS	-	Warehouse Receipt System
PPP	-	Public Private Partnerships

OPERATIONAL DEFINITION OF TERMS

Adoption – A process through which a person goes through a process so that they end up doing something differently from what they have done previously (Singer, 2002)

Agricultural Commodities – Any form of crops harvested from a farm that could be sold (FAO, 1995).

Commitment and Trust are two essential ingredients for a successful relationship. Commitment refers to the quality of being dedicated to a cause or activity, and trust refers to a firm belief in the reliability, truth, or ability of someone or something (Morgan & Hunt, 1994).

Critical Success Factors are vital factors determining an organisation's success or failure (Messineo, 2024)

Market Information Systems - a system that collects, analyses, packages, stores, and disseminates information about prices and other data relevant to farmers, traders, processors, and other stakeholders in agricultural supply chains. It uses mobile phones, the internet, radio, and print media channels to deliver credible and actionable insights tailored to specific user groups. (Megha, 2015).

Price Speculation - conducting financial transactions with substantial risk, aiming for significant gains (Chen, 2023).

Relationship Marketing is a form of marketing in which marketing campaigns emphasise customer satisfaction and retention instead of sales transactions (Ciotti, 2023).

Warehouse Receipt System is a system in which owners of food commodities deposit their commodities in a certified warehouse and are issued a receipt and proof of ownership document. This document can be used as collateral for finance (NCPD, 2017).

Warehouse Receipt - A document issued by a Licensed warehouse operator certifying the quantity and quality of a specified commodity placed by a Depositor (NCPB, 2017).

CHAPTER ONE: INTRODUCTION TO THE STUDY

1.1 Background of the Study

Agriculture remains the cornerstone of Kenya's economy, contributing approximately 33% of the country's GDP and accounting for 60% of total exports (Government of Kenya, 2019). The sector employs over 40% of Kenya's total workforce and supports nearly 70% of the rural population (USAID, 2023). Smallholder farmers, who manage about 75% of agricultural production, face systemic challenges that undermine their productivity and profitability (FAO, 2023).

One of the most pressing issues is limited access to formal credit. Commercial banks allocate less than 4% of their total lending to agriculture (Murungi et al., 2023), leaving most farmers reliant on personal savings (86.84% according to study findings) or exploitative informal lenders. This financial exclusion stems from multiple factors: lack of acceptable collateral, high transactional costs due to poor rural infrastructure, and the perceived risks of agricultural lending (Antonaci et al., 2014). Without access to capital, farmers struggle to purchase quality inputs like certified seeds, fertilizers, or modern equipment, perpetuating low yields and poverty cycles (USAID, 2023).

The situation worsened with the collapse of Kenya's robust cooperative system. In the 1970s-80s, strong farmers' cooperatives like Kenya Farmers Association (KFA) and Kenya Cooperative Creameries (KCC) provided crucial marketing channels and input financing (Ngotho, 2020). However, most collapsed due to mismanagement, political interference, and financial impropriety (Mkawale, 2020), leaving farmers vulnerable to exploitation. Middlemen dominate agricultural markets today - FAO reports that they capture up to 20 times more profit than producers (Amir, 2021). These intermediaries often form cartel-like networks that control prices and market access (Koppes, 2021), forcing farmers into distress sales during harvest surpluses.

Post-harvest losses compound these challenges. Due to poor storage and handling, Kenya loses 12% to 20% of cereal harvests annually (FAO, 2023; Njeru, 2018). In 2017 alone, 4.5 million bags of maize (equivalent to the entire short rains harvest) got spoiled - a devastating loss for food security and farmer incomes (Njeru, 2018). Traditional storage methods expose crops to pests, moulds, and rodents (Kiaya, 2014), while inadequate drying and transport infrastructure further degrade quality (Njoroge et al., 2019).

Recognising these systemic failures, Kenya's Vision 2030 blueprint identified agricultural modernisation as key to Kenya achieving middle-income status (Government of Kenya, 2019). The WRS, established by the 2019 Act, emerged as a potential solution. Modelled after successful systems in Burkina Faso, Uganda and Senegal (PARM, 2017), WRS allows farmers to:

- Deposit farm produce in certified warehouses as collateral for loans,
- Avoid distress sales by storing crops until prices improve,
- Reduce post-harvest losses through professional storage,
- Bypass exploitative middlemen through direct market linkages.

International evidence shows that WRS's success depends on several CSFs. In Indonesia, low farmer awareness significantly limited adoption (Gunawan et al., 2019a), while in Turkey, institutional trust was a key factor in farmers adopting the WRS (Yazar & Secer, 2023). African implementations highlight the need for:

- Strong legal frameworks (USAID, 2014)
- Accessible warehouse networks (AGRA, 2020)
- Active financial institution participation (PARM, 2017)
- Digital integration for transparency (Chapter 5 findings)

Kenya's WRS Council faces unique challenges. This study reveals that only 20% of Nakuru farmers understand WRS benefits, while 84% rate current performance as poor due to:

- Complex bagging requirements,
- Limited warehouse accessibility,
- Delays in operationalizing KOMEX exchange,
- Persistent middlemen competition.

Theoretical frameworks help explain these adoption barriers. Rogers' Diffusion of Innovations (2003) suggests WRS faces resistance due to perceived complexity - farmers accustomed to immediate cash sales distrust unfamiliar processes. Stakeholder Theory (Freeman, 1984) reveals misaligned interests among actors (banks want low-risk clients, warehouses need volume, farmers seek

quick payments). Commitment-Trust Theory (Morgan & Hunt, 1994) highlights how past failures (like cooperative collapses) erode confidence and trust in new systems.

Addressing these challenges requires tackling CSFs identified in this study such as:

- Organisational Strengthening WRS Council governance,
- Targeted farmer education and gender-inclusive programs,
- Blockchain and mobile money integration,
- Enforcing regulations against cartels.

The transformative potential is significant - WRS could increase farmer incomes by 30-50% through better prices and credit access (IFC Africa, 2023). However, as with Kenya's failed cooperatives, success requires addressing all CSFs identified simultaneously. This study provides the a comprehensive analysis of how these factors interact in Kenya's context, offering actionable insights for policymakers and development partners.

1.2 Contextual Discussion on Nakuru County

Nakuru County, situated in Kenya's agriculturally productive Rift Valley, is a leading producer of staple crops such as maize, wheat, beans, and potatoes and the country's third-largest milk producer (Mwale & Simiyu, 2022). Its fertile soils, favourable climate, and strategic location along key transport corridors makes it a critical hub for agricultural trade. However, smallholder farmers in the region face persistent challenges, including limited access to affordable credit, inadequate post-harvest storage, and market price volatility (Murungi et al., 2023). These constraints highlight the potential relevance of the WRS, which enables farmers to store produce in certified warehouses, use warehouse receipts as collateral for credit, and strategically time sales to maximise profits.

Despite Nakuru's relatively developed infrastructure, WRS adoption remains hindered by several factors. Certified warehouses are scarce, particularly in rural areas, limiting accessibility for smallholders. Additionally, low financial literacy and a lack of awareness about WRS mechanisms restrict farmers' ability to leverage the system. Nevertheless, Nakuru's proximity to major urban markets, such as Nairobi, presents a significant opportunity for WRS to mitigate price volatility by allowing farmers to delay sales until prices improve.

In summary, while Nakuru's agricultural potential and market access make it an ideal candidate for WRS implementation, critical gaps—such as storage infrastructure, financial literacy, and institutional support—must be addressed to ensure widespread adoption.

To illustrate, consider a smallholder maize farmer in Njoro, Nakuru. Post-harvest, low prices and spoilage risks threaten his profitability. A functional WRS would allow him to store his maize in a certified warehouse, obtain a receipt for credit access, and sell later at higher prices. However, without accessible warehouses or sufficient understanding of the system, these benefits remain out of reach. This example underscores the importance of infrastructure development, capacity building, and financial education in driving WRS adoption in Nakuru.

1.3 Statement of the Problem

Kenya's agricultural sector, dominated by smallholder farmers, faces systemic inefficiencies including price volatility, exploitative intermediaries, and limited access to credit (Kiaya, 2014). The WRS—introduced to mitigate these challenges—enables farmers to store produce in certified warehouses, use receipts as collateral for loans, and sell commodities strategically via platforms like the Kenya National Multi-Commodity Exchange (KOMEX) (Harvesters, 2019). By 2022, the system had expanded to five licensed warehouses under the National Cereals and Produce Board (NCPB), serving 300 depositors (WRS Council, n.d.).

Despite its potential, WRS adoption remains low among smallholder farmers. International evidence shows that WRS can improve incomes (e.g., a Kenyan AGRA pilot boosted farmer earnings by 11% [Hub, 2021]), yet systemic barriers persist. In Malawi, high transaction costs and stringent quality standards exclude smallholders (Baulch, 2020), while in Kenya, studies identify limited financial literacy, warehouse accessibility, and awareness as adoption hurdles (Miranda, 2017). However, critical gaps remain:

- Lack of CSF-focused research: Existing studies highlight challenges (e.g., logistics, awareness) but fail to systematically analyse which factors are most influential for WRS success in Kenya.
- Disconnect between design and smallholder needs: The system's current structure (e.g., minimum volume requirements, re-bagging of commodities and warehouse location) may inadvertently favour larger traders, yet no studies assess how to tailor WRS to smallholder contexts.

- Inadequate evidence on policy and institutional roles: While partnerships (e.g., NCPB, KOMEX) exist, their effectiveness in driving adoption—and the role of broader policy incentives—is under-researched.

This study addresses these gaps by investigating the CSFs influencing WRS adoption in Kenya, focusing on smallholder farmers. It evaluates the key CSFs impacting adoption, ways to optimize policy and system design to overcome barriers, and lessons from markets like Malawi and Ethiopia to improve Kenya's WRS framework.

The study aims to provide actionable insights for policymakers and stakeholders to enhance WRS efficacy for smallholder empowerment and agricultural transformation by bridging these gaps.

1.4 Research Objectives

1.4.1 General Objectives

The study aims to identify the critical success factors influencing smallholder farmers' adoption of the Warehouse Receipt System in Kenya.

1.4.2 Specific Objectives

The following are the specific objectives of this research:

i. To identify the stakeholder management factors influencing WRS adoption in Kenya.

ii. To determine the organisational factors affecting smallholder farmers' participation in the WRS.

iii. To investigate industry and contextual factors affecting WRS Scalability

iv. To determine the potential of digital solutions in enhancing WRS adoption by smallholder farmers.

1.5 Research Questions

The study sought to answer the following research questions.

i. How do stakeholder dynamics (e.g., engagement, education, sensitisation) hinder or enable WRS adoption in Kenya?

ii. What organisational practices (e.g., leadership, structure, financing) are critical for building farmer trust in WRS?

iii. What industry/contextual factors (e.g. Legal framework, market information systems, commodity exchanges) influence the scalability of WRS for smallholder farmers?

iv. To what extent do digital tools (e.g., blockchain traceability, mobile payment systems) mitigate adoption barriers like information asymmetry or fraud risks?

1.6 Significance of the Study

This study provides critical insights into the factors influencing the adoption and effectiveness of the WRS in Kenya, with direct implications for key stakeholders.

For Policymakers, the findings will inform government agencies, including the WRS Council and the Ministry of Agriculture, by identifying systemic barriers (e.g., infrastructure gaps, financial literacy deficits) and opportunities for policy intervention. By clarifying the CSFs, the study equips policymakers to:

- Design targeted regulatory frameworks to incentivise WRS participation among smallholders.
- Allocate resources more effectively (e.g., expanding certified warehouse networks in underserved regions).
- Strengthen linkages between WRS and financial institutions to enhance credit access.

For warehouse operators, banks, insurers, and commodity exchanges like KOMEX, the study offers actionable recommendations to optimise WRS operations:

- Warehouse operators: Insights into smallholder needs (e.g., flexible storage terms, reduced minimum volumes) can improve service design.
- Financial institutions: Evidence on how warehouse receipts mitigate lending risks can encourage more credit products tailored to farmers.
- WRS Council: The CSFs identified will help develop performance metrics (e.g., balanced scorecards) and strategic plans to monitor and scale the system.

For future scholars, the study contributes to academic discourse by:

- Providing a framework for analysing WRS adoption in similar agrarian economies, filling gaps in the literature on institutional innovations in Africa.

- Highlighting underexplored intersections between agricultural finance, supply-chain governance, and smallholder behaviour, offering avenues for further research.

The study advances practical WRS implementation and theoretical understanding of agricultural market reforms by addressing these issues.

1.7 The Scope of Study

The study utilised the Case Study method, a research strategy that involves an in-depth, detailed examination of a single case or a small number of cases (Yin, 2018). In this case, the effectiveness of the WRS in enabling farmers to access credit from financial institutions using their farm produce as collateral was investigated. The study focused on Nakuru County, which was selected because it was one of the few counties with farmers depositing maize grains in the National Cereal and Produce Board (NCPB) warehouses in 2022 - 2024. The primary data collection methods were questionnaires, key informant interviews, and focus group discussions with key stakeholders from Nakuru County, the WRS staff members and other stakeholders like the EAGC and AGRA. The survey was conducted in February 2025. The study's findings will contribute to farmers using agricultural produce as collateral to access credit.

1.8 Chapter Summary

This chapter examines the WRS and the possible critical success factors for adoption by smallholder farmers in Kenya. It outlines the importance of stakeholder involvement, operational efficiency, and a conducive operating environment as key factors influencing adoption. The chapter details the system’s role in enabling farmers to use stored produce as collateral for loans. It highlights global and Kenyan experiences with the system, emphasising challenges such as low adoption rates among smallholder farmers. It presents the research objectives and questions, focusing on how these possible success factors affect smallholder farmers’ participation and the potential of the WRS to improve financial access for them. Finally, it outlines the significance and the scope of this study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter comprehensively reviews the theoretical, empirical, and contextual literature underpinning this study. It begins by examining the three core theoretical frameworks that inform the research: Stakeholder Theory, Diffusion of Innovations (DOI) Theory, and the Commitment-Trust Theory of Relationship Marketing. These theories collectively address the institutional, behavioural, and systemic challenges influencing the adoption of the WRS among smallholder farmers in Kenya.

The chapter then presents an empirical review of the WRS, synthesizing global and regional evidence on its implementation, successes, and persistent barriers. Further, the chapter conducts a systematic literature review of CSFs for public projects in Kenya. It then operationalises the study's key variables and culminates in a conceptual framework that integrates theoretical lenses, empirical findings, and CSFs to explain the determinants of WRS adoption.

2.2 Theoretical Review

A complex interplay of institutional, behavioural, and systemic barriers hinders smallholder farmers' adoption of Kenya's WRS. Three theories collectively illuminate these challenges: Stakeholder Theory (Freeman, 1984), Trust and Commitment Theory (Morgan & Hunt, 1994) and the Diffusion of Innovations Theory (Rogers, 1962). They basically reveal how inconsistent legal frameworks and inadequate awareness campaigns delay adoption by failing to address farmers' needs at each stage of the innovation-decision process.

Together, these theories provide a multi-layered framework to analyse WRS adoption: Stakeholder Theory identifies gaps in institutional coordination, Trust Theory decodes behavioural resistance, and DOI Theory highlights systemic rollout failures. By integrating these perspectives, this study uncovers how Kenya's WRS can be redesigned to foster stakeholder collaboration, rebuild trust, and align innovation diffusion with smallholder realities - ultimately enhancing adoption.

2.2.1 Stakeholder Theory

Stakeholder Theory can be traced to Edward Freeman, who developed the theory in 1984 (Freeman, 2013). This idea contends that an organisation should consider the interests of all parties involved, such as investors, employees, clients, suppliers, and the community, not just the shareholders (Keup, 2022). Everyone affected or related to the company is considered a stakeholder. Mutabazi (2022)

states that stakeholders are any people positively or negatively impacted by a project, initiative, policy, or organisation. Elsewhere, stakeholders are those individuals or groups that depend on an organisation to fulfil their own goals and on whom, in turn, the organisation depends (Whittington, 2020). For a company to thrive and expand, an enterprise should try to satisfy each of its stakeholders. This theory is opposed to shareholder theory, which argues that since the main drive of shareholders is profits, a company should strive to make profits at any cost (Mayer et al., 2020). For WRS, balancing stakeholder interests (farmers, banks, govt.) is crucial, as purely profit-driven approaches could exclude smallholders.

Stakeholder theory has been criticised as being too demanding. According to Ndunda (2017), it is too complex and unrealistic to expect project managers to change how they operate to consider interests other than those of shareholders. Elson (2019) argues that a manager cannot be equally accountable to all stakeholders; if one is accountable to everyone, then one is accountable to no one. Despite this criticism, this theory is still relevant to this study, given that the WRS depends on many stakeholders and aligning each of their interests is critical to the system's success.

2.2.2 Diffusion of Innovations Theory

The Diffusion of Innovations (DOI) Theory, developed by Everett Rogers (1962), explains how new ideas, technologies, or products spread within a social system over time (Nick, 2023). As a foundational framework for understanding technological adoption, the theory emphasizes tailoring innovations to meet adopters' needs across different segments (Kaminski, 2011). Rogers classifies adopters into five categories: innovators, early adopters, early majority, late majority, and laggards—sometimes expanded to include non-adopters (Mohammed, 2023). While initially conceptualised for general innovation adoption, the theory has since been widely applied to product diffusion, making "product innovation" and "innovation adoption" functionally interchangeable in this context.

The theory posits that adoption is not instantaneous but rather a gradual process influenced by individuals' varying readiness to embrace change (Singer, 2022). It highlights the role of communication channels—interpersonal networks and mass media—in shaping perceptions and accelerating uptake. This makes the framework particularly relevant for policymakers, change agents, and professionals (e.g., in IT or agriculture) seeking to implement innovations effectively.

However, the theory has limitations. It assumes homogeneity among adopters and a linear adoption trajectory, overlooking external disruptions (e.g., market shocks or policy shifts) and the impact of modern factors like social media (Bewsell, 2021). Critics also note its "individual blame" bias, which

attributes non-adoption solely to users rather than considering potential flaws in the innovation or its dissemination (Atzberger, 2019). Despite these shortcomings, the theory remains influential in analysing macro- and micro-level adoption processes, including agricultural innovations.

In Kenya, the WRS represents an institutional innovation, albeit one long established elsewhere. Rogers' theory elucidates why its adoption may face delays, as acceptance varies across individuals and social systems (Sirk, 2020). Four key factors determine diffusion: (1) the innovation's perceived attributes, (2) communication channels, (3) the time required for decision-making, and (4) the social system's structure (Cross, 2020). Adoption follows a five-stage sequence: knowledge acquisition, persuasion, decision, implementation, and confirmation (Albrecht, 2022).

2.2.3 Commitment-Trust Theory of Relationship Marketing

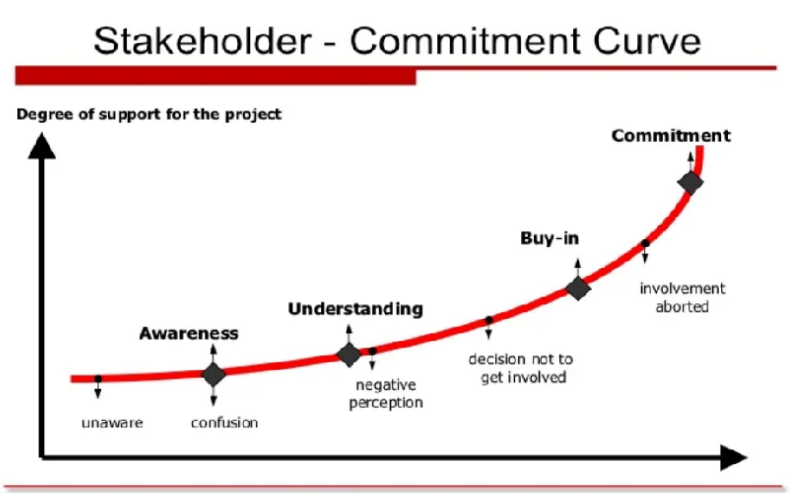
The Commitment-Trust theory of relationship marketing says that two critical factors, trust and commitment, must be present for any relationship to be successful (Hashim, 2015). Respecting consumers' needs and commitments is a critical component of relationship marketing. Customers start to trust these businesses, and a win-win partnership develops. Morgan and Hunt's commitment-trust theory is a departure from traditional, transaction-focused marketing (Morgan & Hunt, 1994).

Trust is increasingly seen as an intangible asset that can help boost material value. According to Galetto, 'the efforts to improve levels of trust include assessing initiatives that affect stakeholder relations across the enterprise and then developing tailored strategies that can be monitored periodically' (Galetto, 2021). If a business cannot maintain trust with its stakeholders, it will not be able to maintain its revenue or even grow in the long run.

Commitment is equally essential in any relationship; securing it cannot be easy. Stakeholder commitment is critical for the success of any project or organisation. Indeed, research shows that organisations that perform well in managing stakeholder relations are 2.5 times more likely to deliver project objectives (Dang, 2024). It has been reported that 85% of successful projects have strong stakeholder engagement at their core (Emmanuel, 2025).

Stakeholder commitment is not easy to secure, and in doing so, one must go through the'Commitment Curve' (see Figure below)

FIGURE 1: STAKEHOLDER COMMITMENT CURVE



Source: (Subrananiam, 2009)

2.2.4 Critical Success Factors Framework

Critical success factors are those elements that the customers value and offer a substantial cost advantage to the business. They are, therefore, likely to be an essential source of competitive advantage (Whittington, 2020). According to Vanessa (2008), applying CSFs to business dates back to Daniel's work in 1961. However, it was John F. Rockart who, in 1979, first developed a research method designed to elicit CSFs (Team, 2022). Rockart defined CFSs as 'the limited number of areas in which results, if they are satisfactory, will ensure the successful competitive performance of the organisation'. He identified four main types of CSFs that businesses need to consider: industry, environmental, strategic/competitive, and temporal critical success factors (MTCT, nd).

Rockart developed a method to help executives derive a strategy and goal and answer the question, 'What would it take to be successful in this business?'. Antony and his team further used the concept to develop a management control system in 1972 (Amberg et al., 2005). They pointed out that a management control system measures profitability and identifies key variables: strategic factors, critical success factors, key result areas, and pulse points.

Vanessa (2008), asserted that CSFs have been credited for making several research contributions. This is primarily due to the simplicity of the method and the ability to focus and actively engage management's attention on the most essential areas of a business. However, due to changing environmental and organisational factors, CSFs have been criticised for difficulty in determining the correct number and type of CSFs and the need for frequent reviews.

Lawrimore (2015), conducted work on CSFs. He reviewed and analysed over 100 top-selling books, professional articles, and interviews and determined that there are five CSFs, each with six to ten sub-components. He gives the top five CSFs: strategic focus, people, operations and processes, marketing, and finance.

Since CSFs provide a few areas of activity in which favourable results would indicate success for a manager, it is essential that information necessary for tracking, monitoring, and reporting these CSFs be stipulated. According to Martins (2022), CSFs must be paired with the Key Performance Indicators (KPIs) to determine whether an organisation is on track to achieve them and its strategic goals.

The CSF methods aim to provide executives with critical information from identified areas requiring attention (Tuan, 2020). Given the enormous amount of information available in an organisation, the objective is to reduce the number of decisions that executives must make.

