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Influence of Land Use on Performance of Public Development Project Portfolios in Gakenke District (2018 – 2023), Rwanda

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Abstract: *This study investigates the influence of the Land Use Plan on the performance of public development project portfolios in Gakenke District, Rwanda. The objectives were to assess the impact of the Agricultural, Tourism, and Mining Plans on project performance in the district. A mixed-method approach was employed, using both qualitative and quantitative data collection techniques. A total of 133 respondents, including local government officials, project managers, and community representatives, participated in the survey. Data was analyzed using descriptive statistics, inferential statistics, and correlation tests. Key findings revealed that the Agricultural, Tourism, and Mining Plans significantly influenced the performance of public development projects. The Agricultural Plan contributed to efficient budget use and sustainable farming practices, while the Tourism Plan promoted local economic growth and infrastructure development. The Mining Plan facilitated efficient land use and supported infrastructure for public projects. The study recommends strengthening land use planning frameworks, allocating more resources for community engagement, and fostering collaboration between government, private sector, and NGOs. It also highlights the need for further research on the impact of land use planning on long-term sustainability and socio-economic development in rural areas.*

Keywords: Land Use Plan, Public development projects, Project performance, Agricultural Plan, Economic growth

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1. Introduction

Land use planning is an essential element of sustainable development, impacting a range of sectors that include agriculture, mining, and tourism. These sectors, critical for the economic development of many regions, are directly influenced by how land is allocated, managed, and utilized. In rural areas like Gakenke District, Rwanda, efficient land use planning is necessary to enhance agricultural productivity, promote sustainable mining practices, and foster eco-tourism development. The relationship between land use planning and the success of public development projects is significant, as poor land management can lead to inefficiencies, resource conflicts, and hindered socio-economic growth (FAO, 2020).

Globally, land use planning has gained increasing importance, with nations recognizing its role in maximizing land potential and mitigating the negative impacts of poorly planned development. In many parts of the world, integrated approaches such as agroforestry, precision farming, and sustainable irrigation techniques are being employed to improve productivity while minimizing environmental harm (FAO, 2020).

The agriculture and mining sectors that often compete for land with other industries, particularly in resource-rich countries. Africa, with its vast mineral wealth, has seen mining play a central role in economic development. However, mining activities are frequently associated with land degradation, loss of biodiversity, and social conflicts, especially when land use planning is not adequately integrated into the sector's development strategies. Countries like South Africa and Ghana have sought to address these issues through policies that balance economic growth with environmental conservation (Clark, 2020). In Rwanda, where mining activities such as the extraction of cassiterite, tin, and coltan contribute significantly to national income, effective land use planning is essential to ensure that mining activities do not adversely affect agricultural land or natural resources (MINAGRI, 2020).

Tourism, especially eco-tourism, is another vital sector that hinges on sustainable land use planning. In regions where natural landscapes and biodiversity are key attractions, such as the Volcanoes National Park in Rwanda, tourism development must be carefully aligned with environmental conservation efforts. Rwanda, with its rich biodiversity, including the endangered mountain gorillas, has become a major eco-tourism destination. However, the growth of tourism requires that land use decisions protect the environment while providing opportunities for local communities to benefit economically (RDB, 2020).

1.1Statement of the Problem

The effective implementation of land use plans remains a significant challenge in many countries, including Rwanda. Although comprehensive policies and strategies have been developed to manage land resources, there is often weak alignment between land use projects and national development objectives. This misalignment leads to inefficient resource allocation, fragmented project implementation, and missed opportunities for achieving sustainable development outcomes. These challenges are particularly evident in rural districts such as Gakenke, where land management is complex and institutional coordination is limited. Key sectors like agriculture, mining, and tourism frequently operate in isolation, resulting in overlapping and sometimes conflicting land use initiatives that hinder progress and reduce long-term sustainability (Mugiraneza 2018).

The primary issue in Gakenke lies in the lack of integration between the District Land Use Plan and the application of Project Portfolio Management (PPM) practices. This disconnects leads to poor project prioritization, inadequate monitoring, and inefficient land utilization. For instance, agricultural land critical for food security and rural livelihoods often competes with land designated for mining and tourism, creating conflicts that delay development and compromise sustainable outcomes. Moreover, the absence of formalized PPM structures at the district level further contributes to the poor performance of public development projects. Without robust mechanisms to monitor, evaluate, and adapt project portfolios, inefficiencies persist, and resources are not effectively optimized. Although Rwanda has made notable progress in land use policy development, research indicates that local-level implementation remains inconsistent, resulting in lost opportunities for sustainable land management and poor project outcomes (Arimah, 2020; John K., 2019).

