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The Impact of government spending efficiency on forest restoration outcomes in the Mau Forest Complex, Kenya.

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THE IMPACT OF GOVERNMENT SPENDING EFFICIENCY ON FOREST RESTORATION OUTCOMES IN THE MAU FOREST COMPLEX, KENYA.

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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.

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ABSTRACT

The Mau Forest Complex (MFC) is one of the most extensive montane forests in Eastern Africa. It is located in Kenya's most crucial water catchment regions, but it remains affected by persistent environmental degradation. Despite considerable public investments aimed at its restoration, doubts persist around whether these resources have been efficiently allocated, implemented, and monitored. This study investigates how government spending efficiency, specifically in terms of allocation, project implementation, and monitoring and evaluation efficiency, affects forest restoration outcomes, both ecologically and socially. It is anchored in Theory of Public Expenditure and Forest Transition Theory and adopted a pragmatic worldview and also a sequential explanatory mixed-methods approach. Quantitative data was collected from a stratified sample of 217 participants, comprising government officials, indigenous groups and community representatives involved in forest-related interventions. A multiple linear regression model was employed using SPSS version 27 to assess relationships among the variables, followed by qualitative interviews that deepened and clarified the quantitative findings. The findings of the study showed a strong positive association between allocation efficiency and restoration outcomes. However, the effectiveness was weakened by slow disbursement processes and governance-related obstacles. Project implementation showed moderate efficiency, particularly in cost management and collaboration, yet was hampered by frequent delays and administrative bottlenecks. Similarly, while monitoring mechanisms were present, the limited integration of stakeholder feedback and modern technology weakened adaptive management. The study's contribution is anchored in bridging theoretical concepts with empirical findings on government spending efficiency on forest restoration initiatives in a developing-country context. It sheds light on systemic inefficiencies in public forest restoration spending and offers targeted recommendations to improve institutional responsiveness, community engagement, and long-term sustainability in forest governance.

Key words: Government Spending, forest restoration initiatives, allocation efficiency, project implementation efficiency, M&E efficiency, stakeholder engagements, long term sustainability, environmental and social outcomes.

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ABBREVIATIONS AND ACRONYMS

AECOM- Architecture, Engineering, Construction, Operations, and Management

AE - Allocation Efficiency

AFR - African Forest, Landscape, and Restoration initiatives

ANOVA- Analysis of Variances

ARDL - Autoregressive Distributed Lag model.

CBA - Cost Benefit Analysis

CC - Climatic Conditions

ECK - Environmental Kuznets Curve

ESG - Environment, Social, Governance

FCP - Finite Population Correction

FDAP - Forest Declaration Assessment Partners

FLR - Forest Landscape Restoration

FOLAREP - Forest and Landscape Restoration Implementation Plan

FRO - Forest Restoration Outcomes

GHG - Green House Gases

GFA - Glasgow Leaders' Declaration on Forest and Land Use

GIS - Geographic Information System

GSE - Government Spending Efficiency

IPCC - Intergovernmental Panel on Climate Change

ICS - Interim Coordinating Secretariat

KFS - Kenya Forest Service

KEFRI - Kenya Forest Research Institute

MENR - Ministry of Environment and Natural Resources

MECF - Ministry of Environment, Climate Change and Forestry

MEE - Monitoring & Evaluation Efficiency

MFC - Mau Forest Complex

MDGs - Millennium Development Goals

NACOSTI - National Commission for Science, Technology, and Innovation

PIE - Project Implementation Efficiency

PFMP - Participatory Forest Management Plans

SFA - Stochastic Frontier Analysis

SAGA - Semi-Autonomous Government Agency

SDG - Sustainable Development Goals

TEER - The Economics of Ecosystem Restoration

WWF - World Wildlife Fund

DEFINITION OF TERMS

Government Spending Efficiency	Government spending refers to public funds and public expenditure spent, and incurred by the government on goods and services to meet its social and economic goals (Ngigi et al., 2024). Government spending efficiency is how well a government uses these funds to achieve goals and provide services (Gupta et al., 1997)
Forest Restoration Initiatives:	Refers to projects undertaken to recover forests such as planting of trees, restoration of forest cover and the recovery of natural processes to safeguard biodiversity, and provide sustainable means of living for nearby inhabitants (De Jong et al., 2021)
Environmental Outcomes	Refers to biodiversity improvements, land tenure, and changes in the forest cover or the proportion of land area occupied by forests, serving as an important indicator of the well-being and long-term viability of forest ecosystems, over a time span (Mendenhall et al., 2016)
Community Livelihood:	refers to the ways in which a community in a society meets its basic needs such as food, water, housing, income as they coexist and carry on their normal duties.(Kumi et al., 2024)
Climate Change:	refers to the gradual change of the global temperature, patterns of precipitation, sea levels, and weather patterns arising from both natural elements and human activities. (Borras Jr. et al., 2022)
Environmental Degradation	Refers to depletion of resources, pollution, and unsustainable actions cause environmental deterioration. Environmental degradation causes biodiversity loss, ecosystem service disruption, agricultural productivity loss, natural disaster vulnerability, and health and well-being challenges (Bentley, 2022).

Forest-dependent Communities:	Refer to indigenous and vulnerable communities living in and adjacent forests, rely on them for livelihoods, cultural activities, general social and economic, and engage in conservation activities (De Jong et al., 2021).
Montane Forests	These are forests that are commonly located in mountainous regions, usually at higher altitudes (De Jong et al., 2021)
Allocation Efficiency	This refers to the optimal utilization and distribution of government resources that are aimed at achieving tangible outcomes which have the highest social and environmental benefits. This is assessing how well government spending is utilized and prioritized for those activities that translate into environmental and social outcomes. (IMF, 2021).
Project Implementation Efficiency	refers to the execution of government projects aimed at achieving restoration success in the Mau Forest Complex. This relates to whether these projects are undertaken in a timely, cost-effective, and an inclusive manner to ensure forest restoration outcomes such as forest cover, community engagement are well implemented in accordance to the expected standards (Laniado et al., 2013)
Monitoring & Evaluation Efficiency	This entails the extent to which government projects are monitored, tracked and assessed to establish value for government expenditure directed at forest restoration efforts. This component assesses feedback mechanisms and participatory monitoring to assess whether the goals or outcomes are achieved and evaluated in a timely manner (CIFOR-ICRAF, 2023)

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Forests are indispensable ecosystems that provide critical environmental, economic, and social benefits. Deforestation and forest degradation, however, continue to be significant worldwide issues that lead to a decline in biodiversity, climate change, and loss of livelihoods. Global efforts to address climate change have placed a greater emphasis on forest restoration, a crucial tactic under programs like the United Nations Decade on Ecosystem Restoration and the Bonn Challenge, according to the Intergovernmental Panel on Climate Change (IPCC, 2023). Despite these initiatives, global forest cover continues to decline at an alarming rate, with annual losses estimated at 10 million hectares, disproportionately affecting developing regions, including Sub-Saharan Africa (FAO, 2023).

Global funding towards effective forest restoration is faced by a persistent financial gap between the required and actual financial investments. The World Wildlife Fund (2023) predicts that an annual expenditure of US$460 billion is required to maintain, improve, and restore the world's forest resources, with governments worldwide allocating public funds for forest restoration efforts. Worldwide, a small proportion of funds equivalent to USD 2.2 billion of all public funds for forest initiatives is allocated to forests annually. (Forest Declaration Assessment Partners, 2023). According to WWF (2023) assessments, if deforestation were to be stopped and complete restoration is accomplished, financing would have to be at least 50 times higher, if not more.

In Sub-Saharan Africa, governments develop innovative institutional frameworks for restoration and foster cross-sector and cross-scale governance to support, account for, and coordinate comprehensive forest land restoration initiatives (Djenontin et al., 2018). In Kenya, the situation is particularly concerning. Forest cover has dwindled from approximately 12% in the 1960s to below 6% in 2020, significantly below the constitutional goal of 10% (Ministry of Environment and Forestry, 2022). Within the Kenyan context, the MFC is Kenya’s largest closed-canopy forest

and the most significant water catchment area, supporting over five million people and feeding thirteen major rivers (Kenya Wildlife Service, 2019). Over the past two decades, the MFC has lost about 40% of its forest cover due to illegal logging, agricultural encroachment, and settlement (UNEP, 2023). The degradation of the MFC has resulted in diminished water quality, increased soil erosion, loss of biodiversity, and negative impacts on local communities (Claridge & Obei, 2022).

To address these challenges, Kenya has committed to ambitious restoration targets, such as lowering greenhouse gas emissions by 32% through its Nationally Determined Contributions (NDCs) under the Paris Agreement and planting 5.1 million hectares of trees by 2030 under the African Forest Landscape Restoration Initiative (AFR100), (WWF, 2023). However, despite these commitments, inefficiencies in public expenditure have hindered progress. Ministry of Environment and Forestry (2022) reports that while forest restoration budgets increased by 45% between 2010 and 2020, project completion rates fell by 30%, indicating misallocation of funds, delays in disbursements, and poor monitoring mechanisms.

Existing literature around forest restoration in Kenya and in particular assessing the impact of government spending on forest restoration outcomes in the MFC, is limited despite a growing interest in this area. A report by Kenya Wildlife Service (2019) has published restoration initiatives around the Mau Forest Complex and suggested reforms to be carried out by the national government. Additionally, reports have been documented by other groups of stakeholders such as the Green Belt Movement (2024), and the Initiative for Sustainable Landscapes (IDH Sustainable Trade Initiative, 2017), regard the same reforms There is limited studies regarding how government spending on forest initiatives translates to restoration outcomes in the MFC, specifically when assessing how allocation, implementation and monitoring contributes to restoration outcomes. Studies have shown that governments operate under complex governance structures and the need for coordinated action among government, local communities, and conservation organizations, is necessary to assess not only how much money is spent on allocation, projects, and evaluations, but also how efficient government spending is. (Claridge & Obei, 2022)

Key variables such as budget allocation efficiency, project implementation efficiency, monitoring and evaluation efficiency of public funds, and impact on restoration efforts are central to assessing

government spending effectiveness. These variables can be measured through annual budgetary allocations, cost per hectare restored, project completion rates, and funds allocated to community-based initiatives (Claridge & Obei, 2022). Additionally, environmental outcomes such as forest cover changes and biodiversity improvements provide insights into the effectiveness of restoration efforts. Public participation through stakeholder engagement is a critical yet often overlooked factor in forest restoration. Meaningful stakeholder engagement, particularly with Indigenous communities such as the Ogiek, enhances project sustainability and inclusivity (Jebiwott et al., 2023). Studies show that limited community involvement in decision-making has resulted in resistance and conflicts and a decline in the effectiveness of restoration programs (WWF, 2023). Strengthening public participation in forest management can foster transparency, build trust, and improve resource allocation efficiency.

This study employed a sequential explanatory mixed methods approach to government expenditure on forest restoration in the Mau Forest Complex from 2010 to 2022. It specifically aimed to assess the effects of allocation, project implementation, and Monitoring and Evaluation efficiency on forest restoration outcomes. Forest restoration outcomes were evaluated using environmental indicators such as changes in forest cover, land degradation, and biodiversity improvements, and social outcomes were assessed through community participation. The study's originality lies in its comprehensive approach to linking government spending with environmental and socio-economic outcomes in a region that plays a critical role in Kenya's ecological and economic well-being. By addressing conceptual, contextual, and methodological gaps, the research provided actionable insights for policymakers to optimize resource allocation, improve public expenditure efficiency, and enhance the inclusivity of stakeholders in restoration initiatives.

1.1.1 Government Spending on Forest Restoration Initiatives

Globally, scaling up forest restoration requires addressing barriers and identifying enablers to achieve sustainable outcomes (Mansourian et al., 2022). Chu et al (2023) estimate that stopping deforestation and achieving targets under the Glasgow Leaders' Declaration will require additional investments of USD 11 and 52 billion annually, emphasizing the gap between current funding levels and global restoration goals. This gap highlights the need for further research on financial spending efficiency, particularly government expenditures, to ensure that restoration efforts

effectively achieve ecological and socio-economic objectives. Further, Forest Declaration Assessment Partners (2022) highlights that domestic and international public financing has traditionally supported forest initiatives, with USD 23.5 billion committed annually. However, these funds remain far below the annual required target of USD 460 billion to end deforestation. Forest Declaration Assessment Partners (2023) further emphasize that achieving global targets to halt deforestation by 2030 requires enhanced financial commitments and efficient allocation of resources. This significant gap in funding is further exacerbated by poor resource allocation where funding is directed towards activities that do not directly support reforestation efforts. (Forest Declaration Assessment Partners, 2023). The report further adds that Indigenous communities and local stakeholders receive minimal funding relative to their financial needs, underscoring the importance of government collaboration with these groups to ensure progress in restoration efforts.

The challenge is prevalent in Africa where its governments, including Kenya, have pledged to restore more than 100 million hectares under the African Forest Landscape Restoration Initiative (AFR100) and the Bonn Challenge (KEFRI, 2021). This ambitious plan is hampered by insufficient and inconsistent funding, limited coordination among actors, and institutional weaknesses limiting its progress (CIFOR-ICRAF, 2023). The Kenyan Government pledged to restore 5.1 million hectares of degraded forests by 2030 (FAOLEX, 2023; KEFRI, 2021). During the period of 2010 -2022, Kenya set ambitious policies and strategic plans, including the Forest Conservation and Management Act (2016), the National Climate Change Action Plan, and the Forest and Landscape Restoration Implementation Plan (FOLAREP) and subsequently, increased budgetary allocation towards these initiatives (FAOLEX, 2023; CIFOR-ICRAF, 2023) According to Kenya Forest Service's financial statements, the annual budget for forest-related activities ranged from Ksh 12.5 billion to Ksh 13.1 billion in the years 2018/19 to 2020/21, representing about 0.5% of the national budget (Kenya Forest Service, 2022; KIPPRA, 2024). In addition, the development partners provided additional financing of Kshs 951 million adding the total allocation during the fiscal year 2021/22, to Ksh 4.68 billion. In the period under review (2010-2022), the cumulative government allocation for forest restoration exceeded Ksh 15 billion (Ministry of Environment and Forestry, 2022).

Resource mobilization is a concern with government funding falling short of the budget required to achieve national targets. For instance, the National Campaign for Achieving and Maintaining Over 30% Tree Cover by 2032 is projected to require Ksh 600 billion over ten years, yet only Ksh 10.15 billion and Ksh 14.3 billion were allocated in 2022/23 and 2023/24, respectively (KIPPRA, 2024). This inadequacy in funding affects the scope and sustainability of restoration outcomes. Government spending effectiveness is not only subject to the allocation of funds but also, how well these funds are implemented and evaluated.

For the period between 2010 and 2022, Government has carried out initiatives in the MFC including afforestation, enrichment planting, and community-based programs. This accentuated stakeholder engagement as one of the key drivers to efficient spending using approaches such as the implementation of Participatory Forest Management Plans (PFMPs) and partnerships with NGOs and international donors (Ministry of Environment and Forestry, 2022). Studies such as Rana et al. (2022) identified inefficiencies in tree-planting initiatives due to poor implementation policies, leading to unnecessary expenditures and reduced restoration effectiveness. The study noted that excluding local communities from planning and budgeting processes undermines the sustainability of restoration activities. Vincenti et al. (2020) underscore the importance of engaging local stakeholders while César et al. (2020) observed a growing recognition of the role of socio-economic factors and stakeholder engagement in driving success. While stakeholder engagement is critical, Forest Declaration Assessment Partners, (2023) further add that Indigenous communities and local stakeholders receive minimal funding relative to their financial needs, underscoring the importance of government collaboration with these groups to ensure progress in restoration efforts.

In Kenya, inefficiencies in government spending on forest restoration have significant economic and environmental implications. Muthuri et al (2022) estimate annual losses of USD 1.3 billion due to land degradation, despite water tower ecosystems contributing substantially to national GDP and livelihoods. According to Wainaina et al. (2020), prioritizing finite resources is critical to addressing environmental degradation, but inadequate institutional capacity often hampers governance and restoration efforts (Höhl et al., 2020). Kumi et al. (2024) argue that simplifying regulations and fostering collaboration with stakeholders, including indigenous groups, is essential

for effective restoration. Forest Declaration Assessment Partners (2023) further stresses the importance of providing communities with information access, incentives, and technical aid to enhance participation and outcomes. This study aims to evaluate the efficiency of government spending in forest restoration initiatives in Kenya, focusing on indicators such as fund allocation, utilization rates, project completion, and stakeholder engagement to inform policy and improve restoration outcomes.

1.1.2 Overview of Forest Restoration initiatives in Mau Forest Complex

The MFC has been the focal point of Kenya's forest restoration efforts, owing to its ecological and socio-economic importance. Restoration efforts in the MFC aim to restore environmental functionality and improve the livelihoods of forest-dependent communities, aligning with global policy discussions on terrestrial ecosystem restoration (Indrajaya et al., 2022). These initiatives are guided by Kenya's Vision 2030, the National Climate Change Action Plan (NCCAP), and the Forest Conservation and Management Act of 2016, emphasizing workable forest management and the achievement of 10% forest cover. Policies such as the Mau Forest Rehabilitation Framework provide specific directives on resource allocation and stakeholder collaboration for restoring degraded areas. The Water Towers Conservation Fund and the Green Belt Movement have also played instrumental roles in funding and implementing reforestation programs in the MFC.

Restoration in the MFC is anchored in Kenya’s Vision 2030, the National Climate Change Action Plan (NCCAP), and the Forest Conservation and Management Act of 2016. These frameworks emphasize sustainable forest management, stakeholder participation, and the attainment of at least 10% national forest cover (FAOLEX, 2023). The Mau Forest Rehabilitation Framework, developed following the recommendations of the Mau Forest Complex Taskforce (2008–2009), provided a blueprint for coordinated restoration, resource mobilization, and stakeholder collaboration (Ministry of Environment and Forestry, 2018)

Government-led initiatives include the Mau Forest Complex Taskforce formed in 2008 provided a blueprint to address deforestation and degradation through coordination, resource mobilization and stakeholder engagement. This task force outlined a detailed action plan involving the eviction of illegal settlers, boundary demarcation, and afforestation efforts (Ministry of Environment and

Forestry, 2018). Between 2010 and 2020, the government has partnered with non-governmental organizations (NGOs) and international donors, such as the World Bank's Kenya Water Towers Program, to undertake reforestation and community support programs targeting the MFC (Ministry of Environment and Forestry, 2020). The 2016 Forest Conservation and Management Act strengthened institutional frameworks by establishing the Kenya Forest Service (KFS) to coordinate restoration and conservation activities.

During the scope of the study (2010-2022), the government in conjunction with other non-state partners launched and implemented specific initiatives in the MFC such as, formation of Mau Forest Complex Taskforce and Interim Coordinating Secretariat (ICS), in 2008 to undertake interventions, including the eviction of illegal settlers, boundary demarcation, and restoration of degraded sites. The ICS was mandated to coordinate various agencies in resource mobilization, and stakeholder engagement and was later gazetted in 2012 as Kenya Water Towers Agency. Other initiatives included a strategic plan for MFC to guide the phased restoration of all seven forest blocks, a replanting exercise targeting Enderit in Mau Narok Block, interventions included enrichment planting on 2,500 hectares, mixed planting on 1,500 hectares, and natural regeneration across 15,241 hectares. Participatory Forest Management Plans (PFMPs) were other initiatives aimed at including local communities, and the Ogiek into Community Forest Associations (CFAs) in a bid to empower them to co-manage forest resources alongside the Kenya Forest Service (KFS). Partnerships with the French Development Agency (AFD) duped Green Belt Movement, launched a four-year reforestation initiative (2021–2024) targeting degraded areas in Dundori, Nandi North, and Tinderet forests. The Water Towers Conservation Fund was also established as part of the MFC restoration initiatives to provide sustained financial and technical support for restoration, research, and community engagement. A partnership with World Bank’s Kenya Water Towers Program mobilized additional resources for landscape restoration, focusing on the South Western Mau and supporting farmer-led conservation on 60,000 hectares.