2.3 Empirical Review

2.3.1 Core Features and Elements of the Warehouse Receipt System

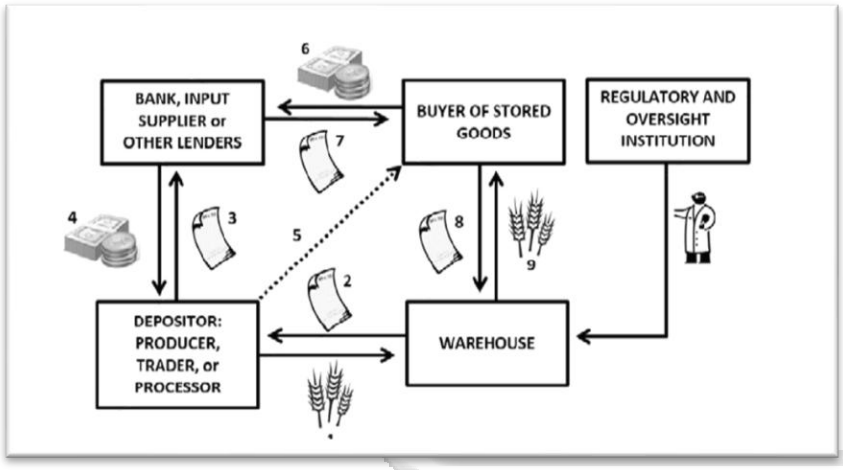
The WRS enables smallholder farmers to store their crops in bulk in government-certified warehouses that ensure quality standards are maintained over an agreed period. The warehouse issues a receipt that can be used as loan collateral from pre-approved financial institutions. In addition to enabling farmers to access credit, the WRS acts as an alternative solution for commodity producers, processors, and traders to take short-term advantage of price fluctuations and secure the storage of their produce (Kiriakov, 2015). The main advantage is that it overcomes the problem of smallholder farmers being unjustly compelled to sell their surplus crops at harvest, when market prices are typically at their lowest.

Miranda (2017) states that the WRS is not new. The usage of warehouse receipts issued against the stored grain as money dates to 2000 BCE, according to clay tablets that have survived from Mesopotamia. The system was used in the USA by the Chicago Board of Trade as early as 1856 until it was formalised in 1916. Many countries in Latin America, Western Europe, and Asia have long used this system based on legislation dating back to the start of the 20th century (Garthwaite, 2015).

In Sub-Saharan Africa (SSA), many governments, local groups, development partners, and other stakeholders have recently shown interest and invested resources in different WRS schemes. Some of these countries include Uganda (coffee and seed cotton), Tanzania (Cashew Nuts), Cameroon (Maize and Millet), Senegal (Maize and Millet), and Kenya (Maize) (B. Osman, 2017).

The diagram below explains the basic concept of a Warehouse Receipt System (Garthwaite, 2015).

FIGURE 2: BASIC CONCEPTS OF A WAREHOUSE RECEIPT SYSTEM



Source: (Garthwaite, 2015)

2.3.2 The Benefits and Challenges of a Warehouse Receipts System

A warehouse receipt system offers numerous benefits when well implemented. Onumah (2010) notes that the system addresses inefficiencies in agricultural markets and tackles underlying challenges. One of the critical benefits is that the WRS system opens access to remunerative markets by enabling smallholder farmers to bulk their crops for deposit while complying with quality standards. Additionally, it reduces the chances of cheating in agricultural trade, particularly for farmers who are often exploited in terms of quality and weight. The system also enhances liquidity in agricultural trade by allowing farmers to access the funds they need for consumption and production costs.

Furthermore, the WRS can help reduce post-harvest losses by encouraging proper storage of farm produce in well-maintained facilities. A viable WRS improves the prospects of promoting commodity trading by providing trusted delivery systems, which have significantly hindered the success of many commodity exchanges in Africa.

Despite these benefits, Onumah (2010) identifies several key challenges facing the effective development of the WRS in Africa. One of the primary challenges is the lack of adequate suitable storage, stemming from the absence of a network of well-managed warehouses accessible to smallholder farmers. An appropriate legal, regulatory, and institutional framework is also lacking to guide the system's implementation. Another challenge is the shortage of warehouse management skills and the absence of structured ways to deliver the necessary training and capacity-building programs.

Moreover, inadequate complementary market institutions and infrastructure, particularly the absence of a reliable market information system (MIS), significantly impede the effectiveness of the WRS. For instance, the Kenya Agricultural Market Information System (KAMIS) provides essential data on market prices and demand trends. Nevertheless, its limited accessibility restricts smallholder farmers' ability to make informed decisions regarding the sale of their produce (Kyenze, 2024). This lack of timely and accurate information exacerbates the challenges faced by farmers in maximising their returns and effectively utilising the WRS.

It is challenging to attract stakeholders, particularly bankers, who need more incentives to innovate beyond traditional balance sheet lending. Ensuring smallholder farmers' effective participation to benefit from aggregation, depositing, and marketing through farmers' groups remains a concern. Lastly, policy-related constraints, driven by governments' ad hoc interventions for political or food security reasons, also impede the system's development.

2.3.3 Warehouse Receipt System Performance in Africa and Elsewhere

Several countries, including Argentina, Brazil, Colombia, Côte d'Ivoire, Ghana, India, Indonesia, Kenya, Malawi, Mexico, South Africa, Tanzania, and others, have adopted the Warehouse Receipt system with varying degrees of success (Kadigi & Falanta, 2018). Tanzania launched its first WRS in 1999, focusing on Cotton and Coffee. The system has been celebrated, leading to increased transparency and improved legal and regulatory support systems (Gro Intelligence, 2014). Ghana's WRS has had a mixed performance. On the one hand, it has successfully provided smallholder farmers access to credit and enabled them to delay sales and obtain higher prices. On the other hand, its reach has been limited and has not yet significantly impacted the agricultural value chain (Safo et al., 2021).

In Zambia, a regulated WRS was established in 2001. Despite the potential benefits of this system, a study conducted by Gro Intelligence found that the system faces various challenges,including low awareness levels even among large grain traders and processors; limited warehousing management skills in the industry; unclear strategy for smallholders' inclusiveness; reluctance by the financial institutions to finance WRS due to policy inconsistencies in grain markets; and lack of an up-to-date grain Market Information System (Gro Intelligence, 2014).

Ethiopia has been recognised as Africa's most compelling example of the WRS system concept. Since 2009, this initiative has helped expand access to financing for farmers, traders, and cooperatives and developed the agricultural commodities market (Kadigi & Falanta, 2018). This system enables mostly farmers, farmer associations, and small-scale rural commodity aggregators to access

otherwise unavailable finance due to their low 'creditworthiness' in standard banking practice (Stravoravdis, 2020).

The WRS has also helped farmers in Indonesia to delay sales and obtain higher prices. By depositing their crops in a warehouse, farmers can store them until prices are more favourable (Stravoravdis, 2020). A study conducted in the East Java region of Indonesia found that price fluctuation at harvest is a significant determinant of failure in the agricultural sector (Sulistyaningsih et al., 2020). According to the study, farmers' income declines due to the dramatic drop in prices at harvest. A solution is to use the WRS so farmers can delay selling at harvest time and sell a few months later when prices could be better. A study conducted in South Sulawesi found that the income obtained from the actual model using the WRS is higher than direct income (selling corn directly) without entering it in the WRS, as well as actual income (where 100% of the corn that enters the warehouse is immediately sold) at the time without any delay in selling (Mardia et al., 2021).

In Turkey, the WRS offers advantages such as high-quality products by ensuring that consumers have access to goods that meet specific standards of quality, price stability, and reduced stocking costs. Still, its development faces challenges due to small-scale enterprises using the system, the lack of specialised commodity exchange, and the high costs of establishing licensed warehouses (Tosun et al., 2014). Despite these challenges, with the implementation of the WRS, wheat and corn farmers increased their profits by 2%-18 % and 12%, respectively (Mardia et al., 2021).

In India, the WRS has benefited farmers by providing them with access to credit and by reducing post-harvest losses, and farmers are reported to have adopted the system (Amith, 2016). However, there are challenges, including issues with the quality of stored produce and limited access for smallholders, which need to be addressed for the system to be more effective (Hussain, 2018).

The United States of America has a long history with the system. It has helped improve food security at the state level since 1856 and under the Federal Statute since 1916 (USAID, 2014). Other countries with an operating WRS include France, Bulgaria, the Philippines, Belarus, the UAE, and many others (UNCITRAL, 2018).

2.4 Interplay between Critical Success Factors and Warehouse Receipt System Adoption

The adoption of WRS in Kenya is contingent upon a set of interconnected CSFs. These CSFs are particularly significant in the context of WRS, where their alignment is crucial for facilitating the participation of smallholder farmers, who are vital to the system's success.

Several key CSFs can be identified. Firstly, robust institutional support is essential, encompassing effective government policies and strong regulatory frameworks (FSDKenya, 2024). While Kenya's WRS Council supports rural infrastructure and training, implementation and coordination challenges persist. Lessons can be drawn from Indonesia and Turkey, where certified warehouses and public investments have fostered farmer confidence, and from Zambia, where effective leadership has promoted smallholder inclusion (Coulter & Onumah, 2002).

Secondly, adequate financial literacy among farmers is necessary for them to understand the benefits of WRS, such as enhanced access to credit and price stability. Low awareness in Indonesia hindered adoption (Gunawan et al., 2019). Improving financial education is crucial for enabling farmers to optimise sales timing and stabilise incomes. Although institutions like Kenya's Agricultural Finance Corporation (AFC) are important, past financial instability has eroded trust (Jared & Duncan, 2024).

Thirdly, effective stakeholder engagement, particularly through cooperatives and farmer organizations, can facilitate improved negotiation with financial institutions, as demonstrated in Turkey (Yazar & Secer, 2023). In Kenya, rebuilding trust through cooperatives can reduce transaction costs and enhance outreach. Public-Private-Partnerships (PPP) are also important, although Kenya faces challenges with overlapping mandates despite the WRS Act of 2019 (Republic of Kenya, 2019).

Fourthly, adequate infrastructure and market access are fundamental. Investments in storage facilities and market linkages have driven success in Ethiopia and Uganda, and India's public-private partnership model offers a potential framework for Kenya. However, Kenya's current warehouse capacity is limited, and the inconsistent enforcement of quality assurance measures, such as commodity grading, discourages participation (Kenya National Bureau of Statistics (KNBS), 2022).

Fifthly, a clear and consistent legal and regulatory environment is paramount. While Kenya's WRS Act of 2019 provides a structure, conflicts with other laws, such as the Movable Property Security Rights Act, create compliance challenges. Zambia's streamlined adoption, facilitated by a clear legal framework, underscores the importance of legal coherence (Coulter & Onumah, 2002). Additionally, limited access to real-time market data in Kenya, in contrast to Ethiopia's SMS-based price alerts, hinders informed decision-making (Jared & Duncan, 2024). The underutilisation of KOMEX due to liquidity constraints (unlike the South African model) further exacerbates market access issues (Coulter & Onumah, 2002).

Sixthly, integrating digital and technological factors presents opportunities and challenges. Kenya's mobile money ecosystem supports electronic receipts, but inconsistent rural internet access remains

a constraint. Data security is also a concern, although blockchain pilots in Ghana offer potential solutions (Asare et al., 2025). The prevalence of manual receipt systems in Kenya increases the risk of fraud, contrasting with the enhanced security of electronic systems in countries like India (Sarah Hidayani & Dwidjono, 2019). While technological complexity can be a barrier for some Kenyan farmers, the successful implementation of SMS-based updates in Zambia demonstrates the potential of accessible technology (Jared & Duncan, 2024).

Finally, it is crucial to consider the interplay and local context of these CSFs. No single factor is sufficient in isolation; for example, infrastructure investment must be accompanied by efforts to enhance financial literacy and foster stakeholder collaboration. While Kenya can learn from global examples, such as Indonesia's policy frameworks and Turkey's cooperative models, these must be adapted to local realities, including rural-urban disparities and environmental challenges.

Addressing these CSFs holistically has the potential to yield significant benefits for Kenya's agricultural sector, including increased access to credit (as seen in Ghana), reduced postharvest losses (as in Zambia), enhanced farmer incomes (as in Indonesia), improved financial inclusion through mobile money integration, and greater price stability (as in Tanzania).

2.5 Summary of Research Gaps

The following section outlines key research gaps and findings from global studies on Warehouse Receipt Systems (WRS), with a focus on implications for smallholder farmers in Kenya. While WRS has shown potential in improving post-harvest management and access to credit, evidence from Ghana, Indonesia, and Pakistan reveals systemic challenges, particularly minimal smallholder inclusion and inadequate policy support. This analysis highlights critical gaps in Kenya’s WRS adoption, including the need for targeted farmer education, equitable financing models, and stronger policy interventions to unlock its full benefits.

TABLE 1: SUMMARY OF RESEARCH GAPS

Author	Title	Findings	Research Gap
(2018).	Farmers of the Warehouse Receipt System in Indonesia	While some studies assess farmers' perceptions of the WRS, there is a lack of research on the impact of the WRS on smallholder farmers' livelihoods.	The impact of WRS on smallholder farmers in Kenya
Miranda et al., (2018)	Does warehouse receipt financing benefit Ghanaian smallholders?	Warehouse receipt financing has generally failed to deliver benefits to smallholders as hoped for by development economists and practitioners. Large traders, processors, and exporters use warehouse receipt financing almost exclusively in Ghana and generally throughout Africa.	
Thunde & Baulch, (2020)	Who Uses and Who Benefits from Warehouse Receipt Systems?	The study examined who uses and benefits from the warehouse receipt systems using unique transaction-level data from the Agricultural Commodity Exchange for Africa.	Who uses and who benefits from the Warehouse Receipt Financing System in Kenya
Kennedy, (2015)	The potential for the development of a warehouse receipt system to serve the province of Punjab, Pakistan	This study in Punjab found that a policy framework to support investment and early adoption, including stakeholder sensitisation, establishment of a WRS Authority, and incentivising investors, is needed.	There is a gap in exploring the policy interventions that can be put in place to encourage investment and early adoption of the WRS in Kenya
Sulistyaningsih et al., (2020)	Post-harvests in the agricultural sector: A critical view of the warehouse receipt system in East Java, Indonesia	While there are studies that highlight the challenges of the WRS system implementation, there is a need for more research on how to address these challenges	Limited research on the challenges of WRS implementation and how they should be addressed.
Chitra, (2014)	Factors Influencing the Use of Warehouse Receipts as a Financial Instrument in Kenya	The farmers' lack of awareness of the benefits of warehouse receipts in the informal financial market limits their use of warehouse receipts as financial instruments.	An analysis of the country's loss of storage for staple crops and the financial losses incurred by indirect marketing should be conducted.

2.6 Findings from Systematic Literature Review

According to Saunders et al., (2019), a systematic literature review is essential as it helps to identify the research gap, refine research questions, and ensure that the research is grounded in existing knowledge. It prevents duplication of effort and provides a solid foundation for data collection. This research used a systematic search to find the maximum number of studies already done in the last five years (2019 – 2024), directly or indirectly related to CSFs for public or government-funded projects. A total of 155 articles/studies were collected during the search process, with 61 articles/studies identified as relevant to the subject of critical factors for WRS's success. These articles were accessed and analysed. While analysing these articles, digital/technological factors were identified and incorporated into the conceptual framework as an additional category of CSFs.

From the literature review, organisational factors emerged as the most critical for the success of government/public-funded projects. This is in line with a study conducted by Muller & Jugdev (2017) which found that organisational factors, such as leadership, strategic alignment, and resource allocation, were most important in project success. Project leadership, management structure, financing, and systems of the organisation tasked with implementing the public project are paramount, as they significantly influence the execution of other critical factors.

Stakeholder management factors were ranked second because projects often fail due to misaligned expectations, poor communication, or lack of engagement with key stakeholders. According to Bourne (2016), effective stakeholder management is not merely about identifying and engaging stakeholders; it is about fostering trust, aligning interests, and ensuring active participation. This approach secures buy-in and minimises resistance, which is critical for successfully implementing any initiative. This finding aligns well with the stakeholder theory on the importance of undertaking a detailed stakeholder analysis and mapping to understand and therefore strategise on how to approach each stakeholder (Whittington, 2020).

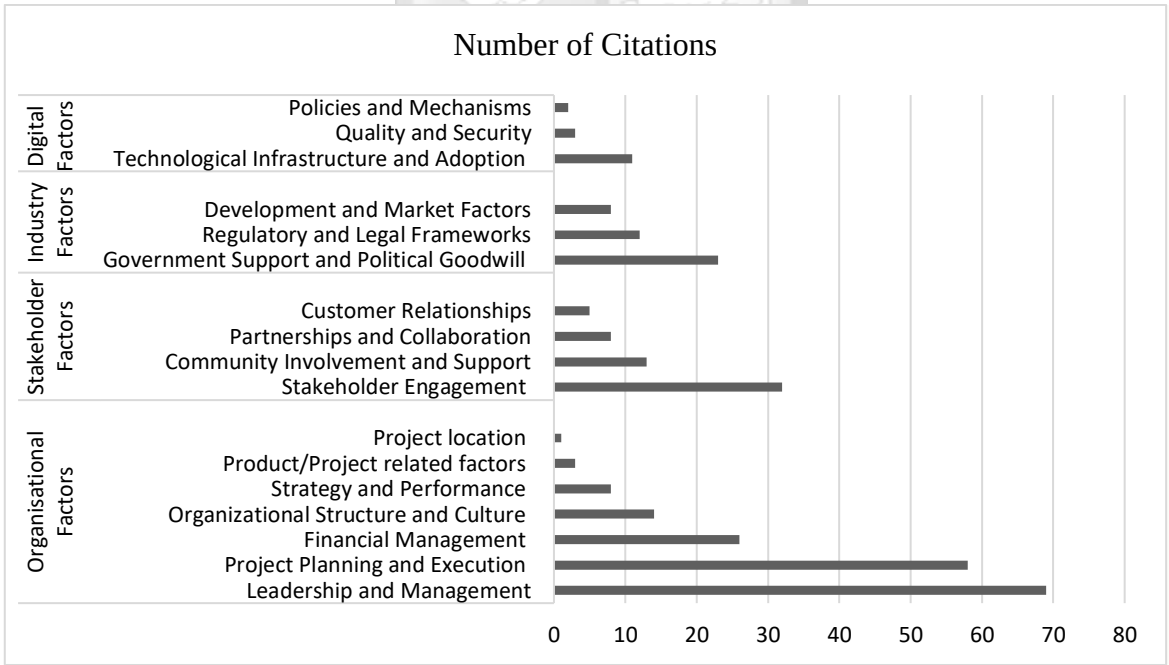
Industry factors ranked third in the review. These factors include market conditions, competition, and the regulatory environment, often external and beyond the organisation's control. They are critical in shaping organisational strategy and performance (Grant, 2016). Industry factors play a critical role in the success of government or public projects as they influence project selection, execution, and outcomes. According to Gasik (2024), projects that are developed independently from governmental policies and strategies may not be successful. This statement emphasises that government-level factors (political support, regulatory frameworks, alignment with national strategies) are

foundational to public project success. This assertion holds particularly true in Kenya, where political backing and goodwill assure government funding despite regime change, alignment with national policies guarantees relevance and sustainability, and regulatory clarity helps minimise corruption and ensure accountability.

Finally, emerging from this review were technological factors that are increasingly important, especially in industries driven by innovation and digital transformation. These factors play a crucial role in the success of projects in various ways, including enhancing efficiency and productivity, improving communication and collaboration, managing risk, enabling data-driven decisions, and so on. However, technology alone cannot guarantee success without organisational and stakeholder support. According to Bharadwaj et al., (2017) technology's potential is realised only when integrated into the organisation's broader strategic framework, ensuring that it addresses operational efficiency and stakeholder needs.

The graph below summarises the number of times each critical success factor was cited from the literature review.

FIGURE 3: CSFS NUMBER OF CITATIONS FROM LITERATURE REVIEW



The table below summarises the critical success factors obtained from the literature review across the four categories.

TABLE 2: CRITICAL SUCCESS FACTORS OBTAINED FROM LITERATURE

Critical Success Factors - 61 Publications	
Categorisation of Factors - Listed in Order of importance (based on the # of citations)	
Organisational Factors (177) **Leadership and Management (69)** • Project management and Leadership (36) • Staff skills and Competency (26) • Effective change Management (7) **Project Planning and Execution (58)** • Project Design and Planning (20) • Timely procurement of products and services (18) • Monitoring, Evaluation, and Communication (19) **Financial Management (26**) • Adequate Funding and Financing (20) • Cost Management (2) • Risk Management (4) **Organisational Structure and Culture (14)** • Organisational Structure and teamwork (9) • Strong Support Systems and integration (5) **Strategy and Performance (8)** • Strategy formulation and implementation (6) • Good marketing skills (2) **Product/Project related factors (3)** • Product Affordability and Acceptance (2) • Project location (1)	Stakeholder management Factors (58) **Stakeholder Engagement (32)** • Stakeholder Participation (26) • Stakeholder Education and Training (3) • Stakeholder Coordination and Communication (3) **Community Involvement and Support (13)** • Community Sensitisation and Involvement (6) • Community Support and acceptance (7) **Partnerships and Collaboration (8)** • Client-Supplier Relationship (5) • Partnership Alliances and Collaboration (2) • Development of Local Capabilities (1) **Customer Relationships (5)** • Relationship with Customers (2) • Creating Customer Brands (3)
Digital/Technological Factors (15) **Technological Infrastructure and Adoption (11)** • ICT Infrastructure and robust Technology (7) • Technological adoption and update (3) • Availability of a Reliable ISP (1) **Quality and Security (3)** • Quality Internet and Data Security (2) • Quality Website (1) **Policies and Mechanisms (2)** • Project Contracting Mechanisms (1) • Approved ICT Policy (1)	Industry Factors (43) **Government Support and Political Goodwill (23)** • Government Support, oversight and policies (14) • Political goodwill and stability (2) • Quality of Facilities and Infrastructure (7) **Regulatory and Legal Frameworks (12)** • Independence of regulatory agency (1) • Legal and Regulatory Frameworks (6) • Ease of doing business (5) **Development and Market Factors (8)** • Marketing information and positioning (4) • Financial Markets and sustainability (3) • Clear Contractual duties (1)

2.7 Operationalisation of Variables

This study's dependent variable is the rate of WRS adoption by smallholder farmers in Kenya. The independent variables are the level of stakeholder involvement, the operational efficiency of the WRS itself, the operating context and the role of technology in advancing the system.