1.2 General Objective

The general objective of this study is to investigate the influence of the Land Use Plan on the performance of public development project portfolios in Gakenke District, Rwanda.

1.2.1 Objectives of the Study

1. To assess the influence of the Agricultural Plan on the performance of public development project portfolios in Gakenke District.
2. To examine the influence of the Tourism Plan on the performance of public development project portfolios in Gakenke District.
3. To investigate the influence of the Mining Plan on the performance of public development projects in Gakenke District.

2. Literature Review

This Section focused on reviewing the concepts, theories, and empirical studies related to the impact of district land use planning on the performance of Project Portfolio Management (PPM) in Gakenke District, Rwanda. The Section begins with a conceptual review of land use planning and PPM, followed by a theoretical review of relevant models and frameworks. The empirical review examines previous research studies related to the integration of land use planning and PPM, particularly in Gakenke District.

2.1 Conceptual Review

2.1.1 Agricultural Land Planning

Agricultural land planning refers to the process of allocating and managing land resources for agricultural production. This involves determining where different types of agricultural activities, such as crop farming, livestock production, or agroforestry, should take place.

The goal of agricultural land planning is to optimize land use for food security, economic growth, and environmental sustainability. Effective agricultural land planning considers factors such as soil quality, water availability, climate, and the local community's needs. According to FAO (2019), agricultural land planning is critical in ensuring that farming practices are both economically viable and environmentally responsible. In Rwanda, agricultural land planning is central to achieving food security and improving rural livelihoods, especially considering the country's small landholdings and growing population. The National Agricultural Land Use Master Plan guides land use decisions in Rwanda's agricultural sector. However, challenges such as land fragmentation, limited access to quality agricultural inputs, and climatic variations continue to hinder effective land use planning (Niyonsenga, 2020).

2.1.2 Mining Land Planning

Mining land planning is the process of allocating land for mineral extraction and related activities, while considering the environmental, social, and economic impacts. It involves the identification of land areas rich in mineral resources and their sustainable management to prevent over-exploitation and degradation. Mining land planning also includes the rehabilitation of mining sites post-extraction, ensuring that the land is returned to a usable state for future use, such as agriculture or recreation. According to the World Bank (2018).

2.1.3 Tourism Land Planning

Tourism land planning involves designating land for tourism-related activities, such as resorts, hotels, national parks, and cultural heritage sites, while ensuring the sustainable use of resources. This type of planning addresses the need for infrastructure development, accessibility, and preservation of natural and cultural assets. Tourism land planning also focuses on balancing the economic benefits of tourism with the environmental and social impacts. According to the United Nations Environment Programme (2019), sustainable tourism land planning emphasizes minimizing environmental degradation, reducing overcrowding, and promoting local community participation in tourism development. In Rwanda, tourism plays a significant role in the national economy, with attractions like the Volcanoes National Park and cultural heritage sites drawing both international and local visitors. However, tourism land planning faces challenges in managing visitor numbers, preserving wildlife habitats, and maintaining community involvement. **(**RDB, 2020).

Integrated Land Use Planning

Integrated land use planning is an approach that considers the multiple and often competing uses of land, such as agriculture, mining, and tourism, and seeks to balance them in a sustainable way. This approach is essential for ensuring that land resources are used efficiently and that conflicts between sectors are minimized. According to Sutherland et al. (2018), integrated land use planning helps in reconciling the needs of different land users by considering long-term economic, environmental, and social goals. In Rwanda, integrated land use planning is critical due to the country's limited land area and high population density. The integration of agricultural, mining, and tourism land plans allows for a more coordinated approach to land use, improving resource management and reducing land-use conflicts. However, challenges such as insufficient data, limited technical capacity, and a lack of coordination between government agencies impede the effective integration of land use plans in Rwanda. Strengthening the integration of sectoral land use plans, such as those for agriculture, mining, and tourism, is key to achieving sustainable land management and fostering inclusive development. **(**Sutherland et al., 2018**)**

2.1.4 Project Performance

Project performance is a central concept in project management, used to evaluate how well a project achieves its objectives, remains within budget, and satisfies stakeholder expectations. It is a multi-dimensional concept that encompasses several key performance indicators, including scope, quality, time, cost, and stakeholder satisfaction. According to Hass (2019), project performance can be assessed using both quantitative and qualitative metrics, such as the adherence to schedules, budget constraints, quality standards, and the achievement of specified deliverables.

In Rwanda, where land use planning is integral to national development, evaluating the performance of public development project portfolios can help identify successful interventions and highlight areas where improvements are needed. Proper performance management ensures that the public sector maximizes its investment in land resources, ultimately contributing to broader economic development and sustainable land use practices. (Hass, 2019).