Despite these efforts, the MFC faces significant challenges, including encroachment, population pressure, and political interference. In 2019, the government initiated a large-scale eviction of settlers from the forest to reclaim degraded areas, sparking conflicts with local communities (Ministry of Lands and Physical Planning, 2020). Restoration initiatives have increasingly

prioritized community engagement to address these issues through programs such as the Participatory Forest Management Plans (PFMPs), which empower local communities to co-manage forest resources alongside the Kenya Forest Service (KFS).

Ecological outcomes include a gradual increase in forest cover, with reports indicating that over 25,000 hectares have been restored since 2010 (Ministry of Environment and Forestry, 2021). Community livelihoods have also benefited through initiatives such as the establishment of tree nurseries, agroforestry programs, and ecotourism projects, which provide alternative sources of income. However, challenges such as inadequate funding, weak enforcement of regulations, and competing land-use priorities remain barriers to achieving sustainable restoration. Strengthening these policies, addressing funding gaps, and fostering collaboration between stakeholders contribute significantly to the improvements of restoration initiatives in the Mau Forest Complex.

1.1.3 Mau Forest Complex

The MFC, East Africa's largest continuous montane indigenous forest and an essential water tower for Kenya, spanning across 400,000 hectares and consists of seven forest blocks (Langat et al., 2019). As Odawa and Seo (2019) explain, the MFC supports twelve significant rivers, including the Mara, Nzoia, Yala, and Sondu-Miriu, which flow into critical ecosystems such as Lake Nakuru, Lake Victoria, and Lake Natron. These rivers are vital for human consumption, agriculture, wildlife, and livestock. Jebiwott et al. (2021) note that the complex contributes significantly to Kenya's hydropower potential with the capacity to generate 508 megawatts of electricity. However, decades of human activity have increased land fragmentation, deforestation, and wetland degradation. In 2001, approximately 67,000 hectares of forest reserve were cleared, demonstrating the severity of forest cover loss despite the forest's numerous ecological, economic, and cultural benefits (Jebiwott et al., 2021). These challenges have led to significant forest cover loss, threatening livelihoods, wildlife habitats, and climate resilience, underscoring the urgency of targeted restoration efforts in this forest.

The Mau Forest Complex was chosen for this study due to its unique ecological importance and the scale of its degradation, threatening both local and regional ecosystems. The forest's ability to regulate water flow and store carbon makes it critical for addressing climate change impacts and

ensuring sustainable development (Tonetti et al., 2022). Additionally, the MFC is home to the Ogiek indigenous community, whose cultural and economic activities are closely tied to the forest (Resources, 2016). Unlike other forests in Kenya, the MFC is characterized by its historical and political complexities, including controversial land allocations and large-scale forest clearances, which have accelerated its degradation (Ojoatre et al., 2024). The forest's strategic location as a water tower, its biodiversity significance, and the socio-political dynamics surrounding its conservation make it a key focus for examining government spending efficiency and restoration outcomes. By addressing these issues, the study contributes to understanding how effective resource allocation can enhance ecological restoration and improve the livelihoods of forest-dependent communities.

1.2 Statement of the Problem

The MFC is one of Kenya's most vital ecosystems, serving as a key water tower and contributing significantly to biodiversity, climate regulation, and the livelihoods of forest-dependent communities. Despite its ecological and socio-economic importance, the MFC has faced extensive degradation, with over 40% of its forest cover lost in recent decades due to illegal logging, agricultural encroachment, and human settlement (Jebiwott et al., 2021). This loss threatens the water supply for major rivers such as the Mara and Sondu-Miriu, critical for hydropower, agriculture, and biodiversity. Forest restoration initiatives have been implemented, notably, the establishment of the Prime Minister's Task Force on the Conservation of the Mau Forests Complex in 2008 that led to a comprehensive set of recommendations, including the creation of an effective management structure, relocation of forest inhabitants, restoration of degraded areas, and mobilization of resources for long-term sustainability (Kenya Wildlife Service, 2019). Another initiative by the government in adopting forest and landscape restoration (FLR) in national policy include forming the Landscape Restoration Technical Working Group and committing to restore 5.1 million hectares by 2030 under the African Forest Landscape Restoration Initiative (AFR100) (CIFOR-ICRAF, 2022). Further the government has supported community initiatives through participatory management systems, such as Community Forest Associations (CFAs), which involve local communities in conservation and decision-making (Chepkemoi & Musya, 2023). Despite these efforts and initiatives, questions remain about the efficiency of government spending

in reversing degradation, particularly in how resources are allocated, utilized, and monitored to achieve sustainable outcomes. This study addresses the lack of empirical evidence linking government expenditure to ecological restoration and socio-economic impacts in the MFC.

Conceptually, the relationship between government spending and forest restoration outcomes remains inadequately explored in Kenya. Although forest restoration is recognized as a critical tool for combating climate change and enhancing livelihoods, previous studies often focus on environmental outcomes without examining the efficiency of financial investments or their impact on community livelihoods (Odawa & Seo, 2019). The study addressed the gaps by assessing the effects of how public funds are allocated, the effectiveness of their utilization, and the degree to which these expenditures improve ecological and social outcomes such as community participation. Methodologically, previous research on forest restoration has primarily relied on descriptive approaches that fail to incorporate robust quantitative analyses of financial efficiency or mixed methods to contextualize findings (Mutunga et al., 2023). Studies have often used single-variable analysis, overlooking the interplay between government spending, environmental metrics, and community outcomes. This study addressed the gap by utilizing a sequential explanatory mixed-methods design, integrating multiple regression models and qualitative thematic analysis to offer a comprehensive understanding of the efficiency of government spending.

Contextually, while global and regional studies provide insights into forest restoration, there is limited research specific to the Mau Forest Complex, particularly on government-led initiatives. This study focuses on the MFC to generate localized insights that inform national policies and international restoration strategies. The aim of the study was to assess the impact of government spending efficiency on forest restoration outcomes by analyzing allocative efficiency, project implementation efficiency, and M&E efficiency and their effect on environmental and social outcomes in the Mau Forest Complex, which has undergone decades of deforestation and degradation. Focusing on the Mau Forest Complex, this study offered localized evidence to inform national forest policies and guide international restoration initiatives. Additionally, the study highlighted the role of inclusive governance in ensuring that restoration efforts are efficient and sustainable, thus addressing the methodological, conceptual, and contextual gaps identified in existing literature.

1.3 Research Objectives

1.3.1 General Objective

The primary aim of this study was to assess the impact of government spending efficiency on the outcomes of forest restoration in the Mau Forest Complex.

1.3.2 Specific Objectives

The specific objectives were;

i. To assess the effect of allocation efficiency on forest restoration outcomes in the Mau Forest Complex, Kenya.
ii. To evaluate the effect of project implementation efficiency on forest restoration outcomes in the Mau Forest Complex
iii. To assess the influence of Monitoring and Evaluation Efficiency on forest restoration outcomes in the Mau Forest Complex, Kenya.

1.3.3 Research Questions

The research questions were as follows;

i. What is the role of allocation efficiency in enhancing the efficiency of government spending on forest restoration in the Mau Forest Complex?
ii. How does project implementation efficiency affect forest restoration in the Mau Forest Complex?
iii. What are the effects of Monitoring and Evaluation Efficiency on forest restoration outcomes in the Mau Forest Complex, Kenya?

1.4 The Scope of the study

The main aim of the study was to assess the impacts of government spending efficiency on forest restoration outcomes in the MFC, Kenya, from 2010 to 2022. It focused on significant restoration efforts, policy interventions, and budgetary allocations addressing deforestation and land degradation within the MFC. An ecologically vital water tower that is socio-economically crucial

to local communities. The target population included 474 stakeholders, such as government officers, indigenous community representatives, and local community-based organizations involved in restoration and sustainable resource management. The observation unit comprised 217 government officials, community group representatives, and indigenous community leader. Closed and open-ended questionnaires were used to collect data to assess public expenditure efficiency and its environmental and social impacts. This localized study aimed to provide evidence-based insights to guide policy and enhance restoration strategies in Kenya.

1.5 Significance of the Study

This section explored the relevance of the research to the following:

1.5.1 Significance of the Study to Policy

This research provided valuable insights into the efficiency of government spending on forest restoration initiatives in the Mau Forest Complex, offering evidence-based recommendations for policymakers. This study offers valuable insights to beneficiaries such as policymakers, government agencies, for example, the Ministry of Environment and Forestry its semi-autonomous agencies (SAGAs), as well as international organizations and donors, while highlighting critical gaps and opportunities in implementing restoration programs by examining budget allocation, fund utilization, and monitoring activities. The findings informed the development of more effective policies and frameworks for sustainable forest management, ensuring timely and efficient resource allocation in optimizing environmental and social outcomes. Additionally, the study underscored the importance of inclusive governance and stakeholder engagement, enabling policymakers to design participatory strategies that enhance the long-term sustainability of restoration efforts. By aligning restoration policies with the needs of communities and global conservation goals, the research contributes to strengthening Kenya's environmental governance and achieving its national and international commitments, like the African Forest Landscape Restoration Initiative (AFR100) and the Paris Agreement.

1.5.2 Significance of the Study to Practice

The practical insights provided by the study revolved around improving forest restoration implementation initiatives in the Mau Forest Complex. By identifying key indicators of government spending efficiency, such as cost-effectiveness, project completion rates, and stakeholder engagement, the study equips practitioners with actionable data to optimize resource allocation and management. The findings emphasize the importance of integrating public participation, especially communities, into restoration efforts, offering practical guidance on fostering collaborative governance. Moreover, the study highlighted the socio-economic impacts of restoration initiatives, enabling practitioners to design programs that simultaneously enhance forest cover and improve community involvement in forest restoration initiatives. These practitioners or beneficiaries include forest managers, restoration practitioners, local community leaders, Indigenous groups such as the Ogiek, NGOs, civil society groups, and the private sector involved in sustainable land use and restoration projects. These insights would support grassroots efforts to address deforestation, promote sustainable practices in land use, and achieve measurable forest restoration outcomes in the Mau Forest Complex and beyond.

1.5.3 Significance of the Study to Theory

This research advances theoretical frameworks by exploring the relationship between government spending efficiency and forest restoration outcomes. It integrates concepts from public expenditure theory and forest transition theory, providing empirical evidence on how financial resources influence ecological and socio-economic outcomes in forest restoration. By examining the role of government spending on forest restoration initiatives, the study contributed to theoretical discussions on inclusive governance and resource allocation in environmental conservation. Additionally, it addressed existing gaps in forest restoration literature by linking financial efficiency to restoration effectiveness, offering a theoretical foundation for future studies. The finding also identified gaps where existing models and frameworks require further inquiry to enhance their applicability to forest management in a sustainable manner. Therefore, the study stands to offer theoretical insights and empirical evidence to beneficiaries such as academic researchers, graduate students, think tanks, and research institutions in the fields of environmental science, public policy, and development finance

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter began with theories underpinning the study and the other sections entailed empirical review of previous studies related to the study, categorised according to the study's objectives. Thereafter, a summary of research gaps was provided and an illustration of the conceptual framework showing the independent variables as well as the dependent variable and finally, a summary of the section was provided.

2.2 Theoretical Framework

The study investigated the deforestation and environmental damage cycle by applying government expenditure and forest restoration principles. It used Public Expenditure Theory and Forest Transition Theory as a theoretical basis to analyze resource utilization for long-term forest health and social welfare in sustainable forest management. The study focused on collective consumption commodities, specifically forest restoration, which benefits all. The analysis aligned with these theories to assess resource mobilization and forest restoration outcomes, determining the effects of environmental degradation on the Mau Forest Complex. This comprehensive analysis provided valuable insights into resource mobilization and forest restoration outcomes.

2.2.1 Theory of Public Expenditure

Public Expenditure theory was first advanced by Erik Lindahl, who significantly simplified the mechanisms governing public expenditures according to (Johansen, 1963). The framework according to Johansen (1963), was limited by its own assumption that individuals revealed their preferences for public goods which was later critiqued as impractical given the free-riding nature of the good. The theory was further advanced by Samuelson (1954), who explicitly argued that public goods were characterized as non-rivalrous and non-excludable and that markets alone could not provide these goods due to the free-rider problem, necessitating government financing and policy intervention. Samuelson formalized that for optimal resource allocation; the social marginal

benefit of public goods must equal their social marginal cost. In a follow-up study, Samuelson (1958) investigates the model that highlights the inefficiencies in resource allocation and external effects in the presence of public goods. In contrast to the prominence of taxation theories, Samuelson emphasizes the comparative lack of attention given to theories on public expenditure in economic literature. Forest restoration, for instance, is a public good in this context, where the larger society benefits from climate regulation, a source of livelihoods for communities, and biodiversity improvements. The study's objectives are to assess the impacts of government spending on forest restoration outcomes in the MFC and align with the theory's proponents. The study further analyses three components: how well funds are distributed and prioritized for restoration, how effectively these resources are used, and how these are monitored and evaluated.

To gain comprehensive knowledge of government expenditure further, it is necessary to analyze and criticize theories on public Spending, according to Samuelson (1958). Despite the theory's foundational relevance, Afonso & Fraga (2024) noted that the model was criticized for the assumption that governments act efficiently while in practice is criticized since government institutions are faced with inefficiencies such as bureaucracy and corruption, conflict of interest from political interferences with intended outcomes of government spending. According to Afonso & Fraga (2024), governments are generally inefficient and can achieve their intended outcomes with much less Spending. Similarly, Sosvilla-Rivero et al. (2025) highlight that government spending on environmental sustainability undeniably promotes social welfare, but if government policies aren't aligned, long-term economic growth is not guaranteed. These tensions in empirical findings led to the motivation to advance these theoretical justifications for government spending further and the empirical need for efficiency. This study draws on the study's foundations and critically engages with contemporary concerns around government efficiency and forest restoration outcomes.

The theory is further critiqued as it often overlooks the complexity of political economy factors-such as patronage, misaligned incentives, and weak institutional capacity that may lead to distortion of resource allocation and reduce efficiency, especially in developing countries (Afonso & Fraga, 2024). While public goods and in this context, forest restoration, is justified by theory regarding government intervention, empirical research highlights that the actual impact of

spending depends on how funds are allocated, implemented, and monitored (Chepkemoi & Musya, 2023).

2.2.2 Forest Transition Theory

According to Mather (1992), the forest transition theory posits that a forest area can transition from a state of decline to expansion, frequently in response to deliberate measures taken to counteract unfavorable exploitation. Additionally, it assumes that shifting government policies, attitudes toward forests, and population changes all substantially impact global forest trends (Mather, 1992). The theoretical framework in this case, highlights shift in government policies, evolving societal attitudes towards forests, and demographic changes are all critical drivers influencing global forest trends according to (Mather, 1992; Mather, 2004). In later years, Mather's assumption provides evidence of a forest transition, investigates the causes and mechanisms of this change, and makes assumptions about its universal application (Mather, 2004). He further attributes these shifts to a slow population growth rate and to changing perceptions and attitudes of key players in forest restoration.

The forest transition theory has been critiqued by scholars despite the theoretical foundation it provides for this study in forest conservation dynamics in Kenya, where government interventions play a pivotal role. The criticism is evident in the fact that FTT often oversimplifies complex socio-political realities by assuming a linear progression from deforestation to reforestation, and may not factor the dynamic local trajectories and the multidimensional nature of sustainability according to (de Jong et al., 2017; Angelsen & Rudel, 2013). The theoretical basis of forest transition is a foundation to explore this framework further to understand forest conservation dynamics in Kenya and the role of government intervention. Further, empirical studies have shown that forest transitions can be accelerated by targeted government policies, technological advances, and active multi-stakeholder participation, as seen in countries such as China, Vietnam, and the Philippines as noted by (de Jong et al., 2017). MFC has undergone severe deforestation, as highlighted by (Odawa & Seo, 2019), despite government efforts to restore the critical water tower. According to a report by the Ministry of Environment and Natural Resources (2019), Kenya is headed toward the conclusion of phase three (3), or the late transition, where there is insufficient forest cover and the demands and attention are directed toward replanting possibilities.

This theory further informs the study's dependent variable, identified as forest restoration outcomes, where indicators such as forest cover, land degradation, and community participation are used to measure the changes. According to (De Jong, 2010), forest transitions can be accelerated when restoration efforts are more targeted, like in China, Vietnam, and the Philippines, where deliberate restoration efforts follow extensive deforestation. The study further states that government policies, technological advancement, and multi-stakeholder participation further reinforce the theoretical basis, further contrasting the limitation of FTT, which indicates that forest transition follows a linear trajectory and is further criticized for its oversimplification and generalization of socio-political factors (De Jong, 2010). While FTT, according to Mather (1992), offers a necessary framework for understanding forest transition, his study on the Scottish case Mather (2004) underscored factors such as globalization in influencing transitions. This view is relevant to MFC, where national and regional economic factors influence forest recovery trajectory. This study goes beyond theoretical underpinnings to form empirical evidence in assessing government spending and evaluating how well resources are allocated, utilized, and monitored to achieve environmental and social outcomes.

2.3 Empirical Review

This section reflects previous studies done in recent years to emphasize the gaps in studies on government spending efficiency and forest restoration and, to provide empirical evidence and contribute to the existing literature while undertaking the research on assessing the efficiency of government spending on forest restoration initiatives in the Mau Forest Complex.

2.3.1 Allocation Efficiency on forest restoration Outcomes

Adegboye & Akinyele (2022) examined the effectiveness of government spending using a Stochastic Frontier Approach (SFA) in 40 African countries from 2000 to 2020. Their findings showed that government spending was necessary to improve human development indicators, but inefficiencies still existed. Challenges such as governance issues, colonial legacies, and underutilization of natural resources were identified as impediments to effective Spending. While their findings were insightful at a macro level, their study did not address how government spending, specifically allocations, influenced forest restoration outcomes at a localized level. This

study intended to fill the contextual gap and add to the literature by focusing on linking allocation indicators such as budget adherence, timely disbursement, and proportion of funds allocated to forest restoration and social outcomes in a localized context, the MFC.

Similarly, Brancalion et al. (2016) and Chu et al. (2023) analyzed aspects of restoration finance in Brazil, Latin America, and Asia, respectively. Their studies found that the success of restoration efforts is usually affected by weak allocation mechanisms and high costs of executing these projects, regardless of how crucial capital availability is. The two studies focused on aggregate Spending on a national level and failed to account for regional dynamics and localized expenditure analysis, highlighting a contextual gap addressed by this study in assessing government spending in a specific area, the MFC, which is significant to Kenya's social and economic development. The study seeks explicitly to determine the allocative efficiency of government spending in restoring the degraded water tower and contribute to the existing literature in its findings.

Albassam (2020) provided a tool to assess the effectiveness of public Spending based on data from 71 nations between 1996 and 2017. The goal of the model was to estimate the extent to which public allocations may be used to meet the government's objectives, given the challenges governments face in allocating funds to successful public programs and projects. Nonetheless, it highlighted a methodological gap that does not easily accommodate sector-specific analysis and community feedback, especially in forest restoration. The study filled this gap by applying a mixed methods approach to collect further insights and perspectives of stakeholders engaged in restoration initiatives.

Rachel et al. (2021) investigated the growing use of expenditure review tools for efficient biodiversity preservation in Ireland. While the findings firmly focused on fund allocation and distribution, there was a need to understand the effects of biodiversity expenditure and the difficulties of monitoring financial allocations for biodiversity preservation. The results showed that regardless of the detailed financial information that could be derived from such a tool, the ambiguous boundaries of biodiversity expenditures and conservation actions made global comparisons challenging. While many countries conduct these expenditure reviews using the

NBER tools, monitoring funding often fails to accurately represent the multifaceted objectives and policy complexity, highlighting a methodological gap. This study addressed this gap by focusing on allocation impacts on restoration outcomes and not concentrating on allocation inputs while using environmental and social indicators to assess the impact.