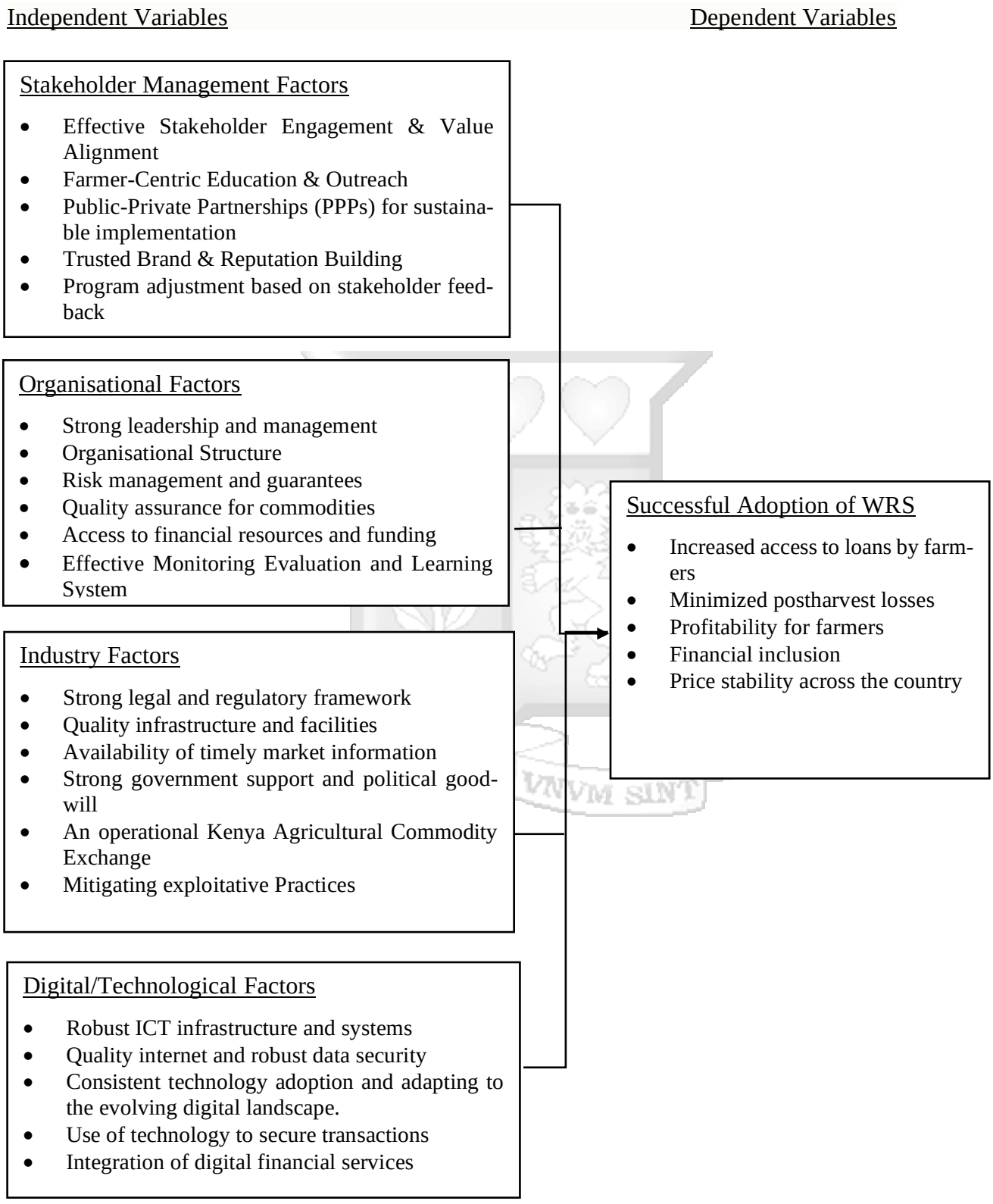
The table below provides a justification for the measures and how each variable was measured.

TABLE 3 OPERATIONALISATION OF VARIABLES

Variable Category	Measurement Indicators	Justification for Measures	Data Collection Instrument	Data Analysis Approach
Stakeholder Factors	• Understanding customer needs • Targeted education programs • Farmers' outreach initiatives • Brand trust attributes (integrity, accountability) • Clear stakeholder value propositions	• These measures assess the human dimension of WRS adoption. Customer understanding and education programs address financial literacy gaps (Miranda, 2017). • Trust metrics evaluate historical scepticism toward agricultural systems (Morgan & Hunt, 1994), while value propositions align with Stakeholder Theory's emphasis on mutually beneficial engagement.	• Structured surveys (Likert scale) • Focus Group Discussions • Key Informant Interviews	• Descriptive statistics • Likert scale analysis (mean scores, frequency distributions) • Thematic analysis for qualitative data
Organisational Factors	• Leadership effectiveness • Risk management systems • Commodity quality assurance • Infrastructure adequacy • Market information reliability • Technology utilisation	• These operational metrics reflect Rockart's (1979) CSF framework. • Leadership and risk management measure institutional readiness (IFC, 2020), while infrastructure and technology indicators assess implementation capacity, critical for the DOI Theory's compatibility construct (Rogers, 1962).	• Institutional audits • KIIs with warehouse operators • FGDs with farmer groups	• Comparative analysis across regions • Likert scale
Industry/Contextual Factors	• Regulatory framework • Government support • KOMEX functionality • Trader competition intensity • Logistics infrastructure	• These variables test the institutional environment posited by DOI Theory. • Legal/political measures evaluate the "policy space" (Baulch, 2020), while competition metrics assess market distortions - key concerns in Stakeholder Theory's power dynamics.	• Policy document review • Expert interviews (regulators, traders) • Farmer FGDs	• Regulatory gap analysis • Likert scale correlation with adoption rates
Digital/Technological Factors	• ICT infrastructure robustness • Data security provisions • Technology adoption rate • Transaction security mechanisms • Financial service integration	• Measures align with the DOI's complexity construct and Trust Theory's security requirements. • Digital infrastructure reflects Kenya's FinTech landscape (CBK, 2023), while integration metrics test system interoperability - a known WRS barrier (Gunawan et al., 2019).	• Technology audits User experience surveys • Fintech provider interviews	• Technology acceptance modelling

2.8 The Conceptual Framework

FIGURE 4: THE CONCEPTUAL FRAMEWORK



2.9 Chapter Summary

This chapter examines theoretical frameworks and empirical studies on the implementation of Warehouse Receipt Systems (WRS). Key theories include Stakeholder Theory, which stresses aligning interests among farmers, banks, and governments for successful adoption; Diffusion of Innovations Theory, which explains how WRS spreads through social systems; and Commitment-Trust Theory, which highlights trust and stakeholder engagement as essential for sustainability. Empirical studies show mixed results—Ethiopia's WRS improved credit access, and Indonesia saw an 11% income increase, whereas Ghana and Zambia struggled with high costs, policy gaps, and low farmer participation. A systematic literature review (2019–2024) identifies four CSFs categories: organisational, stakeholder management, industry/contextual, and technological. The chapter concludes by discussing research gaps, particularly limited studies on Kenya's WRS impact, and a conceptual framework linking CSFs to adoption rates.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research philosophy, design, population, sampling, and data collection methods used in this study. It also explains the quality assurance measures carried out for reliability and validity. An overview of the ethical considerations and data analysis methods is also described.

3.2 Research Philosophy

This study adopted a pragmatist research philosophy. Pragmatism emphasises the practical application of knowledge to address real-world problems, prioritising utility over abstract theory. According to Rashid (2023) pragmatists value knowledge for its utility in solving concrete issues and believe that the validity of a theory or concept lies in its ability to inform effective action. This philosophy was well-suited to the present study, which aimed to explore how Kenya's WRS can better serve smallholder farmers.

Pragmatism supports a flexible, problem-centred approach to research, allowing the integration of both qualitative and quantitative methods, as necessary, to yield insights that can lead to actionable solutions. As Saunders et al. (2019) argue, pragmatic researchers focus on the connection between theory and practice, believing that theories, ideas, and concepts must be evaluated by their impact in real-world situations. This study aimed to identify the CSFs and ensure that these factors could be applied to improve the operational success and adoption of the WRS, instilling hope for positive change.

Given the WRS's potential to revolutionise access to credit for smallholder farmers in Kenya, adopting a pragmatic approach enabled the research to remain focused on practical outcomes. This philosophy allowed the study to combine theoretical insights with empirical data to generate results that inform policy, operational improvements, and better stakeholder engagement strategies. By grounding the research in pragmatic inquiry, this study sought to contribute meaningfully to the agricultural sector in Kenya by providing solutions that are actionable, sustainable, and capable of addressing the challenges smallholder farmers face.

3.3 Research Design

This study adopted a mixed-methods explanatory design, incorporating qualitative and quantitative approaches to address the research questions comprehensively. This design was chosen to ensure a robust exploration of the WRS's CSFs, as it combined a systematic literature review, a case study approach, interviews, and a questionnaire.

The first phase involved conducting a systematic literature review. A systematic search strategy identified studies conducted over the last ten years directly or indirectly related to CSFs for the WRS or public projects in Kenya. Databases such as JSTOR, SAGE, Emerald, Oxford Journals, Google Scholar, and ResearchGate were searched using specific keywords, including "critical success factors," "public sector," "Kenya government," "adoption," "Warehouse Receipt Financing System," and "smallholder farmers." A total of 155 articles were identified and analysed for relevance, availability and citation frequency. This led to 61 articles being identified as potentially relevant to this study. These articles were further analysed to yield a table that outlined the CSFs ranked in order of importance based on the number of citations. This systematic review was the foundation for developing an initial set of CSFs and refining the conceptual framework.

The second phase focused on an in-depth case study of Nakuru County's WRS. The case study method was justified as it allowed the researcher to explore the research questions thoroughly, providing a rich, contextual understanding of the topic (McCombes, 2019). Nakuru County was chosen due to the presence of the National Cereals and Produce Board (NCPB) warehouses and the involvement of smallholder farmers who have deposited their produce there. The qualitative aspect of this research included semi-structured interviews with key stakeholders, such as the Nakuru WRS Manager, Nakuru Equity Bank Manager, Nakuru County Executive Committee members responsible for agriculture, livestock, and fisheries and sampled farmers who had engaged with the system. Face-to-face interviews were conducted with individual farmers and Focus Group Discussions (FGDs) with Farmers' Cooperatives to capture diverse opinions and experiences. Qualitative research provides flexibility, enabling the researcher to adapt questions and settings to elicit more profound responses (Vaughan, 2021). As Saunders et al. (2019) argue, qualitative research strategies, including case studies, are particularly suited to addressing "how," "what," and "why" questions.

In addition to the qualitative approach, the study employed quantitative methods through a questionnaire administered to several Key Informants (KIs). The KIs were asked to rank the identified CSFs using a Likert Scale (1 – 5). This quantitative data complemented the qualitative insights, providing

a more comprehensive understanding of the factors critical to the successful roll-out of the WRS. The KIs were drawn from various stakeholders, including the WRS Chief Executive (or designee), NCPB Nakuru Branch Manager, WRS Council CEO, former AGRA employee, EAGC staff, and Kenya Commodity Exchange staff.

This mixed-methods design was consistent with the study's pragmatic research philosophy, which emphasises the practical application of knowledge to solve real-world problems (Vaughan, 2021). Combining qualitative interviews and FGDs with quantitative data collected from the KIs allowed for a more holistic investigation, ensuring that the research findings were grounded in empirical data and practical experience. The study's design thus contributed valuable insights into the factors necessary to make the WRS a viable solution for smallholder farmers in Kenya.

3.4 Population

The population for this study included all stakeholders involved in the WRS within Nakuru County, Kenya. Nakuru County is known for its high grain production, which made it a relevant region for studying the WRS's impact on smallholder farmers. The population consisted of 55 farmers from 3 farmer cooperatives who had deposited their produce in NCPB warehouses between 2022 and 2023, warehouse managers, bank officials involved in financing the WRS, traders who purchased grains from the warehouses, and key government officials responsible for agricultural policy in the county. These stakeholders represented the entire ecosystem involved in adopting and implementing the WRS. The study aimed to gather comprehensive data on Nakuru's operational, financial, and legal aspects of the WRS by focusing on these groups.

3.5 Sampling

Given the practical constraints and the wide geographical distribution of warehouses across Kenya, the study adopted a purposive sampling method within the chosen case study area - Nakuru County. Purposive sampling was justified because the aim was to select participants who were directly involved with and knowledgeable about the WRS. Nakuru was chosen for its significance as a grain-producing area and because it was logistically convenient for the researcher, allowing for cost-effective data collection.

Initial interviews with the WRS staff were conducted to establish the number of farmers who had engaged with the WRS in Nakuru County. This was followed by a mapping trip to Nakuru where the study area and key informant details were collected from the WRS contact person in Nakuru. This

trip established that four farmers' cooperatives were operational within the Njoro, but only three had engaged with the WRS. A visit to the field established the exact number of farmers who had deposited their grains with the WRS, which was 45 farmers. From this number, the sample size (of 38 farmers) was determined using Yamane's formula: $n=N/(1+Ne^2)$, where 'n' is the sample size, 'N' is the total population, and 'e' is the margin of error expressed as a decimal. Focus Group Discussions were conducted with each cooperative member at the end of the individual farmer interviews.

The WRS contact person provided a list of the key stakeholders for Nakuru. This included:

- Financial Institution Officials: Key officials from a Financial Institution that has been engaged with the system
- The NCPB Nakuru Branch Manager
- Two traders who engaged the system end-to-end,
- Nakuru County government officials: Key informants from the Ministry of Cooperatives and Nakuru County's Agricultural Department.

3.6 Data Collection Methods

This study adopted a mixed-methods approach to gather in-depth insights from various stakeholders in the WRS. The primary focus was on collecting primary and secondary data to comprehensively address the research questions related to the CSFs influencing the effective roll-out of the WRS.

Primary data were collected from smallholder farmers who had deposited their grains in NCPB warehouses under the WRS. Semi-structured questionnaires were used to gather data on farmers' experiences, challenges faced in accessing and using the WRS, their perceptions of the benefits of using their produce as collateral, and opinions on the support received from financial institutions and the government. A team of trained enumerators, supervised by a team leader, administered these questionnaires through face-to-face interviews at the village or farm level. Each questionnaire was reviewed immediately after completion to ensure data quality and completeness. The semi-structured format allowed flexibility, enabling enumerators to delve deeper into topics based on the farmers' responses.

In addition to farmers, key informants, including the Nakuru WRS manager, financial institution officials (e.g., from Equity Bank), warehouse managers, traders, and relevant government officials, were interviewed. These in-depth interviews focused on their roles in the WRS, their operational,

legal, and financial challenges, and their views on the factors critical for the system's success. Furthermore, a Likert-scale questionnaire was administered to critical informants to rank the perceived importance of various CSFs.

Secondary data were collected from reports and documents produced by the WRS, such as performance management reports, progress reports, and audited financial statements. These secondary sources provided additional context and insights, complementing the primary data by highlighting institutional performance and the WRS's operational effectiveness. Using secondary data helped triangulate the findings from primary data and offer a well-rounded perspective on the system's successes and challenges.

3.7 Research Quality

This study ensured the results were valid, reliable, and accurate by adopting several strategies to maintain research quality. According to Saunders et al. (2019), validity refers to the appropriateness of the measures used, the accuracy of the analysis, and the generalizability of the findings, while reliability focuses on the consistency of the research.

Well-established research instruments explicitly tailored for the WRS were used to guarantee validity. The semi-structured questionnaires and interview guides were reviewed by experts in the field before deployment to ensure they appropriately captured the key themes and research questions. A pilot test was conducted with a small sample of respondents to verify that the questions were straightforward and led to relevant, actionable insights. Any issues identified during the pilot study were corrected before full-scale data collection began.

Regarding reliability, consistent data collection procedures were implemented across all respondents. Enumerators underwent rigorous training to ensure they understood how to conduct interviews and administer questionnaires in a standardised manner, minimising bias and inconsistencies. A clear protocol was followed to ensure that every participant received the same level of attention and that questions were delivered in a similar format. Additionally, supervisors monitored enumerators to ensure adherence to the research protocol and quality standards.

A triangulation approach was adopted to enhance credibility and authenticity, gathering data from multiple sources: semi-structured questionnaires, interviews, FGDs, and secondary reports. This method allowed for cross-verification of information, improving the overall robustness of the findings. Data collected from stakeholders such as WRS staff, financial partners, and farmers provided

a holistic understanding of the WRS. Any discrepancies between data sources were thoroughly investigated to identify potential biases or gaps in the research process.

Trustworthiness was also prioritised. Participants were selected based on a clear and unbiased sampling framework, ensuring that all relevant voices were heard. Transparency was maintained by informing participants about the research objectives, the purpose of the study, and how their data would be used—purely for academic purposes. This openness and efforts to build rapport with participants encouraged honest responses.

Additionally, regular data audits were conducted during the data collection process. Supervisors checked completed questionnaires and interview transcripts for errors or missing information, ensuring inconsistencies were resolved in real time. This step helped maintain the accuracy of the data.

Through rigorous enumerator training, a systematic data collection approach, triangulation for validating findings, and careful monitoring and auditing of data collection processes, this study produced reliable, valid, and credible research outcomes

3.8 Data Analysis

After data collection, the raw data were processed and translated into forms suitable for analysis (Kothari & Garg, 2022)The first step was to check the completeness of the questionnaires and the quality of the interviews to ensure critical information was not omitted. Based on the responses, the information was then cleaned, coded, and classified.

Quantitative data from the semi-structured questionnaires were entered into MS Excel for preliminary cleaning and organisation. The data were exported to the Statistical Package for the Social Sciences (SPSS) application for detailed and sophisticated statistical analysis. Basic descriptive statistics, specifically averages and standard deviations, were computed to summarise important respondent characteristics. These statistics helped give a general picture of participant demographics and preliminary insights into responses against some key variables of the WRS.

For qualitative data from FGDs and Key Informant Interviews (KIIs), thematic analysis was adopted. This approach helped identify, analyse, and report patterns or themes within the data. Each FGD and KII transcript was read and re-read, followed by the systematic coding of critical ideas, which were then grouped into themes. Verbatim participant quotations were included to illustrate these themes, ensuring the respondents' voices were captured authentically. The choice of thematic analysis was

justified because it allowed for the flexible interpretation of qualitative data and the generation of rich insights into participants' perspectives on the WRS.

Additionally, content analysis was employed to analyse text-based data collected from reports and secondary sources, such as WRS Council performance reports and financial documents. This method was appropriate for systematically interpreting textual information, providing a deeper understanding of the WRS's operational, financial, and legal framework.

Comparative analysis was also used to compare data from stakeholders such as farmers, WRS staff, and financial partners. This helped identify discrepancies or differences in perceptions regarding the system's effectiveness and challenges.

This study adopted a combination of descriptive statistics for quantitative data, thematic and content analysis for qualitative data, and comparative analysis across stakeholder groups. These analytical techniques provided a comprehensive understanding of the CSFs in the WRS system roll-out, ensuring that quantitative and qualitative insights were captured and integrated effectively. The choice of these methods was aligned with the mixed-methods research design and helped ensure the research findings were robust and multidimensional.

3.9 Ethical Issues

According to Whittington (2020), ethics refers to the standards of behaviour that guide one's conduct concerning the rights of those who become the subject of one's study or are affected by it. This study required human participants; therefore, ethical requirements were observed throughout the research process. Before starting the research, clearance and approval were obtained from the Strathmore University Ethics Review Office. Following this, a license was secured from the National Commission for Science, Technology, and Innovation (NACOSTI) before data collection. The data collection enumerators and their supervisors were adequately trained on issues related to the research, with a specific focus on ethical considerations.

Consent from respondents was sought and secured before the start of each interview. Confidentiality and anonymity were ensured by removing personal identifiers such as names, genders, job titles, and ages and replacing them with anonymous codes: STK1–STK6 for key stakeholders in Nakuru and KI1–KI6 for key informants from the national level. Written consent was also obtained from institutions whose staff participated in interviews, including those representing WRS, NCPB, and participating banks.

In line with Whittington (2020) principles of ethical research, this study adhered to several key ethical standards: open-mindedness by avoiding dishonesty, deception, or misrepresentation of data and findings; respect for others by upholding the rights and dignity of all participants; avoidance of harm - whether emotional, physical, or mental; ensuring participation was voluntary with the right to withdraw at any time; and compliance with data management regulations in line with government policies.

3.10 Chapter Summary

Chapter three outlined the research methodology, detailing the pragmatic research philosophy and the mixed-methods explanatory design used to explore the CSFs for Kenya's WRS. A systematic literature review and a case study conducted in Nakuru County formed the basis of the study, employing a qualitative approach complemented by quantitative data from questionnaires. Purposive sampling targeted smallholder farmers, warehouse managers, financial institution officials, traders, and government representatives. Data were collected through semi-structured interviews, FGDs, and Likert-scale questionnaires.

Expert-reviewed instruments, pilot testing, and triangulation methods were employed to ensure validity and reliability. Data analysis involved qualitative and quantitative techniques, with descriptive statistics used for quantitative data and thematic analysis applied to qualitative insights. Quality assurance measures included training enumerators, standardising data collection procedures, and conducting data audits to ensure accuracy.

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter analyses and interprets data collected through interviews with smallholder farmers in Nakuru and discussions with key informants about system adoption in Kenya. Thematic analysis was employed to categorise the findings according to the key research objectives.

4.2 Findings from Smallholder Farmers and Key Stakeholders in Nakuru

4.2.1 Response Rate

A reasonable response rate is essential to determining whether a study obtained the participants' threshold to make it valid, effective, and representative of the targeted population. (Saunders et al., 2019). The study focused on 55 smallholder farmers selected from three farmer cooperatives who had deposited their farm produce with the WRS. Using the Yamane formula, the sample size was 45 farmers. The enumerators reached 38 farmers, resulting in a response rate of 84.4%. This response rate is considered adequate for analysis. According to (Barbie, 2016), a response rate of 60% or above is generally considered appropriate for a study to make valid conclusions and recommendations, indicating that this study met the threshold. The table below summarises the response rate.

TABLE 4: RESPONSE RATE

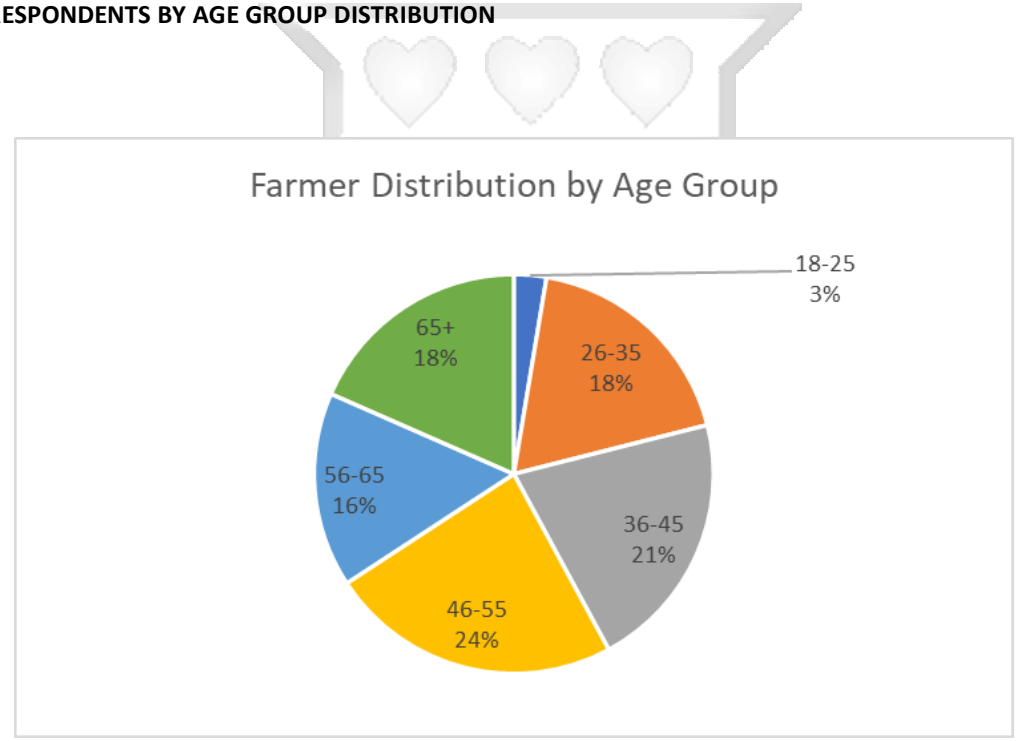
Category	Sample		Response			Non-Response
	Frequency	Percentage	Frequency	Percentage	frequency	Percentage
Farmers	45	100%	38	84.4%	7	15.6%
Nakuru Stakeholders	7	100%	5	71.4%	1	28.6%

For Nakuru-based stakeholders, 5 out of 7 targeted stakeholders were interviewed, achieving a response rate of 71.4%. This high response enhances the validity and reliability of the findings, ensuring that they accurately reflect the perceptions and experiences of farmers, financial institutions, government officials, and warehouse managers regarding WRS adoption in Kenya. The high participation rate also underscores the recognition among stakeholders of WRS's potential to improve agricultural financing and storage systems.