2.2 Theoretical Review

2.2.1 Agricultural Development Theory

The Agricultural Development Theory, proposed by Byerlee and Eicher (1997), suggests that agricultural productivity can be improved through strategic land use planning, the adoption of modern farming techniques,

infrastructure development, and investment in human capital. The theory argues that effectively allocated agricultural land can boost productivity, enhance economic development, and improve food security in rural areas, such as Gakenke District.
This theory is vital for understanding how agricultural land can be optimized within the district's land use planning and Project Portfolio Management (PPM) framework. By applying modern farming methods and improving land allocation, this theory helps achieve higher productivity levels, which directly contributes to economic development and food security goals.

2.2.2 Destination Development Theory

Destination Development Theory, developed by Plog (2001), emphasizes the strategic development of tourism as an economic driver. It stresses the importance of proper tourism infrastructure, environmental sustainability, and community involvement to ensure that tourism generates long-term benefits for both the economy and society.
This theory aids in integrating tourism projects into the district's land use and PPM framework, providing a clear pathway for managing tourism in a way that aligns with sustainable economic development. It helps explain how tourism can be developed without undermining other land uses, particularly in rural regions like Gakenke District where agricultural and mining interests may compete for land.

2.3 Empirical Review

2.3.1 Agricultural Land Use Plan and Performance of Public Development Projects

Numerous studies have explored the relationship between agricultural land use planning and the performance of public development projects, particularly in the context of improving agricultural productivity. O'Neill (2018) emphasized that effective agricultural land use planning ensures sustainable management of soil, water, and other critical resources, which directly influences agricultural productivity. Deininger (2019) highlights the importance of land tenure security in enhancing agricultural outcomes, particularly in developing countries. Additionally, studies from Brazil and China (Sposito, 2019) demonstrate that agricultural productivity significantly improves when farmers have access to well-planned and managed agricultural land. These findings emphasize that agricultural land use planning is crucial for increasing yields and ensuring long-term sustainability in agricultural development worldwide.

In Rwanda, the role of land use planning in agricultural development is well-documented. Niyonsenga et al. (2020) discussed how land consolidation and resource management programs have enhanced agricultural productivity by reducing fragmentation and improving infrastructure. Further studies underscore that strategic agricultural land use policies have enabled Rwanda to address challenges such as soil erosion and inadequate irrigation, promoting sustainable growth (Kigali Tourism Authority, 2019).

In Gakenke District, the role of land use planning in agricultural performance has been a focus of local research. Vision (2020) reported that the district's agricultural land use plan has contributed to increased productivity, especially for key crops like tea and maize. However, local reports also highlight challenges such as insufficient infrastructure and limited access to resources, which restrict the effectiveness of agricultural land use policies. According to MINICOFIN (2020).

2.3.2 Tourism Land Use Planning and Performance of Public Development Projects

Many studies globally have demonstrated that land use planning is crucial for the success of tourism projects, particularly eco-tourism. Butler (2022) asserts that strategic land use planning helps balance environmental conservation with the development of tourism infrastructure, ensuring long-term sustainability. Research by Gellatly (2023) also emphasizes the importance of land use policies in protecting natural resources while fostering tourism in protected areas.

Across Africa, many studies underscore the significant role land use planning plays in developing tourism, particularly eco-tourism. In Botswana, studies by Lindsey et al. (2018) have shown that policies prioritizing wildlife conservation have helped create a thriving tourism industry, contributing to the country's economic growth. Similarly, research on Rwanda demonstrates how land use policies have supported the growth of eco-tourism, particularly through the development of Volcanoes National Park. This focus on sustainable tourism development through land use planning is critical in Africa, where natural resources are abundant but require careful management to ensure that tourism does not degrade the environment (Butler, 2022; Gellatly, 2023).

In Rwanda, many studies have focused on the positive impact of land use planning on the tourism sector. The development of Volcanoes National Park and other protected areas is an example of how strategic land use planning can support eco-tourism. While the district is home to some natural and cultural assets that could be developed for tourism, reports indicate that its tourism

infrastructure is underdeveloped, limiting the potential of land use policies in this sector. The integration of more comprehensive land use planning with tourism development strategies is crucial to unlocking the district's tourism potential and ensuring its long-term success (RDB, 2020).

These studies highlight the importance of aligning tourism land use planning with broader public development projects, ensuring that the necessary infrastructure and conservation measures are in place to support tourism growth. In Gakenke, overcoming existing infrastructure challenges and improving land use policies will be key to boosting the tourism sector and ensuring that public development projects in the district contribute to sustainable economic development (RDB, 2020; Butler, 2022).

2.3.3 Mining Plan and Performance of Public Development Projects

Many studies globally have illustrated how land use planning can impact the performance of mining projects. Hodge (2011) suggests that countries like Canada and Australia have developed land use policies that regulate mining activities, ensuring that environmental damage is minimized while maximizing resource extraction. Effective land use planning can mitigate land use conflicts, promote sustainability, and reduce the negative environmental impact of mining operations (Muwanga & Okello, 2021). Research consistently supports the notion that comprehensive land use planning enhances the performance of mining projects by fostering more sustainable, less contentious operations and facilitating better coordination between land users and mining companies.

Numerous studies in Africa highlight that mining activities are often hindered by poorly coordinated land use policies, leading to conflicts over land ownership and environmental degradation. However, in countries like South Africa and Zambia, improved land use planning has helped better coordinate mining activities, mitigated environmental issues, and enhance the performance of mining projects. These findings underline that a well-structured land use framework is essential for sustainable mining development, particularly in resource-rich African countries where land-related disputes and environmental challenges are prevalent (Nchito, 2020).

Several studies and reports in Gakenke District have underscored the impact of land use planning on local mining activities. Despite the district's mineral wealth, including deposits of tin and wolfram, mining activities remain underdeveloped due to challenges such as inadequate infrastructure, poor coordination of land use policies, and insufficient training for miners (NST1, 2017). Land use planning in Gakenke has had limited success in fostering a sustainable mining sector, largely due to these local barriers. Addressing these issues could significantly improve the performance of mining projects in the district, contributing to broader public development goals. Better integration of land use planning with mining development strategies, infrastructure improvements, and capacity building for local miners could unlock the full potential of the mining sector, thus enhancing the overall performance of public development projects in Gakenke (Vision, 2020).

3 Methodology

The research employed a mixed-methods approach, combining both quantitative and qualitative data collection techniques. Primary data was collected through questionnaires distributed to 133 respondents, and helped to assess the performance of agricultural, tourism, and mining projects. Secondary data was obtained from different publications including libraries, Gakenke District and electronic resources through a literature review.

3.1 Research design

According to Saunders and Miller (2019), the research design describes how the research will be carried out and provides the limits within which the research will be focused. It is essentially the plan for conducting the study. The research design for this study was descriptive and correlational**,** as it aimed to investigate the influence of land use planning on the performance of public development project portfolios in Gakenke District, Rwanda.

3.2 Target Population

The target population for this study consisted of all individuals and groups directly or indirectly involved in, or benefiting from, land use planning and project implementation in Gakenke District, Rwanda. Specifically, it included key stakeholders engaged in agricultural, tourism, and mining projects within the district. The total target population for this study was 200 individuals.

3.3 Sample Size of the Study

The sample size for this study was determined using Yamane's formula for sample size calculation, which is widely used in social sciences research. The formula for sample size is**:** $\boldsymbol{n = \frac{N}{1+(N-1)(e)2}}$. Thus, the sample size is approximately 133 respondents**.**

3.4 Data Collection Instruments

For this study, a combination of qualitative and quantitative. Primary data was collected through structured questionnaires and Secondary data was obtained from different publications including libraries, Gakenke District and electronic resources through a literature review.

3.5 Validity of Research Instrument

To ensure the validity of the research instruments for the study on the Influence of Land Use Plan on the Performance of Public Development Project Portfolios in Gakenke District, several strategies have been employed:

Literature Review and Expert Consultation: The instruments were developed after an extensive review of relevant literature and consultation with experts in land use planning and project management to ensure that they reflect the key variables influencing project performance.
Expert Panel Review: A panel of experts reviewed the instruments to assess their clarity, comprehensiveness, and alignment with the study's objectives. This ensures the instruments effectively measure the intended constructs.

Alignment with Conceptual Framework**:** The instruments align with the study's conceptual framework to focus on key factors such as land use, project performance, and resource allocation.
Construct and Criterion Validity: The instruments were evaluated for construct validity by comparing results with established external measures and statistical analysis to ensure reliability and accuracy.

3.6 Reliability

For this study on the influence of the Land Use Plan on the performance of public development project portfolios in Gakenke District, reliability was ensured through the following approaches: The same questionnaire was administered to the same sample at two different points in time. The correlation between the two sets of responses was calculated to assess the stability of the instrument. The instruments were pilot tested on a small sample that resembled the study population but was not part of the main study. Feedback from the pilot test was used to refine the instruments.

3.7 Data Analysis

Data analysis is a critical process in this study, as it helps to organize, interpret, and present the data to test hypotheses, draw conclusions, and make informed decisions. In this research on the Influence of Land Use Plan on the Performance of Public Development Project Portfolios in Gakenke District, Rwanda**,** data analysis focused on examining the impact of the district's land use plan on the effectiveness of public development projects, particularly in the sectors of agriculture, tourism, and mining.