2.2.2 Project Implementation Efficiency on Forest Restoration Outcomes

A study by Rana et al. (2022) used ensemble machine learning techniques to forecast future tree cover loss in the Indian Himalayas while predicting wasteful expenditure in tree planting programs. Findings revealed multiple challenges with government-led tree-planting initiatives, such as poor implementation of restoration projects, disregard for long-term goals attributable to inefficient government interventions, inadequate community involvement, and lack of attention to resolving deforestation and degradation. While the findings led to insightful conclusions, they highlighted a conceptual gap where the linkage between government spending and long-term restoration success was not achieved. This study addressed the gap by assessing the linkage between project implementation efficiency and forest restoration outcomes in MFC using cost-effectiveness, project completion rates, and timeliness to measure the impacts.

Moshiri and Daneshmand (2020) investigated the effectiveness of government expenditure on environmental preservation and found no evidence of a threshold in the income-pollution relationship. They also found no significant impact of government spending on lowering the ecological footprint and no empirical data to support the findings. In contrast, Niu (2024) found a notable positive association between government expenditure on environmental protection and national ESG performance using a panel Tobit regression model. They also concluded that government expenditure enhances environmental and social performance. These contradicting results highlighted conceptual and contextual gaps emphasizing the need for a study focusing on implementation efficiency in a localized setting to assess relationships between government spending and forest restoration outcomes.

A recent study by Baral et al. (2025) examined the cost-effectiveness of Nepal's Leasehold Forestry Program using a cost-benefit analysis, focusing mainly on case studies. The study incorporated a cost-benefit analysis and a survey instrument and found that leasehold forests yielded higher

benefit-cost ratios, which underscores the success of project implementation strategies, equitable resource allocation, and community participation as success factors. While the study showed economic viability and improved community welfare in leasehold forests as opposed to controlled forests, the study was limited in its geographical scope and government policies specific to Nepal. This presents a contextual gap that this study filled by surveying a more localized Kenyan context to complement the study's findings by assessing linkages between implementation efficiency and measurable forest restoration outcomes using metrics such as cost-effectiveness, project completion rates, and project timelines.

Chisika et al. (2024) undertook a study on "the Adopt-a-Forest" initiative to address forest management and deforestation issues in Kenya. The findings of the study indicated that inter-agency coordination affected sustainable forest management and disturbed silos of forest management in Kenya. The study also revealed different socio-economic circumstances, historical land-use patterns, and government regulations, among other factors causing unequal regional cooperation. However, the study did not explore indicators such as cost-effectiveness to examine further how efficiently these programs were implemented, underscoring the need for this study to link implementation efficiency to restoration outcomes. The uneven collaboration across regions highlights a contextual gap, raising concerns about inequality.

2.2.3 Monitoring and Evaluation Efficiency on Forest Restoration Outcomes

Wainaina et al. (2020) conducted a study on Cost-Benefit Analysis (CBA). They revealed that a scarcity of comprehensive studies on landscape restoration existed, highlighting that most restoration projects do not allocate funds for CBA studies under the assumption that such projects always result in positive outcomes. This revealed a weakness in employing CBA and necessitates the need for more empirical evidence on monitoring and evaluation frameworks that offer favorable returns on investment across various landscapes, highlighting a conceptual and methodological gap that this study intended to address by assessing stakeholder engagement, frequency of monitoring activities and availability of impact assessment reports as dimensions of M&E efficiency through a mixed methods approach.

In another study, Bodin et al. (2022) surveyed to establish a consistent approach for evaluating the expenses and benefits of public-private restoration initiatives and particular restoration approaches. The results found that consistent data on the costs and benefits of restoration projects is necessary. Access to project-level information was found to be limited due to confidentiality issues and access restrictions, thereby restricting the pilot test. This finding underscored the role of monitoring and evaluating projects in achieving their intended outcomes, highlighting both a conceptual and a methodological gap that the study filled by conducting an inquiry into the direct linkage between M&E efficiency and forest restoration outcomes using semi-structured and regression models to establish causal relationships and gather insights to inform nuanced findings to add to existing literature.

Kumi et al. (2024) explored forest landscape restoration (FLR) efforts in Ghana's Tain II Forest Reserve using a partial least squares path model (PLS-PM). Their study highlighted factors such as technical support, community-based fire management, information access, and targeted incentives as key to driving successful restoration. On the other hand, challenges such as insecure land tenure, resource conflicts, and weak governance stood in the way of long-term outcomes. Although the research didn't specifically analyze the efficiency or structure of monitoring and evaluation (M&E) systems, it did point to the value of community involvement and flexible, adaptive management practices. This current study builds on that by directly examining M&E practices, such as how often monitoring occurs, the quality of assessment reports, how stakeholder input is used, and the role of technology in shaping restoration outcomes in the context of Kenya's Mau Forest Complex.

Meroni et al. (2017) studied restoration interventions in Senegal using a remote sensing-based methodology using the Normalized Difference Vegetation Index (NDVI) to assess vegetation improvements over time. The approach offered a nuanced, scalable, and standardized tool for evaluating biophysical outcomes but lacked socio-economic and stakeholder-level metrics, revealing a methodological gap. This study addressed the gap by surveying to assess the efficacy of M&E in forest restoration outcomes such as biodiversity improvements, forest cover, and community involvement. An earlier study by Vallauri et al. (2005) found that monitoring and evaluation (M&E) systems must evolve beyond simplistic metrics to assess socio-environmental

impacts, which this study adds by studying the efficiency of government funding through M&E on forest restoration outcomes in the Mau Forest Complex by integrating both environmental and community-based indicators through a mixed-methods approach, thus enhancing the robustness and inclusivity of restoration monitoring frameworks.

2.4 Summary of Research Gaps

Empirical studies on government spending do not often link components such as allocation efficiency, project implementation, and monitoring and evaluation in assessing impacts on forest restoration outcomes. An example is Adegboye and Akinyele (2022) and Rachel et al. (2021), who emphasized the role of financial inputs but did not show any direct linkages of expenditures to concrete ecological or socio-economic outcomes, highlighting conceptual gaps. Additionally, prior studies focused on developed countries, while few focused on ecosystem-specific dynamics, especially in low-income or resource-constrained regions. Studies like Korhonen and Frey (2023) provide valuable insights from wealthier economies but fail to account for the unique governance, institutional, and ecological challenges, say, in Kenya's Mau Forest Complex, lacking an in-depth understanding of how local dynamics, such as land conflicts or weak coordination, affect restoration outcomes in these environments.

Similarly, the existing literature leans on broader econometric models (Albassam, 2020; Rana et al., 2022), which do not adequately capture the real-world complexities of project execution or stakeholder engagement, thus highlighting methodological gaps. These advanced models give nuanced results but on macro levels and fail to address individual insights and perceptions. This study adopts an explanatory sequential mixed methods approach by integrating quantitative outcomes with qualitative insights from the ground in assessing how government spending across allocation, implementation, and monitoring dimensions translate into tangible forest restoration outcomes and community-level impacts in the Mau Forest Complex.

Table 2.1 1:Summary of literature and research gaps

Author	**Topic**	**Findings**	**Research Gap**	**Current Study Focus**
Adegboye & Akinyele (2022)	Government spending efficiency in Africa	Spending affects development; inefficiencies tied to economic size	Methodological gap in measuring spending efficiency	Applies multiple linear regression to assess efficiency in forest restoration
Albassam (2020)	Model for assessing public spending efficiency	Economic complexity influences spending outcomes	Conceptual and methodological gap—no sector-specific focus	Adopts regression model specific to forest restoration in a developing country
Rachel et al. (2021)	Biodiversity expenditure reviews	Difficulty in tracking biodiversity-related funds	Methodological gap in evaluating biodiversity spending impact	Evaluates effectiveness of spending using regression and mixed methods

Wainaina et al. (2020)	CBA of landscape restoration	Few restoration projects use CBA tools; many assume positive outcomes	Conceptual gap in financial evaluation of restoration efforts	Fills empirical gap using measurable outcome indicators in MFC
Brancalion et al. (2016)	Passive vs active restoration outcomes	Legislative frameworks and natural regeneration enhance success	Contextual gap—focus not on financial efficiency	Links policy, spending, and outcomes in Kenyan forest restoration
Moshiri & Daneshmand (2020)	Government spending & ecological footprint in Iran	No effect of spending on reducing pollution	Conceptual gap in linking expenditure and outcomes	Contextualizes effectiveness of Kenyan public spending on forests
Niu (2024)	Spending on environmental protection and ESG	Government spending improves ESG via innovation	Contextual gap—need for more spatial studies	Measures ecological/social outcomes of spending in MFC

Rana et al. (2022)	Predicting inefficiency in afforestation in India	Short-term thinking and weak community engagement hinder success	Contextual gap in African restoration programs	Assesses fund use, long-term impact, and local engagement
Kumi et al. (2024)	FLR barriers and opportunities in Ghana	Positive impact of incentives, but hindered by governance issues	Contextual gap in replicable restoration models	Applies findings to Mau Forest, emphasizing technical and social inputs
Afonso & Fraga (2024)	Public Spending Efficiency in Latin America	Revealed that governments could reduce spending by 27% and still achieve the same performance levels, indicating potential fiscal waste.	Limited to Latin American contexts, lacking comparability with African fiscal structures and sector-specific analyses.	Tests public expenditure efficiency in Kenya's forest sector using multiple linear regression and thematic analysis

Chisika et al. (2023)	Assessment of the "Adopt-a-Forest" Initiative in Kenya	Documented significant interagency collaboration and forest restoration through the initiative, yet revealed uneven distribution of collaboration and funding across regions.	While the study highlighted the benefits of multi-agency coordination, it did not quantify key project-level implementation metrics such as cost-effectiveness or timely execution, pointing to a gap in measuring practical outcomes.	Addresses the need to evaluate detailed implementation efficiency metrics alongside collaborative governance in the MFC.
Baral et al., (2025)	Evaluation of the Leasehold Forestry Programme in Nepal	Leasehold Forestry Programme outperformed control forests economically and in enhancing user livelihoods, primarily through secure tenure and equitable resource allocation.	Focused on tenure security and economic returns without detailed analysis of implementation efficiency metrics, thus creating a gap in understanding overall spending effectiveness.	Provides a comparative benchmark on the influence of project implementation and community-based funding mechanisms in forest restoration.

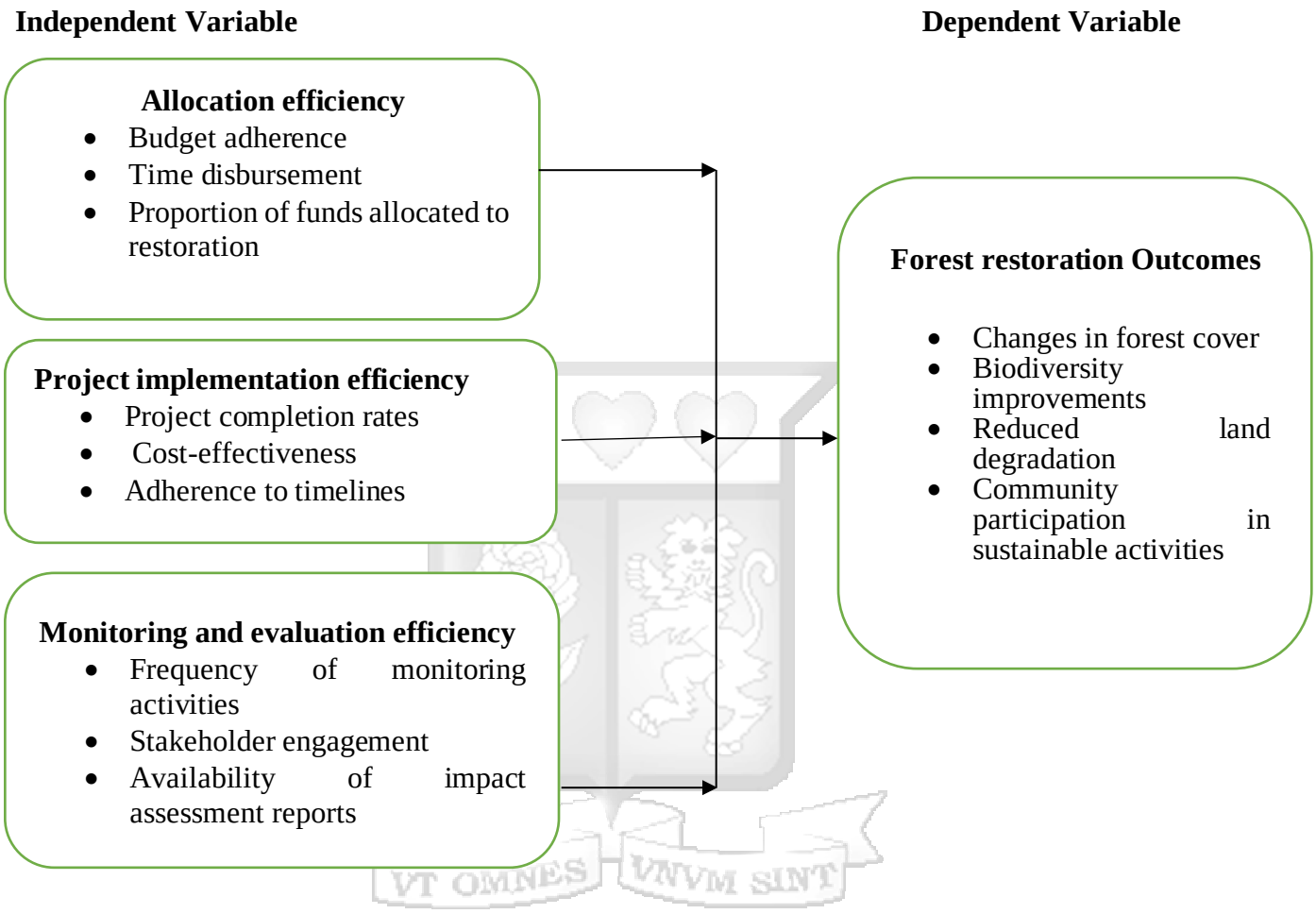
Source: Research (2025)

2.5 Conceptual Framework

This framework illustrates the relationship between the various variables that serve as the foundation of the research and also as a tool to visually and systematically present a study by providing a clear and logical explanation of the background of studies and illustrating the expected relationship between variables (Naslund & Norrman, 2022). This research seeks to establish the efficiency of government spending on forest restoration outcomes in the ecosystem of Mau Forest Complex to assess the preservation of its health and vitality. The interaction between the variables is illustrated through a diagram.

The conceptual framework for this research examines the affiliation between government spending efficiency (independent variable) and forest restoration outcomes (dependent variable) in the Mau Forest Complex, Kenya. Government spending efficiency is operationalized through three key dimensions: allocation efficiency, measured by budget adherence, timely fund disbursement, and the proportion of funds allocated to restoration activities; project implementation efficiency, assessed based on project completion rates, cost-effectiveness, and adherence to timelines; and Monitoring and Evaluation Efficiency, evaluated by the frequency of monitoring activities, stakeholder engagement, and availability of impact assessment reports. As the dependent variable, forest restoration outcomes are operationalized through ecological indicators, such as changes in forest cover, biodiversity improvements, and reduced land degradation, as well as socio-economic indicators, including income generation, job creation, and community participation in sustainable activities. This framework provides a structured approach to understanding how spending efficiency influences restoration success and community impacts in the Mau Forest Complex.

Figure 2.1 Conceptual Framework



2.6 Operationalization of Study Variables

This segment outlines how the study variables were operationalized. The dependent variable is forest restoration outcomes, while the independent variables are allocation efficiency, project implementation efficiency, and Monitoring and Evaluation Efficiency, as detailed in the table below:

Table 2.1.2: Operationalization of variables matrix

Variable	**Nature of Variable**	**Operational Indicators**	**Measurement Scale**	**Data Analysis**	**References**
Forest Restoration Outcomes	Dependent Variable	Changes in forest cover - Biodiversity improvements - Reduced land degradation - Community participation in sustainable activities	Through ordinal Scale using a Likert Scale	Use of descriptive Statistics, regression tests and also Correlation Tests	Menéndez-Miguélez et al (2024; CIFOR-ICRAF, 2023)
Allocation efficiency	Independent Variable	-Budget adherence - Timeliness of fund disbursement - Proportion of funds allocated to key restoration activities	Through ordinal Scale using a Likert Scale	Use of descriptive Statistics, regression tests and also	Alfonso & Furceri, 2010; Afonso & Jalles, 2016

				Correlation Tests	
Project implementation efficiency	Independent Variable	-Project completion rates - Cost per hectare restored - Adherence to project timelines	Through ordinal Scale using a Likert Scale	Use of descriptive Statistics, regression tests and also Correlation Tests	Montero et al., 2015; Montero & Onieva, 2016
Monitoring and evaluation efficiency	Independent Variable	- Frequency of monitoring activities - Stakeholder engagement - Availability of impact assessment reports	Through ordinal Scale using a Likert Scale	Use of descriptive Statistics, regression tests and also Correlation Tests	CIFOR-ICRAF (2023)

Source: Research (2025)

2.7 Chapter Summary

The chapter summary entailed a detailed inquiry into theories that forms the basis of government spending efficiency and forest restoration outcomes, including the theory of public expenditure and forest transition theory. It also deliberated on previous empirical studies, identifying knowledge gaps related to allocation efficiency, project implementation efficiency, and Monitoring and Evaluation Efficiency in forest restoration. The chapter outlined the relationship between the study variables and operationalizes the dependent and independent variables to guide analysis further.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter entailed a comprehensive explanation of the research philosophy, design, and the characteristics of the target population, including the sample and sampling techniques utilized. Additionally, it detailed the instruments used for data collection, the procedures followed during data gathering, the strategies for data processing and analysis, as well as the ethical principles that guided the entire research process.

3.2 Research Philosophy

The research was grounded in the pragmatist research philosophy because it provided a flexible framework for addressing practical challenges by integrating multiple sources and methods of data, chosen for its ability to combine quantitative and qualitative techniques. This philosophy, as articulated by scholars such as Dewey, James, and later expanded by Tashakkori and Teddlie (2010), emphasized the dominance of research questions and the practical consequences of an inquiry over adherence to any single philosophical tradition. Pragmatism is characterized by its focus on practical ways on how things work to address the research problem (Creswell & Creswell, 2018). Rather than being constrained by the dichotomy between positivism which supports objective, quantitative data and interpretivism which values subjective, qualitative understanding, the pragmatist worldview advocates for mixed method. This flexibility allows researchers to draw on both numerical data and stakeholder perspectives to generate actionable knowledge (Morgan, 2014). This philosophy aligns with the study's aim to not only advance theoretical foundations and empirical evidence, but also inform policy decisions. This study is well anchored under this philosophy due to its actionable results that is useful in bridging the gap between theory and application. This is especially relevant and appropriate for forest restoration, where policy interventions must be responsive to dynamic environmental and socio-economic challenges according to Odawa & Seo (2019), especially in the context of evaluating government spending efficiency on forest restoration in the Mau Forest Complex from 2010 – 2020. This pragmatism

approach is further strengthened since the research questions around forest restoration are inherently multifaceted, involving economic, ecological, and social dimensions that cannot be fully captured by a single methodological approach (Tashakkori & Teddlie, 2010). Additionally, Creswell (2009) supports this worldview by emphasizing that pragmatism prioritizes actionable results and research's practical impacts rather than strictly adhering to one methodological tradition. This made it particularly suitable for the study to adopt mixed method approach, which combined quantitative data with stakeholder insights to form a comprehensive picture of public spending efficacy. The practical relevance of this approach is underscored by findings from Odawa and Seo (2019), which showed a significant environmental decline in the Mau Forest Complex, a situation that demands innovative, adaptable, and integrative research solutions.