4.2.2 Distribution of Respondents by Age Group

The demographic analysis reveals that farmers predominantly fall within the age group of 46-55 years, comprising 23.68% of the total, followed closely by those aged 36-45 years at 21.05%, as illustrated in Figure 4.2.1 below. The age groups 26-35 years and 65 years and older each account for approximately 18.42%. Meanwhile, farmers aged 56-65 years constitute 15.79% of the sample. Notably, the youngest age group (18-25 years) is the least represented, making up only 2.63% of the total. This demographic profile suggests that farming is predominantly practised by middle-aged and older individuals, with a marked absence of young people. Consequently, this trend may challenge engaging younger generations in agriculture, potentially jeopardising the sector's long-term sustainability if left unaddressed.

FIGURE 5: RESPONDENTS BY AGE GROUP DISTRIBUTION

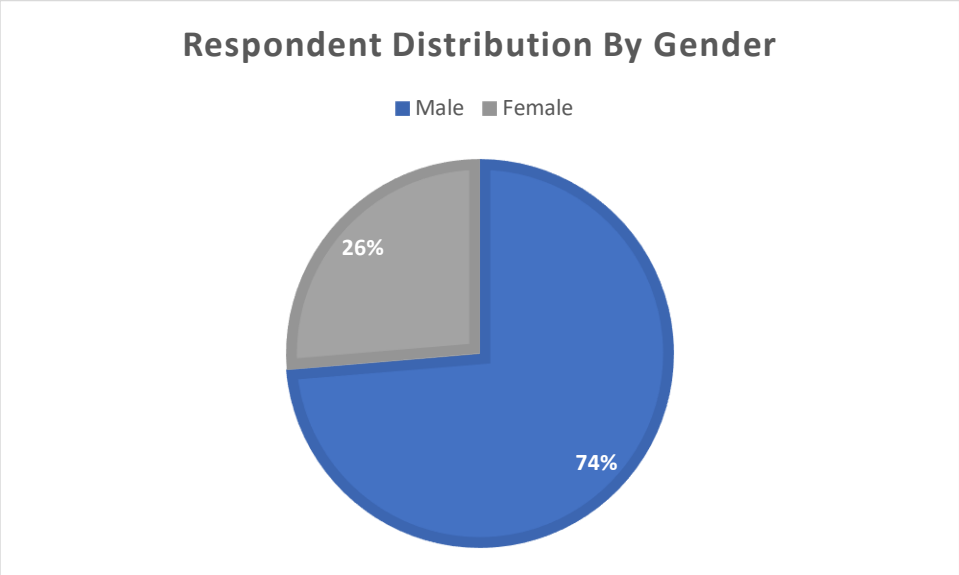


4.2.3 Distribution of respondents by gender

The figure below illustrates the gender distribution of surveyed farmers, depicting a disproportionate gender composition within Kenya's agricultural sector. Male farmers constitute a significant majority (74%), while female representation remains markedly low (26%). This disparity underscores the sector's male-dominated structure and highlights systemic barriers to female participation, including limited access to land ownership, agricultural resources, and gender-sensitive financing mechanisms.

The observed imbalance suggests entrenched socio-economic inequities that may hinder women's full engagement in farming activities. Addressing this gap necessitates strategic policy interventions, such as land tenure reforms, targeted empowerment programs, and gender-sensitive agricultural financing frameworks, to foster greater inclusivity and equitable participation in the sector.

FIGURE 6: Distribution of Respondents by Gender



4.2.4 Distribution of Respondents by number of years working as a farmer

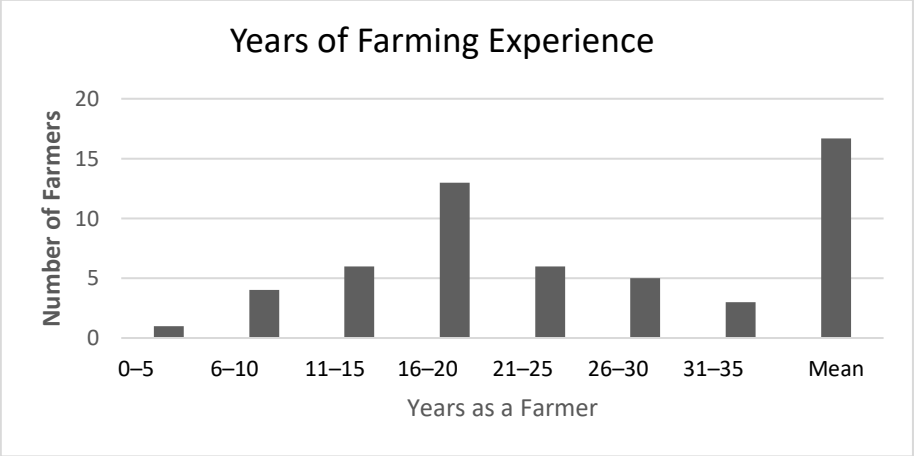
The figure below presents a bar graph illustrating farmers' farming experience. According to the data, the largest group consists of farmers with 16–20 years of experience, with 14 individuals falling into this category. This indicates that many farmers are long-term practitioners, benefiting from extensive knowledge and experience accrued over time. The second largest group comprises farmers with 11-15 years of experience, followed by those with over 21 years of experience.

These findings highlight a significant presence of seasoned farmers within the population. Conversely, newer entrants to farming are notably fewer, with only six farmers in the 6-10 years category and just one farmer in the 0-5 years category. This suggests a limited influx of new participants into farming, raising concerns about generational transitions in agriculture. The challenges of attracting younger or less experienced individuals may have implications for the sustainability of farming practices if efforts are not made to encourage new entrants into agriculture.

This finding aligns with research by the World Bank (2024), which emphasises the resilience of Kenya's agricultural sector despite challenges such as youth unemployment and climate change. The report notes that while agriculture remains a cornerstone of Kenya's economy, barriers such as

limited access to resources and opportunities for younger generations threaten its long-term sustainability.

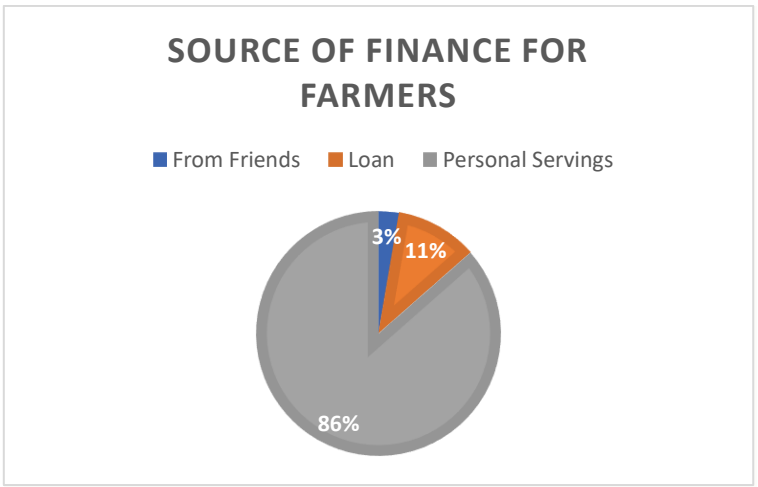
FIGURE 7: DISTRIBUTION OF FARMERS' EXPERIENCE



4.2.5 Farmers' Source of Finance

The data in the figure below indicate that farmers predominantly rely on personal savings, which account for 86.84% of their funding sources. This reliance on self-resources underscores the limited capital available for expansion, potentially constraining agricultural growth. Loans contribute only 10.53%, suggesting that few farmers access external financing, possibly due to high interest rates, lack of collateral, or lengthy loan application processes. Furthermore, financial support from friends is minimal, at 2.63%, highlighting a weak social support network.

FIGURE 8: SOURCE OF FINANCE FOR FARMING



These findings highlight farmers' significant challenges, including limited access to institutional credit, a high dependence on personal funding, and a lack of diverse funding sources. Such constraints can hinder the adoption of new technologies that enhance productivity and resilience against economic shocks. Consequently, there is a pressing need for broader financial inclusion and access to affordable credit facilities to support agricultural development.

This scenario aligns with observations by the Central Bank of Kenya (2025), which notes that farmers often face challenges in accessing external financing, leading to a reliance on personal savings for agricultural inputs. The report emphasises the importance of improving access to credit for agricultural development.

4.2.6 Respondents' Rating on the WRS Performance Rating

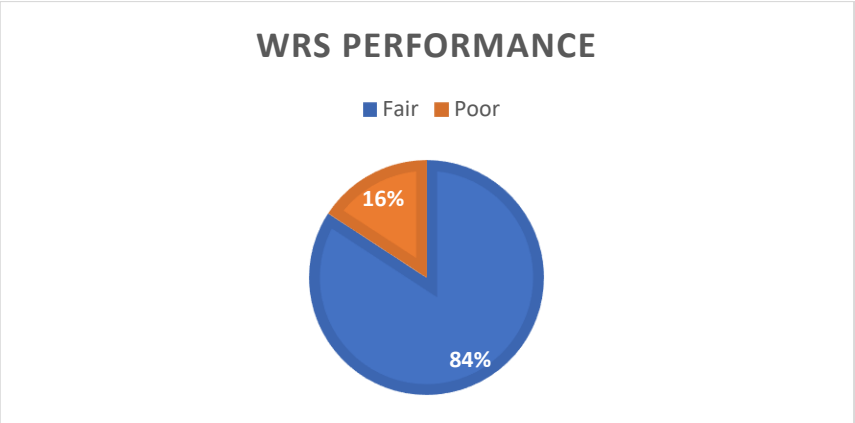
The findings reveal a deeply polarised assessment of the WRS performance, with 84% of respondents rating the system as poor and 16% evaluating it as fair. This stark division underscores significant challenges in the system's implementation and effectiveness. The primary drivers of dissatisfaction include financial losses due to price fluctuations, logistical inefficiencies, and market access difficulties.

Farmers face substantial risks when commodity prices drop unexpectedly, eroding the financial benefits of using the WRS. Additionally, logistical challenges such as inadequate storage facilities, loan access delays, and inconsistent grading systems further exacerbate frustrations. These issues highlight systemic gaps in the WRS framework, particularly in stabilising prices, streamlining operations, and enhancing market linkages—factors critical for building farmers' confidence and ensuring sustained adoption.

This aligns with findings from AGRA (2020), which examined warehouse receipt systems (WRS) in Africa. The report identifies key barriers to WRS success in Kenya, including price volatility, limited infrastructure, and weak market integration. It emphasises that if these issues are not addressed, WRS will struggle to achieve its intended benefits for smallholder farmers.

The findings align with broader challenges observed in agricultural financing systems, where structural barriers such as fragmented infrastructure and inconsistent implementation often undermine adoption (World Bank, 2023). Despite the system's perceived value in principle, its practical limitations—such as unreliable processes and logistical bottlenecks—pose significant hurdles to sustained engagement.

FIGURE 9: SYSTEM PERFORMANCE RATING BY RESPONDENTS



The primary drivers of dissatisfaction included financial losses from price fluctuations, logistical challenges, and marketing difficulties. These findings underscore systemic gaps in implementation, particularly in stabilising prices, streamlining operations, and enhancing market access—critical factors for farmer confidence and sustained adoption.

The results align with broader challenges in agricultural financing systems, where price volatility and logistical inefficiencies often exacerbate risks for smallholder farmers (World Bank, 2023). Addressing these issues through price stabilisation mechanisms, infrastructure development, and market integration strategies could mitigate losses and improve the system's perceived effectiveness.

4.3 Challenges Faced by Smallholder Farmers in Adopting the WRS

As illustrated in the figure below, smallholders encounter specific key challenges in adopting the WRS. The primary hindrance to the system's adoption is the lack of awareness and understanding, cited by 20% of respondents. Farmers interviewed demonstrated limited knowledge of the system's objectives and stakeholder roles, underscoring the need for enhanced educational campaigns and outreach programs. Price speculation (15%) impedes market participation. This practice involves buying food commodities at a certain price to profit from future price movements. Additionally, high transaction costs (14%) further discourage engagement. To address these challenges, well-structured price stabilisation policies are necessary. Such policies may include hedging, price insurance, and similar mechanisms. Furthermore, access to low-interest financial services is critical. Financial institutions can provide these services effectively if supported by appropriate regulations.

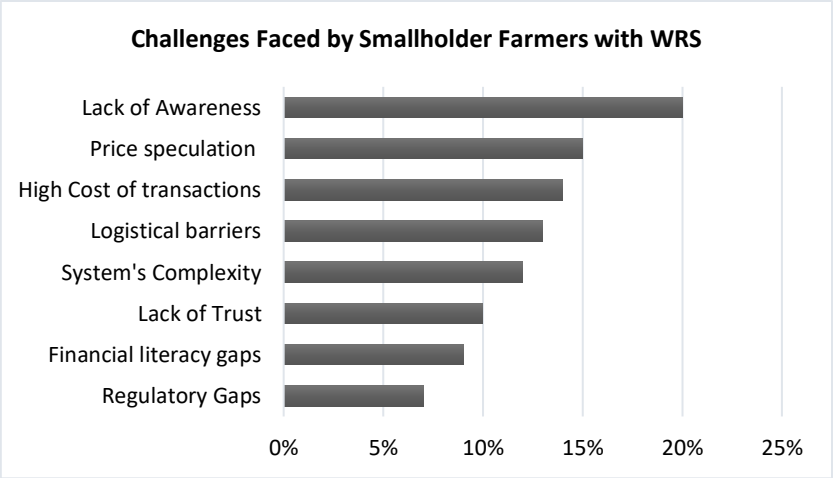
Logistical challenges (13%) and system complexities (12%) are not merely assumed barriers but reflect documented inefficiencies in Kenya's agricultural value chains. For instance, Gatonye &

Adam (2023) attribute 78% of post-harvest losses to poor roads and storage, while Mwangi et al. (2021) quantifies how transport costs slash smallholder profits by 30% – 40%. These findings, corroborated by the IFC's WRS initiative, underscore the urgency of infrastructure upgrades and systemic reforms (Nyawira, 2023).

Building trust in the WRS and enhancing financial literacy are critical for its adoption among smallholder farmers. Farmers often lack confidence in the system due to limited awareness and perceived risks, such as mismanagement or fraud. For instance, the Kenya Economic Update by the World Bank (2019), highlights that poor knowledge delivery systems, including limited extension services and financial education, hinder farmers' ability to adopt modern agricultural technologies and financing mechanisms. Empirical evidence underscores the importance of addressing these challenges. The Ministry of Trade and IFC's USD 2.3 million WRS project aims to strengthen Kenya's legal framework, establish a central registry for warehouse receipts, and improve public awareness through stakeholder dialogues (IFC, 2023). These initiatives are designed to foster confidence in the system and ensure its accessibility.

To enhance adoption rates, targeted interventions such as financial literacy training programs for farmers, robust regulatory enforcement mechanisms, price stabilisation measures through commodity exchanges, and infrastructure development (e.g., certified warehouses) are essential. AGRA (2023) notes, "A strong warehouse receipt system provides farmers with secure storage facilities and access to credit while reducing post-harvest losses." These efforts collectively address systemic barriers and create an enabling environment for smallholder farmers to benefit fully from WRS.

FIGURE 10: CHALLENGES FACED BY SMALLHOLDER FARMERS WITH THE SYSTEM



These findings align with research emphasising the importance of awareness and infrastructure in agricultural systems. For instance, a study by the Food and Agriculture Organisation (FAO) of the United Nations highlights the role of education and infrastructure in improving agricultural productivity and market access for smallholder farmers (FAO, 2022)

4.4 Respondents' perspectives on the Warehouse Receipt System

Below are relevant quotes highlighting the main challenges and opportunities identified by the Nakuru respondents, conveying their diverse perspectives and experiences regarding CSFs for WRS adoption in Kenya.

TABLE 5: NAKURU COUNTY STAKEHOLDERS' INSIGHTS ON FACTORS INFLUENCING WRS ADOPTION

Theme	Source	Direct Quote	Context/Explanation
Stakeholder Management			
Farmer Education	Nessuit Farmer	"We find the system too complicated, and the benefits are unclear. The government needs to help us understand how this works."	This underscores the necessity of government-led educational initiatives to demystify the system's mechanics and clarify its advantages for farmers.
Organizational Factors			
Decentralized Representation	STK-3	"For better engagement with the farmers, the WRS Council needs field representatives at the county level."	This highlights the need for a stronger institutional presence at the grassroots level to drive system adoption and address localised challenges.
System Simplification	STK-2	"We need to simplify the system. For example, why do we need to re-bag products into 50 kg bags, and why insist on using chute bags, which are too expensive?"	This points to the urgency of streamlining operational requirements to reduce costs and enhance accessibility for smallholder farmers.
Industry Factors			
Transformative Potential	STK-4	"Given the current status of cereal trading in Kenya, the WRS is a saviour to our farmers' plight. Unfortunately, we are way off from achieving the intended objectives,	This underscores the transformative potential of Warehouse Receipt Systems (WRS) in mitigating challenges smallholder farmers face, despite persistent implementation barriers.

4.5 Findings from Key Informant Interviews

Key informant interviews are a critical methodological tool for assessing system performance, as they offer in-depth insights into stakeholders' perceptions, experiences, and expertise. Key informants, who often possess specialised knowledge or privileged access to information, play a pivotal role in enhancing the understanding of complex research topics. This method is particularly effective

for exploring sensitive issues, identifying underlying challenges, and providing contextual nuances that may not be captured through other qualitative approaches (Pahwa et al., 2023).

4.5.1 Key Informants Response Rate

Six key informants (KIs) out of the seven initially targeted were interviewed, yielding a response rate of 85.7%, as stipulated in the table below.

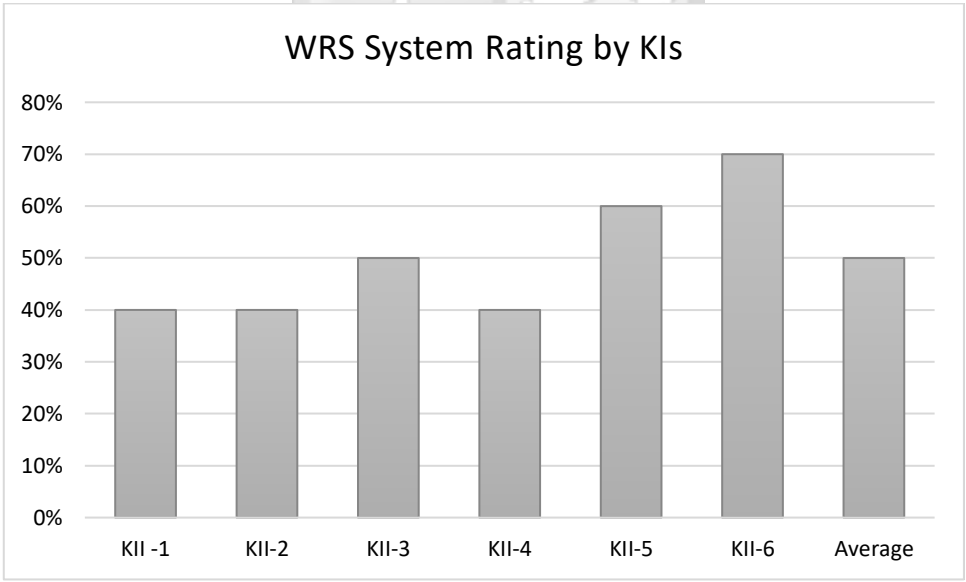
TABLE 6: RESPONSE RATE FOR KEY INFORMANT INTERVIEWS

Category	Sample		Response			Non-Response
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
National Level KIs	7	100%	6	85.7%	1	14.2%

4.5.2 Key Respondents Rating on the WRS Performance

The table below presents the ratings provided by the KIs regarding the WRS's performance. With an average rating of 50%, the KIs perceived that the system has progressed but still falls short of achieving its intended objectives.

FIGURE 11: WRS PERFORMANCE RATING



4.5.3 Critical Success Factors Ranking by Key Informants

The key informants were anonymised and assigned unique identifiers (KII-1, KII-2, KII-3, KII-4, KII-5, KII-6) to ensure their confidentiality per ethical research protocols. This approach was implemented to protect participants' privacy while maintaining the research findings' integrity. Anonymisation safeguards respondents' identities and encourages openness and honesty in their responses, which is critical for collecting reliable qualitative data. Furthermore, this practice aligns with established ethical standards in qualitative research, where protecting participant identities is essential to fostering trust and minimising potential risks (Saunders et al., 2019). The results of this exercise are summarised in the table below.

TABLE 7: CRITICAL SUCCESS FACTORS RATINGS

Critical Factors	KI-1	KI-2	KI-3	KI-4	KI-5	KI-6	Mean	Std. Dev
Stakeholder Management Factors								
Stakeholder Engagement	5	5	5	4	4	4	4.5	0.55
Targeted education and sensitisation programs	5	5	5	5	4	5	4.83	0.41
Building strong Public-Private Partnerships	5	5	5	5	4	5	4.83	0.41
Building WRS brand (Trust, Integrity, and Accountability)	5	5	4	3	4	4	4.16	0.75
Developing sub-county and local capacities for WRS	4	5	5	5	4	4	4.5	0.55
Organisational Factors								
Effective WRS Leadership & Management	5	5	5	5	5	5	5	0.00
Strong Field Representation	4	5	5	5	5	5	4.83	0.41
Monitoring & Evaluation	4	5	5	4	5	5	4.66	0.52
Risk Management & Quality Assurance	5	5	5	5	5	5	5	0.00
Adequate Funding & Timely Financing	4	5	5	4	5	5	4.66	0.52
Industry Factors								
Strong Legal and Regulatory Framework	4	5	5	4	5	5	4.66	0.52
Government Support and Political Goodwill	5	5	5	5	5	5	5	0.00
Functional Commodities Exchange (	4	5	4	5	4	5	4.5	0.55
Competition from Traders, Cartels, and Middlemen	3	4	4	3	4	3	3.5	0.55
Suitable Infrastructure and Logistics	4	5	5	4	5	5	4.66	0.52
Technological Factors								
Establishing ICT Infrastructure	5	5	5	5	5	5	5	0.00

Critical Factors	KI-1	KI-2	KI-3	KI-4	KI-5	KI-6	Mean	Std. Dev
Using technology to enhance security and transparency in the system	5	5	5	5	5	5	5	0.00
Setting up WRS digital platform	5	5	5	5	5	5	5	0.00
Reliable Market Information System	5	5	5	5	5	5	5	0.00
Use of social media for information dissemination	5	4	5	5	5	5	4.83	0.41

Under stakeholder management factors, the findings show that collaboration among multiple stakeholders—including government agencies, financial institutions, NGOs, public-private partnerships (PPPs), and farmers' cooperatives—plays a crucial role in adopting WRS. This collaboration has a moderate level of agreement, reflected in a mean score of 4.5 out of 5 with a standard deviation of 0.55, confirming that most people recognise stakeholder involvement as key to supporting WRS adoption. This aligns with a study conducted in West Java, Indonesia, which found that a lack of awareness and limited stakeholder involvement (e.g., farmers, local governments, financial institutions) hindered WRS adoption (Gunawan et al., 2019).