3.7.1 Descriptive Statistics

Descriptive statistics, such as means, standard deviations, frequencies, and percentages, were used to summarize the characteristics of the sample population, as well as the key features of the District Land Use Plan and the performance of public development projects. This helped to provide an overview of the data and offer a clear understanding of the general trends in the study population.

3.7.2 Correlation Analysis

Correlation analysis was conducted to measure the strength and direction of the relationship between two continuous variables. The Pearson correlation coefficient (r) was used for this purpose.

Pearson Correlation Coefficient (r):

The coefficient ranges from -1 to 1, where -1 indicates a perfect negative correlation, 1 indicates a perfect positive correlation, and 0 indicates no correlation.
Formula: $r = \frac{(\sum(Xi-\bar{X})(Yi-\bar{Y}))}{\sqrt{(\sum (Xi-\bar{X})\text{^}2\ (Yi-\bar{Y})\text{^}2\ )}}$
Where Xi and Yi are the individual sample points, and $\bar{x}$ and $\bar{Y}$ are the mean values of the x and y variables, respectively.

3.7.2.1 Multiple Regression Analysis

Multiple regression analysis was used to examine the impact of various independent variables (such as land use plan components) on the dependent variable (project performance). This technique helped to determine the strength of these factors in predicting project outcomes.

Regression Model:

Based on the conceptual framework provided, where the District Land Use Plan is the independent variable, (across multiple project types such as agricultural, tourism, and mining projects) is the dependent variable, project performance

Model for Each Dependent Variable:

Since we have multiple dependent variables (performance indicators), the researcher run three separate regression models, one for each dependent variable.
Model 1: Timely Completion of Projects (Y_1)

$$Y_1 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + +\beta_7 X_7 + +\beta_8 X_8 + +\beta_9 X_9 + \varepsilon$$

Model 2: Efficiency of Budget Used (Y_2)

$$Y_2 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + +\beta_7 X_7 + +\beta_8 X_8 + +\beta_9 X_9 + \varepsilon$$

Model 3: Achieving Project Goals (Y_3)

$$Y_3 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + +\beta_7 X_7 + +\beta_8 X_8 + +\beta_9 X_9 + \varepsilon$$

Statistical Tests

To analyze the data and test the hypotheses, the following statistical tests have been applied:

A T-test was used to compare the means of two groups in order to evaluate if there is a significant difference between them.

ANOVA was used when comparing the means of more than two groups to determine if at least one group differs significantly from the others. This test allowed for an examination of the effect of different levels of land use planning on project performance across various sectors (agriculture, tourism, and mining).

4. Results and Discussion

This section presents the findings of a study aimed at investigating the influence of the Land Use Plan on the performance of public development project portfolios in Gakenke District, Rwanda. The research focused on understanding how land use planning particularly in the agricultural, tourism, and mining sectors affects the successful implementation and outcomes of public development projects. These findings are consistent with earlier studies, such as those by Mugiraneza and Niyonsenga (2018), who highlighted the importance of coordinated land use in promoting sustainable rural development, and Arimah (2020), who emphasized the role of spatial planning in enhancing project efficiency and alignment with national goals. The total sample consisted of 133 respondents, determined using a standard sample size formula. Descriptive statistics, including frequencies and percentages, were used to analyze the data, while multiple regression analysis examined the relationships between land use plan components and project performance. The results align with Pottier (2017), who found that overlapping land use functions without integrated planning often lead to inefficiencies and conflicts in resource allocation. Overall, the findings of this study provide valuable insights into how effective land use planning can enhance the performance of public development projects in Gakenke District, ultimately contributing to the district's socio-economic development.

4.1Findings

4.1.1 Descriptive statistics of Influence of Land Use Plans on the Performance of Public Development Project Portfolios in Gakenke District

Descriptive findings indicate that land use plans Agricultural, Tourism, and Mining positively influenced public development projects in Gakenke District between 2019 and 2024. All plans contributed moderately to project performance across key indicators. The Agricultural Plan improved budget efficiency (M = 3.61) and stakeholder coordination but was less impactful in land consolidation (M = 3.53). The Tourism Plan supported budget use (M = 3.73) and project timeliness, though responses varied regarding infrastructure development. The Mining Plan emerged as the strongest contributor, particularly in optimizing land use (M = 3.77), creating jobs, and promoting timely project completion. It also ranked highest in perceived achievement of project goals (M = 3.74), though concerns remained about revenue allocation.

Table 1: Respondent View on the influence of Agricultural Plan on the performance of public development project portfolios in Gakenke District.