3.3 Research Design

A research design outlines the comprehensive structure of a study, encompassing key elements such as data collection techniques, analytical strategies, and underlying assumptions. As identified by Creswell (2009), there are three primary types of research approaches: quantitative, qualitative, and mixed methods. The mixed-methods approach integrates both qualitative and quantitative techniques within the same study to provide a more holistic approach of the research problem (Creswell, 2004). According to Shan (2022), the quantitative method focuses on the systematic collection of numerical data through strategies like experiments, quasi-experimental designs, surveys, and longitudinal studies. In contrast, qualitative research emphasizes the collection of descriptive, non-numeric data using techniques such as narrative inquiry, phenomenology, ethnographic studies, and case study methods.

This study employed a mixed-methods design, incorporating both quantitative and qualitative analyses to investigate the relationship between government spending efficiency and forest restoration outcomes in the Mau Forest Complex for the period 2010 - 2022. This approach was selected to strengthen the reliability of the findings, enhance their contribution to academic discourse, and provide a richer interpretation of the results (Schoonenboom & Johnson, 2017). Specifically, the research utilized an Explanatory Sequential Design, where the initial stage focused on analysis of quantitative data, followed by a qualitative phase aimed at clarifying and

expanding upon the initial results. As explained by Schoonenboom and Johnson (2017), this design facilitates data triangulation and allows for a deeper interpretation by connecting the results of both phases before drawing final conclusions.

3.4 Target Population

The population comprises all individuals interested in a study, and based on statistics, the target population is viewed as the particular group from which information was obtained (Taylor, 2015). The target population for this study comprises key stakeholders involved in forest restoration initiatives in the Mau Forest Complex, Kenya**.** Specifically, 474 MFC officials from the Ministry of Environment and Forestry, staff from Kenya Forest Service, Ogiek community representatives, local community-based organizations involved in restoration activities, Representatives from NGOs engaged in forest conservation and restoration projects within the Mau Forest Complex, representatives from Companies and organizations involved in reforestation projects, eco-tourism, and sustainable resource management within the Mau Forest region and County Forest Conservator officers in Narok, Bomet, Nakuru and Kericho Counties, involved in MFC restoration initiatives (as shown in table 3.1). The unit of observation in this study comprised government officers (ministry, staff from Kenya Forest Service and County Forest Conservator officers), community group representatives (Companies and organizations involved in reforestation projects, eco-tourism, and sustainable resource management within the Mau Forest region) and representatives of indigenous communities involved in forest restoration activities.

Table 3.1.1: Population

Category	**Population**
Government officials	284
Community Representatives	142
Ogiek community	48
TOTAL	**474**

Source: MFC Internal Data (2024)

3.5 Sample and Sampling Procedure

When designing an empirical study, according to Lakens (2022), it is crucial to provide a rationale for the sample size that was gathered since collecting a more significant amount of data enhanced the informativeness of a study about its inferential objectives. This study adopted stratified random sampling in conjunction with Yamane's (1967) formula to determine the sample size of 217 participants. In stratified random sampling, the target population is separated into discrete strata of government officials, community representatives, and members of the Ogiek community based on their roles and involvement in forest restoration initiatives. This approach ensured that each subgroup was adequately represented, reflecting stakeholders' diverse perspectives and contributions in the Mau Forest Complex.

Yamane's formular was used to calculate a sample size with a 5% margin of error to ensure reliability and precision in the findings. This technique was selected since it reduces sampling bias, enhances representativeness across the different strata, and ensures that the study captures the variations in perspectives and experiences among these groups. To ensure a thorough and reliable examination of the link between government spending efficiency and forest restoration outcomes, the study employed stratified random sampling. This method allows for a more representative sample across different subgroups. The sample size was determined using Yamane's formula (Yamane, 1967)

$$= \frac{N}{1 + Ne^2}$$

Where:

- *n* represents the required sample size (used when the population is under 10,000)
- *N* is the total population, which in this case is 474
- *e* is the margin of error, set at 0.05 for a 95% confidence level

Applying the formula:

$$n = \frac{474}{1 + 474(0.05)^2} = 217$$

Table 3.1.2: Sample Size

Category	Population	Sample Size
Government officials	284	130
Community Representatives	142	65
Ogiek community	48	22
TOTAL	**474**	**217**

Source: Research (2025)

3.6 Data Collection Methods

Collection of data in an organized manner is considered a key activity in gathering relevant information on the variables being studied to fully answer the research questions and test the hypotheses (Creswell & Creswell, 2018). The methods for data collection encompass the tools, techniques, or strategies utilized to acquire data from participants or other sources (Bolderston, 2012). These methods are specifically designed to align with the research objectives, study framework, and the features of the target population, ensuring the acquisition of precise and dependable data. For this study, primary data collection was prioritized to obtain current, context-specific insights directly from stakeholders engaged in forest restoration activities in the Mau Forest Complex between 2010 - 2022. Semi -structured questionnaires were administered, comprising both closed-ended and open-ended questions. The closed-ended items provided standardized response options suitable for quantitative analysis, while the open-ended questions allowed for richer, qualitative input reflecting participants' experiences and perspectives. The questionnaire was structured to include demographic information and sections directly aligned with the study's objectives. Distribution was conducted both in-person and via online platforms, such as Google Forms, to maximize accessibility and participation.

The study leaned more on the use of primary data which aligns with the best practices in environmental and policy research, where information gathered first hand, is essential for understanding complex, dynamic ecosystems (Creswell & Creswell, 2018; Bolderston, 2012). On the other hand, secondary data such as government reports, published research, and project evaluation documents offer valuable historical and contextual information (Johnston, 2017). While budgetary allocations towards forest restoration is available in the national budgets, data on expenditures specific to MFC was unavailable across the period under study and was also fragmented and the study's adoption of primary data was informed by this inadequacy. This limitation in the use of secondary data in this study is further acknowledged as a methodological limitation in Chapter 5, with a recommendation that future research should integrate secondary data sources more extensively to enhance triangulation and contextual depth (Johnston, 2017) using more advanced models such as Data Envelopment Analysis or Stochastic Frontier. The study opted to undertake a rigorous inferential statistic and a thematic analysis obtained from the semi-structured questionnaires to further gather insights and empirical evidence to guide generation of actionable recommendations for policymakers and practitioners, grounded in robust, context-specific evidence (Creswell & Plano Clark, 2017; World Bank, 2023).

3.7 Data Analysis

3.7.1 Data Analysis

Data collected during the study for the period 2010 -2022 was processed systematically, involving editing, classification, and coding stages to ensure accuracy and consistency. Both descriptive and inferential statistical analyses were performed. Descriptive statistics was used to summarize the data and provide insights into key variables' distribution and central tendencies. In contrast, inferential statistics was employed to examine relationships and test hypotheses. Specifically, correlation analysis and multiple linear regression were utilized to explore the association and impact of government spending efficiency on forest restoration outcomes. All statistical analyses were conducted using SPSS software, version 27, to ensure precision and dependability of results. The study employed the following general linear regression model to represent forest restoration outcomes:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where:

Y represents forest restoration results, assessed through indicators such as forest cover expansion, biodiversity gains, reduced land degradation, and increased community involvement.

α denotes the model intercept or constant.

β_1, β_2, β_3 are the slope coefficients indicating how each independent variable influences the dependent variable.

X_1 corresponds to allocation efficiency.

X_2 refers to efficiency in project implementation.

X_3 signifies the effectiveness of monitoring and evaluation.

ε is the error term, capturing variation in the dependent variable not explained by the included predictors.

The results of descriptive and inferential analyses are offered in tables and figures, with relevant interpretations and discussions. The significance of the regression model and its coefficients was tested at a 5% significance level to ensure statistical reliability and draw meaningful conclusions.

To complement the numerical analysis, the study also drew from interviews and responses to open-ended survey questions. These qualitative inputs were analyzed using thematic analysis, a method that helps researchers find and interpret recurring ideas or patterns in written or spoken responses (Braun & Clarke, 2006). Qualitative analysis of data involved sorting through the responses carefully, followed by coding key points, grouping similar ideas into broader themes, and refining them into meaningful categories for interpretation. Analysing data in this manner allows the research a richer perspective, offering a window into how stakeholders actually perceive and experience the effectiveness of government spending on forest restoration while maintaining the trustworthiness of the analysis (Nowell et al., 2017). This analysis of qualitative data offered robust

insight and helped triangulation of the statistical results better, offering valuable context and helping to explain why certain patterns appeared in the data.

3.8 Diagnostic Tests

Before data analysis, several diagnostic tests were performed to ensure the regression assumptions' validity and identify potential violations. These tests are crucial for confirming that the data meets the requirements for reliable statistical analysis. The specific diagnostic tests to be conducted are outlined in Table 3.4

Table 3.1.3: Diagnostic Tests

Assumption	Description	Type of Tests	Interpretations	Treatment
Test of Normality	A normal distribution follows a bell-shaped curve, indicating that the errors or residuals in the data should follow a normal pattern.	Normal Q-Q Plot.	How well a variable fits a normal distribution.	Data is interpreted using a line of best fit plot to check for normality
Multicollinearity test	Multicollinearity arises when independent variables exhibit a strong correlation with one another.	Variance Inflation Factor	VIF factor >10 infers presence of multicollinearity.	Obtaining additional data and omitting collinear variables.
Homoscedasticity	The assumption is that dependent variable maintains a consistent level of variance throughout all values of the independent variables.	Breusch Pagan Test	P > 0.05 implies homoscedasticity	Use logs and reciprocal techniques to interpret data
Linearity Test	The response variable is modeled as a linear expression of the explanatory variables and associated error components.	ANOVA test	Deviation from linearity of the linear F test p > 0.05	Data is interpreted using logs and reciprocal techniques.

3.9 Research Quality

Reliability and validity are essential components of ensuring data quality in research. These elements provide confidence in the research findings by minimizing errors and ensuring that the instruments measure what they are intended to measure. The following outlines how reliability and validity were addressed in this study.

3.9.1 Reliability of Research Instrument

Reliability describes how consistently a research instrument yields stable results over repeated applications. This study adopted Cronbach's Alpha to gauge internal consistency, which involves checking how closely related items within a scale are (Denscombe, 2014). A score of 0.7 or higher was deemed satisfactory, suggesting that the tool reliably captured the intended variables.

This evaluation is essential in confirming whether the instrument consistently captures the targeted variables, even when using slightly varied or rephrased questions. Both rating scales and dichotomous items were subjected to this analysis to verify the consistency of responses. A strong reliability score reassures that the data is dependable for subsequent analysis.

As detailed in Table 3.5, the Cronbach's Alpha values were as follows: allocation efficiency recorded 0.865, project implementation efficiency scored 0.764, monitoring and evaluation efficiency achieved 0.875, and forest restoration outcomes had a value of 0.852. All scores surpassed the minimum acceptable threshold of 0.7, confirming the reliability of each construct measured.

Table 3.1.4: Reliability Analysis

Variable	Number of Items	Cronbach Alpha
Allocation efficiency	6	0.865
Project implementation efficiency	6	0.764
Monitoring and evaluation Efficiency	6	0.875
Forest restoration outcomes	9	0.852

3.9.2 Validity of Research Instrument

Validity assesses whether the research instrument accurately measures the intended constructs. This study employed construct validity to evaluate whether the operational definitions of variables align with their theoretical definitions. To ensure validity, the questionnaire was developed based on prior studies that have successfully measured similar constructs and modified them to suit the specific objectives of this study. Additionally, expert review by the supervisor was conducted to ensure the content adequately reflects the theoretical dimensions of the variables as conceptualized. This process guarantees that the research instrument captures the intended constructs and provides accurate data for analysis.

As indicated in Table 3.5, all items corresponding to each research variable demonstrated factor loading values exceeding 0.4. This threshold confirms the validity of the items, suggesting they were appropriate for measuring the intended constructs. Consequently, no items were excluded from the analysis, and this confirmed that the questionnaire items were suitable for use in the main data collection phase of the study.

Table 3.6 presents the communalities derived from the Exploratory Factor Analysis (EFA), detailing the proportion of each variable's variance that can be explained by the extracted factors.

Table 3.1.5: Communalities for Exploratory Component Factor Analysis

	Initial	Extraction
Budget allocation for forest restoration initiatives is done in a timely manner to support project activities.	1.000	.764
The funds allocated to forest restoration are distributed equitably across priority areas.	1.000	.784
The organization ensures transparency in the allocation of resources for forest restoration projects.	1.000	.659
Adequate monitoring mechanisms are in place to track the allocation and utilization of restoration funds.	1.000	.805
Budget allocations prioritize key restoration activities, such as reforestation and community engagement.	1.000	.756
Allocated funds are sufficient to achieve the intended forest restoration goals effectively.	1.000	.764
Projects are completed within the allocated timelines.	1.000	.780

Resource utilization during project implementation is efficient and cost-effective.	1.000	.748
Restoration projects adhere to the planned budgets without significant overruns.	1.000	.643
The organization ensures effective coordination among stakeholders during project implementation.	1.000	.816
Regular progress reviews are conducted to ensure project goals are being met.	1.000	.782
There is sufficient technical expertise available to implement forest restoration projects successfully.	1.000	.844
Monitoring activities are conducted regularly throughout the project lifecycle.	1.000	.858
Evaluation reports are comprehensive and provide actionable insights for improving restoration projects.	1.000	.705
Stakeholders are actively involved in the monitoring and evaluation processes.	1.000	.702
The organization uses advanced tools and technologies for monitoring forest restoration progress.	1.000	.684
Impact assessments are conducted to measure the long-term success of restoration projects.	1.000	.835
Feedback from monitoring and evaluation is effectively used to adjust project strategies.	1.000	.712
The forest restoration projects have significantly increased the overall forest cover in the Mau Forest Complex.	1.000	.711
There has been a noticeable improvement in tree survival rates following reforestation efforts.	1.000	.734
Deforested areas have been successfully rehabilitated into sustainable forest ecosystems.	1.000	.800
Forest restoration projects have contributed to an increase in the diversity of plant species.	1.000	.755
Wildlife habitats in the Mau Forest Complex have been restored and preserved effectively.	1.000	.770
The restoration efforts have reduced the risk of biodiversity loss in the Mau Forest Complex.	1.000	.698
Local communities are actively engaged in reforestation and conservation activities.	1.000	.786
The restoration projects have provided communities with sustainable livelihood opportunities.	1.000	.796

Community participation has significantly contributed to the success of forest restoration initiatives.	1.000	.687

3.10 Ethical Issues in Research

Ethical protocols were strictly observed in this study to ensure compliance with research standards and respect for participants. Necessary approvals were obtained, including authorization from the school and a permit to undertake a study from NACOSTI, which oversees research in Kenya. Permission was also obtained from government agencies, local community leaders, and other relevant stakeholders to facilitate access and cooperation within the Mau Forest Complex. Respondents were informed in detail about the aim of the study including the objectives, measures taken to carry out the study including risks and benefits that may arise, and their voluntary participation was secured through informed consent. Self-administered questionnaires were used to allow respondents to respond privately and independently. Confidentiality and anonymity were maintained by ensuring no identifying information was collected, thus upholding privacy, respect, and integrity throughout the research process.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter entailed the analysis, interpretation, and reporting of the study findings, structured around both the general and specific research objectives. It began with a summary of the response rate and the demographic profile of the respondents, followed by descriptive statistics for both the independent and dependent variables—including qualitative insights drawn from open-ended responses. The chapter concluded with inferential statistical analysis, notably multiple linear regression and the testing of its underlying assumptions to explore any associations between dependent and the independent variables. All the analysis and interpretations were done based on data collected for the period 2010 – 2022.

4.2 Response Rate

Out of the 217 individuals targeted for the survey, 174 returned completed questionnaires, resulting in a response rate of 80.2%. Out of 100 government officials, 104 respondents participated and returned completed questionnaires, 52 out of 65 community representatives and 18 out of 22 Ogiek community members also returned completed questionnaires. This level of participation is considered satisfactory for data analysis and deriving valid conclusions about the study population. Mugenda & Mugenda (2006) indicate that a response rate of 50% is sufficient, 60% is viewed as good, while rates exceeding 70% are classified as excellent. Table 4.1 outlines these benchmarks.

Table 4. 1: Response Rate

Category	Frequency	Percent
Response	174	80.2
Non-Response	43	19.8
Total	217	100.00

Source: Primary Data (2025)

4.3 Demographic Characteristics of Respondents

It is essential to understand the demographic characteristics of the respondents used to carry out the survey, as it enhances both the reliability of the findings and their applicability to broader contexts. This section outlines key background details of the participants—namely gender, age, educational attainment, and tenure in their current roles—which form a basis for interpreting the study's results. A summary of this demographic data is provided in Table 4.2.

Table 4. 2: Demographic Characteristics of Respondents

Characteristics	Category	Frequency	Percentage
Gender	Female	**57**	**32.8**
	Male	**117**	**67.2**
Age group	18-30 years	27	15.5
	31-40 years	84	48.3
	31-50 years	52	29.9
	Over 50 years	11	6.3
Education Level	Diploma	7	4.0
	Degree	68	39.1
	Masters	83	47.7
	PhD	8	4.6
	Others (Secondary)	8	4.6
Working Experience	Less than 1 year	8	4.6
	1-3 years	46	26.4
	4-7 years	79	45.4
	8 years and 5 above	41	23.6

As shown in Table 4.2, in terms of gender distribution, most respondents are male, accounting for 67.2% (117 respondents), while females make up 32.8% (57 respondents). Regarding age, the largest group of respondents falls within the 31-40 years category, representing 48.3% (84 respondents), followed by those aged 41-50 at 29.9% (52 respondents). Younger respondents (18-30 years) and those over 50 years constitute smaller proportions at 15.5% (27 respondents) and 6.3% (11 respondents), respectively.

Regarding education, 47.7% (83 respondents) have a Master's degree, while 39.1% (68 respondents) hold a Bachelor's degree. A smaller percentage have a PhD (4.6%, eight respondents)

or a Diploma (4.0%, seven respondents), and 4.6% (8 respondents) have secondary education or other qualifications.

Regarding work experience, 45.4% (79 respondents) have 4-7 years of experience, while 23.6% (41 respondents) have 8 years or more. Those with 1-3 years of experience account for 26.4% (46 respondents), and only 4.6% (8 respondents) have less than one year of experience.

4.4 Descriptive Statistics

Descriptive statistics involved the minimum, maximum, mean, and standard deviation of independent and dependent variables for the period 2010 -2022. By summarizing the data this way, descriptive statistics offered a clear and concise overview of the dataset, enabling researchers to identify patterns, trends, and potential outliers. This formed the foundation for further statistical analysis and interpretation of the study's findings.

4.4.1 Allocation efficiency

Allocation efficiency in forest restoration was assessed using key financial management indicators, including budget adherence, timely disbursement, and proportional allocation of funds to restoration projects. Respondents provided their perceptions on six statements about allocation efficiency using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), as shown in Table 4.3.

Table 4. 3: Allocation efficiency

	Allocation efficiency	Mean	S. D
1	Budget allocation for forest restoration initiatives is done in a timely manner to support project activities.	3.25	.907
2	The funds allocated to forest restoration are distributed equitably across priority areas.	3.24	1.025
3	The organization ensures transparency in the allocation of resources for forest restoration projects.	3.55	.941
4	Adequate monitoring mechanisms are in place to track the allocation and utilization of restoration funds.	3.67	.882

5	Budget allocations prioritize key restoration activities, such as reforestation and community engagement.	3.58	.841
6	Allocated funds are sufficient to achieve the intended forest restoration goals effectively.	2.93	1.035
	Mean	**3.37**	**0.939**

According to the data presented in Table 4.3, responses to the statement "*Budget allocation for forest restoration initiatives is done in a timely manner to support project activities*" showed variation from 2 (disagree) to 5 (strongly agree), with an average rating of 3.25 and a standard deviation of 0.907. When asked whether "*The funds allocated to forest restoration are distributed equitably across priority areas*," participant responses spanned from 1 (strongly disagree) to 5 (strongly agree), yielding a mean of 3.24 and a standard deviation of 1.025. For the statement on transparency in fund allocation for forest restoration projects, responses ranged from 1 to 5, with a mean of 3.55 and a standard deviation of 0.941. Regarding monitoring mechanisms to oversee fund allocation and usage, scores ranged from 2 to 5, producing a mean of 3.67 and a standard deviation of 0.882. The item addressing whether budget allocations prioritize key activities—such as reforestation and community engagement—had responses between 1 and 5, with an average score of 3.58 and a standard deviation of 0.841. Lastly, for the perception that "*Allocated funds are sufficient to achieve the intended forest restoration goals*," responses varied from 1 to 4, producing a lower mean of 2.93 and a standard deviation of 1.035. The aggregate mean score for allocation efficiency across all items was 3.37, with a standard deviation of 0.939.