Two factors demonstrate an exceptionally high level of consensus among respondents: targeted education programs and public-private partnerships, both of which received a mean rating of 4.83 with a low standard deviation of 0.41. This minimal response variability suggests near-unanimous agreement regarding their effectiveness in driving the WRS adoption. In contrast, trust-building emerged as an area of significant response dispersion, with a mean score of 4.16 and a notably higher standard deviation of 0.75. This value, nearly double that of other factors, indicates polarized views regarding institutional credibility. While some stakeholders acknowledge progress in trust-building initiatives, others remain highly sceptical, particularly concerning pricing mechanisms and payment timelines. Such scepticism aligns with documented concerns over market manipulation and political interference in agricultural market (FSDKenya, 2024).

Capacity development initiatives also display moderate agreement, a mean score of 4.5 and a standard deviation of 0.55. The response variability suggests a broad consensus on the necessity of local capacity-building efforts, yet it also highlights ongoing disagreements regarding the effectiveness of current implementation strategies. To address these findings, several strategic recommendations emerge. High-consensus areas, such as targeted education programs and public-private partnerships, should be leveraged as foundational elements to secure early successes (ADB Group, 2021). Trust

issues require specific solutions, like using clear pricing dashboards that share real-time data to build credibility. Working together in cooperative networks can help reduce differences in opinions about capacity-building efforts, creating better agreement through peer learning.

This statistical analysis underscores the importance of considering mean scores and response variability when assessing CSFs. While average ratings indicate general trends, the standard deviation values reveal areas where targeted interventions are most needed, particularly in trust-building and policy enforcement. These findings align with patterns observed in East African agricultural credit systems, where standard deviations exceeding 0.7 often signal critical intervention points in financial inclusion programs (Wagao et al., 2024).

The analysis of organisational factors reveals a unanimous stakeholder consensus on two critical pillars: leadership and management within the WRS, risk management and quality assurance. Both factors received a perfect score of 5.0, with a standard deviation of 0.00, indicating absolute agreement on their indispensable role in ensuring system coordination and integrity. Similarly, strong field representation exhibits a high level of agreement, reflected in a mean score of 4.83 and a low standard deviation of 0.41. This finding underscores its crucial role in bridging accessibility gaps for remote farmers.

Monitoring systems and funding mechanisms, both scoring 4.66 with a standard deviation of 0.52, demonstrate moderate response variability. This suggests that while their importance is recognised, stakeholder perspectives diverge regarding current implementation effectiveness. To address these concerns, decentralising decision-making processes and incorporating cooperative networks for peer learning emerge as strategic priorities, ensuring that monitoring and funding mechanisms align more closely with stakeholder expectations.

Regarding industry factors, government support enjoys absolute consensus, receiving a perfect mean score of 5.0 with a standard deviation of 0.00. This result underscores the perception that government backing is integral to WRS sustainability. However, factors such as legal frameworks, infrastructure, and KOMEX functionality exhibit moderate variability, with mean scores of 4.66 and 4.5 and standard deviations ranging between 0.52 and 0.55. These findings suggest mixed views on policy enforcement and market connectivity.

Competition from intermediaries emerges as a significant challenge, with the lowest mean score of 3.5 and a relatively high standard deviation of 0.55, reflecting acute concerns regarding cartel dominance and price manipulation. Given these findings, strategic interventions should focus on

enhancing transparency through blockchain-enabled price dashboards, a solution successfully tested in Kenya's Twiga Foods-IBM partnership (Ngila, 2021) . This approach can improve trust in legal and infrastructural frameworks by providing accessibility to real-time price data.

Technological factors display exceptionally strong stakeholder alignment, with four key components—ICT infrastructure, security-enhancing technology, digital WRS platforms, and market information systems—achieving perfect scores of 5.0 with a standard deviation of 0.00. These results indicate a universal belief in technology's transformative potential within the WRS ecosystem. However, social media adoption, with a mean score of 4.83 and a standard deviation of 0.41, exhibits slightly lower consensus, likely influenced by rural digital literacy gaps. A parallel trend was observed in Tanzania's Kilimo MIS study, which highlighted the impact of mobile penetration on system adoption (Kilimo, 2020). To address these challenges, integrating high-consensus technological tools with grassroots training programs emerges as a strategic priority. Adopting Dimitra's mobile-first blockchain models offers a viable solution to overcome literacy barriers and enhance digital adoption among rural stakeholders (Dimitra, 2021). However, challenges persist, including unequal access to smartphones and reliable internet, which can limit the inclusivity of these systems (Mulwa, 2021).

Synthesizing these findings reveals critical patterns in stakeholder alignment and response variability. Factors with a standard deviation below 0.5, such as technological infrastructure, should be leveraged as consensus anchors, forming a strong foundation for system implementation. Those with standard deviations between 0.5 and 0.55, including legal frameworks and KOMEX outreach, require targeted solutions tailored to specific contexts to enhance stakeholder trust. Meanwhile, factors with a standard deviation exceeding 0.55, such as competition from intermediaries, should be treated as systemic risks requiring urgent interventions, such as anti-trust measures to mitigate cartel influence. This dual-metric approach aligns with the strategic goals of Kenya's WRS Council, offering a roadmap to address stakeholder alignment gaps and operational hurdles

4.6 Analysis of respondents' perspectives on WRS adoption

Below are relevant quotes organised thematically to convey the respondents' diverse perspectives and experiences regarding CSFs for WRS adoption in Kenya. These quotes highlight the main challenges and opportunities identified by the participants.

TABLE 8: KEY INFORMANTS' INSIGHTS ON WRS

Theme	Source	Direct Quote	Context/Explanation
Stakeholder Management			
Farmer Education	KI-5	"Most smallholder farmers are not conversant with the system, and farmer sensitisation remains low."	This highlights the critical need for intensive farmer education on the WRS to enhance awareness and adoption.
Stakeholder Engagement	KI-1	"We need a serious stakeholder consultation forum for the system to work. This should include millers, farmers, financial institutions, and the government."	This emphasises the importance of continuous stakeholder engagement to foster collaboration and align interests across sectors.
Organizational Factors			
Regional Price Monitoring	KI-1	"The WRS Council should consider a regional view on price variations since maize prices in Uganda or Tanzania affect prices in Kenya."	This highlights the need for closer monitoring of regional commodity prices to curb speculative practices and ensure fair pricing for farmers. Additionally, farmer education programs should be implemented to explain the factors contributing to lower maize prices in Uganda and Tanzania.
Industry Factors			
Infrastructure and Systems	KI-6	"The government should consider privatizing NCPB and mandating them to implement the WRS. They have the infrastructure and systems nationwide to deliver on the WRS mandate."	This proposes leveraging existing infrastructure through privatisation to enhance efficiency and scalability in system implementation.
Financial Support Mechanisms	KI-1	"The government should establish a fund (similar to the Cherry Fund for coffee) to offer low-cost advances to farmers to meet immediate post-harvest needs."	Highlights the need for financial mechanisms to prevent distress sales and encourage farmer participation in WRS.
Market Transparency	KI-2	"The establishment of a marketing information system and a credible trade platform is critical to the success of the WRS."	Emphasizes the importance of initiatives like KOMEX and EAGC's G-Soko in promoting transparency, reducing exploitation, and fostering trust in grain trading.

4.7 Recommendations for Warehouse Receipt System

Several recommendations and suggestions were made on enhancing the WRS and engaging smallholder farmers throughout the data collection process. These recommendations represented solutions to the stakeholders' challenges and pain points with the system. The table below ranks these in order of importance.

TABLE 9: TOP TEN RECOMMENDATIONS FROM RESPONDENTS

	Top Ten Recommendations from Respondents	# mention
1	Restructure the WRS leadership and Management systems for better governance and more substantial field presence (*Action point addresses governance, compliance, operationalisation, and reach challenges facing WRS)*	10
2	Enhance Farmer Education and Awareness Programs *(Action points on training initiatives to improve WRS adoption and best practices.)*	9
3	Strengthen the digital integration of WRS with existing e-commerce platforms and mobile money *(Action points on digitising marketing, receipts and enhancing market linkages.)*	9
4	Establish a Price-Stabilisation Fund for WRS Participants *(Action points on mitigating price volatility risks for farmers)*	9
5	Foster Public-Private Partnerships to Scale WRS Investments *(Action points on incentivising private sector engagement in WRS expansion)*	8
6	Develop Tailored WRS Products for Large-Scale Farmers *(Action points on customised solutions to attract commercial producers)*	8
7	Expand and Modernise Warehouse Infrastructure in Key Agricultural Regions *(Action points on improving storage accessibility and certification)*	7
8	The government should prioritise the full operationalisation of the KOMEX and actively support the expansion of platforms like G-SOKO to enhance transparent, open trade. *(Action points on the creation of a competitive marketplace, improved price discovery, and a boost to farmer participation in formal markets)*	7
9	Diversify Crop Production to Include High-Value Crops *(Action points to focus on promoting non-maize crops to boost farmer income)*	7
10	Promote smallholder participation through cooperative incentives and Subsidies *(Action points on financial support mechanisms for farmer groups and societies who are the main grain aggregators)*	6

4.8 Findings and Interpretation

4.8.1 Stakeholder Management Factors Influencing WRS Adoption

The adoption of the WRS in Kenya is strongly influenced by stakeholder management factors, most notably limited awareness and understanding among smallholder farmers. Only 20% of surveyed farmers cited adequate knowledge of WRS, with many expressing confusion regarding its benefits and processes. This finding is consistent with previous research, highlighting that a lack of awareness and information is a significant barrier to WRS uptake in Kenya and other sub-Saharan African countries (Chitra, 2014). Gender disparities persist, as male farmers dominate participation due to systemic issues such as unequal land ownership and restricted access to credit for women. Stakeholder collaboration, particularly through public-private partnerships and farmer education, was identified as critical for successful adoption. These insights align with the Warehouse Receipt System Act, which mandates the Council to promote stakeholder engagement and education as part of its core functions (Republic of Kenya, 2019). Thus, targeted sensitisation and inclusive engagement strategies are essential to demystify WRS and build trust among smallholders.

4.8.2 Organisational Factors Affecting Smallholder Participation in WRS

Organisational capacity, especially in leadership and governance, emerged as a decisive factor in WRS adoption. Weak field representation and bureaucratic delays were cited as significant obstacles, echoing findings from studies that emphasise the need for strong institutional frameworks and effective management to support WRS implementation. Financial constraints remain a significant challenge, with 86.84% of farmers relying on personal savings due to limited access to credit facilities, a situation exacerbated by the absence of robust monitoring and evaluation mechanisms (Gichau, 2011). The Warehouse Receipt System Act (2019) underscores the importance of establishing a central registry and a network of licensed warehouses to ensure system integrity and efficiency (Republic of Kenya, 2019). Therefore, strengthening governance, improving field-level representation, and establishing mechanisms such as price stabilisation funds are critical for enhancing organisational effectiveness and supporting smallholder inclusion.

4.8.3 Industry and Contextual Factors Affecting WRS Scalability

Industry-level constraints, particularly infrastructure deficits and policy gaps, significantly affect the scalability of WRS in Kenya. Logistical challenges, such as inadequate storage facilities and poor rural transport, contribute to post-harvest losses and market inefficiencies (RNRRS, n.d.). While government support for WRS is strong, weak enforcement of regulations has allowed market manipulation by cartels, undermining the system's benefits. The potential of commodity exchanges, such as KOMEX, to enhance market transparency and price discovery was highlighted as a promising reform. These findings are supported by regional experiences, where the lack of efficient storage, grading systems, and reliable market information has hindered the effectiveness of WRS in sub-Saharan Africa (Onumah, 2010). Thus, industry reforms must create a transparent and efficient market environment, including privatising state-run storage facilities and operationalising commodity exchanges.

4.8.4 Potential of Digital Solutions in Enhancing WRS Adoption

Technological innovation is recognised as a transformative factor for WRS adoption. The integration of digital platforms, such as mobile money and blockchain, was rated highly influential, yet access among smallholder farmers remains limited (Chitra, 2014). Social media and ICT infrastructure are underutilized but hold potential for disseminating market information and improving system transparency. Adopting digital solutions can streamline transactions, reduce fraud, and enhance traceability, aligning with global trends in agri-finance innovation. The Warehouse Receipt System Act

also emphasises the need for efficient record-keeping and monitoring, which digital tools can support. Therefore, integrating WRS with digital platforms and adopting blockchain technology are strategic steps toward increasing transparency, efficiency, and trust in the system (RNRRS, n.d.).

In summary, the findings across all four objectives reveal a complex interplay of stakeholder, organisational, industry, and technological factors influencing WRS adoption in Kenya. Addressing these challenges requires a holistic approach that combines targeted education, institutional strengthening, industry reforms, and digital innovation. These recommendations are supported by both local and regional evidence, positioning Kenya to leverage its unique institutional capacity and stakeholder networks for sustainable agricultural transformation.

4.9 Chapter Summary

This chapter examined the adoption of Kenya's WRS using mixed methods, achieving strong response rates of 84.4% from farmers and 85.7% from key informants. The analysis focused on four primary areas aligned with the research objectives. Findings revealed low farmer awareness (only 20%) and significant gender imbalance (74% male participation) hindered WRS uptake. Stakeholder collaboration was highly valued (4.83/5), with calls for more decentralised representation and stronger public-private partnerships to improve inclusivity and reach.

Organisational challenges emerged as significant barriers, with weak leadership and heavy reliance on personal savings (86.84%) limiting system efficiency. Respondents emphasised the need for robust field representation (4.83/5) and effective price stabilisation mechanisms to overcome bureaucratic and financial constraints. At the industry level, infrastructure gaps such as inadequate storage and logistics and cartel exploitation (3.5/5) eroded trust in the system. However, strong government support (5/5) and the functionality of the commodities exchange (KOMEX, 4.5/5) were critical enablers for reform and market stabilisation.

Technological factors stood out as transformative, with digital solutions, including blockchain and mobile platforms, rated a perfect 5/5 for enhancing transparency and market access. The chapter concludes with clear policy implications: regulatory reforms, targeted financial incentives, and infrastructure investments, supported by emerging technologies, are essential to boost WRS adoption. These findings offer practical guidance for policymakers to strengthen Kenya's agricultural financing framework and effectively engage smallholder farmers.

CHAPTER 5: DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This discussion synthesises findings on the CSFs and challenges influencing the adoption of Kenya's WRS, framed within the research objectives. The analysis draws on the Diffusion of Innovations Theory (Rogers, 2003), Stakeholder Theory (Freeman, 1984), and Commitment-Trust Theory (Morgan & Hunt, 1994) to contextualize the barriers and opportunities for smallholder farmers.

5.2 Summary of Findings

The study revealed that smallholder farmers in Nakuru face significant barriers to WRS adoption, including low awareness (20% of respondents), price volatility risks, and high reliance on personal savings (86.84%) due to limited access to credit. Demographic data showed a male-dominated sector (74% male participation) and an ageing farmer population, with only 2.63% under 25 years engaged in WRS. Despite these challenges, farmers recognised the system's potential benefits, such as secure storage and market linkages, though 84% rated its current performance as "poor" due to logistical inefficiencies and lack of trust in pricing mechanisms.

Local stakeholders - including cooperatives, warehouse managers, and county officials - emphasised operational bottlenecks, such as complex bagging requirements and inadequate field representation, that deterred farmer participation. They highlighted the need for simplified processes (e.g., reducing re-bagging costs) and decentralised governance to improve accessibility. Notably, stakeholders acknowledged WRS's transformative potential for stabilising grain markets but stressed that systemic gaps, including weak enforcement against cartels and fragmented infrastructure, must be addressed to unlock its full impact.

Key informants (response rate: 85.7%) identified strong leadership (rated 5/5), digital integration (e.g., blockchain, mobile platforms), and policy enforcement as CSFs. They advocated for public-private partnerships (4.83/5) to scale infrastructure investments and farmer education programs to bridge awareness gaps. However, informants noted persistent challenges, such as competition from middlemen (3.5/5) and delays in operationalising KOMEX, underscoring the need for coordinated action between government, financiers, and tech providers to drive WRS adoption.

5.3 Discussion of Findings

This section discusses the CSFs influencing the adoption of the WRS by smallholder farmers in Kenya, organised according to the four research objectives. The discussion integrates the Diffusion of Innovations Theory (Rogers, 2003), Stakeholder Theory (Freeman, 1984), and Commitment-Trust Theory (Morgan & Hunt, 1994) to provide a theoretical lens on the findings.

5.3.1 Stakeholder Management Factors Influencing WRS Adoption

The study found that limited awareness and understanding of WRS among smallholder farmers is a fundamental barrier to adoption, with 20% reporting insufficient knowledge of the system's benefits and processes. This aligns with Rogers' Diffusion of Innovations Theory, which posits that innovations perceived as complex or incompatible with existing practices experience slow adoption (Rogers, 2003). Despite government and IFC efforts to increase awareness, outreach remains fragmented and insufficient, limiting diffusion.

Gender disparities also emerged as a critical stakeholder management issue. Male farmers dominate participation due to systemic barriers such as land ownership inequality and limited access to credit for women, consistent with findings from KENAFF (2022) and Towo & Kimaro (2014). Cultural norms and safety concerns further restrict women's engagement, underscoring the need for inclusive outreach programs.

Stakeholder theory emphasises the importance of collaborative governance in addressing these systemic inequities (Freeman, 1984). The partnership between the Ministry of Trade and the IFC to strengthen the legal framework and central registry illustrates this collaboration. Strengthening farmer cooperatives and enhancing financial literacy are also vital to empower marginalised groups, as recommended by AGRA (2023). These strategies can foster trust and shared commitment, which are critical for successful WRS adoption.

5.3.2 Organisational Factors Affecting Smallholder Participation in WRS

Organisational leadership and governance were identified as pivotal CSFs. The WRS Council's regulatory-heavy mandate and limited field presence reduce its operational effectiveness, mirroring challenges noted in other African contexts (Chitra, 2014). Weak leadership, bureaucratic delays, and inadequate staff capacity hinder system responsiveness and farmer engagement.

Financial constraints are another significant organisational barrier, with 86.84% of farmers relying on personal savings due to limited access to formal credit. This challenge is compounded by high transaction costs related to storage fees and logistics, which disproportionately affect smallholder farmers (IFC Africa, 2023). Key informants suggest that establishing a price stabilisation fund and improving monitoring mechanisms could mitigate these issues.

From a theoretical perspective, Commitment-Trust Theory (Morgan & Hunt, 1994) highlights that building trust through transparent governance and reliable service delivery is essential for sustained farmer participation. Strengthening the Council's leadership and operational agility aligns with this theory and global best practices, fostering organisational accountability and farmer confidence.

5.3.3 Industry Factors Affecting WRS Scalability

Industry-level factors such as infrastructure deficits and regulatory gaps critically influence WRS scalability. Poor rural infrastructure, including inadequate certified warehouses and transport networks, exacerbates post-harvest losses and limits farmer access (AGRA, 2023; Gatonye & Adam, 2023). Although government support for WRS is strong, enforcement weaknesses allow market manipulation by cartels, undermining farmer trust.

The potential of commodity exchanges like KOMEX to enhance price transparency and market efficiency was highlighted, consistent with regional experiences where such platforms improve price discovery and reduce volatility (Kanda & Lutta, 2022). Privatization of state-run storage facilities, such as the NCPB, is recommended to leverage existing infrastructure and improve service delivery.

Stakeholder Theory again underscores the need for multi-actor collaboration to address these systemic challenges (Freeman, 1984). Regulatory reforms supported by IFC and enhanced accountability mechanisms are critical to build trust, as emphasised by Commitment-Trust Theory (Morgan & Hunt, 1994). Together, these efforts can create an enabling environment for WRS scalability.

5.3.4 Potential of Digital Solutions in Enhancing WRS Adoption

Technological factors emerged as transformative enablers of WRS adoption. All technological components, including ICT infrastructure, mobile money integration, and blockchain applications, were rated highly influential. However, limited access to digital platforms among smallholder farmers constrains their benefits (KNBS, 2023; Ndemo, 2023).

Digital solutions can enhance transparency, reduce transaction costs, and build trust by enabling real-time monitoring and secure transactions. For example, blockchain technology offers traceability and fraud reduction, aligning with the transparency and trust elements of Commitment-Trust Theory (Morgan & Hunt, 1994). Social media, though underutilized, holds potential for disseminating market information and increasing system visibility.

Integrating WRS with mobile money platforms can facilitate faster payments and credit access, addressing financial inclusion challenges. This technological integration supports the Diffusion of Innovations framework by reducing perceived complexity and increasing observability of benefits (Rogers, 2003).

5.3.5 Theoretical Integration and Relationships Among CSFs

The findings demonstrate interrelatedness among the CSFs and the three theories. Diffusion of Innovations Theory explains the slow uptake of WRS due to perceived complexity and low observability of benefits, which can be mitigated through targeted education and digital tools. Stakeholder Theory highlights the necessity of collaborative governance among government, financial institutions, cooperatives, and farmers to align interests and share risks. Commitment-Trust Theory emphasises the foundational role of trust and commitment, fostered through transparent pricing mechanisms, regulatory enforcement, and reliable service delivery.

Together, these theories provide a comprehensive framework to understand and address the multifaceted challenges facing WRS adoption. For example, stakeholder collaboration (Stakeholder Theory) enhances organisational effectiveness, which builds trust (Commitment-Trust Theory), thereby facilitating diffusion (Diffusion of Innovations). Digital technologies act as enablers that cut across all these dimensions by improving communication, transparency, and access.

5.4 Conclusion

This study examined the CSFs and challenges influencing smallholder farmers' adoption of Kenya's WRS, structured around the four research objectives. The findings reveal that limited awareness, price speculation, high transaction costs, and logistical inefficiencies constitute the primary barriers to adoption. Conversely, stakeholder collaboration, digital integration, and regulatory reforms emerge as pivotal enablers. These insights underscore the necessity of a holistic approach, rooted in Stakeholder Theory (Freeman, 1984), Diffusion of Innovations Theory (Rogers, 2003), and

Commitment-Trust Theory (Morgan & Hunt, 1994), to address systemic gaps, build trust, and foster sustained engagement.

By identifying organizational, contextual, and technological CSFs, this research contributes actionable strategies for policymakers, financial institutions, and agricultural stakeholders. For example, restructuring the WRS Council to enhance field presence and foster public-private partnerships aligns with Stakeholder Theory's emphasis on collaborative governance. Similarly, integrating blockchain and mobile platforms reflects the Diffusion of Innovations Theory's focus on reducing complexity and enhancing compatibility, thus accelerating adoption. These interventions can empower smallholder farmers to access credit, stabilize incomes, and reduce post-harvest losses, ultimately improving Kenya's agricultural productivity and food security.

The transformative potential of WRS lies in its ability to bridge financing gaps and improve market access, particularly for marginalized groups such as women, who face systemic exclusion due to land ownership and cultural barriers. Unlocking these opportunities requires urgent action, including government-supported risk-sharing mechanisms, tailored digital tools like farmer-friendly smartphone applications, and inclusive outreach programs. This approach resonates with Commitment-Trust Theory, which highlights transparency and trust as foundational to long-term stakeholder commitment.

As Kenya's agricultural sector evolves, this study serves as a roadmap for sustainable and equitable growth. It emphasises that collaboration, innovation, and trust are non-negotiable pillars for WRS success. The interdependence of CSFs - stakeholder engagement, organisational capacity, industry infrastructure, and technological advancement - must be addressed coherently to create an enabling environment for WRS adoption.