Statements	N	Mean	Std. Deviation
The Agricultural Plan has contributed to the efficient use of the budget in public development projects in Gakenke District.	133	3.61	1.058
Access to agricultural inputs, such as fertilizers and seeds, has improved project success under the Agricultural Plan.	133	3.59	1.115
The Agricultural Plan has increased the cooperation between farmers and local authorities, leading to improved project outcomes.	133	3.58	1.123
The Agricultural Plan has played a role in the timely completion of public development projects in Gakenke District.	133	3.57	1.054
The Agricultural Plan has promoted the use of sustainable farming practices that contribute to the long-term success of public projects.	133	3.56	1.003
Irrigation infrastructure established under the Agricultural Plan has helped achieve long-term sustainability in public projects.	133	3.55	1.151
The implementation of the Agricultural Plan has helped achieve the goals of public development projects in Gakenke District.	133	3.54	1.070
Land consolidation under the Agricultural Plan has contributed to increased agricultural productivity, benefiting public projects.	133	3.53	1.077
Valid N (listwise)	133		

Source: Field data 2025.

The results in Table 1 indicated that respondents generally viewed the Agricultural Plan as having a positive impact on the performance of public development projects in Gakenke District. The mean scores for all eight statements ranged from 3.53 to 3.61, suggesting a moderate level of agreement, with respondents leaning toward agreeing that the Agricultural Plan had contributed to various aspects of project success. The highest mean score (3.61) reflected that respondents strongly agreed with the statement that the Agricultural Plan had contributed to the efficient use of the budget in public projects. Additionally, the lowest mean score (3.53) was associated with land consolidation, implying that while respondents recognized its value, they perceived it as somewhat less impactful compared to other aspects. The standard deviations for the responses ranged from 1.003 to 1.151, showing moderate variability in the answers. Overall, the data suggested that the Agricultural Plan was positively influencing the success of public development projects, particularly in terms of budget efficiency and cooperation between farmers and local authorities.

Table 2: Respondent View on the influence of Tourism Plan on the performance of public development project portfolios in Gakenke District.

Statements	N	Mean	Std. Deviation
The Tourism Plan has contributed to the efficient use of the budget in public development projects in Gakenke District.	133	3.73	1.095
The Tourism Plan has promoted the timely completion of public development projects in Gakenke District.	133	3.72	1.076
The Tourism Plan has attracted investments that have improved the local economy and supported the success of public projects.	133	3.71	1.084
The establishment of conservation areas under the Tourism Plan has contributed to the sustainability of tourism-related projects.	133	3.69	1.102
The Tourism Plan has enhanced the quality of life in the community by creating new jobs and improving infrastructure.	133	3.68	1.062
Tourism infrastructure development under the Tourism Plan has led to more successful implementation of related public projects.	133	3.66	1.186
The Tourism Plan has helped achieve the goals of public development projects in Gakenke District.	133	3.65	1.148
Proper land use allocation in the Tourism Plan has facilitated efficient tourism development projects.	133	3.63	1.164
Valid N (listwise)	133		

Source: Field data 2025.

The results in Table 2 show that respondents generally viewed the Tourism Plan as having a positive influence on the performance of public development projects in Gakenke District. The mean scores for the statements ranged from 3.63 to 3.73, indicating that respondents largely agreed with the statements, though their level of agreement was moderate. The statement with the highest mean score (3.73) suggests that respondents felt the Tourism Plan had a significant impact on the efficient use of the budget in public projects. On the other hand, the statement with the lowest mean score (3.63) indicated that respondents were slightly less convinced about the effectiveness of proper land use allocation in facilitating efficient tourism development. The standard deviations ranged from 1.062 to 1.186, reflecting moderate variability in the responses. Overall, the data suggests that the Tourism Plan has been positively received, particularly in terms of budget efficiency, project completion, and local economic benefits. However, the variability in responses highlights areas where further attention or improvement may be needed, particularly in tourism infrastructure development and land use planning

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Table 3: Respondent View on the influence of the Mining Plan on the performance of public development projects in Gakenke District

Statements	N	Mean	Std. Deviation
The Mining Plan has contributed to the efficient land use for mining, optimizing project outcomes.	133	3.77	1.100
The Mining Plan has promoted the timely completion of public development projects in Gakenke District.	133	3.74	1.042
The Mining Plan has created job opportunities and improved local infrastructure, benefiting public projects in Gakenke District.	133	3.74	1.114
The Mining Plan has contributed to the efficient use of the budget in public development projects in Gakenke District.	133	3.73	1.109
Infrastructure development required for mining operations under the Mining Plan has benefited other public development projects.	133	3.71	1.112
The revenue allocation from mining activities, as outlined in the Mining Plan, has been effectively utilized to support public projects.	133	3.69	1.136
The implementation of mining regulations under the Mining Plan has contributed to more sustainable mining activities.	133	3.65	1.015
The Mining Plan has played a significant role in achieving the goals of public development projects in Gakenke District.	133	3.63	1.097
Valid N (listwise)	133		

Source: Field data 2025.

The results in Table 3 show that respondents generally viewed the Mining Plan as having a positive influence on the performance of public development projects in Gakenke District. The mean scores for the statements ranged from 3.63 to 3.77, suggesting that respondents largely agreed with the statements, indicating a moderate level of agreement. The highest mean score (3.77) was for the statement that the Mining Plan contributed to the efficient use of land for mining, optimizing project outcomes, reflecting strong support for the plan's impact on land use. Conversely, the lowest mean score (3.63) was for the statement about the Mining Plan's contribution to achieving the goals of public development projects, suggesting that respondents saw this aspect as somewhat less significant. Overall, the Mining Plan was seen as positively influencing land use, job creation, and project completion.

4.2 Inferential Analysis

This section presents the inferential analysis of the relationship between land use plans namely the Agricultural, Tourism, and Mining Plans and the performance of public development project portfolios in Gakenke District. Using correlation, regression, ANOVA, and hypothesis testing, the analysis reveals a strong positive relationship between the implementation of these land use plans and project performance. The regression model demonstrates a high R value (0.893) and R-squared value (0.797), indicating that 79.7% of the variation in project performance is explained by the three plans. All variables were statistically significant predictors ($p < 0.001$), with the Agricultural Plan showing the highest impact. T-tests further confirmed these results, rejecting all null hypotheses. Correlation coefficients exceeding 0.98 highlight the strong interconnectivity and collective contribution of the plans. The Durbin-Watson statistic (1.714) suggests minimal autocorrelation, affirming the

model's reliability. Overall, the findings underscore the critical role of integrated land use planning in driving public project success in Gakenke District.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.893[a]	.797	.796	.122

Source: Field data 2025.

The results from Table 5, which presents the Model Summary of the inferential analysis, highlight a strong relationship between the land use plans (Agricultural, Tourism, and Mining Plans) and the performance of public development projects in Gakenke District. The R value of 0.893 indicates a strong positive correlation, meaning that changes in the land use plans are highly associated with the performance outcomes of these projects. Additionally, the R Square value of 0.797 suggests that approximately are highly accurate, with the actual and predicted values being very close. 79.7% of the variation in project performance can be explained by the land use plans, demonstrating that these factors play a significant role in shaping project outcomes. The Adjusted R Square value of 0.796 confirms that the model fits the data well without overfitting, ensuring that the inclusion of the independent variables is justified. Lastly, the Standard Error of the Estimate of 0.122 indicates that the model's predictions

Table 5: Coefficients results

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1 (Constant)	.057	.038		1.520	.011
The Influence of the Agricultural Plan	.331	.058	.338	5.731	.000
The influence of the Tourism Plan	.329	.091	.330	3.603	.000
The influence of the Mining Plan	.329	.091	.330	3.603	.000

a. Dependent Variable: performance of public development project portfolios in Gakenke District,

Table 5 presents the coefficients from the regression analysis, which investigates the influence of the Agricultural Plan, Tourism Plan, and Mining Plan on the performance of public development project portfolios in Gakenke District. The results show that all three plans have a positive and statistically significant effect on the performance of public projects. For the Agricultural Plan, the coefficient of 0.331 indicates a strong positive relationship with project performance, meaning that as the influence of the Agricultural Plan increases, the performance of public projects improves. This result is statistically significant with a p-value of 0.000, confirming the importance of the Agricultural Plan in enhancing project outcomes. Similarly, the Tourism Plan has a coefficient of 0.329, suggesting that it also positively influences project performance. This relationship is statistically significant, with a t-value of 3.603 and a p-value of 0.000, which highlights the critical role the Tourism Plan plays in improving public project outcomes. The Mining Plan shows a comparable impact, with a coefficient of 0.329 and a Beta value of 0.330, suggesting a moderate but significant influence on project performance. The p-value of 0.000 further supports the significance of the Mining Plan in achieving successful project results. Overall, the coefficients for all three plans are highly significant, indicating that the Agricultural, Tourism, and Mining Plans each contribute positively to the performance of public development projects in Gakenke District.

Table 7: ANOVA Result tests

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	142.592	4	35.648	1310.044	.000
Within Groups	3.483	128	.027		
Total	146.075	132			

Source: Field data 2025.

The ANOVA results indicate that there is a significant difference in the performance of public development project portfolios in Gakenke District, Rwanda, based on the various land use plans (Agricultural, Tourism, and Mining). The F-statistic of 1310.044 is notably high, suggesting that the variation between the groups is much greater than the variation within the groups. With a p-value of 0.000, which is far below the typical significance threshold of 0.05, the null hypothesis is rejected. This means that the Agricultural, Tourism, and Mining Plans have a statistically significant impact on the performance of public development projects in the district. The results strongly imply that the implementation of these plans contributes to differences in the effectiveness and success of the projects.

Table 8: Correlations analysis

		The Agricultural Plan	The Tourism Plan	The Mining Plan	Performance of public development project
The Agricultural Plan.	Pearson Correlation	1	.983**	.983**	.987**
	Sig. (2-tailed)		.000	.000	.000
	N	133	133	133	133
The Tourism Plan.	Pearson Correlation	.983**	1	.993**	.990**
	Sig. (2-tailed)	.000		.000	.000
	N	133	133	133	133
The Mining Plan	Pearson Correlation	.983**	.993**	1	.990**
	Sig. (2-tailed)	.000	.000		.000
	N	133	133	133	133
Performance of public development project	Pearson Correlation	.987**	.990**	.990**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	133	133	133	133

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

Table 8: Correlations illustrate the relationships between the influence of the Agricultural, Tourism, and Mining Plans on the performance of public development project portfolios in Gakenke District, Rwanda. The analysis reveals very strong, positive, and statistically significant correlations among the variables. The Agricultural Plan exhibits a very high positive correlation with project performance ($r = 0.987$, $p < 0.01$), indicating that its effective implementation significantly enhances the successful outcomes of public projects. Similarly, the Tourism Plan and Mining Plan also show strong positive correlations with project performance ($r = 0.990$, $p < 0.01$ for both), suggesting that progress in these areas also leads to improved project outcomes.

Additionally, the interrelationships between the plans are notably high, with the Agricultural Plan showing a strong correlation with both the Tourism Plan ($r = 0.983$, $p < 0.01$) and the Mining Plan ($r = 0.983$, $p < 0.01$), highlighting the interconnected nature of the plans. The Tourism Plan and Mining Plan are also highly correlated with each other ($r = 0.993$, $p < 0.01$), further emphasizing the synergy between these sectors in influencing public project performance. In conclusion, these results demonstrate that the successful execution of agricultural, tourism, and mining strategies plays a crucial role in enhancing the performance of public development projects in Gakenke District, with each plan contributing significantly to overall project success.

4. Conclusion and Recommendations

This Section summarizes the findings, conclusions, and recommendations of the study on the influence of land use planning on public development projects in Gakenke District, Rwanda. The research highlighted the importance of aligning land use plans with project goals in sectors like agriculture, tourism, and mining to optimize resource allocation and reduce conflicts. It concluded that better integration of land use planning with Project Portfolio Management (PPM) could improve coordination and project outcomes. Recommendations are provided to enhance planning, ensure sustainability, and support the district's long-term development goals.

5.1Conclusion

This study aimed to investigate the influence of the Land Use Plan on the performance of public development project portfolios in Gakenke District, Rwanda, with a specific focus on the Agricultural, Tourism, and Mining Plans. The research findings indicate that the implementation of these land use plans plays a significant role in the successful execution of public development projects. Each of the land use plans Agricultural, Tourism, and Mining has contributed positively to various aspects of project performance, including the efficient use of resources, timely completion of projects, and achievement of long-term sustainability. The study found that the Agricultural

Plan has facilitated improved budget utilization and the adoption of sustainable farming practices that benefit public projects. It also highlighted the role of agricultural infrastructure, such as irrigation, in ensuring the long-term success of projects. Similarly, the Tourism Plan has led to enhanced community welfare through job creation and infrastructure development, directly benefiting public projects related to tourism. Furthermore, the Mining Plan has contributed to the efficient use of land for mining, which has supported local infrastructure and created additional resources for other public development initiatives. The findings also underline the importance of coordination and integration between various land use plans for achieving optimal project outcomes.

5.2Recommendations

Based on the findings of the study, the following recommendations are provided for various stakeholders involved in the performance of public development project portfolios in Gakenke District, Rwanda:

1. The Ministry of Infrastructure and Ministry of Agriculture should develop a national strategy to better integrate these plans and ensure that they align with one another. This integration will maximize resources and improve project outcomes across sectors.

2. Gakenke District Must Establish regular community meetings and stakeholder consultations. Local authorities should also create feedback loops to ensure that local concerns are addressed in project designs.

3. Project managers should adopt a comprehensive approach that integrates elements from agricultural, tourism, and mining land use plans when managing public development projects, Project managers should work closely with land use planners to ensure that all relevant plans are incorporated into the project design from the outset.
4. The private sector should align their investments with national development priorities to maximize the impact of their projects.

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