4.4.1.1 Thematic Analysis on Allocation Efficiency

According to Braun and Clarke (2006), qualitative study gives insights into the study through thematic analysis to ensure stakeholder's perspectives were interpretated in a transparent manner. Thematic analysis is conducted in phases where familiarization of data is carried out first, then generation of codes, reviewing themes, defining names and finally, naming them (Braun & Clarke, 2006). Qualitative insights from respondents on allocation efficiency in the MFC was undertaken by systematically identifying, organizing and interpreting patterns within open ended statements to derive key themes.

One of the most notable themes identified was the challenge of **insufficient funding and difficulty acquiring finances**, where government budgetary allocations prioritize other sectors over long-term environmental initiatives. One respondent noted, "*Government budgets have competing development priorities and often prioritize infrastructure, agriculture, and social services over long-term environmental restoration*." They further noted that donor funding fluctuates occasionally, making long-term planning difficult. Another respondent proposed, *"Some of the solutions to addressing financial difficulties are through the development of diversified funding strategies, attracting international environmental funding, and signing public-private partnership deals,"* as some of the ways to address the challenges identified.

Another theme was **corruption and financial mismanagement of funds** as barriers to effective resource allocation to forest restoration programs. Most notably, government entities responsible for forest restoration engaged in corruption, resulting in misallocation of financial resources and a lack of transparency in tracking funding, as noted by one respondent who stated, *"Mismanagement of funds, corruption, and a lack of transparency in financial operations have led to poor resource utilization, reducing the effectiveness of restoration efforts."* Some of the solutions proposed were implementing financial oversight mechanisms and adopting technologies such as blockchain to enhance transparency in fund disbursement. One respondent proposed and noted, *"Mau complex is a large landscape with many players engaging in its conservation and protection, and when these players coordinate their activities, it will ensure transparency, efficiency, and successful restoration of the ecosystem."*

Bureaucratic inefficiency and poor coordination by government agencies was another theme identified as a hindrance to restoration efforts following lengthy bureaucratic processes, red tape, and poor coordination in ensuring government efforts towards restoration efficiency. The institutions mandated to oversee restoration activities face overlapping roles, resulting in delayed decision-making processes. One respondent stated, "*Overlapping mandates among agencies at times result in inefficiencies and misallocation of resources."* Another participant observed, "*Lack of clear restoration plans and synergy among implementing agencies results in non-optimal outcomes."* To address this, one respondent stated, *"Strengthen interagency collaboration through an integrated management framework, streamline bureaucratic approval processes, and ensure a*

coordinated approach to restoration activities." Another recommended dissolution of the agencies with duplicated roles to optimize resources for restoration as part of the solution to the challenges facing efficient allocation of resources.

Lack of political goodwill and weak governance especially in restoration programs was identified as a significant obstacle to the effective allocation of resources. A respondent noted, *"There is a deficiency of political goodwill, particularly among parliamentarians, who favor immediate political advantages over enduring environmental restoration."* Another respondent added, *"Members of Parliament are more concerned about their votes and will encourage encroachment by fighting for the community members to stay in the Mau Complex."* Another added, *"There is a lack of science-driven targeted intervention, and instead, politics takes center stage."* Others expressed diverse political interests, politicizing Indigenous community efforts, complicating land ownership, and evictions of communities from the forest, leading to lengthy court cases. Respondents proposed depoliticizing forest restoration operations, enforcing stringent financial responsibility, and enacting rules safeguarding forest restoration initiatives from political interference. A respondent stated, *"The government must resolve judicial cases that may obstruct the efficient allocation of funding resources in the Mau Complex, and the surrounding community should be educated to become allies of the forest, enabling them to volunteer for tree planting without requiring financial support."*

A respondent remarked, "*Strengthening land-use policies, involving local communities in decision-making, and using technology for monitoring can enhance efficiency"* as part of the solution to **encroachment and illegal logging** undermining allocation to restoration efforts. Another participant added, *"The increasing demand for land and timber has led to continuous deforestation, reducing the impact of restoration activities, creating a placebo effect in allocating resources to curb the same."* Another respondent suggested that *"Strengthening land-use policies, involving local communities in decision-making, and using technology for monitoring can enhance efficiency."* Another remarked, *"Strict enforcement of anti-encroachment laws, along with incentives for sustainable land use, can further protect restored areas from degradation."* as part of the solution.

Finally, **weak monitoring and evaluation systems** was a theme identified as a limitation to efficient fund utilization. One stated, *"Without proper tracking mechanisms, it is difficult to measure the impact of restoration initiatives and identify areas where improvements are needed."* Another respondent suggested, "*Adopting technology-driven monitoring tools, such as satellite imaging and remote sensing, can enable real-time tracking of forest restoration progress where regular impact assessments and community participation in monitoring efforts can also enhance transparency and accountability in project implementation."* Another remarked, *"Strict enforcement of anti-encroachment laws, along with incentives for sustainable land use, can further protect restored areas from degradation."*

4.4.2 Project Implementation Efficiency

Project implementation efficiency was assessed using three key dimensions: project completion rates, cost-effectiveness, and adherence to timelines. Respondents provided their perceptions on six statements related to project implementation efficiency, using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The results are summarized in Table 4.4, which provides the minimum, maximum, mean, and standard deviation for each statement and an overall mean for project implementation efficiency.

Table 4. 4: Project Implementation Efficiency

	Project Implementation Efficiency	Mean	S. D
1	Projects are completed within the allocated timelines.	2.82	1.041
2	Resource utilization during project implementation is efficient and cost-effective.	3.08	1.000
3	Restoration projects adhere to the planned budgets without significant overruns.	3.24	.924
4	The organization ensures effective coordination among stakeholders during project implementation.	3.84	.725
5	Regular progress reviews are conducted to ensure project goals are being met.	3.79	.807
6	There is sufficient technical expertise available to implement forest restoration projects successfully.	3.71	.872
	Mean	**3.41**	**0.895**

Table 4.4 presents findings on project implementation efficiency. Responses to the item *"Projects are completed within the allocated timelines"* ranged from 1 (strongly disagree) to 5 (strongly agree), resulting in a mean score of 2.82 and a standard deviation of 1.041. For the efficiency and cost-effectiveness of resource utilization during implementation, the ratings also spanned from 1 to 5, yielding a mean of 3.08 and a standard deviation of 1.000. In evaluating adherence to planned budgets without significant overruns, the responses ranged from 1 to 5, with a computed mean of 3.24 and a standard deviation of 0.924. The item on stakeholder coordination during project implementation had responses between 2 (disagree) and 5 (strongly agree), leading to a mean of 3.84 and a standard deviation of 0.725. On whether regular progress reviews are conducted to track project outcomes, responses varied from 1 to 5, with a mean of 3.79 and a standard deviation of 0.807. Finally, for the availability of sufficient technical expertise in implementing restoration projects, ratings also ranged from 1 to 5, resulting in a mean of 3.71 and a standard deviation of 0.872. The overall average score across all items assessing project implementation efficiency stood at 3.41, with a standard deviation of 0.895.

4.4.2.1 Thematic Analysis on Allocation Efficiency

Delayed disbursement of funds was a key theme in the analysis of the open-ended statements, where respondents underlined delayed disbursement of funds as one of the most probable challenges impacting time-sensitive activities. *"Activities like seedling production rely on rainy seasons for optimum growth. Any delay in resource allocation derails this activity."* one respondent said. Another respondent added, *"Late disbursement of project funds when the right weather seasons are long gone is not viable, and project implementing agencies should prioritize coordinating their activities with the weatherman."* To address this, one of the respondents posited that *"Establishing contingency plans to address delays and aligning funding cycles with project timelines, increasing funding through public-private partnerships, innovative financing mechanisms, and advocating for higher priority and consistent funding for forest restoration in national budgets."* as potential solutions to project implementation efficiency in forest restoration initiatives. Another solution suggested by a respondent was, *"Climate change is now evident throughout the country through frequent droughts and flooding. There is a need for the government to put adequate resources and strategies in place to mitigate these adverse effects."*

Administrative and bureaucratic challenges was another theme identified from respondents contributing to delays and inefficiencies. A respondent highlighted, *"Lengthy and complex permitting processes delay implementation."* Another shared, *"Lengthy approval processes which can be addressed by streamlining decision-making and shortening approval processes but with checks and balances."* Another respondent cited the lack of proper systems to keep those handling the resources accountable and suggested creating working systems and the introduction of a reward system for exemplary performance as measures to curb bureaucracy.

Another theme was **insufficient budget allocation,** which was identified as a concern in project execution. One respondent noted, *"The government gives less priority to allocating resources to forest conservation, unlike water, road, and health sectors."* Another raised similar concerns, "*Persistent budget cuts and lack of prioritization of restoration project."* Another respondent stated, *"insufficient funding."* Moreover, they added that *"politicians instead of technocrats make decisions."* Another said, "*The sector has inadequate resources to run the implementation of projects."* Solutions suggested diversifying funding options to facilitate the implementation of projects, with one respondent noting that *"To avoid reliance on budgetary allocations, incorporate public-private partnerships, and other innovative sources of funding, and prioritize efficient resource management and execution."*

Poor coordination among government agencies was a significant challenge identified by respondents is coordination issues among government agencies and stakeholders. One respondent underlined, *"Poor planning and low prioritization of forest restoration projects affect the implementation of projects."* Moreover, they added, "All *stakeholders have to be informed of the significance of restoration."* Another added, *"Lack of coordination amongst institutions where implementing partners should have technical working groups to coordinate and monitor progress."* Respondents further suggested that strengthening interagency coordination through an integrated management system is part of the suitable solutions. One respondent suggested, *"Create thorough, collaborative restoration plans with defined timelines and responsibilities for all stakeholders."* Another added, *"There is a need for coordinated ministry efforts to bring all stakeholders to work in synergy."*

Political and governance challenges was a recurring barrier to the effective implementation of projects. A respondent noted, *"Senior policy-level staff and directors' turnover due to political appointment"* and added, *"There is a need to establish long-term plans anchored in the Climate Change Council and security of tenure for key personnel."* Another respondent added, "*Political interests, inconsistent policies, and changes in political priorities can disrupt restoration initiatives."* Depoliticizing forest management was one of the solutions suggested, and one participant remarked, *"Reduce political interference in forest restoration initiatives by establishing independent oversight bodies and ensuring that funds are ring-fenced for restoration activities."* Another added, *"Implementing strict monitoring to prevent the diversion of funds and using technologies like blockchain to ensure traceability and accountability in fund disbursement can also enhance transparency and governance."*

Participants also pointed out weather conditions and climate change as significant obstacles to project execution. One participant observed, *"Unpredictable weather patterns and climate change can disrupt restoration activities, especially those dependent on specific weather conditions, such as planting seasons."* Another respondent proposed *that "Governments should create climate-resilient restoration strategies and include climate adaptation elements into restoration plans"* to offset climate risk. A second respondent proposed. *"Using weather forecasting to align activities with optimal conditions can also improve the timing and effectiveness of restoration efforts."* Another participant remarked that *"delays in procuring and delivering seedlings, as well as the delivery of unsuitable seedlings, hinder planting activities."* and further suggested that *"Improving seedling production and supply chains to ensure timely availability of high-quality seedlings and establishing local nurseries to reduce dependency on external suppliers.*" as suitable measures to aid in implementing forest restoration projects.

The insights from respondents further identified **social factors and engagements** as a key theme among local communities which led delays in executing rehabilitation initiatives. One respondent stated, *"There is a lack of community buy-in and opposition to restoration initiatives by community members, which postpones execution of projects."* Another added, *"Historical land excisions and settlements create complex legal and social challenges, especially for Indigenous communities residing in the Mau."* Another similar observation is that *"governments should recognize the rights*

of indigenous communities who have traditional knowledge of conserving forests." Public awareness efforts to emphasize the economic and environmental advantages of forest restoration and the involvement of local communities in planning and execution were identified as suitable solutions to inclusivity. One respondent posited that *"these problems can be helped by resolving land conflicts via comprehensive land surveys and establishing unambiguous land tenure regulations."* Another proposed, *"Simplify permitting processes and improve interagency coordination,"* while another emphasized, *"Develop and implement long-term restoration plans which includes community involvement."*

Finally, **capacity and knowledge gaps** among implementing agencies, was a key theme acting as a barrier to implementing restoration efforts. A respondent noted, *"Limited technical and financial capacity, as well as a lack of data-driven planning, lead to poor planning and suboptimal outcomes."* Another suggested *that "building capacity through training programs and technical support, and engaging local communities and stakeholders in restoration activities can aid in planning and executing projects according to their timelines."* Another added, *"Conducting comprehensive site assessments and developing data-driven restoration plans with realistic timelines and budgets can improve planning and implementation, and monitoring and evaluation systems to track progress and make informed decisions can further enhance the effectiveness of restoration efforts."*

4.4.3 Monitoring and Evaluation Efficiency

Monitoring and Evaluation (M&E) efficiency was assessed using five key dimensions: frequency of monitoring activities, stakeholder engagement, availability of impact assessment reports, timeliness of disbursement, and proportion of funds allocated to restoration. Respondents provided their perceptions on six statements related to M&E efficiency, using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). As summarized in Table 4.5, the results provide insights into the minimum, maximum, mean, and standard deviation for each statement and an overall mean for M&E efficiency.

Table 4. 5: Monitoring and Evaluation Efficiency

Monitoring and Evaluation Efficiency	Mean	S. D

1	Monitoring activities are conducted regularly throughout the project lifecycle.	3.30	.875
2	Evaluation reports are comprehensive and provide actionable insights for improving restoration projects.	3.48	.831
3	Stakeholders are actively involved in the monitoring and evaluation processes.	3.52	.910
4	The organization uses advanced tools and technologies for monitoring forest restoration progress.	3.18	.972
5	Impact assessments are conducted to measure the long-term success of restoration projects.	3.26	.918
6	Feedback from monitoring and evaluation is effectively used to adjust project strategies.	3.12	1.021
	Mean	**3.31**	**0.921**

Table 4.5 summarizes forest restoration projects' monitoring and evaluation (M&E) efficiency findings. For the item assessing the regularity of monitoring activities throughout the project lifecycle, participants provided ratings from 2 (disagree) to 5 (strongly agree), with an average score of 3.30 and a standard deviation of 0.875. Responses on the comprehensiveness and usefulness of evaluation reports in enhancing restoration projects also ranged between 2 and 5, yielding a mean of 3.48 and a standard deviation of 0.831. Concerning stakeholder involvement in M&E processes, scores varied from 1 to 5, resulting in a mean of 3.52 and a standard deviation of 0.910. The item examining the use of advanced tools and technologies in monitoring progress received responses across the full Likert scale (1 to 5), with a calculated mean of 3.18 and a standard deviation of 0.972. Whether long-term impact assessments are carried out, responses ranged from 1 to 5, giving a mean of 3.26 and a standard deviation of 0.918. Lastly, for the effectiveness of incorporating feedback from M&E into project strategy adjustments, participants rated between 1 and 5, leading to a mean score of 3.12 and a standard deviation of 1.021. Overall, the mean score for monitoring and evaluation efficiency stood at 3.31, with a standard deviation of 0.921.

4.4.3.1 Thematic Analysis on Monitoring and Evaluation Efficiency

Thematic analysis from the open-ended statements highlighted key themes on different approaches identified from the data that might impact the effectiveness of monitoring and evaluation (M&E) in forest restoration projects. **Adopting current innovative technologies for data collection and**

analysis was one of the significant themes identified in the responses among the participants. One respondent said, *"Monitoring vast or unreachable regions inside the forest complex can be aided by modern technologies, including remote sensing."* Another participant observed, *"Use Geographic Information Systems (GIS), remote sensing, and drone technology for real-time forest cover analysis and change detection."* Respondents proposed innovative technologies to enhance real-time monitoring, data accuracy, and general project monitoring and evaluation.

Stakeholder engagement and community participation was another significant theme noted regarding technological innovations. One respondent stated, *"Train local communities to carry out basic monitoring tasks such as tree growing while beating up of trees, soil sampling, or wildlife sightings,"* one respondent said. Another said, *"Build local capacity by involving local communities in monitoring."* Stakeholder engagement of all key stakeholders was another key observation in monitoring restoration initiatives, as one respondent stated. *"Engaging all key stakeholders, including government agencies, NGOs, and community representatives, in M&E processes ensures ownership and alignment of goals."* Another added, "*Establishing regular coordination meetings and developing an inclusive M&E framework that involves stakeholders at all stages of the project lifecycle can improve collaboration and accountability."*

Another key theme was **capacity building among stakeholders**. *"Increase funding and capacity for M&E,"* said one respondent. At the same time, another added, *"Deliberately allocating resources for training M&E personnel, forest conservators, and local communities in undertaking monitoring and evaluation activities will go a long way in monitoring efforts,"* In addition to technological advancements in M&E, respondents suggested conducting training programs using of advanced tools, data collection methods, and reporting systems to build the capacity of those involved in M&E activities. Additionally, a respondent noted, *"Develop clear and measurable indicators for forest restoration outcomes, regularly reviewing and updating them to reflect emerging issues and project goals can further improve the relevance and accuracy of M&E efforts."*

An additional key theme was **resource allocation to M&E initiatives**, a key factor in their effectiveness. One respondent stated, *"There should be a deliberate effort in allocating resources for monitoring and evaluation activities."* Another added, *"Without sufficient financial support,*

M&E activities may be inconsistent or ineffective." The feedback highlighted efforts towards accountability in M&E processes where one responded, *"Establish an M&E system collaboratively, set realistic targets easy to measure, engage qualified monitoring officers, and have a dedicated budget for monitoring."*

Ensuring a **structured and transparent approach** is crucial for improving the effectiveness of M&E according to key responses from participants. One respondent stated, *"Ensuring clear communication of findings to relevant stakeholders and ensuring transparent and simple reporting systems."* The importance of setting measurable goals was also highlighted in the response: Another respondent remarked, *"Develop SMART clear and measurable indicators, implement advanced Technology and Data Management tools and equipment as a measure to assess M&E activities."* Objectivity in reporting was also highlighted when one responded, *"Establishing clear targets and improving reporting mechanisms can ensure that restoration projects are evaluated objectively and adjusted where necessary."*

The analysis further identified **institutional coordination and communication between key stakeholders** as essential to effectively monitoring and evaluating restoration initiatives. According to participants, these were to avoid duplication of efforts and promote synergy among government institutions and other players. One respondent remarked, *"Implementing regular coordination meetings with all actors within the forest ecosystem, including community representatives, is necessary."* Another stated, *"Ensure there is cohesion between departments despite their different lines of duty."* Additionally, calls for independent and transparent M&E mechanisms were identified as a measure of credibility and accountability. One respondent proposed, *"Use of an independent evaluation team that is focused and unbiased."* Another added, *"Transparent and simple reporting systems that communicate findings to all stakeholders."*

4.4.4 Forest Restoration Outcomes in the Mau Forest Complex

Forest Restoration Outcomes were assessed using five key dimensions: changes in forest cover, Biodiversity improvements, Reduced land degradation, and Community participation in sustainable activities. Respondents provided their perceptions on nine statements related to Forest Restoration Outcomes, using a five-point Likert scale ranging from 1 (strongly disagree) to 5

(strongly agree). The results, as summarized in Table 4.6, provide insights into the minimum, maximum, mean, and standard deviation for each statement and an overall mean for Forest Restoration Outcomes.

Table 4. 6: Forest Restoration Outcomes in the Mau Forest Complex

	Forest Restoration Outcomes in the Mau Forest Complex	Mean	S. D
	Changes in forest cover		
1.	The forest restoration projects have significantly increased the overall forest cover in the Mau Forest Complex.	4.02	.671
2.	There has been a noticeable improvement in tree survival rates following reforestation efforts.	4.04	.716
3.	Deforested areas have been successfully rehabilitated into sustainable forest ecosystems.	3.70	.799
	Sub Average	**3.92**	**0.729**
	Biodiversity improvements		
4.	Forest restoration projects have contributed to an increase in the diversity of plant species.	3.98	.794
5.	Wildlife habitats in the Mau Forest Complex have been restored and preserved effectively.	3.61	.891
6.	The restoration efforts have reduced the risk of biodiversity loss in the Mau Forest Complex.	3.97	.667
	Sub Average	**3.85**	**0.784**
	Community participation in sustainable activities		
7.	Local communities are actively engaged in reforestation and conservation activities.	4.09	.674
8.	The restoration projects have provided communities with sustainable livelihood opportunities.	3.84	.751
9.	Community participation has significantly contributed to the success of forest restoration initiatives.	4.18	.618
10.	**Sub average**	**4.04**	**0.681**
	Overall Mean	**3.94**	**0.731**

Table 4.6 summarizes participants' perceptions regarding the outcomes of forest restoration initiatives in the Mau Forest Complex. For the statement, "The forest restoration projects have significantly increased the overall forest cover in the Mau Forest Complex," responses ranged from 2 (Disagree) to 5 (Strongly Agree), yielding a mean score of 4.02 and a standard deviation of 0.671. Similarly, the statement, "There has been a noticeable improvement in tree survival rates

following reforestation efforts," received a mean of 4.04 and a standard deviation of 0.716. For the item, "Deforested areas have been successfully rehabilitated into sustainable forest ecosystems," the mean was 3.70 with a standard deviation of 0.799. Collectively, these results give a sub-average of 3.92 and a standard deviation of 0.729, indicating a high level of agreement in the dimension of forest cover improvement.

In terms of biodiversity outcomes, the statement, "Forest restoration projects have contributed to an increase in the diversity of plant species," received a mean of 3.98 (SD = 0.794). The item, "Wildlife habitats in the Mau Forest Complex have been restored and preserved effectively," had a slightly lower mean of 3.61 and a standard deviation of 0.891. Additionally, the statement, "The restoration efforts have reduced the risk of biodiversity loss in the Mau Forest Complex," recorded a mean of 3.97 and a standard deviation of 0.667. The average score for biodiversity-related outcomes stands at 3.85 with a standard deviation of 0.784, pointing to generally favorable assessments in this area.

Regarding community participation, respondents showed strong agreement with the statement, "Local communities are actively engaged in reforestation and conservation activities," which had a mean score of 4.09 (SD = 0.674). The statement, "The restoration projects have provided communities with sustainable livelihood opportunities," recorded a mean of 3.84 and standard deviation of 0.751. Lastly, the statement, "Community participation has significantly contributed to the success of forest restoration initiatives," achieved the highest mean of 4.18 (SD = 0.618). These findings produce a sub-average of 4.04 with a standard deviation of 0.681, indicating highly positive perceptions regarding community involvement. Overall, the mean score for forest restoration outcomes across all indicators was 3.94, with a standard deviation of 0.731, reflecting strong general agreement with the effectiveness of the restoration projects.0.731.

4.4.4.1 Thematic Analysis on Forest Restoration Outcomes

Thematic analysis from the open-ended statements revealed key themes, such as illegal logging and encroachment, limited resources, political interests, insufficient community engagement, land tenure issues, climate change, and weak coordination among stakeholders as factors affecting forest restoration outcomes. **Illegal logging and encroachment** was a central theme in the

responses, with one respondent stating, *"Encroachment is still a big threat—proper surveillance and use of technology are needed to monitor and protect the forest."* Another added, *"Overdependence on forest land for cattle grazing is a major issue. Livestock destroy newly planted trees, affecting restoration progress."* Respondents further noted that strengthening law enforcement, using advanced monitoring tools, and involving local communities in protection and surveillance activities are ways to address the challenges.

Political interference in forest matters was another theme identified among responses from participants as a barrier to effective forest restoration initiatives. They further noted that politicizing forest issues was for personal and electoral gains. One respondent noted, "*Mau is used as a campaign tool with false promises of land ownership, making restoration difficult."* Another remarked, *"Political interference remains the main issue. Conservation should be depoliticized and prioritized by all leaders."* Respondents proposed clear policy guidelines, secure land tenure, and hold politicians accountable through legal and institutional frameworks as ways suggested to curb the challenge. One respondent proposed, "*Issue title deeds for all forest blocks and develop clear land-use policies prioritizing forest conservation over politics."*

Insufficient funding for forest restoration initiatives was also highlighted as a barrier to restoration efforts. One respondent noted, "*There is a lack of proper funding and limited resources to support restoration. Without enough staff and equipment, we cannot meet our targets."* Most respondents similarly identified limited resources as a concern in restoration efforts. A respondent added, *"Limited financial resources restrict activities such as reforestation, monitoring, and enforcement, making it difficult to combat land degradation effectively."* Respondents further proposed resource mobilization through stakeholder engagements and innovative finance models to mitigate the challenges identified.

Another theme highlighted was **minimal community engagement and awareness in forest restoration matters**, citing a poor understanding of the benefits of conservation efforts. One respondent noted, *"Poor awareness among locals results in low ownership of restoration projects."* Another remarked, *"Human activities persist because people believe they should have uncontrolled access to forests."* A significant theme in the proposed solutions included regular

grassroots community sensitization, capacity building, and strengthening community groups such as Community Forest Associations (CFA), local ownership, and stewardship.

Land disputes in the Mau Forest Complex were a key theme and challenge identified by through unclear Land boundaries, where most of the forest blocks in the Mau Forest Complex do not have well-demarcated boundaries, contributing to encroachment issues. One respondent stated, *"Most of the boundaries are not demarcated. Title deeds must be issued for all blocks to secure them."* Respondents identified surveying forest land, issuing legal titles, and resolving historical land claims as solutions to land tenure challenges, especially those involving indigenous communities such as the Ogiek.

In addition, **unpredictable weather patterns, climate change, forest fires, and steep terrains** of the forest areas were identified as barriers to restoration efforts. A respondent noted, *"The steep terrain encourages erosion, and forest fires cause a lot of destruction."* To address these challenges, a respondent proposed, *"Climate change is here with us; matters of adaptation and mitigation must be prioritized."* Another added. *"Engage in climate-resilient reforestation, adopt fire management strategies, and use sustainable land practices such as agroforestry and crop rotation."* Another respondent remarked, *"Use remote sensing to access the forest blocks and work with surveyors to identify and secure boundaries."*

Finally, **poor coordination among stakeholders** was another key feature of the analysis. This was seen as a barrier to effective forest management. One respondent stated, *"Multiple stakeholders are involved, but there is poor coordination, which leads to duplication of efforts."* Another noted, *"There should be integrated planning and collaboration between government agencies, NGOs, and local communities."*

4.5 Inferential Statistics

4.5.1 Assumptions of Linear Regressions

To compute multiple regression between response variables (Forest restoration outcomes) and the predictor variables (Allocation efficiency, Monitoring, and Evaluation Efficiency, and Project

implementation efficiency), the assumption of the Normality Test, Multicollinearity test, Homoscedasticity, and Linearity Test.

4.5.1.1 Normality Test

Many parametric methods such as correlation, regression, ANOVA, and t-tests, are based on the assumption of a normal (Gaussian) distribution. Failure to meet this assumption often results in statistical inaccuracies within research literature. Hence, parametric approaches may be used since, irrespective of the data's form, the sampling distribution tends to be normal with large samples (<30 or 40). The use of a Normal Q-Q plot for visual assessment of normalcy is recommended by (Liang, 2019). The data points were considered to be generally distributed as they were rotating around the line of best fit, as shown below

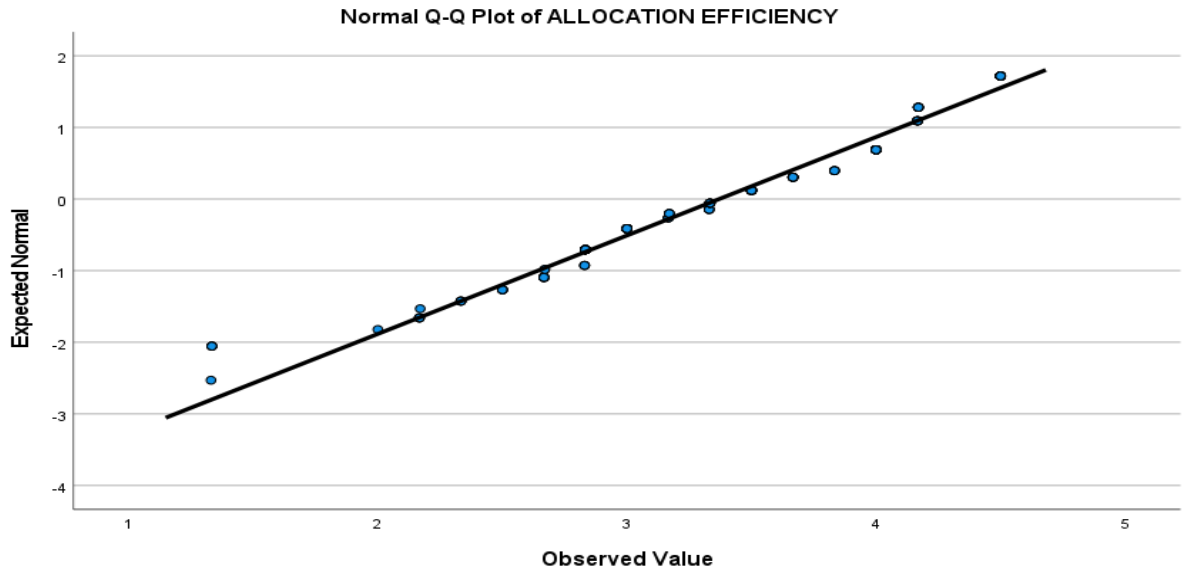


Figure 4. 1: Normal Q-Q plot of Allocation Efficiency

The Q-Q plot for allocation efficiency shows data points closely aligned along the diagonal line, indicating that the data follows a normal distribution. Minor deviations at the tails suggest slight skewness, but the normality assumption is reasonable overall.

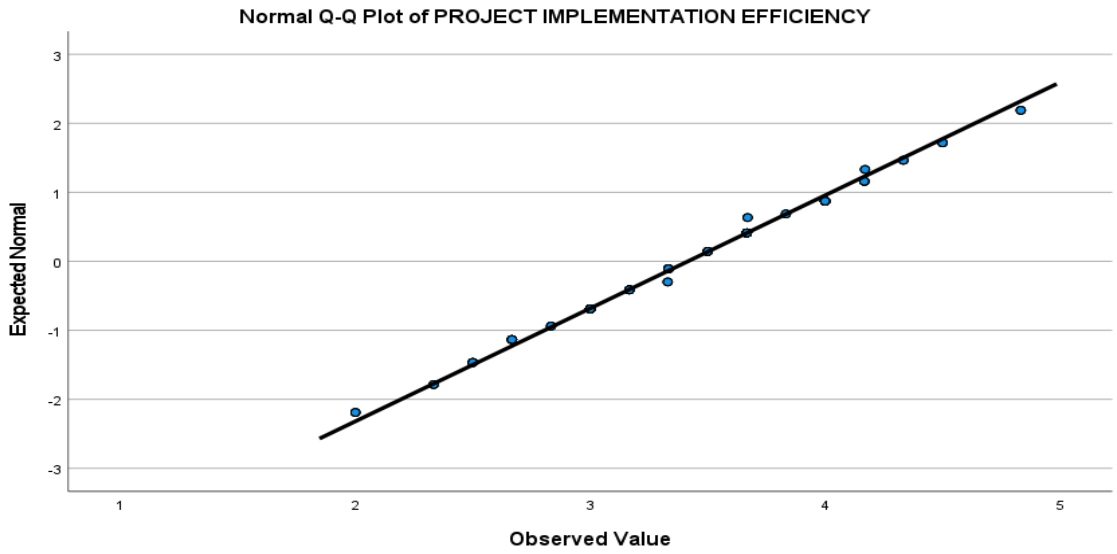


Figure 4. 2: Normal Q-Q plot of Project Implementation Efficiency

The Q-Q plot for project implementation efficiency indicates that the data largely aligns with the expected normal distribution, as evidenced by most points clustering along the diagonal line.

However, slight deviations observed at the extremes suggest the presence of a few outliers, which may have a modest influence on the overall normality of the data.

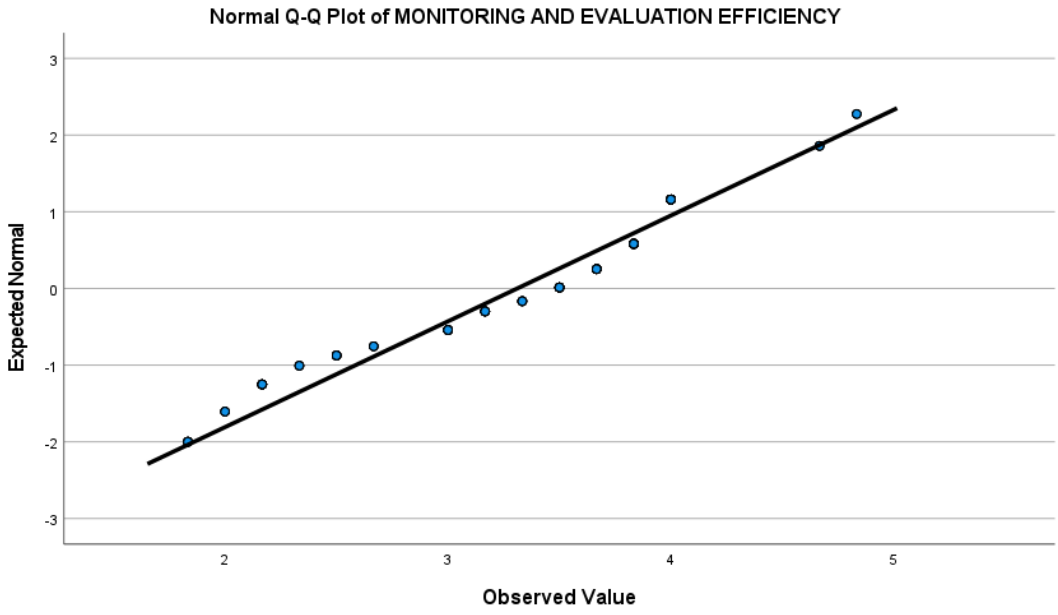


Figure 4. 3: Normal Q-Q plot of Monitoring and Evaluation Efficiency

The Q-Q plot for monitoring and evaluation efficiency reveals a normal distribution, with slight deviations at the lower and upper ends. Counting points around the reference line indicates that the data is not heavily skewed.

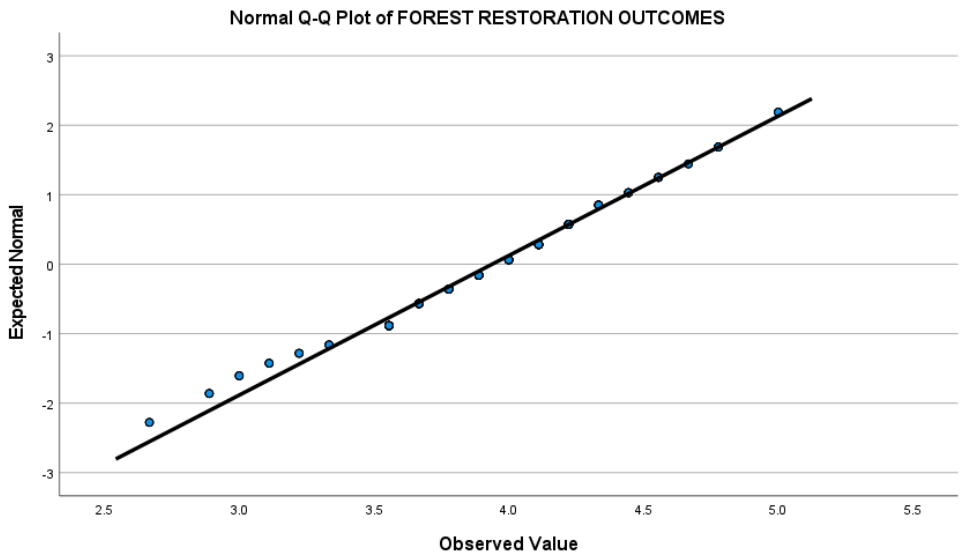


Figure 4. 4: Normal Q-Q Plot of Forest Restoration Outcomes

The Q-Q plot for forest restoration outcomes shows a strong alignment of data points with the reference line, confirming that the variable is approximately normally distributed. Minimal deviations indicate a slight tendency for skewness but not enough to violate normality assumptions.

4.5.1.2 Multi-Collinearity Test

Table 4.7 presents the findings of the multicollinearity assessment, which is essential when examining whether independent variables are highly correlated. When strong intercorrelations exist, interpreting regression coefficients becomes challenging, as their reliability may be compromised (Cooper & Schindler, 2011). The analysis employed both Variance Inflation Factor (VIF) values and tolerance statistics to identify potential multicollinearity. Generally, multicollinearity is considered negligible when VIF values remain below 10, and tolerance levels exceed 0.1, indicating that the predictor variables do not threaten the model's stability.

Table 4. 7: Multi-Collinearity Test

Independent variable	Tolerance	VIF
Allocation efficiency	.550	1.820
Project implementation efficiency	.529	1.890

Monitoring and Evaluation Efficiency	.841	1.188

4.5.1.3 Linearity

The ANOVA test for Linearity assesses whether the relationship between Forest Restoration Outcomes and the independent variables (Allocation Efficiency, Project Implementation Efficiency, and Monitoring and evaluation Efficiency) follows a linear pattern. This is crucial in determining whether linear regression is appropriate for modeling the data, as shown in Table 4.8.

Table 4. 8: Linearity Test

			Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Forest Restoration Outcomes * Allocation Efficiency	Between Groups	(Combined)	23.577	18	1.310	10.507	.000
		Linearity	20.651	1	20.651	165.650	.000
		Deviation from Linearity	2.926	17	.172	1.381	.153
	Within Groups		19.323	155	.125		
	Total		42.900	173			

			Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Forest Restoration Outcomes * Project Implementation Efficiency	Between Groups	(Combined)	1.518	18	.084	10.097	.000
		Linearity	1.326	1	1.326	158.684	.000
		Deviation from Linearity	.193	17	.011	1.357	.165
	Within Groups		1.295	155	.008		
	Total		2.813	173			

			Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Forest Restoration Outcomes * Monitoring and evaluation Efficiency	Between Groups	(Combined)	1.580	18	.088	9.653	.000
		Linearity	1.370	1	1.370	150.658	.000
		Deviation from Linearity	.210	17	.012	1.359	.161
	Within Groups		1.409	155	.009		
	Total		2.989	173			

The results in Table 4.8 show a highly significant linear relationship with a p-value of 0.000, indicating that allocation efficiency strongly influences forest restoration outcomes linearly. Additionally, the deviation from Linearity has a p-value of 0.153, which is insignificant. This

confirms that the relationship does not significantly deviate from a straight-line pattern, making a linear regression model suitable for this variable.

The linearity test for project implementation efficiency also shows a statistically significant linear relationship ($p = 0.000$). This suggests that project implementation efficiency contributes directly to changes in forest restoration outcomes. The deviation from Linearity is insignificant ($p = 0.165$), confirming that the relationship is best represented using a linear model. Similarly, monitoring and evaluation efficiency exhibit a significant linear relationship ($p = 0.000$), indicating that improvements in monitoring efforts align with better forest restoration outcomes. The deviation from Linearity ($p = 0.161$) is insignificant, reinforcing that a linear relationship is appropriate for modeling.

Since all three independent variables, Allocation Efficiency, Project Implementation Efficiency, and Monitoring and evaluation Efficiency exhibit strong linear relationships with Forest Restoration Outcomes ($p < 0.05$) and no significant deviation from Linearity ($p > 0.05$), a linear regression model is suitable for further analysis. This means that changes in these independent variables are likely to predict changes in forest restoration outcomes linearly and predictably.

4.5.1.4 Heteroskedasticity Test

The test of heteroskedasticity was conducted using Breusch-Pagan approach to assess whether the variance of residuals in a regression model is inconsistent in all the levels regarding independent variables. This test evaluates the null hypothesis (H_0) that the error variance remains constant, implying homoskedasticity. The results are shown in Table 4.9.

Table 4. 9: Breusch-Pagan Test for Heteroskedasticity

Chi-Square	Df	Sig.
.338	1	.561

a. Dependent variable: Forest Restoration Outcomes
b. Tests the null hypothesis that the variance of the errors does not depend on the values of the independent variables.
c. Predicted values from design: Intercept + Allocation Efficiency, Project implementation efficiency, monitoring and evaluation efficiency

Given that the p-value of 0.561 exceeds the 0.05 threshold, we do not reject the null hypothesis, as illustrated in Table 4.9. This outcome implies that heteroskedasticity is absent, and the regression model residuals exhibit constant variance. Such a result is favorable, as it confirms that the model satisfies the homoskedasticity assumption, thereby supporting the reliability and objectivity of the regression estimates.

4.5.2 Correlation Analysis

The correlation between the Forest restoration outcomes and the overall means of each dimension on the Government Spending Efficiency scales was established once the variables had been successfully computed. After establishing a correlation between each dimension and Forest restoration outcomes, the next step was to aggregate the means of all the Government Spending Efficiency scales and then use multiple linear regression to establish a correlation with Forest restoration outcomes further. A significance level of 0.05 was selected for all correlations, indicating that the analysis was conducted at a 95% confidence level. Pearson's correlation analysis was used to assess both the direction (positive or negative) and the strength (ranging from -1 to +1) of the relationship between two or more ratio or scale variables. The results are presented in Table 4.10, showing the correlation coefficient (r).

Table 4. 10: Correlation between Government Spending Efficiency and Forest Restoration Outcomes in the Mau Forest Complex

		AE	PIE	M&E	FRO
AE=Allocation efficiency	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	174			
PIE=Project implementation efficiency	Pearson Correlation	.665**	1		
	Sig. (2-tailed)	.000			
	N	174	174		
M&E=Monitoring and Evaluation Efficiency	Pearson Correlation	.337**	.383**	1	
	Sig. (2-tailed)	.000	.000		
	N	174	174	174	
FRO=Forest restoration outcomes	Pearson Correlation	.603**	.694**	.546**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	174	174	174	174

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Primary Data (2025)

As presented in Table 4.10, a strong positive correlation exists between Allocation Efficiency and Forest Restoration Outcomes, evidenced by a Pearson correlation coefficient of 0.603 and a p-value of 0.000. This indicates that improvements in Allocation Efficiency are closely associated with enhanced outcomes in forest restoration efforts. The significance level confirms that the relationship is statistically meaningful at the 1% level, implying a less than 1% likelihood that this result is due to random chance. This finding highlights the important role of effective resource distribution—such as timely funding and material support—in driving successful restoration projects.

Furthermore, the correlation between Forest Restoration Outcomes and Project Implementation Efficiency is even more pronounced, with a Pearson coefficient of 0.694 and a p-value of 0.000. This denotes a strong and statistically significant positive association, suggesting that higher efficiency in executing projects directly contributes to improved restoration results. This finding underscores the importance of effective project implementation, including timely execution, plan adherence, and efficient resource use, in achieving positive restoration outcomes.

The relationship between Forest Restoration Outcomes and Monitoring and Evaluation Efficiency is also positive, with a Pearson correlation coefficient of 0.546 and a significance level of 0.000. This indicates a moderate to strong positive association, meaning that as Monitoring and Evaluation Efficiency increases, Forest Restoration Outcomes also tend to improve. The p-value of 0.000 confirms that this relationship is statistically significant at the 0.01 level. This suggests that regular monitoring and evaluation of restoration projects, including tracking progress and identifying areas for improvement, contribute significantly to the success of forest restoration efforts.

4.5.3 Multiple Linear Regression of the Government Spending Efficiency Regressed Against Forest Restoration Outcomes in the Mau Forest Complex

This research aimed to investigate the impact of government spending efficiency on the forest restoration outcomes in the Mau Forest Complex from 2010 - 2022. This was accomplished by doing typical multiple regressions using a model that included each component of Government Spending Efficiency. The research aimed to investigate the impact of each government spending efficiency on forest restoration outcomes in the Mau Forest Complex when all these factors were collectively included in the model. The multiple linear regression analysis findings are displayed in Table 4.12, including the ANOVA results (F Ratio, Significance Value) for goodness of fit and the model summary (R, R2, Adj R2) in Table 4.11. Table 4.13, on the other hand, presented the results for the regression coefficients (Unstandardized and standardized), t-values, and Significance values.

The research aimed to ascertain the model summary results to establish the total percentage change in Forest Restoration Outcomes in the Mau Forest Complex explained by the Government Spending Efficiency metrics using R2. The data in Table 4.11 display the values for R, R2, Adj R2, F ratio, and Sig. Value.

Table 4. 11: Model Summary and ANOVA

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.773[a]	.597	.590	.3187	.597	84.101	3	170	.000

a. Predictors: (Constant), Project implementation efficiency, Monitoring and Evaluation Efficiency, Allocation efficiency

b. Dependent Variable: Forest Restoration Outcomes in the Mau Forest Complex

Source: Primary Data (2025)

The model summary (Table 4.11) provides insights into the strength and explanatory power of the regression model predicting Forest Restoration Outcomes in the Mau Forest Complex based on allocation efficiency, project implementation efficiency, and monitoring and evaluation efficiency.

The R value (0.773) indicates a strong positive association between the independent variables (efficiency measures) and the dependent variable (forest restoration outcomes). This suggests that improvements in resource allocation, project execution, and monitoring are strongly associated with better restoration outcomes. The R Square value (0.597) means that 59.7% of the variation in forest restoration outcomes can be explained by the three efficiency factors included in the model. This indicates a moderately strong explanatory power, suggesting that other factors influence forest restoration outcomes beyond these three. The Adjusted R Square (0.590) is slightly lower than the R Square, which accounts for the number of predictors in the model. This minimal decrease suggests the model does not suffer from overfitting and maintains a balance between complexity and explanatory power.

Table 4. 12: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.631	3	8.544	84.101	.000[b]
	Residual	17.270	170	.102		
	Total	42.900	173			

a. Dependent Variable: Forest restoration outcomes

b. Predictors: (Constant), Project implementation efficiency, Monitoring and Evaluation Efficiency, Allocation efficiency

Source: Primary Data (2025)

The results of the ANOVA test (Table 4.12) were used to assess the overall significance of the regression model in explaining Forest Restoration Outcomes using allocation efficiency, project implementation efficiency, and monitoring and evaluation efficiency as predictors. The F-value of 84.101 with a p-value of 0.000 indicates that the null hypothesis is rejected since it suggested that the independent variables have no meaningful influence on the dependent variable. This outcome demonstrates that the combined effect of the three predictors has a statistically significant association on forest restoration outcomes. This suggests that Allocation Efficiency, Project Implementation Efficiency, and Monitoring and Evaluation Efficiency are important predictors of forest restoration outcomes. These findings highlight the importance of improving efficiency in these areas to achieve successful forest restoration in the Mau Forest Complex, Kenya.

Table 4. 13: Coefficients on influence of Constructs of Government Spending Efficiency on Forest Restoration Outcomes in the Mau Forest Complex

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	1.538	.153		10.033	.000
Allocation Efficiency	.142	.045	.207	3.160	.002
Project implementation Efficiency	.357	.055	.437	6.539	.000
Monitoring and Evaluation Efficiency	.212	.036	.309	5.828	.000

Dependent Variable: Forest Restoration Outcomes in the Mau Forest Complex

Source: Primary Data (2025)

The constant (intercept) has an unstandardized coefficient of 1.538, which shows the predicted value of Forest Restoration Outcomes when all independent variables are at zero. This constant intercept is statistically significant ($p = 0.000$), meaning that it is significantly different from zero. For Allocation Efficiency, the unstandardized coefficient is 0.142, meaning that for every one-unit increase in Allocation Efficiency, Forest Restoration Outcomes increase by 0.142 units, holding other variables constant. The standardized coefficient (Beta) of 0.207 indicates a moderate positive influence, and the p-value of 0.002 confirms that this effect is statistically significant.

The unstandardized coefficient for project implementation efficiency is 0.357, indicating that for every one-unit increase in Project Implementation Efficiency, Forest Restoration Outcomes increase by 0.357 units, holding other variables constant. The standardized coefficient (Beta) of 0.437 indicates a strong positive influence, and the p-value of 0.000 confirms that this effect is statistically significant.

For Monitoring and Evaluation Efficiency, the unstandardized coefficient is 0.212, meaning that for every one-unit increase in Monitoring and Evaluation Efficiency, Forest Restoration Outcomes increase by 0.212 units, holding other variables constant. The standardized coefficient (Beta) of 0.309 indicates a moderate to strong positive influence, and the p-value of 0.000 confirms that this effect is statistically significant.

4.6 Chapter Summary

The study's findings showed that allocation efficiency positively correlated with forest restoration outcomes ($r = 0.603$, $p < .001$), indicating that timely fund disbursement and equitable distribution were significant to restoration success. Transparency in fund allocation showed unexpectedly moderate high scores (mean = 3.55) despite reported bureaucratic delays. Similarly, community participation also showed unexpectedly high results (mean = 4.04), underlining its critical role in restoration efforts. The study also found that Project implementation efficiency had the most substantial effect ($\beta = 0.437$, $p < .001$), implying that efficient implementation of projects significantly enhances outcomes. The study showed that Monitoring and Evaluation also had a high significance ($\beta = 0.309$, $p < .001$), underscoring the need to oversee ineffective restoration initiatives. The study's regression model explained 59.7% of the variability ($R^2 = 0.597$), implying that 59.7% of the variation in forest restoration outcomes can be explained by the three efficiency factors included in the model, further highlighting the key role of Government Spending Efficiency in Mau Forest Complex restoration efforts over the period 2010 – 2022.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The results of the study are interpreted in this chapter according to the objectives of the study. The study's limitations, results, practice and policy recommendations, and areas for further research are also covered in the chapter. The purpose of the study was to assess the impact of government spending efficiency on forest restoration outcomes in the Mau Forest Complex between 2010 and 2022.

5.2 Discussions of the Findings

5.2.1 Effect of allocation efficiency on Forest Restoration Outcomes in the Mau Forest Complex in Kenya

The study's objective was to assess the effect of allocation efficiency on forest restoration outcomes in the Mau Forest Complex, a critical water tower facing environmental degradation and deforestation that requires immediate attention to restoration efforts. This study found that while funds were allocated towards forest restoration, there was moderate efficiency in distributing these funds regardless of a strong positive association between forest restoration outcomes and allocation efficiency. The study concluded that there was moderate allocation efficiency of funds towards restoration outcomes, despite the strong positive association between forest restoration outcomes and allocation efficiency, attributable to financial, institutional, and political challenges that undermined the allocative effectiveness of restoration efforts.

The study's findings provide important empirical distinction to the theory, challenging the assumptions of Samuelson's (1954) Public Expenditure theory, which holds that public goods like forest restoration need active and adequate government resources and policy interventions. Samuelson's theory assumes that governments act benevolently and with efficient governance in delivering services for the common good. This study highlights real world challenges, where corruption and mismanagement of funds, bureaucratic processes, political interferences, and lack

of political goodwill are identified as barriers to the effective allocation of resources to forest restoration initiatives. These empirical findings align with critiques in the literature that question the assumption of government efficiency advocated for by Samuelson's theory and call for a more context-sensitive application of public expenditure theory that address the gaps in implementation efforts that reflect real-world governance matters. In addition, the study's findings indicated that the allocation of resources and policy interventions are necessary conditions for effective resource allocation but not sufficient.

Similarly, the study's conclusions echoed the assumptions of Mather's Forest Transition Theory, which argued that factors such as rural-to-urban migration, technological advancements in agriculture, and policy interventions aimed at conservation drive the transition from a state of deforestation to reforestation (Mather, 1992). While this theory provides a theoretical framework in understanding forest transitions, the findings from the study indicate that restoration is not linear. In addition, the results showed insufficient funds allocated towards restoration efforts and delays in disbursement of funds, as recurring issues due to weak governance, inadequate land-use policies, poor innovation uptake, and encroachment issues within the Mau Forest Complex further exacerbating the socio-political dynamics of government interventions. In retrospect, a call for governance quality, land use, community participation and innovation can facilitate or limit restoration success (de Jong et al., 2017).

The findings are also consistent with prior empirical studies; for instance, the survey by Adegboye & Akinyele (2022) found that macro-level inefficiencies across African countries are influenced by systemic governance challenges and emphasized government spending's role in development. While the study did not disaggregate how specific budgetary practices, such as timeliness and proportion of funds allocated, influence outcomes at a localized ecological scale, this study extended the findings, offering empirical evidence by identifying challenges, such as insufficient funds and delays in disbursement, as an impediment in achieving high allocation efficiency in the Mau Forest Complex. The findings of this study agreed with Albassam (2020) and Rachel et al. (2021), who emphasized the importance of allocation models but failed to evaluate how these allocations translate into restoration success or community impact. This study concluded that allocation efficiency is moderate, and governments ought to address governance and

accountability issues, promote inclusive community engagement, and adopt complementary policies to maximize the ecological impact of forest restoration funding in the Mau Forest Complex. This study advanced their limitation in revealing insights into how systemic inefficiencies slow restoration progress and reinforce the need for devolved, performance-based funding models in Kenya's forest policy.

5.2.2 Effect of Project Implementation Efficiency on Forest Restoration Outcomes in the Mau Forest Complex in Kenya

The research objective was to evaluate the effect of project implementation efficiency on forest restoration outcomes in the Mau Forest Complex. The results found a moderately efficient project implementation efficiency with strengths and persistent challenges. The study established that project implementation efficiency was moderate with mixed results despite a high positive association between forest restoration outcomes and project implementation efficiency. One significant observation was the frequent failure to meet project timelines. Lagging in carrying out activities, particularly for time-sensitive activities, e.g., tree planting during rainy seasons, hinders general success in restoration. Such inefficacies reflect the broad criticism of Samuelson's Theory of Public Expenditure, which identified the role of the government in providing public goods like forest restoration but warned against operational inefficiencies of the public sector.

The study's findings contribute to Samuelson's theory which emphasizes government's role on delivering public goods such as forest restoration, by adding more insights. While the theory advocates for government interventions, there exists possibility of inefficiencies within public institutions especially where, delayed fund distribution, insufficient budgetary allocations, and administrative and bureaucratic challenges arise in forest restoration initiatives (Pickhardt, 2006; Afonso et al., 2005). The study's result show that these challenges persist despite clear policy goals and allocated resources, where significant hurdles in implementation continue to disrupt effective delivery. These operational issues echo long-standing concerns raised by scholars, suggesting that inclusive policies and resource allocation do not always translate to successful implementation of forest restoration projects. (Afonso & Fraga, 2024; Sosvilla-Rivero et al., 2025). The findings also bring new perspective to Forest Transition Theory (FTT), which argues that reforestation typically follows improvements in policy and socioeconomic conditions (Mather, 1992). In the MFC,

though, the implementation phase reveals a notable challenge where policy intention is not backed by implementation capacity, which is a contradiction that FTT underestimates. Barbier's (2022) and Kaimowitz & Angelsen's (2021) criticism of FTT is especially relevant in this context when they argue that the theory over-simplifies socio-political conditions and also downplays ground-level complexities, like undermining the quality of governance, institutional bottlenecks, and socio-political dynamics in forest transitions.

Empirically, the findings echo the study of Rana et al. (2022), where poor designs and disregard for long-term outcomes were attributed to poor planning and monitoring mechanisms. The study further identified political interference, bureaucracy, and administrative challenges as impediments to practical project implementation. Further, the study advances the insights from Baral et al. (2025), who demonstrated that fair and cost-effective implementation of programs in Nepal improved forest outcomes and livelihood by assessing the same concepts in a different geographical region, the MFC, to further add on to the broader body of implementation-focused literature with findings applicable to decentralizing and devolved forest governance systems. The study further advances a survey conducted in Kenya by Chisika et al. (2024), who highlighted interagency coordination as a driver of implementation success. However, the study's findings highlighted multiple players with overlapping mandates as barriers to effective implementation processes. The study further highlighted stakeholder coordination as necessary in ensuring forest restoration success.

5.2.3 Effect of Monitoring and Evaluation (M&E) efficiency on Forest Restoration Outcomes in the Mau Forest Complex in Kenya

The study aims to determine the impact of monitoring and evaluation (M&E) on forest restoration success within the Mau Forest Complex (MFC). The study showed that Monitoring and Evaluation (M&E) effectiveness moderately contributed to the success of forest restoration activities within the Mau Forest Complex regardless of the moderate to high positive correlation between forest restoration success and monitoring and evaluation efficiency. The research findings showed that although current M&E practices have some strengths, such as routine monitoring and stakeholder engagement, persistent gaps are required for adaptive forest management, including technological integration, data use, and feedback. A key finding in the study identified monitoring activity as

highly institutionalized but ineffective through inconsistency in implementation due to variations in technical capacity, funding gaps, and institutional support. The study underscored the need for utilizing sophisticated M&E tools like GIS, drones, and remote sensing technologies to track forest change processes.

The study also revealed, among other things, stakeholder coordination problems, social and community involvement complexities, and knowledge gaps among key stakeholders. Political and governance limitations were the key findings that challenged Samuelson's Theory of Public Expenditure, in which rational and prudent government intervention is assumed to deliver public goods. The lack of robust feedback mechanisms, opportunities for learning, and continuous improvement identified in the study resonated with the World Bank's (2023) criticisms that most developing countries are plagued by systemic weaknesses when evaluating program decision-making. At a broader level, the study confirmed the importance of policy and governance interventions to stop deforestation, as explained by Forest Transition Theory (FTT). However, the study contradicts FTT's arguments where the theory tended to downplay socio-political bottlenecks such as political interference, land conflicts, and decentralized capacity gaps, which, as this study found, continued to limit restoration success in the MFC.

Empirical studies such as Wainaina et al. (2020) and Bodin et al. (2022) found limited robust CBA mechanisms in most restoration programs and limited data accessibility due to a lack of standard M&E models resonated with the study's findings that real-time learning mechanisms and technological integration into M&E were needed as well as independent evaluations of M&E activities. The study added to the findings of Kumi et al. (2024), who emphasized the role of community participation in forest landscape restoration in Ghana by concluding that community involvement was also a key factor in implementing, monitoring, and evaluating restoration programs in MFC. Similarly, it echoed Vallauri et al.'s (2005) findings that go beyond simplistic metrics to measure impacts if adaptive governance were to be achieved and offer feedback insights to global forest restoration strategies.

5.3 Conclusions of the Study

The study's findings showed that government spending efficiency had a favorable and significant impact on forest restoration outcomes in the Mau Forest Complex, Kenya, where allocation, project implementation, and M&E efficiency were studied. The study found that allocation efficiency had a moderately favorable and significant effect on forest restoration outcomes. The study's findings asserted that equitable allocation and prioritization of key restoration activities, such as reforestation and community engagement, led to successful forest restoration outcomes. Budgetary allocations to restoration programs were found to be successful but limited to certain factors, such as delays in fund disbursement, insufficient funding, lack of transparency in budget allocations, political interference, and systemic governance issues, that required to be addressed to achieve optimal forest restoration initiatives in the Mau Forest Complex.

The study concluded that project implementation efficiency positively impacted forest restoration outcomes. The study found that a successful implementation of a project was influenced by factors such as proper planning and timeliness of activities, optimal resource allocation, stakeholder engagement, technical proficiency, and regular progress reviews of projects. To achieve effective project implementation efficiencies, barriers such as poor coordination of stakeholders, financial challenges, political and governance issues, unpredictable weather conditions, and climate change are to be addressed. The study further identified institutional delays, bureaucratic processes, and red tape as significant bottlenecks to well-executed projects.

Finally, monitoring and evaluation (M&E) efficiency was a good predictor of government spending efficiency on forest restoration outcomes in MFC. The study's result showed that M&E significantly impacted forest restoration. Regularly tracking project activities, involving stakeholders throughout the process, and producing well-documented evaluation reports contributed to restoration success. However, to successfully undertake M&E activities, the study highlighted barriers that must be addressed, such as limited use of modern technologies, poor integration of feedback, and gaps in technical skills. These challenges highlight the need to strengthen M&E frameworks, especially to promote transparency, accountability, and flexibility in managing restoration projects.

5.4 Recommendations

5.4.1 Managerial Recommendations

The study found that delays in the disbursement of funds and insufficient financial allocation were persistent challenges undermining the effectiveness of forest restoration. As a result, managers responsible for restoration in the implementing agencies must prioritize and ensure that resource allocation is timely and sufficient to meet the required needs. Some of the ways to achieve a more proactive budget forecasting is through improved planning cycles and partnerships with non-state actors such as international environmental NGOs, for example, the Green Climate Fund, the International Union for Conservation of Nature (IUCN), other governments, and private investors to supplement government funding. Senior management should establish standing restoration funds at the county or national level to minimize bureaucratic bottlenecks and ensure timely access to resources for seasonally sensitive activities like tree planting. Managers can introduce, say, a phased funding model based on project milestones where, for example, funds should not be disbursed in bulk at the start but rather allocated as specific project benchmarks (e.g., seedling planting, first-stage monitoring) are met. This ensures that funds are available when needed, reducing delays in project execution and making it easier to track the allocation and establish their effectiveness. Managers should also introduce fast-track approval mechanisms for restoration projects where bottlenecks in fund allocation can be avoided by establishing a central fund management body with clear timelines for disbursements and transparent decision-making. This could also mean simplifying approval processes for routine expenses and focusing on reducing paperwork and administrative hurdles that slow down project implementation.

In the study's findings, strengthening planning and coordination frameworks was one way to improve project implementation efficiency. This further highlighted the key responsibilities of project managers in ensuring that any delays in disbursement that undermine the effectiveness of interventions programmed are addressed. The project managers should ensure strict adherence to timelines, enhance procurement and logistic systems, coordinate restoration activities across departments, and synchronize restoration activities across departments responsible for implementing restoration initiatives. Managers can manage the cumbersome procurement processes by creating predefined contracts for commonly used services (e.g., nursery production,

aerial monitoring) to reduce the time spent on administrative procedures. They should further enforce financial controls to minimize wastage and misappropriation as they maximize optimal budget controls to ensure cost-effectiveness, conduct regular progress reviews and audits to support accountability, and ensure that projects remain aligned with restoration objectives. This can be made possible by adopting a standardized procurement framework that aligns with project timelines, ensuring contractors and suppliers are quickly onboard when needed. Another way of improving efficiency in the implementation of projects is for managers to develop and adopt a transparent financial tracking system that monitors every shilling spent and its impact on the restoration efforts and every economic decision. For example, purchasing seedlings or machinery is tracked and evaluated in real-time to help identify inefficiencies or overspending early. This would allow stakeholders to adjust resource allocation and re-prioritize spending where necessary. Managers are also recommended to ensure their field teams have undergone capacity building through training and equipping them with better logistical support to help reduce time lags and implementation inefficiencies.

Despite limited optimal feedback mechanisms, monitoring and Evaluation (M&E) efficiency positively influenced government spending efficiency in restoration outcomes. Implementing agencies, through their project managers, should, therefore, integrate M&E feedback mechanisms into decision-making processes while incorporating technological innovations by using advanced tools in monitoring activities such as GIS, remote sensing, and mobile-based data collection platforms to enhance real-time monitoring and accuracy in tracking ecological changes, thereby improving responsiveness. The managers should also prioritize proper planning, community involvement, and independent evaluation techniques and integrate them into project decision-making through regular review meetings, implementing action plans based on evaluation findings, and allocating dedicated budget lines for adaptive management. Additionally, the study found stakeholder engagement to be relatively strong but unevenly distributed across the M&E cycle, encouraging project managers to institutionalize inclusive frameworks that allow local communities to participate not only in implementation but also in evaluation and reporting in a bid to promote a participatory approach that can lead to increase in transparency, fostering local ownership, and improve the sustainability of restoration efforts. For instance, after each M&E cycle, the findings should be reviewed in a structured format with actionable outcomes. This could

involve regular stakeholder meetings (e.g., quarterly) to assess M&E findings and discuss adjustments to project strategies with full representation from all key stakeholders, including local communities, technical experts, and government agencies, to ensure diverse perspectives are considered. Another example is if an M&E report shows that certain restoration activities, e.g., soil conservation techniques, are not yielding the expected results, additional funds should be allocated, and instead, audits to find the reason for non-performance. This would help create a system where funding and project adjustments are directly tied to the evidence provided by M&E activities, ensuring that funds are used more efficiently to meet restoration goals.

5.5.2 Policy Recommendations

Policymakers must develop strong governance frameworks to address systemic inefficiencies such as inherent corruption, political interference, and lack of financial oversight mechanisms that impede government roles to the citizens. The study highlights a lack of political goodwill and persistent political interference in the MFC, which is hindering restoration efforts. There is a critical need for frameworks that guarantee the equitable and need-based allocation of restoration funds and policy interventions that ensure strong community participation in government restoration initiatives. Findings indicated that allocation efficiency had a strong positive correlation to forest restoration outcomes. However, policymakers must develop data-driven models to achieve optimal results that integrate technological advancement to track and allocate resources based on environmental degradation severity, socioeconomic vulnerability, and ecological significance. They should also ensure the adoption of these policies to maximize restoration efforts, ensure they are well targeted and can deliver the greatest environmental and social returns. An example could be having a third-party audit system to review the use of restoration funds, ensuring that the funds are allocated as planned and that any irregularities are immediately flagged and corrected. This ensures transparency and trust from stakeholders involved in the project.

Moreover, policymakers are tasked to address further the need to strengthen financial oversight mechanisms. They ought to develop policies that institutionalize independent audits, establish real-time expenditure tracking systems, and mandate transparent reporting by implementing agencies to enhance accountability and reduce the risks of corruption, mismanagement, and political

interference, historically hindering restoration effectiveness in the MFC. For example, establishing clear guidelines for fund release, where funds are disbursed in predetermined phases based on project milestones, could improve timelines, and engaging in civic education at grassroots levels to depoliticize forest restoration efforts can enhance optimal results and create harmony among communities, especially the Ogiek curbing the menace of encroachment and illegal logging.

Policies should include long-term sustainability aspects to encourage further use of cost-effective and locally driven restoration by promoting community-based implementation models, incentivizing public-private partnerships, and leveraging nature-based solutions. Policymakers should also enforce and ensure the implementation of regulatory provisions that require the integration of M&E findings into budget revisions, policy reviews, and restoration planning. They should focus on regular updates of legal frameworks and align them with advanced technologies such as satellite imagery, drones, and remote sensing in forest monitoring to ensure restoration progress. One step could be establishing a fund for technology adoption in restoration projects. For example, a specific portion of the restoration budget could be earmarked to purchase and maintain drones or satellite imagery for forest monitoring.

Another example is participating in public-private partnerships to bring in technology companies that could offer their expertise and tools at discounted rates for restoration efforts. This would lower the entry barrier for using advanced technologies, helping to scale up their adoption in the restoration process. These policies are detrimental to ensuring that progress is verifiable and data-informed, strengthening the overall oversight of forest restoration in the Mau Forest Complex and ultimately improving ecological outcomes and the efficient use of public resources.

5.5.3 Implications for Academia and Research

The study's findings contribute to scholarly work by providing empirical insights into the relationship between government spending efficiency and forest restoration outcomes in the Mau Forest Complex. This reinforces the importance of financial accountability, strategic resource allocation, and structured monitoring and evaluation in achieving sustainable environmental conservation. Scholars and researchers in development finance and environmental governance space can use the findings of this study to discuss further how government spending impacts the

economy and ecological restoration projects on a larger scale. Scholars should delve further into this study area and challenge the theoretical assumptions of classical public expenditure theory assumptions of effective and benevolent governance. These require refining forest transition models to incorporate localized socio-political factors that limit their effectiveness. They should further explore comparative studies in other forest ecosystems to generalize findings into effective government spending in forest restoration matters.

5.6 Limitations of the Study

The limitations identified in the study involve flaws that may impede meaningful interpretation of data. The study analyzed three dimensions to ascertain the impact of government spending on forest restoration outcomes in MFC: allocation efficiency, project implementation efficiency, and M&E efficiency. The study noted that while the three were good predictors of government spending efficiency, other factors, such as procurement processes, coordination between different players in restoration activities, and enforcement of environmental laws, were not fully explored to capture the wide spectrum of government spending efficiency, thus creating an area to explore in future studies.

The study was also limited to the location of Mau Forest Complex, a crucial water tower characterized by specific socioeconomic, environmental, and political dynamics. This led to a lack of generalization of findings to other similar ecosystems, water towers, or regions. This limitation calls for comparative studies in those areas to establish more patterns and external validations. Questionnaires were also used in the study as a tool for collecting data. While this method yielded measurable insights into experiences and perceptions, the study could have explored more tools, such as focus groups and in-depth interviews, to get a more nuanced view of experiences, especially on socio-political dynamics and cultural factors that inform the informal approaches to forest restoration outcomes.

The study's design involved a mixed methods approach where certain limitations in methodology was identified. The study relied mainly on primary data from semi structured questionnaires which allowed quantification of stakeholder perceptions and experiences but may not have captured the financial input-output translating to forest restoration outcomes. Due to lack of consistent data

across the period under review and the lack of disaggregated project-level expenditure and output data specific to relating to MFC, quantification of data using models such Data Envelopment Analysis (DEA) or Stochastic Frontier Analysis (SFA), was limited. The study acknowledged this as a limitation and the study was supported by existing literature that suggested use of perception-based ordinal data, supplemented by qualitative insights, provide a validated and pragmatic alternative (Creswell & Plano Clark, 2017; World Bank, 2023. The study applied appropriate inferential statistical techniques for ordinal data, complemented by thematic qualitative analysis, thus providing substantive insights into government spending efficiency's impact on forest restoration outcomes.

Another limitation was the limited use of secondary data in the analysis. The study leaned more on primary data, with limited integration of secondary data sources. While primary data provided current and context-specific insights, the restricted use of secondary data may have constrained the triangulation of results and the historical contextualization of government spending patterns (Johnston, 2017; Smith et al., 2011). Furthermore, advanced analytical techniques such as Data Envelopment Analysis (DEA) or Stochastic Frontier Analysis (SFA), were not employed due to data and design constraints and also the cost implication. These are recognized as limitations to the study and addressing them in future studies will allow for more robust causal inference and efficiency assessment (Coelli et al., 2005).

Finally, the study acknowledged the inclusion of control variables as a limitation. Studies by Afonso et al. (2020) and Kumi et al. (2024) provide empirical basis and further supports the notion that, in governance and spending efficiency research, the marginal improvement in explanatory power from adding control variables like rainfall or economic activity tends to be small, and does not significantly alter the interpretation of institutional drivers. In addition, Creswell and Plano Clark (2017) emphasize, in mixed-methods studies grounded in pragmatic paradigms, contextual depth and stakeholder perspectives can compensate for certain econometric constraints.

5.7 Areas of Further Studies

The study's findings provided meaningful insights into assessing government spending efficiency on forest restoration outcomes in the Mau Forest Complex. Regardless, other areas remain

unexplored in a bid to deepen and broaden the understanding of government spending efficiency beyond the three dimensions: allocation, project implementation, and M&E efficiency. The study suggests additional studies to evaluate other factors affecting government spending efficiency in Kenya.

The focus of the study was exclusively on the Mau Forest Complex, which lacked generalizability to other regions. Thus, the study suggests further studies to explore other forest blocks in Kenya and beyond to inform national policies and improve generalizability. This suggestion of comparative studies as further research could help identify context-specific and other factors influencing government spending in restoration initiatives.

The study also used quantitative and semi-structured questionnaires to analyze and gather data. While this method yielded meaningful insights, the study suggests adopting other methods, such advanced analytical techniques such as Data Envelopment Analysis (DEA) or Stochastic Frontier Analysis (SFA), to gain further insights into the informal aspects and also give the narrative depth. This would enhance the richness and validity of findings, helping to uncover nuanced dynamics that cannot be captured through questionnaires only.

Methodologically, the study relied on quantitative data collected through structured and semi-structured questionnaires and while the approach allowed for quantification of perceptions and experiences through ordinal data, it may have limited the exploration of more input-output outcomes through quantifiable scientific metrics. This study recommends future studies to develop expenditure tracking tools that can quantify financial resources to specific ecosystems such as the MFC and match these resources to tangible forest restoration outcomes. Future research is also encouraged to employ a broader range of qualitative methods, such as focus group discussions, in-depth interviews, and participatory observation, to uncover the nuanced socio-political, cultural, and institutional factors that shape restoration outcomes (Braun & Clarke, 2006; Creswell & Plano Clark, 2018).

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APPENDICES

Appendix 1: Letter of Introduction

January 2025

Dear Respondent,

RE: REQUEST FOR RESEARCH DATA

I am a student at Strathmore Business School where I am undertaking a degree in Master of Science in Development Finance. I am expected to submit as part of my course work assessment, research on **"IMPACT OF GOVERNMENT SPENDING EFFICIENCY ON FOREST RESTORATION OUTCOMES IN THE MAU FOREST COMPLEX, KENYA".**

You have been chosen to provide valuable information for this study. Please note that the objective of this data collection is solely for academic use. To protect your privacy, the report will not contain your name or any other identifiable information. The results of this study will be made accessible to you upon request if you would want to view them.

Your assistance will be truly valued.

Thank you in advance.

FARDOSA MOHAMED FARAH

Appendix II: Research Questionnaire

Dear Participant,

You are kindly invited to take part in this study, which seeks to examine the impact of government spending efficiency on forest restoration outcomes within the Mau Forest Complex in Kenya. Your responses will provide valuable insights for academic purposes and will be handled with strict confidentiality.

Instructions:

1. Kindly read each item carefully and tick the option(s) that best represent your views or experiences.
2. You are encouraged to include any additional information that you believe would enrich the study.

PART A: BACKGROUND INFORMATION

PART A: BACKGROUND INFORMATION

1 Gender: Male [ ] Female [ ]

2 Under which age brackets are you?

Below 30	[ ]	31 - 40 Years	[ ]
41 - 50 years	[ ]	Above 50 Years	[ ]

3 What is the greatest level of schooling you have achieved?

Diploma	[ ]
Degree	[ ]
Masters	[ ]
PhD	[ ]
Any other (Please specify)	.....

4 How many years have you worked in your position?

Less than one year	[ ]	1-3 years	[ ]
4-7 years	[ ]	8 years and above	[ ]

PART B: ALLOCATION EFFICIENCY

To what extent do you agree with the following statements? Rate in a scale of 1 to 5 (1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly Agree)

STATEMENT	**1**	**2**	**3**	**4**	**5**
Budget allocation for forest restoration initiatives is done in a timely manner to support project activities.	1				
The funds allocated to forest restoration are distributed equitably across priority areas.	2				
The organization ensures transparency in the allocation of resources for forest restoration projects.	3				
Adequate monitoring mechanisms are in place to track the allocation and utilization of restoration funds.	4				
Budget allocations prioritize key restoration activities, such as reforestation and community engagement.	5				
Allocated funds are sufficient to achieve the intended forest restoration goals effectively.	6				

What challenges do you think hinder the efficient allocation of funds for forest restoration initiatives in the Mau Forest Complex, and how can they be addressed?.....

.....

.....

PART C: PROJECT IMPLEMENTATION EFFICIENCY

To what extent do you agree with the following statements? Rate in a scale of 1 to 5 (1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly Agree)

STATEMENT	**1**	**2**	**3**	**4**	**5**
Projects are completed within the allocated timelines.					
Resource utilization during project implementation is efficient and cost-effective.					
Restoration projects adhere to the planned budgets without significant overruns.					
The organization ensures effective coordination among stakeholders during project implementation.					
Regular progress reviews are conducted to ensure project goals are being met.					
There is sufficient technical expertise available to implement forest restoration projects successfully.					

What do you think contribute to delays or inefficiencies in implementing forest restoration projects, and what solutions would you propose?.....
.....
.....

How cost do you think is the cost incurred per acre of forest restored……..

PART D: MONITORING AND EVALUATION EFFICIENCY

To what extent do you agree with the following statements? Rate in a scale of 1 to 5 (1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly Agree)

STATEMENT	**1**	**2**	**3**	**4**	**5**
Monitoring activities are conducted regularly throughout the project lifecycle.					
Evaluation reports are comprehensive and provide actionable insights for improving restoration projects.					
Stakeholders are actively involved in the monitoring and evaluation processes.					
The organization uses advanced tools and technologies for monitoring forest restoration progress.					
Impact assessments are conducted to measure the long-term success of restoration projects.					

Feedback from monitoring and evaluation is effectively used to adjust project strategies.					

What improvements do you suggest to enhance the effectiveness of Monitoring and Evaluation Efficiency in forest restoration initiatives?.....

.....

.....

PART E: FOREST RESTORATION OUTCOMES

To what extent do you agree with the following statements? Rate in a scale of 1 to 5 (1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly Agree)

STATEMENT	**1**	**2**	**3**	**4**	**5**
Changes in forest cover					
The forest restoration projects have significantly increased the overall forest cover in the Mau Forest Complex.					
There has been a noticeable improvement in tree survival rates following reforestation efforts.					
Deforested areas have been successfully rehabilitated into sustainable forest ecosystems.					
Biodiversity improvements					

Forest restoration projects have contributed to an increase in the diversity of plant species.					
Wildlife habitats in the Mau Forest Complex have been restored and preserved effectively.					
The restoration efforts have reduced the risk of biodiversity loss in the Mau Forest Complex.					
Community participation in sustainable activities					
Local communities are actively engaged in reforestation and conservation activities.					
The restoration projects have provided communities with sustainable livelihood opportunities.					
Community participation has significantly contributed to the success of forest restoration initiatives.					

What challenges do you think hinder the reduction of land degradation in the Mau Forest Complex, and what strategies would you recommend to address them?.....

.....

.....

Thank you very much!

Appendix III: Letter of Ethical approval to conduct research

Strathmore UNIVERSITY

5th February 2025

Ms Farah Fardosa,
fardosa.farah@strathmore.edu

Dear Ms Farah,

RE: Impact of Government Spending Efficiency on Forest Restoration Outcomes in the Mau Forest Complex, Kenya

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** proposal. Your application reference number is **SU-ISERC2621/25.** The approval period is from **5th February 2025 to 4th February 2026.**

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 IV: Permission to conduct research from NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **975104**

Date of Issue: **14/February/2025**

RESEARCH LICENSE

This is to Certify that Ms.. Fardosa Mohamed Farah 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, Narok on the topic: Impact of Government Spending Efficiency on Forest Restoration Outcomes in the Mau Forest Complex, Kenya for the period ending : 14/February/2026.

License No: **NACOSTI/P/25/416022**

975104

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code

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See overleaf for conditions