The table below summarises the top 10 CSFs for WRS adoption.

Table 10 Summary of the Top 10 Critical Success Factors for WRS Adoption in Kenya

Category	Critical Success Factors
Organisational Factors	1. Leadership and Management: Robust governance structures within the WRS Council to ensure strategic alignment and operational efficiency. 2. Capacity Building: Training for WRS secretariat, warehouse staff, and financial institutions to enhance system competence. 3. Risk Management and Compliance: Strict adherence to policies and standards to build accountability and trust.
Stakeholder Factors	4. Farmer Awareness and Education: Targeted sensitization and financial literacy programs to demystify WRS benefits. 5. Stakeholder Collaboration: Strong partnerships among farmers, government, private sector, and cooperatives to align interests and share risks. 6. Trust and Commitment: Transparent communication and fair pricing mechanisms to foster long-term engagement.
Industry Factors	7. Government Support: Provision of subsidies, guarantees, and political goodwill to incentivize adoption. 8. Infrastructure Development: Expansion of certified warehouses and improvement of rural transport networks. 9. Market Accessibility: Enhanced price discovery platforms like KOMEX to ensure fair market access. 10. Regulatory Framework: Strengthening and enforcing legal provisions to protect smallholder interests.
Technological/Digital Factors	11. Digital Integration: Adoption of blockchain, mobile money, and ICT tools to increase transparency, reduce fraud, and improve accessibility.

In closing, this research reaffirms that the WRS is far more than a financing mechanism; it catalyses systemic agricultural transformation. Its successful adoption depends on bold institutional reforms, stakeholder commitment, and technological agility. As Kenya strives to modernise its agricultural sector, prioritising these CSFs will ensure that smallholder farmers, who form the backbone of rural economies, are empowered to thrive amid increasing market complexities and global competition.

5.5 Recommendations

This study offers several actionable strategies to enhance Kenya's WRS adoption and effectiveness. These recommendations address practical, policy, and research dimensions, reflecting the multifaceted nature of the challenges and opportunities identified. A coordinated approach that integrates these aspects is essential to transform WRS into a sustainable instrument for empowering smallholder farmers and strengthening agricultural resilience. Moreover, ongoing research will be critical to adapting the system in response to evolving market conditions, technological innovations, and farmers' needs.

5.5.1 Practical Recommendations

Firstly, practical interventions should focus on restructuring the WRS Council's leadership and management to improve governance, operational efficiency, and field presence. Strengthening these institutional arrangements will help address compliance issues and operational challenges, enabling the system to function more effectively across Kenya's diverse agricultural regions.

Secondly, farmer education and awareness programs must be expanded and intensified. Equipping farmers with knowledge on best practices for produce storage, receipt management, and the strategic use of WRS to access markets and credit is vital for increasing adoption and maximising benefits.

Thirdly, integrating WRS with digital platforms such as e-commerce and mobile money systems should be accelerated. Digitising marketing processes, warehouse receipts, and market linkages will enhance transparency, reduce transaction costs, and facilitate seamless transactions, which are key barriers identified in this study.

Fourthly, there is a pressing need to expand and modernize warehouse infrastructure in key agricultural zones. Investing in certified warehouses and improving storage facilities will increase accessibility for smallholder farmers, ensure compliance with quality standards, and reduce post-harvest losses.

Finally, smallholder farmers should be incentivized to participate in WRS through cooperative support mechanisms, including subsidies and financial assistance. Empowering farmer groups and societies to aggregate their produce will enable them to benefit from economies of scale and improve their bargaining power in formal markets.

5.5.2 Policy Recommendations

On the policy front, the government should establish a price-stabilisation fund to mitigate the risks associated with price volatility. Such a fund would protect farmers from unpredictable market fluctuations and encourage their sustained participation in formal trading systems. Secondly, fostering public-private partnerships is essential to scale investments in WRS operations. Providing incentives to attract private sector engagement will support the expansion of storage infrastructure, digitization initiatives, and farmer training programs.

Thirdly, it is recommended that tailored WRS products specifically designed for large-scale commercial farmers be developed. These customised solutions will attract high-volume producers and

enhance the overall efficiency and viability of the system. Fourthly, the government should prioritise the full operationalisation of the KOMEX while actively supporting digital marketplaces such as G-SOKO. These platforms will improve price discovery, promote transparent trade practices, and increase farmer participation in formal markets.

Lastly, implementing crop diversification policies to encourage the production of high-value crops beyond maize, such as avocados, beans, and horticultural produce, will help boost farmer incomes and reduce dependence on staple grains, thereby contributing to more resilient agricultural livelihoods.

5.6 Theoretical Contribution

This study offers significant theoretical contributions to understanding agricultural innovation adoption, particularly within the Warehouse Receipt Systems (WRS) context among smallholder farmers in Kenya. By applying and integrating the Diffusion of Innovations Theory (Rogers, 2003), Stakeholder Theory (Freeman, 1984), and Commitment-Trust Theory (Morgan & Hunt, 1994), the research advances theoretical knowledge in several ways.

Firstly, this research extends the diffusion of innovations theory by empirically illustrating how perceived complexity and low observability of WRS benefits hinder adoption in a developing country's agricultural setting. Unlike many diffusion studies focused on urban or industrial technologies, this study highlights the critical role of localised farmer education and digital integration in simplifying the innovation and increasing its compatibility with existing farming practices. This aligns with prior research emphasising the importance of trialability and reinvention in agricultural innovations (Sumberg et al., 2003). Furthermore, the study supports findings by Diederen (2003) and Vollaro et al. (2019), who argue that structural and behavioural characteristics influence innovation adoption, underscoring the need for tailored extension and information dissemination strategies in rural contexts.

Secondly, the study contributes to Stakeholder Theory by unpacking the complex governance landscape surrounding WRS adoption. It reveals that collaborative governance involving government agencies, financial institutions, cooperatives, and private sector actors must align diverse interests and address systemic inequities such as gender disparities and credit access. This dynamic interdependence among stakeholders extends Freeman's (1984) framework by situating it within agricultural innovation ecosystems, emphasizing inclusive, participatory governance as a prerequisite for sustainable adoption. The findings resonate with calls for multi-source innovation models in

agricultural research and extension, moving beyond the 'central source' model to embrace farmer participation and multi-actor collaboration (Sumberg et al., 2003).

Thirdly, this research enriches Commitment-Trust Theory by demonstrating how trust and commitment are shaped not only by relational factors but also by technological transparency and regulatory enforcement in the WRS context. Adopting digital tools such as blockchain and mobile money platforms enhances transparency and accountability, strengthening trust among farmers and other stakeholders. Technology integration as a mediator in trust-building processes advances Morgan and Hunt's (1994) theory, reflecting contemporary shifts in agri-finance systems where digital transformation is critical in reducing information asymmetries and transaction costs.

Finally, by synthesising these theoretical perspectives within a critical success factor framework, the study proposes a comprehensive conceptual model that captures the interrelated organisational, stakeholder, industry, and technological factors influencing WRS adoption. This model provides a valuable lens for future research and policy, addressing gaps in the literature on agricultural finance innovations in sub-Saharan Africa (Kanda & Lutta, 202); (Ndemo, 2023)). It also aligns with broader innovation adoption research emphasising the role of information sources, risk perception, and learning in shaping adoption decisions(Marra, 2003; Dearing & Cox, 2018).

In summary, this dissertation confirms the relevance of established theories in explaining WRS adoption while advancing them by contextualising key constructs within the realities of smallholder farming in Kenya. It bridges theoretical gaps by integrating governance, trust, and technology dimensions, offering a robust foundation for academic inquiry and practical interventions to scale agricultural innovations in similar socio-economic contexts.

5.7 Limitation of the Study

This study, while providing valuable insights into the adoption of the WRS among smallholder farmers in Kenya, is subject to several limitations. One primary constraint is the geographical scope of the research. The case study was conducted in only two wards within Nakuru County. Although these wards reflect specific agricultural dynamics, they may not fully capture the diverse socio-economic, infrastructural, and environmental conditions across Kenya's 47 counties. Consequently, the findings have limited generalizability to other regions where different contextual factors may influence WRS adoption.

The research methodology also presents certain limitations. Employing a mixed-methods approach that combined quantitative surveys with qualitative key informant interviews enabled a comprehensive understanding of trends and perspectives. However, the study focused on a specific set of variables, such as awareness, price speculation, transaction costs, and logistical barriers, which, while critical, may not encompass all relevant factors affecting WRS adoption. Other systemic, cultural, or institutional influences might have been overlooked. Additionally, the selection of participants and reliance on self-reported data introduce potential biases that could affect the accuracy and objectivity of the results.

Another limitation arises from the data collection modalities. Due to logistical constraints, some interviews were conducted online rather than face-to-face. Although online interviews offer convenience and broader accessibility, they may lack the immediacy and richness of in-person interactions, potentially reducing the depth and nuance of responses. Furthermore, reliance on digital platforms for data collection may have excluded farmers without access to such technologies, thereby biasing the sample toward more technologically literate participants.

These limitations suggest that while the study's findings contribute important knowledge on WRS adoption in Kenya, caution should be exercised in extrapolating results beyond the study area. Future research with broader geographic coverage, more diverse participant samples, and alternative data collection methods would strengthen understanding of the complex factors shaping WRS adoption across different Kenyan contexts.

5.8 Recommendations for Further Research

Regarding future research, it is important to investigate the long-term economic impacts of WRS adoption on smallholder farmers, focusing on aspects such as income stability, access to credit, and market participation. Secondly, further studies should explore social dimensions, including gender perspectives, rural employment dynamics, and the role of cooperatives in enhancing WRS uptake and sustainability.

Thirdly, research into financial technology innovations, such as blockchain and digital ledger systems, is needed to assess their potential for strengthening transaction security, transparency, and integration with global commodity exchanges. Fourthly, comparative analyses across countries where WRS has been successfully implemented would provide valuable insights into best practices and lessons that can inform Kenya's context.

Finally, further investigation into policy interventions addressing systemic barriers, including government-backed financial guarantees and price stabilisation mechanisms integrated with warehouse certification frameworks, is necessary to guide effective policymaking.

In summary, these recommendations align with the CSFs identified in this study and are grounded in the theoretical frameworks of Stakeholder Theory, Diffusion of Innovations, and Commitment-Trust Theory. Their implementation requires coordinated efforts among government agencies, private sector actors, farmer organisations, and development partners to ensure that WRS fulfils its potential as a catalyst for sustainable agricultural transformation in Kenya.

5.9 Chapter Summary

This chapter synthesises the key findings on the challenges and success factors influencing the adoption of Kenya's WRS among smallholder farmers. The study reveals significant barriers, including low awareness (only 20% of farmers understood WRS benefits), price volatility, and high reliance on personal savings due to limited credit access. Farmers also cited logistical inefficiencies and distrust in pricing mechanisms, with 84% rating WRS performance as "poor." However, stakeholders - cooperatives, warehouse managers, and county officials—recognised the system's potential to stabilise markets if operational bottlenecks like complex bagging rules and weak enforcement against cartels were addressed.

The chapter highlights the CSFs such as strong leadership, digital integration (e.g., blockchain and mobile platforms), and public-private partnerships to improve infrastructure and farmer education. Gender disparities and an ageing farmer population further complicate adoption, underscoring the need for inclusive policies. The discussion ties these insights to theoretical frameworks—Diffusion of Innovations, Stakeholder, and Commitment-Trust Theories—emphasising collaborative governance, trust-building, and technology as catalysts for change. Recommendations include restructuring WRS governance, expanding digital tools, and incentivising farmer participation through subsidies and cooperative support. The chapter stresses the urgency of coordinated action to unlock WRS's transformative potential for Kenya's agricultural sector.

REFERENCES

Achieng, J. (2018). *Critical Success Factors for Private and Public-Private Partnership Investments in Renewable Energy Development in Kenya.* http://hdl.handle.net/11427/29928

ADB Group. (2021). *Capacity Development: A Foundation for Transformation*. Office of the Chief Economist, African Development Institute (ADI). https://vcda`.afdb.org/en/system/files/report/new_african_development_bank_group_capacity_development_strategy_2021-2025.pdf

Ahmed, A. (2019). *Critical Success Factors and Implementation of Capital Expenditure Projects of Telkom Kenya Limited Within Nairobi City County, Kenya.* Unpublished Master's Thesis, Kenyatta University.

Ali, A. (2020). *Factors Affecting the Performance of Kwale County Government Projects in Kenya*. KCA University - Doctoral Dissertation.

Amberg, M., Fischl, F., & Wiener, M. (2005). Background of Critical Success Factors Research. *Working Paper No. 2/2005*. https://www.semanticscholar.org/paper/BACKGROUND-OF-CRITICAL-SUCCESS-FACTOR-RESEARCH

Amith, A. (2016). *Warehouse Receipt Finance: A Game Changer in Agri-finance*. Business Today. https://www.businesstoday.in/opinion/columns/story/warehouse-receipt-finance-a-game-changer-in-agri-finance-58534-2016-03-07

Asare, J. K., Mensah, N. O., Matthew, A., & Dhaka, S. S. (2025). Perception and willingness to participate in warehouse receipt system: Insights from cashew farmers in the Bono region of Ghana. *International Journal of Social Economics, Vol. 52 No. 2, Pp. 236–252.*

Barbie, E. (2016). *The Practice of Social Research (14th ed.)*. Cengage Learning.

Bharadwaj, A., El Sawy, O. A., & Pavlou, P. A. (2017). Digital business strategy: Toward a next generation of insights. MIS Quarterly, 41(2), 471–482. *MIS Quarterly, 41(2),* 471–482.

Bourne, K. (2016). *Stakeholder relationship management: A maturity model for organisational implementation. CRC Press.* CRC Press.

Central Bank of Kenya. (2025). *Agriculture Sector Survey*. Central Bank of Kenya. https://www.centralbank.go.ke

Chen, J. (2023). *Speculation: Trading with high risks, high potential rewards*. https://www.investopedia.com/terms/s/speculation.asp

Chigadi, E. K. A., & Gekara, M. (2020). Chigadi, E. K. A., & Gekara, M. (2020). Critical success factors in the implementation of e-procurement in the public sector: A case of Rural Electrification Authority (REA). *Strategic Journal of Business. Change Management*, *7*, 727–744.

Chileshe, N. N., Kibichii, B. K., Macharia, L. N., & Kavishe, N. (2022). Critical success factors for Public-Private Partnership (PPP) infrastructure and housing projects in Kenya. Ip. *International Journal of Construction Management*, *22(9), 1606-1617.*, *22(9)*, 1606–1617.

Chitra, P. (2014). *Factors Influencing the Use of Warehouse Receipts as a Financial Instrument in Kenya*. University of Nairobi. http://erepository.uonbi.ac.ke/handle/11295/74843

Ciotti, K. (2023). *Relationship marketing: A form of marketing emphasizing customer satisfaction and retention instead of sales transactions.* https://www.forbes.com/councils/theyec/2023/03/07/what-relationship-marketing-can-mean-for-your-business/

Coulter, J., & Onumah, G. (2002). The Role of Warehouse Receipt Systems in Enhanced Commodity Marketing and Rural Livelihoods in Africa. *Food Policy*, *27*, 319–337. https://doi.org/10.1016/S0306-9192(02)00018-0

Dang, T. (2024). *Why Project Stakeholder Management Is Crucial for Your Project Success*. https://www.orientsoftware.com/blog/project-stakeholder-management/

Das, D., & Ngacho, C. (2017). Critical success factors influencing the performance of development projects: An empirical study of Constituency Development Fund projects in Kenya. *IIMB Management Review*, *29*(4), 276–293. https://doi.org/10.1016/j.iimb.2017.11.005

Dearing, J. W., & Cox, J. G. (2018). *Diffusion of Innovations Theory. Journal of Rural Banking, 12(3), 45-58.*

Diederen, P. (2003). *Innovation adoption in agriculture: Structural and behavioural determinants.* Agricultural Economics, 29(2), 123–134.

Dimitra, T. (2021). *Breaking Down Dimitra's Connected Farmer Platform: How 'My Farm' Helps Smallholder Farmers with Operational Management*. https://dimitratech.medium.com/breaking-down-dimitras-connected-farmer-platform-how-my-farm-helps-smallholder-farmers-with-75b5fe6ddeb

Douglas, J., Douglas, A., Muturi, D., & Ochieng, J. (2017). Douglas, J., Douglas, A., Muturi, D., & Ochieng, J. (2017, September). An exploratory study of critical success factors for SMEs in Kenya. In Toulon-Verona Conference" Excellence in Services (pp. 223-234). *In Toulon-Verona Conference" Excellence in Services*, 223–234.

Edu, B., & Gichana, J. (2024). Critical Success Factors of Performance Of Government-Funded Youth Enterprises In Kakamega County Kenya. *International Journal of Social Sciences Management and Entrepreneurship*, *8(2)*.

Elson, C. (2019). *Three Problems with the Stakeholder Theory*. https://www.bidenschool.udel.edu/bideninstitute/bcblog/Pages/Three-Problems-With-the-Stakeholder-Theory.aspx

Emmanuel, A. (2025). *Why is Stakeholder Management Important: The Key to Project Success and Growth*. https://www.itsdart.com/blog/why-is-stakeholder-management-important

Erick, & Susan, D. (2017). *Influence of Critical Success Factors on Completion of Road Projects in Kenya: A Case of Kenya National Highways Authority Projects*. International Journal of Social Sciences Management and Entrepreneurship.

FAO. (2022). *The State of Food Security and Nutrition in the World.* FAO. https://openknowledge.fao.org

Freeman, E. (Director). (2013). *Business is about purpose: R. Edward Freeman at TEDx Charlottesville 2013* [Video recording].

FSDKenya. (2024). *Warehouse Receipt Financing Feasibility Study Key findings and insights*. www.fsdkenya.org

Galetto, N. (2021). Ways CFOs Can Build Trust Among Stakeholders. *Deloitte Articles*, 1.

Garthwaite, P. W. (2015). *Designing Warehouse Receipt Legislation: Regulatory Options and Recent Trends [Technical Report*]. Food and Agriculture Organisation - United Nations.

Gasik, S. (2024). Gasik, S. (2024). Public project success factors. PM World Journal, 13(3), 1–10. *PM World Journal*, *13(3)*, 1–10.

Gichau, A. W. (2011). *Use of warehousing receipt system by the National Cereals and Produce Board as a strategy to increase supply chain efficiency* [Thesis, University of Nairobi]. http://erepository.uonbi.ac.ke/handle/11295/12302

Gitonga, J. (2017). *The Effect of Critical Success Factors on the Completion Of Public Construction Projects In Machakos County Kenya*. Https://Doi.Org/10.61426/Sjbcm.V4i3.525.

Grant, R. M. (2016). *Contemporary strategy analysis: Text and cases (9th ed.)*. Wiley.

Gro Intelligence. (2014). *The Power of a Saved Receipt: A Study on Warehouse Receipt Systems*. GroIntelligece. https://www.gro-intelligence.com/insights/the-power-of-a-saved-receipt-a-study-on-warehouse-receipt-systems

Gunawan, E., Kuwornu, J. K., Datta, A., & Nguyen, L. (2019). Farmers' Perceptions of the Warehouse Receipt System in Indonesia. *Sustainability*, *11*(6), 1690. https://doi.org/10.3390/su11061690

Hashim, K. F. (2015). The mediating role of trust and commitment on members' continuous knowledge sharing intention: A commitment-trust theory perspective. *International Journal of Information Management*, 145–151.

Hussain, S. (2018). *Opinion | Warehousing receipt system: The missing link*. Mint. https://www.livemint.com/Opinion/yFKdPGvwK5IHsKtSChpmwJ/Opinion--Warehousing-receipt-system-the-missing-link.html

IFC. (2023). *Ministry of Investments, Trade and Industry and IFC sign a cooperation agreement to boost investment in Kenya's agriculture value chains.* Agric in Africa.

Jared, O., & Duncan, O. (2024). *Warehouse receipt financing feasibility study findings*. Financial Sector Deepening Kenya. https://www.fsdkenya.org/blogs-publications/warehouse-receipt-financing-feasibility-study-finding/

Kadigi, R. M. J., & Falanta, E. M. (2018). *Challenges and Opportunities for Implementation of Warehouse Receipt Systems in Smallholder Agriculture The case of cereals and pulses in Tanzania*. Agricultural Council of Tanzania.

Kalama, D. J. (2016). *Determinants of Successful Implementation of Community Driven Development Projects in Kilifi County, Kenya*. University of Nairobi Unpublished Dissertation. http://hdl.handle.net/11295/97890

Kanda, E., & Lutta, V. O. (2022). The status and challenges of a modern irrigation system in Kenya: A systematic review. I. *Irrigation and Drainage, 71(3)*, 1–10.

Kennedy, J. A. (2015). *The Potential of Establishing a Warehouse Receipt System in Punjab, Pakistan—USAID Review*. 33.

Kenya National Bureau of Statistics (KNBS). (2022). *Economic survey 2022.* Government of Kenya. https://www.knbs.or.ke

Keup, M. (2022). *What is Stakeholder Theory*? https://www.projectmanager.com/blog/what-is-stakeholder-theory

Khisa, I., & Mutuku, M. (2023). *Khisa, I., & Mutuku, M. (2023). Critical success factors and performance of completed construction projects at National Social Security Fund, Nairobi City County, Kenya. International* Journal of Research in Business and Social Science (2147-4478).

Kiinga, B. K., Makau, G., & Wabala, S. (2022). Critical Success Factors For E-Waste Management Among the Government of Kenya Ministries. *Int Journal of Social Sciences Management and Entrepreneurship Volume 39, Issue 3,* 83–94.

Kilimo. (2020). *Impact of Mobile-Based MIS on Farmers in Tanzania.* Kilimo Trust.

Kimathi, G. D. (2014). *Critical Success Factors in Implementing Donor-Funded Projects in Tharaka Nithi County*. Kenyatta University - Unpublished Dissertation.

Kioko, P., & Ochiri, G. (2019). Influence Of Critical Success Factors on Supply Chain Performance of County Governments in Kenya. *International Journal of Supply Chain and Logistics*. https://doi.org/10.47941/IJSCL.V3I4.328

Kiriakov, K. D. (2015). Necessary Conditions for an Effective Warehouse Receipts Activity. Agriculture Finance Support Facility. *Technical Summary*, 1.

Koech, D., & Bett, A. (2023). Identifying the critical success factors for digital transformation strategy in the public service: Evidence from Kenya. *The Strategic Journal of Business & Change Management, 10 (2), 237 –246.*

Koech, D., Gichunge, E., & Thuo, A. (2016). Factors Influencing Strategic Information Systems Implementation In Government Parastatals: A Case of Kenya Forest Service, Mau Forest Conservancy. *European Scientific Journal, ESJ, 12, 263-263.*

Kothari, C. R., & Garg, G. (2022). *Research Methodology: Methods and Techniques*. New Age International (P) Limited, Publishers.

Kukubo, E. N., & James, R. (2020). Critical Success Factors and the Sustainability of Small-Scale Horticulture Projects in Kiambu County, Kenya. *International Journal of Business and Social Science*, *11*. https://doi.org/10.30845/ijbss.v11n4a10

Kyalo, M. V. (2021). *Cluster-Based Critical Success Factors, Government Moderation And Destination Competitiveness of Conference Facilities in Nairobi City County, Kenya*. Kenyatta University - Unpublished Dissertation.

Kyenze, C. (2024). *Online Food and Groceries Delivery Platforms Market Study*. Competition Authority of Kenya. https://www.cak.go.ke/sites/default/files/Online-Food-and-Groceries-Delivery-Platforms-Market-Study.pdf

Lawrimore, B. (2015). *The 5 Key Success Factors of Business – Based on A 20-Year Study*. www.linkedin.com-key-success-factors-business-based-20-year-study-buck-lawrimore&usg=AOvVaw0Mu2aS0G

MakÓsewe, F. A. (2023). *Critical success factors affecting the adoption of technological innovations and their influence on staff performance and revenue collection at the Kenya Revenue Authority*. Strathmore University Unpublished Dissertation. http://hdl.handle.net/11071/1339

Makumi, M., & James, R. (2020). Critical Success Factors in the Implementation Of Development Projects In Laikipia County, Kenya. *Strategic Journal of Business & Change Management*, *7*. https://consensus.app/papers/critical-success-factors-implementation-development-makumi/ccc0ab85ca325d2d8a0a6de9fc106701/

Mardia, M., Rukmana, D., Mahyuddin, & Fachrie, M. E. (2021). Optimisation of the corn commodity Warehouse Receipt System (WRS) in South Sulawesi based on system dynamics. *IOP Conference Series: Earth and Environmental Science*, *886*(1), 012108.

Marra, M. (2003). Risk perception and learning in agricultural innovation adoption. *Agricultural Systems, 76(2), 123–142.*

Martins, J. (2022). *Critical Success Factors (CSF) for Projects [2023] • Asana*. Asana. https://asana.com/resources/critical-success-factors

Mayer, C., Strine, L., & Winter, J. (2020). 50 years later, Milton Friedman's shareholder doctrine is dead. *FORTUNE*. https://fortune.com/2020/09/13/milton-friedman-anniversary-business-purpose/

McCombes, S. (2019). *What Is a Case Study? | Definition, Examples & Methods*. Scriber. https://www.scribbr.com/methodology/case-study/

Megha, M. (2015). What is a Marketing Information System? Definition and meaning. *Business Jargons*. https://businessjargons.com/marketing-information-system.html

Messineo, J. (2024). *Critical success factors: Vital elements for organisational success.* https://en.wikipedia.org/wiki/Critical_success_factor

Micheni, E. (2017). Micheni, E. (2017). Analysis of the Critical Success Factors of Integrated Financial Management Information Systems in Selected Kenyan Counties. *Journal of Functional Analysis, 5, 185.* https://doi.org/10.11648/J.JFA.20170505.12

Minjire, E. (2015). *Factors Affecting the Performance Of Public-Private Partnerships in Healthcare Projects In Kenya: A Case Study of The Ministry of Health, Nairobi*. Strategic Journal Of Business & Change Management.

Miranda, M. J. (2017). *Warehouse Receipt Financing for Smallholders in Developing Countries: Short on Logic, Long on Imagination*. International Food Policy Research Institute.

Miranda, M. J., Mulangu, F. M., Kemeze, F. H., & Kolavalli, S. (2018). *Does warehouse receipt financing benefit Ghanaian smallholders?* (0 ed.). International Food Policy Research Institute. https://doi.org/10.2499/1024320047

Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *Journal of Marketing*, *58*(3), 20–38.

Morogo, D. K. (2021). *Critical Success Factors and Projects' Performance in Agro-Chemicals And Food Company Limited, Kenya*. Kenyatta University - Unpublished Dissertation.

MTCT. (nd). *Critical Success Factors—Daniel and Rockart's Guide to Achieving Strategic Success*. https://www.mindtools.com/atlntup/critical-success-factors

Muema, D., & Ngugi, L. (2021). *Muema, D., & Ngugi, L. Critical Success Factors and Performance of Water Projects in Machakos County, Kenya*. https://doi.org/10.70619/vol1iss2pp25-37

Muller, J. R., & Jugdev, K. (2017). *The nature of project management: A reflection on The Anatomy of Major Projects by Morris and Hough | Emerald Insight*. https://www.emerald.com/insight/content/doi/10.1108/17538371211268960/full/html

Muluka, K. O., Mukanzi, D. N., & Paul, S. N. (2021). *Influence Of Project Communication Management on the Success of Digital Literacy Programme In Western Kenya*. International Journal Of Social Science and Technology Vol. 6 No. 2.

Mulwa, R. (2021). *Digital Inclusion in Agricultural Development.* African Agricultural Technology Foundation- Nairobi.

Munyao, M. M. (2016). *Influence Of Critical Success Factors on Project Performance: A Case Of Kenya's National Transport and Safety Authority*. University of Nairobi Unpublished Dissertation. http://hdl.handle.net/11295/98620

Muriiki, E. K., & Mungai, A. W. (2022). Muriuki, E. K., & Mungai, A. W. (2022). Critical Success Factors Influencing Monitoring and Evaluation of Community-Based Development Projects in Wajir County, Kenya. *International Journal of Social Sciences Management and Entrepreneurship (IJSSME), 6(2).*

Musangi, P. S., Odero, D., & Kwanya, T. (2019). Critical success factors in library reengineering: A case of academic libraries in Kenya. *Global Knowledge, Memory and Communication*. https://doi.org/10.1108/GKMC-12-2018-0099

Musinguzi, P., Baker, D., Larder, N., & Villano, R. A. (2023). Critical success factors of rural social enterprises: Insights from a developing country context. *Journal of Social Entrepreneurship, 1-23.*

Mutabazi, P. (2022). *What is a Stakeholder*? https://www.linkedin.com/pulse/what-stakeholder-patrick-mutabazi-1c/

Muturi, P. K., & Mose, T. (2020). Critical success factors of digitising vital records at the civil registration department in Nairobi County, Kenya. *Academic Journal of Information Systems, 2, 206-220.*

Mutwiri, F. R. (2021). *Antecedents of Project Success in Constituency Development Fund Construction Projects in Kenya*. Doctoral dissertation, JKUAT-COHRED.

Mwangi, I. G., & Kisimbi, J. M. (2020). Critical Success Factors Influencing the Performance of Infrastructure Projects in The Aviation Industry in Kenya; A Case of Moi International Airport. *Journal of Entrepreneurship and Project Management*. https://doi.org/10.47941/JEPM.498

Napali, B. L., & Wanjala, M. Y. (2018). *Critical Success Factors of Technological Projects in Kenya: A Case Study of Nairobi County.* International Journal of Computer Science and Information Technology Research ISSN 2348- 120X (online) Vol. 6, Issue 2, pp: (85-89).

Ndemo, B. (2023). *Adopt blockchain in Kenya's agriculture*. Business Daily. https://www.businessdailyafrica.com/bd/opinion-analysis/columnists/adopt-blockchain-in-kenya-agriculture--4308532

Ndunda, A. N. (2017). Influence Of Stakeholder Activities on Implementation of Rural Road Projects In Machakos County. *International Academic Journal of Information Sciences and Project Management*, *2*(2), 1–20, 1.

Ndungu, A. G. (2017). *Factors Influencing the Implementation of Government Housing Projects for the Kenya Police Service in Nairobi County, Kenya.* University of Nairobi Unpublished Doctoral Dissertation.

Ngari, A., & Mutua, J. (2024). Critical success factors and strategy implementation in the aviation industry in KENYA. *African Journal of Emerging Issues*, *6*(5), 85–104.

Ngila, F. (2021). *Inside Kenya's blockchain ecosystem: What the future holds*. Nation. https://nation.africa/kenya/business/inside-kenya-s-blockchain-ecosystem-what-the-future-holds-248804

Ngugi, A. K., & Mutuku, M. (2023). *Critical Success Factors and Performance of Fibre Optic Infrastructure Projects by Information and Communication Technology Authority, Kenya* [PhD Thesis]. Kenyatta University.

Ngugi, V. W., & Musembi, K. A. (2022). *Factors Influencing Completion of Poverty Eradication Projects In Nairobi City County, Kenya.* Social Sciences & Humanities Open, 3(2022), 153-163.

Nyawira, S. (2023). *Trade Ministry, IFC in deal to support the Warehouse Receipt System adoption*. Capital Business. https://www.capitalfm.co.ke/business/2023/04/trade-ministry-ifc-in-deal-to-support-adoption-of-the-warehouse-receipt-system/

Obat, K. G. (2016). *Critical success factors in implementing e-Procurement in public entities in Kisumu County, Kenya* [PhD Thesis]. University Of Nairobi.

Odhiambo, K. S. (2020). *Critical success factors for the timely completion of World Bank projects in Kenya* [PhD Thesis]. Strathmore University.

Odongo, J., & Sang, P. (2023). Factors influencing the implementation of public information and communication technology projects in parastatals in Kenya. *International Academic Journal of Information Sciences and Project Management*, *3*(7), 155–178.

Oiriga, D. M., & Ngari, C. (2019). Factors Influencing the Success of Construction Projects In Kenya: Gated Community Projects In Nairobi City County. *Journal of Procurement and Strategic Management*, *5*(1), 18–27.

Ojiambo, J. N. (2018). *Critical success factors, government policy compliance and completion of construction projects in public secondary schools in Bungoma county, Kenya* [PhD Thesis]. University of Nairobi.

Onumah, G. (2010). Implementing Warehouse Receipt Systems in Africa: Potential and Challenges. *Africa Agricultural Markets Program*, 20.

Osman, B. (2017). Warehouse Receipt System in Sub-Saharan Africa: Making Progress in Finance, Market and Post-Harvest Risk Management. Platform for Agricultural Risk Management. *IFAD*, 2–3.

Osman, M. A., & Kimutai, G. (2019). Critical success factors in the implementation of road projects in Wajir County, Kenya. *Unpublished MBA, Kenyatta University*.

Osore, C. K., & Omwenga, J. Q. (2022). Determinants Of Effective Implementation Of Public Health Construction Projects in Kenya. *International Journal of Social Science and Humanities Research ISSN 2348-3164 (Online) Vol. 10, Issue 4, Pp: (12–30),*

Otieno, I., & Omwenga, E. (2015). Otieno, I., & Omwenga, E. (2015). Citizen-centric critical success factors for the implementation of e-government: A case study of Kenya Huduma Centres. Https://doi.org/10.1109/ISTAFRICA.2015.7190525. *2015 IST-Africa Conference, 1-9.*

Otieno, P. A. (2015). *Critical Success Factors Influencing Adoption and Use of E-government Services by SMEs in the Manufacturing Sector in Kenya*. United States International University Africa - Unpublished Dissertation.

Pahwa, M., Cavanagh, M., & Vanstone, M. (2023). *Pahwa, M., Cavanagh, A., & Vanstone, M. (2023). Key informants in applied qualitative health research.* Qualitative Health Research. https://doi.org/10.1177/10497323231198796

Rashid, M. H. A. (2023). Research Philosophy: Positivism, Interpretivism, and Pragmatism. *Library & Information Management*. https://limbd.org/research-philosophy-positivism-interpretivism-and-pragmatism/

Republic of Kenya. (2019). *Warehouse Receipt System Act No. 8 of 2019. National Council for Law Reporting.* https://www.policyvault.africa/wp-content/uploads/policy/KEN1095.pdf

RNRRS. (n.d.). *Transforming agricultural marketing and improving access to finance through warehouse receipt systems. Research Into Use Programme:* https://www.gre.ac.uk/nri

Safo, N. K., AL-Hassan, R. M., Somuah, H. A., Boankye, A. A., & Egyir, I. S. (2021). *Warehouse receipt system: A shift to improve maize marketing in Ghana*. 60–79.

Sammy, H. M. (2023). *Critical Success Factors and Implementation of Projects by the Department of Health and Emergency Services in Machakos County, Kenya* [PhD Thesis]. Kenyatta University.

Sarah Hidayani, & Dwidjono, H. D. (2019). Factors influencing farmers to join the Warehouse Receipt System in Barito Kuala Regency, South Kalimantan, Indonesia. *Eurasia J Biosci 13: 2177- 2183*.

Saunders, M. N., Lewis, P., & Thornhill, A. (2019). *Research Methods for Business Students*. Pearson.

Sikolia, D. M. (2024). Critical Success Factors to the Implementation of Competency-Based Curriculum in Junior Schools in Kiminini Sub-County, Kenya. *The Educator: A Journal of the School of Education, Moi University*, *4*(1), 68–85.

Stravoravdis, fotios. (2020). *IFC-supported Warehouse Receipt Financing System Launched in Ethiopia*. https://collaboration.worldbank.org/content/sites/collaboration-for-development/en/groups/agrifin/products.entry.html/2020/02/03/ifc_supported_wareho-s4aM.html

Subrananiam, A. (2009, July). *Slideshare*. https://www.slideshare.net/anandsubramaniam/stakeholder-communication

Sulistyaningsih, Wibowo, R., Hariyati, Y., Hani, E., & Januar, J. (2020). Post-harvests on the agricultural sector: A critical view of the warehouse receipt system in East Java, Indonesia. *International Journal of Scientific and Technology Research*, *9*, 4475–4483.

Sumberg, J., Okali, J., & Reece, D. (2003). Local knowledge and participation in agricultural innovation. *Agricultural Systems, 76(2), 739–753.*

Suya, O. H., & Kiarie, F. K. (2023). Project success factors and performance of constituency development funded projects in Nakuru Town West Constituency, Kenya. T. *He Strategic Journal of Business & Change Management, 10 (2), 36 –55.*

Team, I. E. (2022). *What Are Critical Success Factors? Benefits and Examples*. https://au.indeed.com/career-advice/career-development/critical-success-factors

Thunde, J., & Baulch, B. (2020). *Who Uses and Who Benefits from Warehouse Receipt Systems? An Examination Of Contract-Level Transactions on the Agricultural Commodity Exchange For Africa, 2011–2018* (0 Ed.). International Food Policy Research Institute. https://doi.org/10.2499/p15738coll2.133733

Tosun, D., Savran, K., Niyaz, Ö., Keskin, B., & Demirbaş, N. (2014). *The Evaluation of the Warehouse Receipt System for Agro-Food Products In Turkey*.

Tuan, N. T. (2020). *Identifying Critical Success Factors through Interactive Management*. Https://Www.Matec-Conferences.Org › Pdf › 2020/08.

UNCITRAL. (2018). *Warehouse Receipts: Developing An UNCITRAL Instrument On Warehouse Receipts*. Working Group I: Warehouse Receipts - UNCITRAL Https://Uncitral.Un.Org

USAID. (2014). *Warehouse Receipt Systems: Helping Small Farmers Across Africa—CASE STUDY*. https://pdf.usaid.gov/pdf_docs/PA00TCSQ.pdf

Vanessa, C. (2008). The Critical Success Factor Method: A review and practical example. *International Conference on Information Resources Management (CONF-IRM*, 1. http://aisel.aisnet.org/.

Vaughan, T. (2021). *10 Advantages and Disadvantages of Qualitative Research | Poppulo*. https://poppulo.com/blog/10-advantages-and-disadvantages-of-qualitative-research

Vihenda, P. (2015). *Critical Success Factors in the Implementation Of Strategic Alliances For Mobile Financial Services By Telecommunication Companies In Kenya* [PhD Thesis]. University of Nairobi.

Vollaro, M., Raggi, M., & Viaggi, D. (2019). *Innovation adoption and farm profitability: The role of research and information sources.* Bio-based and Applied Economics, 8(2), 179-210.

Wagao, H. J., Akyoo, A. M., & Ndyetabula, D. W. (2024). *Macro-determinants of formal agricultural credit supply in Tanzania.* African Journal of Social Issues, 7(1), 836–846. https://www.ajol.info/index.php/ajosi/article/view/285028

Wairumbi, M. W. (2021). *Critical Success Factors to the Implementation of Digital Literacy Programme in Public Schools in Kenya: A Case Study of Langata and Westlands Constituencies in Nairobi County* [PhD Thesis]. University of Nairobi.

Wamoto, F. O. (2015). E-government Implementation in Kenya, an evaluation of Factors hindering or promoting e-government successful implementation. *International Journal of Computer Applications Technology and Research*, *4*(12), 906–915.

Wamoto, F. O., & Hwang, G.-H. (2016). Critical Success and Failure Factors of e-Government Project Implementation in Kenya. *Journal of Korean Society of Industrial and Systems Engineering*, *39*(2), 119–128.

Wekesa, E. W. (2016). *Influence Of Strategic Success Factors on Implementation Of Information Communication Technology Projects In Kenyan Commercial Banks* [PhD Thesis]. University of Nairobi.

Whittington, R. (2020). *Exploring Strategy* (12th ed.). Pearson.

World Bank. (2019). *Kenya Economic Update: Transforming Agricultural Productivity to Achieve Food Security for All*. World Bank Group.

World Bank. (2023). *Kenya Agricultural Sector Review: Pathways to Inclusive Growth.* https://www.worldbank.org

World Bank. (2024). *Kenya Overview*. World Bank. https://www.worldbank.org/en/country/kenya/overview

Yagan, V. J. (2016). *Institutional Factors Influencing Performance Of E-procurement In Public Institutions: A Case of Parastatals Operating in Nairobi Central Business District* [PhD Thesis]. KCA University.

Yazar, F., & Secer, A. (2023). Why Farmers Prefer to Use Warehouse Receipt System in Turkey: An Integrated Model Approach. *Sustainability*, *15*(21), Article 21. https://doi.org/10.3390/su152115232

Yin, R. K. (2018). *Case study research and applications: Design and methods (6th ed.)*. Sage Publications.

APPENDICES

Appendix 1: Questionnaire for the Respondents - Individual Farmers

Dear Respondent,

This questionnaire aims to gather information about 'The Critical Success Factors Influencing the adoption of the Warehouse House Receipt Financing in Kenya: A Case Study of Nakuru County'. You have been chosen as one of the participants and are humbly requested to participate by responding to the questions below with utmost honesty. Kindly note that this data will be treated with utmost confidentiality and will not be used for any other purpose apart from the purpose of this research.

Section A: Respondent Profile

Please mark/tick your responses in the corresponding box.

1. Please indicate your age category

18-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ 56-65 ☐ Above 65 ☐

2. Please indicate your Gender.

Male ☐ Female ☐

3. Please indicate the number of years you have been a farmer

0-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21+ ☐

Section B: Farming experience, source of funding and challenges.

4. What land size did you farm maize on last year?
    - Less than 1 acre?
    - 1 – 5 acres
    - 5 – 10 acres
    - Over 10 acres
5. How do you finance your farm inputs (labour, seeds, logistics, etc.)?
    - Personal Savings
    - Support from family and Friends

- Loan
- Others (please specify) _____

6. If a Loan, from whom did you obtain the loan? And at what interest?
    - Source of loan: _____ Interest rate: _____ or terms of payment: _____
7. How many 90-Kgs bags of maize did you harvest? _____ Bags
8. Did you sell any of your harvest immediately after harvest?
    - ___ Yes
    - ___ No
9. If yes, to whom did you sell?
    - Local traders? Number of bags: _ _ _ _ ____
    - NCPB Number of bags _____
    - Others (please specify) _____ Number of bags _____
10. If no, why? _____

Section C: Farmers and WRS – Perceptions and Recommendations

11. Have you used the Warehouse Receipt System?
    - Yes ___
    - No: ___
12. If yes, what do you know about it? Objectives and purpose?

_____
_____

13. What benefits did you realise from using the system?
    - Financial: _____

- Storage: _____
- Others: (specify)_____

14. If you have not used the system, do you know someone who has?
    - Yes _____
    - No _____
15. If yes, what do they say are its benefits?
    _____
16. If not, why have you not used the system?
    _____
    _____
17. What challenges have you experienced or witnessed with the system?
    _____
    _____
18. In general, how would you rate the system's performance?
    - Poor,
    - Good,
    - Excellent
19. Give reasons for your answer.
    _____
    _____
20. The WRS was designed to help farmers reduce post-harvest losses and access credit from banks using their farm produce as collateral. Is it effective in achieving these objectives?
    - Yes ____
    - No ____
21. If yes, what aspects of the system are effective, and how can they be improved for further adoption?

_____

_____

22. If your answer to question ‘17’ above is NO, can you suggest improvements to the current system that would facilitate a significant adoption by smallholder farmers?

_____

_____

23. Any further recommendations on how the system can be improved to deliver and be helpful to smallholder farmers in your area?

_____

_____

Appendix 2: Questionnaire for Key Stakeholders in Nakuru County

Dear Respondent,

This questionnaire gathers information on "The Critical Success Factors for Warehouse Receipt Financing Adoption in Kenya: A Case Study of Nakuru County." You have been selected as a participant, and your honest responses are highly valued. Please note that all data collected will be treated with the utmost confidentiality and used solely for this research.

1. What does the success of the WRS look like? What are the success factors for the WRS?
   _____
   _____
   _____
2. Based on your experience with the system, how would you rate its performance?
   - Poor,
   - Reasonable,
   - Good,
   - Excellent
3. How would you rate the system's adoption by smallholder farmers?
   - Poor,
   - Reasonable,
   - Good,
   - Excellent
4. How does your institution/company support the adoption and use of WRS?
   _____
   _____
5. What challenges have you faced promoting the system's uptake by smallholder farmers?
   _____
   _____

6. The system is largely meant to help reduce post-harvest losses and help smallholder farmers access credit. Do they think the WRS's system is benefiting them? If so, why?

   _____

   _____

7. If not, who is benefiting from the system as it is? And why?

   _____

   _____

8. How can WRS enhance stakeholder engagement and participation, especially among smallholder farmers?

   _____

   _____

9. Do you see any gaps in the legal and regulatory environment?

   _____

   _____

10. How can WRS use technology to promote the adoption of the system

    _____

    _____

11. The WRS is currently led by a Council that oversees the secretariat managed by a CEO. Do you think this arrangement effectively ensures that the System meets its set objectives?

    - Yes _____
    - NO _____

12. If no, what changes would you recommend to make this organisation more effective?

    _____

13. Can this system work in Kenya as it is structured and organised? If no, what needs to change, and if yes, what needs to be strengthened?

    _____

Appendix 3: Questionnaire for Key Informants Interviews at the National Level

Dear Respondent,

This questionnaire gathers information on "The Critical Success Factors for Warehouse Receipt Financing Adoption in Kenya: A Case Study of Nakuru County." You have been selected as a participant, and your honest responses are highly valued. Please note that all data collected will be treated with the utmost confidentiality and used solely for this research.

1. What has been your experience and engagement with the WRS system?

   _____

   _____

2. How would you rate the system's performance in meeting its objectives, mainly providing a system/platform where farmers can use their farm produce as collateral? (Scale of 1 - poor to 5 excellent) (Indicate a number)
3. What has worked well with the system so far?

_____

_____

4. What has worked less well and needs improvement?

_____

_____

5. Is the system able to benefit smallholder farmers? If yes, how? And if not, why?

_____

_____

6. Can the system work in Kenya as it is currently designed?

   _____

   _____

7. Do you have any other recommendations?

   _____

   _____

8. Below is a list of critical success factors for government/public projects identified through a systematic literature review. How would you rate the importance of the following factors to the success of the WRS in Kenya? (Scale: 1- Inferior, 2 - Poor, 3 - Reasonable, 4 - Good, 5 - Excellent)

Success Factor	Success Sub-Factors	1	2	3	4	5
Organisational factors	Having an effective WRS leadership and management team					
	Organisational structure with strong field representation					
	Strong Reporting, Monitoring and Evaluation of field activities					
	Risk management, Quality Assurance and guarantees					
	Adequate funding and timely financing for the WRS activities					
	An effective communication system across the entire value chain					
Stakeholder Factors	Stakeholder Management and Engagement Strategy					
	Targeted education and sensitisation programs					
	Building strong Public-Private Partnerships					
	Building the WRS brand (Trust, Integrity and Accountability)					
	Developing sub-county and local capacities for WRS					
Industry Factors	Strong government support and political goodwill					
	Strong legal and regulatory framework					
	Presence of quality facilities and infrastructure (Road and transport systems)					
	Having a functional and accessible Agricultural Commodities Exchange					
	Guaranteed financial and project sustainability					
	Building confidence and trust in the system					
Technological Factors	Establishing ICT infrastructure/tools accessible to all key players					
	Use of technology (e.g., blockchain) to secure transactions and ensure transparency in pricing					
	Availability of a reliable Market Information System					

Appendix 4: Systematic Literature Review

	Reference	Title	Identified Critical Success Factors
1	Akinyi & Kisimbii, 2020	Critical Success Factors Influencing the Adoption of Monitoring and Evaluation Systems of County Government Projects in Kenya: A Case of Mombasa County Government	• Organizational culture, • Budgetary allocation, • Organisation structure • Staff competence
2	(Abayo, 2021)	Effect Of Critical Success Factors on Project Delivery in Project-based Organizations, Nairobi County	• Staff competence, • Resource mobilisation, • Organisational culture • Change leadership
3	(Achieng, 2018)	Critical Success Factors for Private and Public-Private Partnership Investments in Renewable Energy Development in Kenya	• Political goodwill • Quality of the country's development plans, • Independence of the Regulator of Energy Investments in Kenya • Government support to the off taker • Environmental and social issues were identified as: • Stakeholder management in Kenya, • quality of environmental laws and standards, • Local population support • Ease of obtaining access and wayleaves.
4	Agoi, 2020	Influence of project management factors on project success: A case of a childcare project in Vihiga County	• Stakeholder Involvement • Risk Management • Continuous Improvement • Policy Implementation • Government Oversight
5	(Ahmed, 2019)	Critical success factors and implementation of capital expenditure projects of Telkom Kenya Limited within Nairobi City County	• Resource allocation, • Communication, • Top management support • Project manager competence.
6	(Ali, 2020)	Factors Affecting the Performance of Kwale County Government Projects in Kenya	• Stakeholders' Engagement, • Project Design, • Project Team Competency, • Monitoring and Evaluation.
7	(Chigadi & Gekara, 2020)	Critical success factors in the implementation of e-procurement in the public sector: A case of Rural Electrification Authority (REA)	• Stakeholder participation. • Monitoring and evaluation
8	(Chileshe et al., 2022)	Critical success factors for Public-Private Partnership (PPP) infrastructure and housing projects in Kenya.	• community acceptance, • project feasibility, • Laws, regulations, • financial market, • well-organised public agencies.

Appendix 4: Systematic Literature Review

	Reference	Title	Identified Critical Success Factors
9	(Douglas et al., 2017)	An exploratory study of critical success factors for SMEs in Kenya	• Maintaining good relationships with customers, • Having a good product or service, • Having good marketing skills and • Creating brand customers can be associated with the critical success factor.
10	(Edu & Gichana, 2024)	Critical success factors of performance of government-funded youth enterprises in Kakamega County Kenya	• Leadership capabilities, • Training, • Youth participation, • Monitoring and evaluation.
11	(Erick & Susan, 2017)	Influence of the critical success factors on completion of road projects in Kenya a case of Kenya National Highways Authority projects	• Stakeholders' involvement • Increase in workers' competency • Contractor's commitment • Increase in project planning
12	(V. W. Ngugi & Musembi, 2022)	Critical success factors influencing completion of poverty eradication projects in Nairobi City County, Kenya	• Effective project management, • Stakeholder involvement, • Adequate funding, and • Comprehensive planning
13	(Kimathi, 2014)	Critical Success Factors in the Implementation of Donor-Funded Projects in Tharaka Nithi County, Kenya	• Stakeholder involvement, • Financing, • Monitoring and Evaluation • Technology
14	(Gitonga, 2017)	The effect of Critical success factors on the completion of public construction projects in Machakos County, Kenya	• Project communication • top management support. • Understanding of stakeholders' communications needs.
15	(Suya & Kiarie, 2023)	Project success factors and performance of Constituency Development funded projects in Nakuru Town West Constituency, Kenya	• Project planning, • Stakeholder involvement, • Project team training, • Project funding • Monitoring and evaluation.
16	(Achieng, 2018)	Critical Success Factors for Private and Public-Private Partnership Investments in Renewable Energy Development in Kenya	• Project design, • Institutional environment, • Project management training, • Project coordination, a • Project monitoring
17	(Kalama, 2016)	Determinants of Successful Implementation of Community Driven Development Projects in Kilifi County, Kenya.	• Timely availability of financial resources • Involvement in the project's implementation by the CBO members • Community training • Availability of Technical support.
18	(Minjire, 2015)	Critical success factors for implementation of public-private	• Socio-Cultural and Economic Factors • Legal and regulatory framework

Appendix 4: Systematic Literature Review

	Reference	Title	Identified Critical Success Factors
		partnerships in health projects at the Ministry of Health in Kenya	
19	(Khisa & Mutuku, 2023)	Critical success factors and performance of completed construction projects at National Social Security Fund, Nairobi City County, Kenya	• Clint variation, • Financial availability, • Construction disputes
20	(Kiinga et al., 2022)	Critical success factors for e-waste management among government of Kenya ministries	• Legal framework factors • E-waste infrastructure
21	(Kioko & Ochiri, 2019)	Influence of critical success factors on supply chain performance of county governments in Kenya	• Quality index management, • Asset utilisation, • Schedule management, • Cost metrics management. •
22	(Koech & Bett, 2023)	Identifying The Critical Success Factors for Digital Transformation Strategy in The Public Service: Evidence from Kenya.	• Effective coordination among stakeholders • Knowledge development and Diffusion, • Entrepreneurial experimentation, • Market Formation • development of localised capabilities
23	(Koech et al., 2016)	Factors influencing strategic information systems implementation in government parastatals: a case of Kenya Forest Service, Mau Forest Conservancy	• Top management support, • Expertise, • End-user training, • Infrastructure
24	(Kukubo & James, 2020)	Critical Success Factors and the Sustainability of Small-Scale Horticulture Projects in Kiambu County, Kenya	• Training, • Financing, • Stakeholder involvement, • Production technology.
25	(Kyalo, 2021)	Cluster-based critical success factors, government moderation and destination competitiveness of conference facilities in Nairobi City County	• Effective change management, • Technological infrastructure, • Human capital development, • Top management commitment, • Hotel design and ambience, • Supportive government policies.
26	(I. Otieno & Omwenga, 2015)	Critical success factors on implementation of public service projects in Kenya: a case of the Huduma Centre Initiative	• improvement of civil servants' utilities and faster service delivery • 'One stop shop' approach that ensured that government services were available under one roof led to increased productivity among staff, faster service delivery to the citizens, improved customer satisfaction and efficiency in the public service. • Monitoring and evaluation are an integral part of the implementation process of a project

Appendix 4: Systematic Literature Review

	Reference	Title	Identified Critical Success Factors
27	(MakÓsew e, 2023)	Critical success factors affecting the adoption of technological innovations and their influence on staff performance and revenue collection at the Kenya Revenue Authority.	• Technology adoption, • Customer service, • Tax base expansion, • Taxpayers' education, • Strategy communication
28	(Makumi & James, 2020)	Critical success factors in the implementation of development projects in Laikipia County, Kenya	• Absorption of adequate proficient skilled staff, • Provision of adequate managerial support always, • ensuring full stakeholder involvement, • Enforcing an effective and efficient Monitoring and evaluation function.
29	(P. A. Otieno, 2015)	Critical Success Factors Influencing Adoption and Use of E-government Services by SMEs in the Manufacturing Sector in Kenya	• usefulness, ease of use, quality of the website, • government regulations and incentives, • organisational competitiveness due to the use of e-government services, • faster broadband connectivity, affordable connectivity, network security and data protection • e-government awareness/training.
30	(Micheni, 2017)	Analysis of the Critical Success Factors of Integrated Financial Management Information Systems in Selected Kenyan Counties	• Change management, • technological infrastructure, • human capital development • Top management commitment
31	(Morogo, 2021)	Critical Success Factors and the Performance of Projects in agrochemicals and food company limited, Kenya	• Effective communication, • stakeholder involvement, • Resource allocation • Project leadership •
32	(Muema & Ngugi, 2021)	Critical Success Factors and Performance of Water Projects in Machakos County, Kenya	• Project management capacity, • Resource support, • Stakeholder involvement, • Effective communication
33	(Muluka et al., 2021)	Project Management Practices and Success Factors of Digital Literacy Programme in Western Kenya	• Effective leadership, • Resource allocation, • Cost management • School leadership, • ICT infrastructure, • Teacher competence
34	(Munyao, 2016)	Influence Of Critical Success Factors on Project Performance: A Case of The National Transport and Safety Authority of Kenya	• With a senior member of management, with sufficient authority on people, systems and funds who acted as a Sponsor. • Projects that were goal-oriented had a clearly defined scope of the project, • With a good focus on the smaller daily

Appendix 4: Systematic Literature Review

	Reference	Title	Identified Critical Success Factors
			• With team members who are action-oriented • With Effective Communication Orientation -
35	(Muriiki & Mungai, 2022)	Critical success factors influencing monitoring and evaluation of community-based development projects in Wajir County, Kenya	• Community Sensitisation • Government policies • Funding allocation for Monitoring and Evaluation.
36	(Musangi et al., 2019)	Critical success factors in library reengineering: a case of academic libraries in Kenya	• Top management commitment, • Planning, • Provision of required resources, • Appropriate IT infrastructure, • Presence of skilled and competent staff, • Value of the library to the university and teamwork
37	(Musinguzi et al., 2023)	Critical success factors of rural social enterprises: Insights from a developing country context	• Community engagement, • Resourcefulness, • Government support, • Leadership, • Market access, • Sustainability practices.
38	(Muturi & Mose, 2020)	Critical success factors of the digitisation of vital records at the civil registration department in Nairobi County, Kenya	• Change management, • Technological infrastructure, • Human capital development, • Top management commitment.
39	(Mutwiri, 2021)	Antecedents of Project Success in Constituency Development Fund Construction Projects in Kenya	• Effective project planning, • Stakeholder engagement, • Timely funding, • Robust monitoring and evaluation.
40	(Mwangi & Kisimbi, 2020)	Critical Success Factors Influencing the Performance of Infrastructure Projects in The Aviation Industry in Kenya: A Case of Moi International Airport.	• Timely financing, • contractor competency, • stakeholder participation, • management skills
41	(Napali & Wanjala, 2018)	Critical Success Factors of Technological Projects in Kenya: A Case Study of Nairobi County	• Risk Management, • Strong Leadership, • Expertise Outsourcing • Client/Supplier relationship.
42	(Ndungu, 2017)	Factors Influencing the Implementation of Government Housing Projects for the Kenya Police Service in Nairobi County, Kenya	• Project planning and communication, • Resource availability, • Staff competency, • Management support, • Contractor selection, • Budgeting, • Project scheduling, • Buying price, • Affordability,

Appendix 4: Systematic Literature Review

	Reference	Title	Identified Critical Success Factors
			• Location, • Accessibility.
43	(Ngari & Mutua, 2024)	Critical Success Factors and Strategy Implementation in the Aviation Industry in Kenya	• Timely financing, • Contractor competency, • Stakeholder participation, • Effective management skills. • Strategy implementation
44	(Das & Ngacho, 2017)	Critical Success Factors Influencing the Performance of Development Projects: An Empirical Study of Constituency Development Fund Projects in Kenya	• Project-Related Factors - clear project objectives, effective planning, and robust project management practices. Timely funding and adherence to project schedules are particularly emphasised • Client-Related Factors - Client involvement and commitment are crucial. • Consultant-Related Factors - Effective communication and coordination between consultants and other stakeholders are essential • Contractor-Related Factors: The competence and performance of contractors are critical. • Supply Chain-Related Factors: Efficient procurement and supply chain management • External Environment-Related Factors: External factors such as political stability, regulatory environment, and community support can influence project performance. • Community involvement in project identification and implementation enhances project ownership and success
45	(A. K. Ngugi & Mutuku, 2023)	Critical success factors and performance of fibre optic infrastructure projects by the Information and Communication Technology Authority, Kenya	• Stakeholder participation, • Human resource capacity, • Government policy, • Financial investment, • Clear project scope.
46	(Obat, 2016)	Critical success factors in the implementation of e-Procurement in public entities in Kisumu County, Kenya	• Change management programs for users on e-procurement, • Supplier involvement and • Availability of a reliable internet service provider
47	(Odhiambo, 2020)	Critical success factors for the timely completion of World Bank projects in Kenya	• Project design, • Institutional environment, • Project management training, • Project coordination

Appendix 4: Systematic Literature Review

	Reference	Title	Identified Critical Success Factors
			• Project monitoring
48	(Odongo & Sang, 2023)	Factors influencing the implementation of public information and communication technology projects in parastatals in Kenya	• Top management support, • Expertise, • Infrastructure, • End-user training, • Managerial competence, • Resource allocation, • Organisational structure, • Stakeholder engagement.
49		Factors Influencing Implementation of Public-private Partnership Projects: A Case Study of the Nairobi Southern Bypass in Nairobi County, Kenya	• Financing methods, • Adequacy of funding, • Technology availability and • Project contract mechanism with • Adequacy of funding • Organisational Top Management influence • Risk identification and allocation, • Communication systems, • Technical capability, • Coordination effectiveness, • Upfront planning efforts, • Developing an appropriate structure and decision-making • Aspects of regulatory factors including corporate taxes, administrative approvals environment, quality assurance program,
50	(Oiriga & Ngari, 2019)	Factors influencing the success of construction projects in Kenya: gated community projects in Nairobi City County	• Project planning • Project monitoring • Construction technology, • Stakeholders' participation
51	(Ojiambo, 2018)	Critical success factors, government policy compliance and completion of construction projects in public secondary schools in Bungoma County, Kenya	• Attributes of the project manager, • Top management support, • Availability of resources, • Socio-economic factors, • Government policy compliance
52	(M. A. Osman & Kimutai, 2019)	Critical success factors in the implementation of road projects in Wajir County, Kenya	• Community support, • Project feasibility, • Regulatory compliance, • Financing, • Project design, • Effective stakeholder engagement
53	(Osore & Omwenga, 2022)	Determinants of effective implementation of public health construction projects in Kenya	• Funding availability, • Community awareness, • Project size, • Procurement processes, • Stakeholder participation,

Appendix 4: Systematic Literature Review

	Reference	Title	Identified Critical Success Factors
			• Project planning, • Government policies, • Sustainability factors.
54	(Sammy, 2023)	Critical success factors and implementation of projects by the Department of Health and Emergency Services in Machakos County, Kenya	• Stakeholder involvement, • Monitoring and evaluation, • Resource allocation • Project leadership significantly
55	(Sikolia, 2024)	Critical Success Factors to the Implementation of Competency-Based Curriculum in Junior Schools in Kiminini Sub-County, Kenya	• Stakeholder engagements • Infrastructural factors – classrooms, teachers and laboratories • Teacher-related factors – training, student ratio and experience.
56	(Vihenda, 2015)	Critical success factors in the implementation of strategic alliances for mobile financial services by telecommunication companies in Kenya	• Partnership alliances, • Government policies, • Market positioning, • Organisational structure, • Community support
57	(Wairumbi, 2021)	Critical Success Factors to the Implementation of Digital Literacy Programme in Public Schools in Kenya: A Case Study of Langata and Westlands Constituencies in Nairobi County	• Strong leadership, • Adequate ICT infrastructure, • Competent and well-trained teachers, • Comprehensive support systems.
58	(Wamoto & Hwang, 2016)	Critical Success and Failure Factors of e-Government Project Implementation in Kenya	• Drive - a strong drive from the government for the change from analogue to digital. • Strategy - An approved ICT policy with strong stakeholder participation in development. • Management - presence of a project champion with apparent authority and responsibility, • Design - incremental and pilot approach. • Competencies - possession of computing skills by government employees • Infrastructure - All offices are fully equipped with LAN • Financial - adequate financial resourcing
59	(Wamoto, 2015)	E-government Implementation in Kenya: An Evaluation of Factors Hindering or Promoting E-government's Successful Implementation.	• Good strategy formulation, • Internal and external drive, • Employee competence, • Enough funding, (Weak ICT infrastructure, poor project management, and design hinder its implementation)

Appendix 4: Systematic Literature Review

	Reference	Title	Identified Critical Success Factors
60	(Wekesa, 2016)	Influence Of Strategic Success Factors on Implementation of Information Communication Technology Projects in Kenyan Commercial Banks	• The project team dynamics, including effective internal communication and the commitment and expertise of team members. • Employing a structured project management methodology is essential for achieving project objectives.
61	(Yagan, 2016)	Institutional Factors Influencing Performance Of E-procurement In Public Institutions: A Case of Parastatals Operating in Nairobi Central Business District	• Employee competence, • Supportive policies, • Robust technology • Infrastructure, • Data security, • Managerial support, • Stakeholder engagement.

Appendix 5: Research Budget

Item Description	# needed	Cost/item	Total
Drive from Nairobi to Nakuru and back for Data Collection mapping (fuel and lunches)	1	15,000	15,000
Drive to Nakuru for Data Collection and back	1	20,000	20,000
Food and accommodation in Nakuru (4 days for two people)	4	2,500	10,000
Stationery and Printing Material needed	1	3,000	3,000
Payment for Enumerator	4	1,000	4,000
Payment for Research Assistant	1	15,000	15,000
Data Analysis Cost	1	30,000	30,000
Subtotal			97,000
Miscellaneous	0		4,850
Grand Total			101,850

Appendix 6: Letter of Introduction

Ole Sangale Rd, Madaraka Estate,
P.O Box 59857 00200, Nairobi, Kenya.
Cell: +254 703 414/6/7, Twitter: @SBSKenya
Email: info@sbs.ac.ke or visit www.sbs.strathmore.edu

Strathmore UNIVERSITY
BUSINESS SCHOOL

Monday, December 9, 2024

To Whom It May Concern,

RE: FACILITATION OF RESEARCH – MBUGUA DANIEL WANGANGA

This is to introduce Mbugua Daniel Wanganga who is a Master of Business Administration (MBA) Student at Strathmore University Business School, admission number MBA/148360 /22. As part of our MBA Programme, Daniel is expected to do applied research and undertake a project. This is in partial fulfilment of the requirements of the MBA course. To this effect, he would like to request appropriate data from your organization.

Daniel is undertaking a research paper on ***"THE CRITICAL SUCCESS FACTORS FOR WAREHOUSE RECEIPT FINANCING ADOPTION IN KENYA: A CASE STUDY OF NAKURU COUNTY."*** The information obtained shall be treated confidentially and shall be used for academic purposes only.

Our MBA Programme seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct use to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and shall be willing to provide any further information if required.

Yours sincerely,

Alois Njenga,
Manager – Graduate Programmes,
Strathmore University Business School.

Strathmore Business School is a Proud member of:
Association of African Business Schools AABS EFMD AACSB

Appendix 7: Ethics Clearance Letter

Strathmore UNIVERSITY

2nd December 2024

Mr Wanganga Daniel,
wanganga.mbugua@strathmore.edu

Dear Mr Wanganga,

RE: The Critical Success Factors for Warehouse Receipt Financing Adoption in Kenya: A Case Study of Nakuru County

This is to inform you that SU-ISERC has reviewed and **approved** your above SU-masters proposal. Your application reference number is **SU-ISERC2436/24.** The approval period is from **2nd December 2024 to 1st December 2025.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

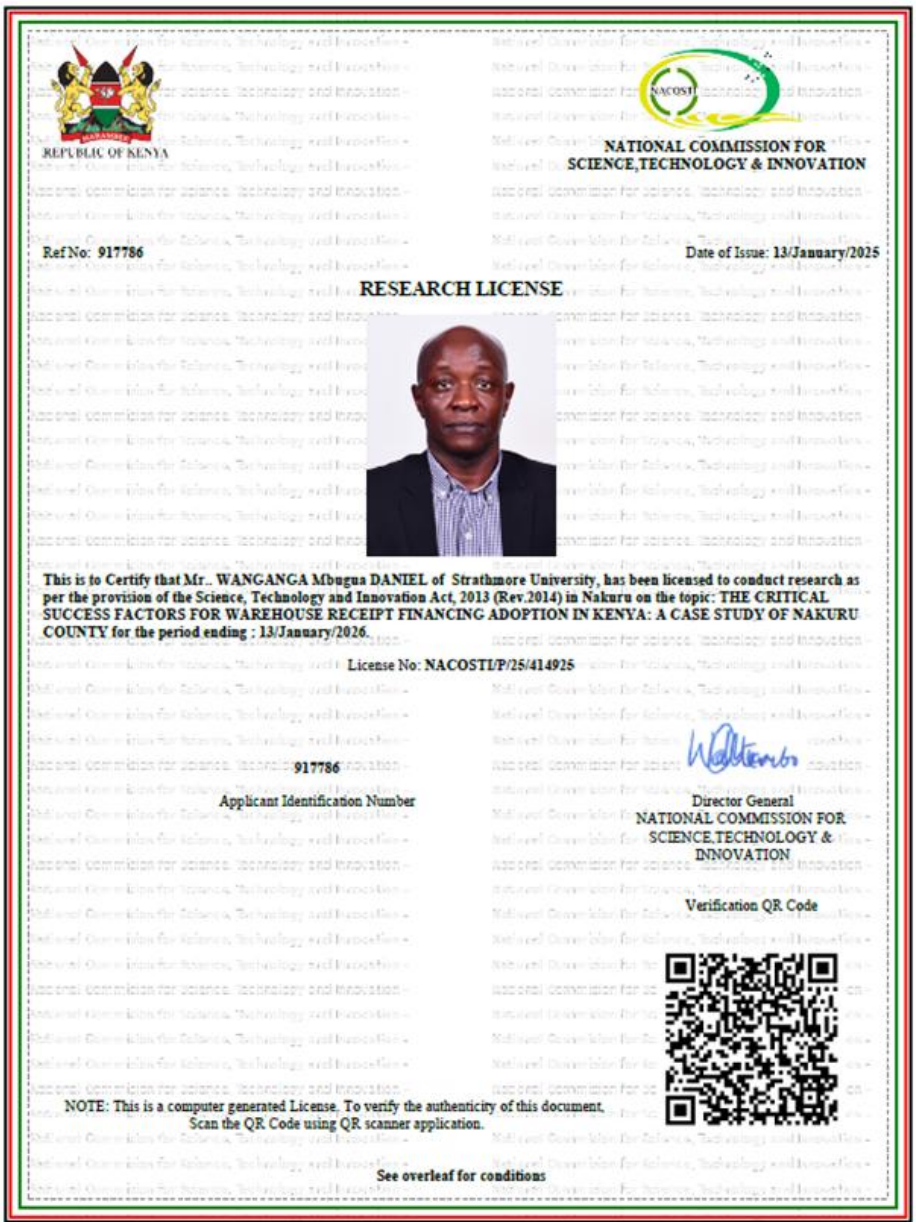
Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

Appendix 8: NACOSTI Permit



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 917786

Date of Issue: 13/January/2025

RESEARCH LICENSE

This is to Certify that Mr.. WANGANGA Mbugua DANIEL of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nakuru on the topic: THE CRITICAL SUCCESS FACTORS FOR WAREHOUSE RECEIPT FINANCING ADOPTION IN KENYA: A CASE STUDY OF NAKURU COUNTY for the period ending : 13/January/2026.

License No: NACOSTI/P/25/414925

917786

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions