Effect of National Urbanization Strategies on Sustainable Human Settlement: A Case of Nyarugenge District, Rwanda

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Abstract: *This study investigated the effect of Rwanda's National Urbanization Strategies on sustainable urban development in Kigali, with particular emphasis on the implementation of the Coordination Strategy and the Kigali Master Plan. Grounded in governance and systems theory, the research employed a descriptive design and integrated both quantitative and qualitative approaches. A total of 312 respondents including urban planners, government officials, and policy experts—were selected through purposive sampling. Data were gathered using structured questionnaires and interviews, and analyzed using SPSS Version 21 through descriptive statistics, correlation, and regression analyses. Findings revealed a strong positive correlation between the coordination strategy (r = 0.742) and sustainable urban development outcomes, underscoring the pivotal role of effective governance and institutional coordination in promoting urban sustainability. Regression analysis further confirmed institutional coordination as a significant predictor of sustainable urban development (β = 0.534, p = 0.000). The study underscores the importance of reinforcing coordination mechanisms across urban planning institutions to ensure coherent policy implementation. Based on these findings, the study recommends that urban planners, government agencies, and private sector stakeholders enhance collaboration and communication by institutionalizing regular coordination meetings, joint planning sessions, and the alignment of strategic objectives. These measures will strengthen decision-making processes and contribute to the development of inclusive, resilient, and sustainable human settlements.*

Keywords: National Urbanization Strategies, Sustainable Human Settlement, Coordination strategy, Nyarugenge District, Kigali City

1. Introduction

National Urbanization Strategies (NUS) play a critical role in steering urban development towards sustainability, inclusivity, and orderliness. As urban populations grow at an unprecedented rate, governments are increasingly focused on developing human settlements that address challenges such as infrastructure gaps, housing shortages, and environmental sustainability (Duhungirehe, 2020). These strategies typically encompass key areas like urban planning, affordable housing, infrastructure development, environmental conservation, and the creation of economic opportunities to ensure that cities can meet the demands of expanding populations while maintaining a high quality of life. By prioritizing these areas, National Urbanization

Strategies aim to balance rapid urban growth with long-term sustainability, particularly in the face of climate change and resource management challenges. For example, countries like South Korea and China have successfully implemented urbanization strategies that emphasize sustainable city development, efficient infrastructure, and the creation of resilient urban environments (UN-Habitat, 2021).

Globally, urbanization is one of the most significant demographic shifts of the 21st century. Over half of the world's population now lives in cities, and this proportion is expected to grow to 68% by 2050 (United Nations, 2018). This shift creates significant pressure on urban infrastructure, services, and the environment. Cities worldwide face challenges such as overcrowding, environmental degradation, and social inequalities. The need for well-managed urbanization policies is evident as cities like São Paulo in Brazil, Mexico City, and Mumbai in India struggle with informal settlements, inadequate public services, and traffic congestion (United Nations, 2018). Global frameworks, like the United Nations' Sustainable Development Goal 11, emphasize the need for sustainable, inclusive, and resilient cities (UN, 2015). Countries like Canada and Germany, with advanced urbanization, are now shifting towards green infrastructure and sustainable urban solutions to mitigate the environmental impact of urban living (OECD, 2020).

In developed countries, urbanization has already reached a high level of maturity, where most of the population resides in urban areas. These nations have established advanced urbanization policies that focus on optimizing urban resources and addressing aging infrastructure. In cities like New York (USA), London (UK), and Tokyo (Japan), sustainable development practices such as green building certifications, smart city technologies, and renewable energy adoption are central to urban policies (OECD, 2020). The "smart city" initiatives in countries like the Netherlands and Singapore use digital technologies to manage traffic, energy use, and waste, improving the efficiency and sustainability of urban environments (Kitchin, 2020). These developed nations are leading examples of how to integrate sustainability into urban growth through urban policies that prioritize environmental conservation and economic resilience.

In Africa, rapid urbanization is occurring at a pace much faster than in other regions, and it is expected that the urban population will double by 2050 (UN-Habitat, 2020). Countries such as Nigeria, Kenya, and South Africa are experiencing a surge in urban migration, which has resulted in a variety of challenges, including overcrowding, inadequate housing, and a lack of basic services like water and sanitation (Satterthwaite, 2016). In cities like Lagos (Nigeria) and Nairobi (Kenya), informal settlements are prevalent, and governments are seeking solutions through National Urbanization Policies aimed at improving infrastructure, providing affordable housing, and promoting sustainable economic development. Despite efforts, the challenge lies in implementing policies effectively, given the rapid pace of urbanization and the financial constraints these countries face (Satterthwaite, 2016).

In East Africa, countries like Kenya, Tanzania, and Uganda are experiencing rapid urban growth, primarily driven by rural-urban migration and high population growth rates. In Nairobi (Kenya), Dar es Salaam (Tanzania), and Kampala (Uganda), urbanization has posed challenges similar to those seen across the continent, including a housing shortage, slum development, and inefficient transportation systems. To address these issues, East African governments are increasingly developing National Urbanization Policies that focus on providing affordable housing, improving urban infrastructure, and ensuring that cities grow in an environmentally sustainable manner (World Bank, 2020). For example, Kenya Urban Support Program (KUSP) has focused on urban infrastructure and housing development to foster better living conditions and economic opportunities in urban areas (World Bank, 2020). However, the effective implementation of these policies remains a significant challenge due to the rapid pace of urban migration and financial constraints.

In Rwanda, the National Urbanization strategy has been central to the country's development agenda as it seeks to guide the growth of Kigali and other urban centers. Rwanda's approach focuses on creating well-planned urban spaces that are environmentally sustainable, economically viable, and socially inclusive. The city of Kigali has seen significant urbanization, with a population growing from 1 million in 2002 to over 1.5 million by 2024 (UN Department of Economic and Social Affairs, 2024). The policy addresses key urbanization challenges such as housing shortages, inadequate public services, and environmental sustainability. For instance, Rwanda has introduced initiatives like the Kigali Master Plan, which guides the city's growth through sustainable development practices, improved infrastructure, and the creation of affordable housing (Rwanda Ministry of Infrastructure, 2021). The government has also prioritized green urban development, with Kigali promoting eco-friendly buildings and green spaces as part of its commitment to sustainable urban growth. However, challenges like overcrowding, land scarcity, and the need for low-cost housing remain critical areas for improvement (World Bank, 2024).

1.1 Problem statement

Urbanization in Rwanda, particularly in Kigali and its rapidly growing districts like Nyarugenge, is happening at an unprecedented pace. In response, the National Urbanization Strategy (NUS) was introduced to manage

this expansion and promote sustainable human settlements. Despite this initiative, significant challenges persist (Rwanda Ministry of Infrastructure, 2021). Issues such as housing shortages, inadequate infrastructure, and the spread of informal settlements continue to plague urban areas. In Nyarugenge, the growing demand for affordable housing has resulted in many residents being pushed into areas lacking essential services like water and sanitation. Additionally, land scarcity and rising property prices further worsen the housing crisis, especially for low-income communities (Satterthwaite, 2021). The rapid urbanization has also led to environmental concerns, including pollution and waste management difficulties (World Bank, 2024). Although the NUS emphasizes sustainability, there are notable gaps in its implementation, particularly in rapidly urbanizing districts like Nyarugenge.

Several studies have examined urbanization challenges in Rwanda and across Africa, such as informal settlements, infrastructure deficits, and environmental impacts. Satterthwaite (2016) explores the pressure on cities like Kigali due to informal housing and insufficient services. Munyambonera et al. (2017) highlight how Kigali's growth strains both infrastructure and housing. Ngendahimana (2020) critiques the Kigali Master Plan, recognizing its successes but also pointing out issues like land scarcity and financing constraints. UN-Habitat (2020) provides a broader overview of urbanization in Africa, identifying common problems faced by rapidly growing cities like Kigali. While these studies are invaluable, they primarily focus on urbanization challenges at a macro level, rather than offering a localized examination of how the NUS is specifically affecting sustainable human settlements in districts like Nyarugenge.

Despite the wealth of research on general urbanization trends, there remains a gap in understanding the localized impact of Rwanda's National Urbanization Strategy, particularly in fast-growing districts such as Nyarugenge. Previous studies tend to overlook the direct outcomes of the strategy in specific neighborhoods, especially regarding housing, infrastructure, and environmental sustainability. Additionally, there is a lack of research focused on the effectiveness of specific NUS components such as the coordination strategy, densification strategy, and conviviality strategy at the district level. This study seeks to address this gap by providing an in-depth analysis of how the National Urbanization Strategy has influenced sustainable human settlement development in Nyarugenge District, with a focus on the challenges and successes of these strategies in the local context.

This study sought to achieve the following Research objective:

> To evaluate the effect coordination strategy on sustainable human settlements in Nyarugenge District

2. Literature Review

In this section, key concepts related to the study, including urbanization, sustainable human settlements, and urbanization strategy, are explored to establish a clear understanding of how these terms are defined and applied within the context of the research

2.1 National Urbanization Strategies (NUS)

Rwanda's National Urbanization Strategy (NUS) is a strategic framework developed by the government to manage urban expansion in a sustainable, inclusive, and organized manner. The strategy aims to guide the country's urban growth by promoting coordinated planning, environmental conservation, and social equity. Its primary goal is to foster balanced urban development and ensure that the benefits of urbanization are widely shared, thus narrowing the disparities between urban and rural areas (Ministry of Infrastructure, 2015). The NUS is closely aligned with Rwanda's broader development vision, particularly Vision 2050, which focuses on sustainable development and economic transformation.

A central pillar of the NUS is the coordination of urban development, which involves collaboration among national and local government bodies, the private sector, and civil society. This integrated approach ensures that urban growth is managed effectively and consistently, focusing on sustainable land use, affordable housing, and efficient infrastructure (Nduwayezu et al., 2018). The strategy stresses the importance of long-term planning that anticipates future urban needs, while also addressing pressing challenges such as access to clean water, sanitation, and transportation. Effective coordination is crucial to ensuring that urban growth is both sustainable and beneficial for all residents.

Furthermore, the NUS promotes densification, which advocates for the efficient use of land by encouraging high-density development. As urban populations continue to grow, especially in cities like Kigali and districts such as Nyarugenge, there is a critical need to optimize land use and curb urban sprawl. Densification aims to maximize land potential, reduce sprawl, and provide sustainable housing solutions. However, the success of this approach relies on the availability of adequate infrastructure, effective governance, and social inclusivity, ensuring that all urban residents have access to essential services and enjoy a high quality of life (United Nations Habitat, 2016). In this way, the NUS seeks to strike a balance between density, livability, and sustainability in urban development.

2.1.1 Coordination Strategy

The Coordination Strategy under Rwanda's National Urbanization Policy (NUP) focuses on creating a well-integrated approach to urban development, aligning the efforts of various stakeholders, including national and local governments, the private sector, and civil society. The policy emphasizes collaboration in urban planning to ensure efficient use of resources and alignment with Rwanda's broader development goals, such as Vision 2050. The strategy addresses key challenges such as inadequate infrastructure, informal settlements, and the fair distribution of public services. Its aim is to create urban areas that are not only economically thriving but also socially inclusive and environmentally sustainable (Ministry of Infrastructure, 2019).

The effectiveness of the coordination strategy depends on the ability to harmonize urban initiatives across different governance levels. At the national level, policies are designed to provide a clear framework for urban growth, while local governments are responsible for implementing these plans. The strategy also focuses on strengthening the capacity of local authorities to manage urbanization effectively, ensuring that urban development meets the needs of all residents, including vulnerable groups. By fostering collaboration among various stakeholders, the strategy aims to ensure that urban growth is managed in a way that benefits all citizens, leading to better integration of sectors such as transport, housing, and environmental management, which will improve the overall livability of urban areas (Nduwayezu et al., 2021).

2.1.2 Sustainable human settlement

Sustainable human settlements are urban areas that are carefully designed and managed to foster social equity, economic development, and environmental sustainability. The goal is to reduce the ecological footprint, improve the well-being of residents, and ensure the long-term viability of urban growth. Key principles of sustainable settlements include efficient resource use, waste minimization, inclusivity, and economic resilience. These principles align with global frameworks such as the United Nations Sustainable Development Goals (SDGs), specifically Goal 11, which emphasizes making cities and human settlements inclusive, safe, resilient, and sustainable (UN, 2023). The objective is to create urban spaces that not only meet present needs but also safeguard the ability of future generations to meet theirs.

In practice, sustainable human settlements incorporate a range of strategies such as energy-efficient buildings, green infrastructure, water conservation, and sustainable transportation systems. For example, integrating renewable energy sources, promoting energy-efficient public transit, and enhancing green spaces are key components of environmentally sustainable cities (World Bank, 2023). Social sustainability is also crucial, ensuring that urban development promotes equity by providing affordable housing, public services, and opportunities for marginalized communities. Economically, sustainable settlements aim to foster self-sufficient local economies that encourage green industries and reduce dependence on external resources. Achieving sustainable human settlements requires a holistic, integrated approach that balances environmental, social, and economic factors, as emphasized by UN-Habitat (2023). This approach ensures that cities can thrive while maintaining resilience and equity for all residents.

2.2.2 Theoretical Review

Theoretical frameworks provide essential insights into the impact of urban policies on sustainable human settlements, offering a foundation for understanding how coordination contributes to urban sustainability. This section explored one key theory which is Systems Theory that is relevant to the study's objectives, examining how it relates to the coordination policies in Nyarugenge District.

The Systems Theory was developed by Ludwig von Bertalanffy, an Austrian biologist, in the 1940s. Bertalanffy introduced the idea of a "general systems theory" that would apply to various domains, including biology, engineering, and social sciences (Oliver, 2020). The theory emphasizes that a system is a set of interconnected components that function as a whole. Over time, the theory was expanded upon by scholars like Jay Forrester and Peter Senge, who applied the concept to organizational management and urban planning. The systems approach has since become fundamental in various fields, including urban development, where it is used to understand the complex interdependencies between urban systems such as housing, transportation, infrastructure, and governance (Senge, 2021).

Systems Theory views an urban area as an interconnected system of social, economic, and physical components (Sabina, 2022). According to the theory, the success of any system depends on the relationship and coordination between these components. In the context of urban development, this theory suggests that urbanization cannot be understood or managed by focusing on individual elements like transportation, housing, or environment in isolation. Instead, it calls for a holistic approach where different urban components work together to achieve overall sustainability and development. Effective coordination between local governments, the private sector, and the community is essential to ensuring that all

components of urbanization are aligned to serve the needs of the population (Forrester, 2021).

In the context of Rwanda's coordination strategy, Systems Theory is highly relevant for understanding how coordinated planning and development can lead to more sustainable human settlements. The theory suggests that in Nyarugenge District, For Nyarugenge District, the importance of the coordination strategy in managing urban growth. The policy aims to bring together various stakeholders such as the government, businesses, and communities to plan and manage urban development. By using Systems Theory, the study can evaluate how well the policy integrates different urban sectors like housing, infrastructure, and services. It highlights the need for effective coordination to create a balanced and sustainable urban environment in Nyarugenge District.

2.4 Empirical Review

This section reviews existing studies and findings related to the effect of urbanization policies on sustainable human settlements, focusing on coordination policy in various contexts.

2.4.1 Coordination strategy and sustainable human settlements

Jones et al. (2018) conducted a study in the UK to assess the role of coordination between local government agencies and urban planning authorities. The study revealed that cities with effective coordination mechanisms experienced a 63% improvement in the delivery of affordable housing and public services. The correlation coefficient of 0.72 indicated a moderate but significant relationship between coordination and the efficiency of urban service delivery. Despite these positive findings, the study identified a critical gap in adapting coordination frameworks to rapidly growing urban areas, where demands for services exceed available resources. The authors emphasized the need for more flexible, scalable coordination strategies that can accommodate dynamic urban populations and evolving infrastructure needs.

In South Africa, Chikodzi et al. (2020) explored the impact of urban governance coordination in Johannesburg. Their study found that better coordination between municipal authorities, local businesses, and communities resulted in a 55% improvement in urban infrastructure development and a 60% increase in overall citizen satisfaction with local services. The correlation coefficient was 0.65, indicating a positive relationship between coordination and urban service effectiveness. However, the study highlighted a gap in the political fragmentation across various municipal bodies, which led to inconsistent implementation of coordinated efforts, limiting the overall sustainability of urban development. The authors recommended stronger institutional frameworks to streamline coordination across different sectors and ensure consistency in urban development policies.

Munyaneza et al. (2020) focused on the coordination of urban planning efforts in Kigali, Rwanda, examining the impact of multi-stakeholder collaboration in the city's growth. They found that urban coordination initiatives resulted in a 75% improvement in the quality of public services such as water supply and waste management. The correlation coefficient of 0.78 indicated a strong, positive effect of coordination on sustainable urban growth. However, the study pointed out a significant gap in the integration of informal settlements into the formal urban planning process. The authors suggested that without incorporating informal areas into coordinated efforts, the benefits of urban planning are unlikely to reach all segments of the population, particularly the most vulnerable groups.

3. Methodology

Research design is a critical framework that guides data collection, analysis, and interpretation to address the research problem (Creswell, 2014). This study focused on the impact of the National Urbanization Strategies on sustainable human settlements in Nyarugenge District, Rwanda. The research adopted an exploratory design to explore the effects of urbanization policies, particularly regarding housing, infrastructure, and environmental sustainability. Given the limited research on these strategies in Kigali's urban areas, this design allows for flexibility and a thorough investigation into how urbanization policies are implemented in the district.

The target population for the study consists of urban residents and professionals in Nyarugenge District, including urban planners, architects, government officials, and private sector stakeholders. The study focused on those directly affected by or involved in the National Urbanization Policy, particularly urban residents who experience the impacts of urbanization on their daily lives. A total of 374,349 individuals, including a mix of professionals and residents, were considered as part of the target population.

The sample design aimed to ensure that the data collected represented the diverse population of Nyarugenge District. The sample size was calculated using the Morgan and Krejcie formula, resulting in a sample size of 384 respondents. These respondents were proportionally distributed across various groups such as urban planners, architects, government officials, private actors, and urban residents, ensuring a balanced representation of the population.

Sampling techniques employed in this study included stratified random sampling and simple random sampling. Stratified sampling divided the population into subgroups based on relevant characteristics, such as occupation or socio-economic status, ensuring that each subgroup was represented proportionally. Simple random sampling was then used within each subgroup to select participants, ensuring equal opportunity for inclusion and enhancing the study's validity and reliability.

Data collection methods included both primary and secondary data. Primary data was gathered through structured questionnaires and semi-structured interviews with urban planners, architects, government officials, and urban residents. Secondary data, including government reports, policy documents, and academic journals, helped provide additional context for the study.

The study used questionnaires and interview guides as data collection instruments. Questionnaires were employed to gather quantitative data from residents and private sector actors, focusing on their perceptions and experiences with urbanization policies. Semi-structured interviews were used with urban planners, architects, and government officials to obtain qualitative insights. These instruments allowed for both numerical and detailed responses, ensuring comprehensive data collection.

A pilot study was conducted with 38 participants (10% of the total sample size) to test the clarity and relevance of the research instruments. The pilot study, however, was carried out outside the study's intended location, which may slightly differ from the characteristics of the actual study population. Despite this, the pilot study helped identify any issues with the instruments, ensuring their effectiveness. Validity was assessed using the Content Validity Index (CVI), which yielded a high score of 0.92, confirming the validity of the instruments. Reliability was assessed through test-retest and internal consistency measures, showing that the instruments were stable and consistent for the study's objectives.

Data analysis in this study involved both quantitative and qualitative methods to explore the impact of the National Urbanization Strategies on sustainable human settlements in Nyarugenge District. Inferential statistics, including correlation analysis, ANOVA, and multiple regression analysis, were used to examine relationships between the strategies (coordination, densification, and conviviality) and sustainable human settlements. Correlation analysis helped determine the strength of these relationships, ANOVA assessed differences in perceptions among different stakeholder groups, and multiple regression analysis evaluated the combined effect of these strategies on sustainability outcomes, controlling other factors.

Qualitative data was gathered through semi-structured interviews with key stakeholders, including urban planners, architects, government officials, and residents, to gain deeper insights into their perceptions and experiences with urbanization strategies. The qualitative analysis involved transcribing interviews, coding for themes, and interpreting these patterns to answer the research questions. Methods such as triangulation, member checking, and peer debriefing were employed to ensure trustworthiness and rigor of the findings. This process provided a rich, detailed understanding of the local context and the challenges and successes of implementing urbanization strategies in the district.

Ethical considerations were paramount in the study to ensure that participants' rights and dignity were respected. Informed consent was obtained from all participants, and they were made aware of their right to withdraw at any time without repercussions. Confidentiality was strictly maintained, and all data was anonymized to protect participants' identities. The study adhered to ethical guidelines to ensure that the research was conducted responsibly, with participants' safety and privacy prioritized, contributing to the overall credibility and integrity of the findings

4. Results and Discussion

4.1 Results

This section presents the analysis and interpretation of the findings of the study in relation to the research hypotheses

4.1.1 Response Rate

The study targeted a total population of 374,349 individuals and sampled 372 respondents. Of these, 357 respondents were given questionnaires, representing 96% of the sample. Additionally, 12 individuals were selected for interviews, which included 2 Urban Planners, 1 architect, 1 local government officials, and 8 private actors. Out of the 357 distributed questionnaires, 312 were returned, yielding a return rate of approximately 87.4%. Adding the 12 interviewees (which accounts for 3.2% of the total sample), the total number of responses for the study was 324, which represents a total response rate of approximately 87.1%. This high response rate reflects strong participation and indicates that the study's findings are both reliable and representative of the target population, providing solid grounds for analysis and conclusions.

Table 1: Distribution of Questionnaires and Response Rate

Category	Frequency	Percentage
Total Sample	372	100
Questionnaires Distributed	357	96
Questionnaires Returned	312	87.4

Source: Field data, 2025

Table 1 shows that out of the 372 respondents targeted in the study, 357 questionnaires were distributed, representing 96% of the total sample. Of these distributed questionnaires, 312 were successfully returned, resulting in a response rate of 87.4%. According to Mugenda & Mugenda (2003), a response rate below 40% is considered unreliable, 40%-50% as poor, 50%-60% as acceptable, 60%-70% as good, 70%-80% as very good, and above 80% as excellent. With a response rate of 87.4%, the study falls within the excellent category. This indicates strong participation, ensuring that the findings are both reliable and representative of the target population. The 87.4% response rate reflects a high level of engagement, making the results robust for analysis and providing a solid foundation for drawing conclusions.

4.1.2 Descriptive Statistics of coordination strategy

The first objective of this study was to evaluate the effect of the coordination strategy on sustainable human settlements in Nyarugenge District. Descriptive statistics were employed to assess respondents' perceptions of the effectiveness of coordination mechanisms in contributing to sustainable urban development. A Likert scale ranging from 1 to 5 was employed to measure the respondents' level of agreement with several statements related to community engagement and project sustainability. The scale was structured as follows: 1-5 was used, where 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree.

Table 2: Level of agreement of coordination strategy on sustainable human settlements

Statements	N	M	SD
I believe that institutional coordination between local and national governments enhances the sustainability of human settlements in Nyarugenge District.	312	4.0	0.97
I think that effective governance leads to better implementation of sustainable urban policies in Nyarugenge District.	312	4.3	0.84
I feel that a lack of planning coherence between urban and environmental planning negatively impacts the sustainability of settlements in Nyarugenge District.	312	4.4	0.88
I believe that strong institutional coordination between various stakeholders (government, private sector, NGOs) promotes sustainable urban development in Nyarugenge District.	312	3.5	0.83
I believe that institutional coordination between local and national governments enhances the sustainability of human settlements in Nyarugenge District.	312	4.3	0.94

Source: Primary data, 2024-**Key:** M: Mean, SD=Standard Deviation

Table 2 provides a detailed analysis of the level of agreement among respondents regarding the coordination strategy for sustainable human settlements in Nyarugenge District. The table includes statements on institutional coordination, governance effectiveness, and planning coherence, with each statement evaluated based on a Likert scale. The mean (M) and standard deviation (SD) for each item offer insights into the general consensus as well as the variability of responses among participants.

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The first statement assesses whether institutional coordination between local and national governments enhances the sustainability of human settlements. With a mean score of 4.0 and a standard deviation of 0.97, the data indicates general agreement on the positive role of institutional coordination. However, the relatively higher standard deviation suggests some diversity in respondents' opinions. While most acknowledge the importance of coordination between different levels of government, there are differing views on the effectiveness and current implementation of such coordination in practice.

The second statement examines the relationship between effective governance and the implementation of sustainable urban policies. With a mean of 4.3 and a lower standard deviation of 0.84, this statement shows a strong consensus among respondents. The majority agree that effective governance significantly contributes to the success of sustainable urban policies. The relatively low standard deviation indicates that respondents uniformly recognize the importance of good governance for ensuring that sustainable development goals are successfully implemented, underlining the critical role of governance in urban sustainability.

The third statement explores the issue of planning coherence, specifically the impact of a lack of alignment between urban and environmental planning. With the highest mean of 4.4 and a standard deviation of 0.88, respondents strongly agree that poor planning coherence negatively impacts the sustainability of settlements. This suggests that the disconnect between urban growth and environmental considerations is seen as a key challenge in Nyarugenge District. Although the standard deviation is not very high, there is still some variability in responses, suggesting that while most recognize this issue as a major

barrier, a few respondents may hold different views or are less certain about its significance.

The fourth statement addresses institutional coordination among multiple stakeholders, including government, private sector, and NGOs, and its impact on sustainable urban development. The mean score of 3.5 with a standard deviation of 0.83 reveals a more neutral stance. This suggests that respondents are divided on how effectively institutional coordination is currently functioning in the district. While many agree that collaboration between various stakeholders is crucial, there appears to be less consensus on the effectiveness of current coordination efforts. The moderate variation in responses indicates that some respondents may feel that stakeholder coordination is not as robust as it should be, or that existing mechanisms may not be sufficient to drive comprehensive urban development.

The final statement, which repeats the first statement regarding institutional coordination, reflects a slightly higher mean score of 4.3 and a standard deviation of 0.94. This reaffirms the importance of coordination between local and national governments in promoting sustainable human settlements. The consistency of the response, coupled with a relatively low standard deviation, strengthens the overall argument that institutional coordination is seen as a central component of sustainable urban development in Nyarugenge District.

4.1.3 Correlation Analysis

The findings of the correlations between the independent variables and the dependent variables are summarized and presented in Table 3

Table 3: Correlation between independent variable and dependent variable

		Coordination Strategy	Sustainable human settlements
Coordination Strategy	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	312	
Sustainable human settlements	Pearson Correlation	.742**	1
	Sig. (2-tailed)	.000	
	N	312	312

Source: Primary data, 2025

The correlation analysis between coordination strategy and sustainable human settlements, as presented in Table 3, indicates a strong positive relationship between the two variables. The Pearson correlation coefficient of 0.742 suggests a robust connection, meaning that improvements

or enhancements in coordination strategies within urban planning are significantly associated with the advancement of sustainable human settlements. This implies that effective coordination in urban planning such as collaboration among various stakeholders, efficient

resource allocation, and well-organized policy implementation directly contributes to the overall sustainability of settlements in the studied area. Furthermore, the statistical significance of the correlation is confirmed by the p-value of 0.000, which is well below the common threshold of 0.05, indicating that the relationship observed is not due to random chance but rather represents a real, measurable effect. With a sample size of 312, these findings are highly reliable and provide strong evidence that improving coordination strategies is crucial for enhancing the sustainability of human settlements. This result underscores the importance of effective coordination in achieving long-term urban sustainability goals.

4.1.5 Multiple Regression

In this study, multiple regression analysis was employed to evaluate the impact of three independent variables coordination strategy, densification strategy, and conviviality strategy on the dependent variable, sustainable human settlements in Nyarugenge District. This statistical technique allowed for an assessment of how each of the strategies contributed to the overall sustainability of urban development, while controlling for the potential influence of the other variables. The analysis involved entering the independent variables into the regression model and evaluating the standardized coefficients to determine their relative importance. Additionally, the R-squared value was used to assess the goodness of fit, indicating how well the model explained the variation in sustainable human settlements. This approach provided a clearer understanding of the interactions between the strategies and their collective impact on urban sustainability outcomes.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.833[a]	.694	.691	.24604

a. Predictors: (Constant), Coordination Strategy

Table 4 presents a model summary for the multiple regression analysis, revealing a strong correlation between coordination strategy and sustainable human settlements, with an R value of 0.833. This indicates that the model has substantial predictive power, and the R-square value of 0.694 means that about 69.4% of the variance in sustainable human settlements can be explained by coordination, densification, and conviviality strategies. The adjusted R-square value of 0.691 further supports the robustness of the model, accounting for potential additional variables. The relatively low standard error of the estimate (0.24604) suggests that the predictions are precise, with

minimal error, indicating that these strategies are key contributors to sustainability in urban settlements. These findings emphasize the significant role that coordinated strategies, land use optimization through densification, and social-cultural aspects of urban development play in fostering sustainable human settlements in Nyarugenge District. The 69.4% explanatory power suggests that urban planners and policymakers should integrate these strategies into their planning frameworks for sustainable development. However, the remaining 30% of unexplained variation suggests that other factors might influence sustainability.

Table 5. Anova Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.237	3	14.079	232.567	.000[b]
	Residual	18.646	308	.061		
	Total	60.883	311			

a. Dependent Variable: Sustainable human settlements
b. Predictors: (Constant), Coordination Strategy

Table 5 presents the ANOVA results for the multiple regression model examining the relationship between coordination strategy, densification strategy, conviviality strategy, and sustainable human settlements. The regression sum of squares of 42.237 indicates the variation in sustainable human settlements explained by the

independent variables, and the F-statistic of 232.567 is statistically significant, with a p-value of 0.000, far below the conventional threshold of 0.05. This confirms that the model is statistically significant, and the independent variables together offer a meaningful contribution to explaining the variance in sustainable human settlements.

The results suggest that these strategies, when considered together, play a crucial role in promoting sustainable urban development in Nyarugenge District. The ANOVA findings emphasize the importance of combining coordination, densification, and conviviality strategies in
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urban planning to achieve sustainable outcomes. The very low p-value (0.000) indicates that the likelihood of these results occurring by chance is extremely low, reinforcing the significant impact of these strategies on sustainability.

Table 6: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.494	.160		-3.079	.002
	Coordination Strategy	.470	.045	.534	10.444	.000

a. Dependent Variable: Sustainable human settlements

Table 6 presents the regression coefficients for predicting sustainable human settlements using the coordination strategy. The results indicate that coordination strategy has the strongest impact, with a coefficient of 0.470, suggesting that improving coordination significantly enhances sustainability. The standardized coefficient shows that coordination strategy is the most significant predictor, with a t-value confirming its high significance. The t-value of 10.444 and a p-value of 0.000 indicate that the coordination strategy has a strong and statistically significant effect on the sustainability of human settlements. These findings emphasize the crucial role of coordination in promoting sustainable urban development. The results suggest that effective collaboration among stakeholders such as the government, private sector, and NGOs is essential for improving urban sustainability.

4.2 Discussion of findings

In this study, the researcher aimed assess effect of Rwanda's National Urbanization Strategies on sustainable urban development in Rwanda. The objective of this study was to evaluate the effect coordination strategy on sustainable human settlements in Nyarugenge District. Findings revealed that institutional coordination, governance effectiveness, and planning coherence play a critical role in achieving sustainable human settlements in Nyarugenge District. While there is broad consensus on the importance of these factors, variations in responses particularly concerning stakeholder coordination and planning coherence indicate that there is still room for improvement. Qualitative insights highlight persistent gaps in communication and collaboration between local and national authorities, often resulting in bureaucratic delays, misaligned policies, and inconsistent enforcement. Respondents emphasized that governance effectiveness is essential to translating sustainability goals into practical outcomes, yet challenges such as corruption, limited

transparency, and weak monitoring mechanisms continue to undermine progress. Additionally, participants stressed that urban development frequently overshadows environmental concerns, calling for integrated, cross-sectoral planning that balances growth with ecological preservation. Another key theme that emerged from the qualitative data is the need for broader stakeholder engagement. Respondents noted that sustainable urban development cannot be achieved through top-down strategies alone and highlighted the importance of involving local communities, private sector actors, and NGOs in planning and implementation processes. Community-driven initiatives were seen as particularly effective in fostering ownership, long-term engagement, and accountability.

Findings from the qualitative data emphasize the critical need for enhanced institutional coordination, more effective governance, and improved planning coherence in Nyarugenge District. Additionally, the data highlights the importance of engaging local communities and other key stakeholders in both the planning and implementation phases to ensure the long-term sustainability of human settlements. These insights provide valuable context for interpreting the quantitative findings, offering a deeper understanding of the factors that influence sustainability outcomes. Furthermore, the qualitative responses deliver practical recommendations for policymakers and urban planners, guiding future efforts to create more resilient and sustainable settlements in the district.

These findings align with and reinforce the conclusions of scholars such as Turok (2024), Bevir (2020), and Kooiman (2023), who argue that effective governance and institutional coordination are essential to overcoming fragmented planning and achieving sustainable outcomes. The study suggests that future policy and urban planning efforts in Nyarugenge District should prioritize strengthening governance structures, improving

institutional collaboration, and promoting inclusive, bottom-up approaches. By doing so, urban planners and policymakers can enhance the sustainability of human settlements, ensuring that development is both effective and equitable for all stakeholders involved

The correlation analysis reveals a strong positive relationship between the coordination strategy and sustainable human settlements in Nyarugenge District. The significant association suggests that improvements in coordination strategies are closely linked to the advancement of sustainable urban settlements. This emphasizes the importance of coordinated efforts in urban planning, such as collaboration among stakeholders, efficient resource distribution, and effective policy execution. Previous studies have consistently emphasized the role of coordination in urban development. For instance, Turok (2024) highlights that effective institutional coordination is key to fostering sustainable urban growth, as it helps align efforts across multiple stakeholders, including local governments, private sector actors, and NGOs. Similarly, Bevir (2020) argues that fragmented governance often impedes urban sustainability, reinforcing the importance of coordinated strategies for effective policy implementation. The findings in Nyarugenge District align with these studies, underscoring that enhancing coordination mechanisms can directly contribute to better sustainability outcomes in urban planning.

The multiple regression analysis further supports these findings by demonstrating the collective impact of coordination, densification, and conviviality strategies on sustainable human settlements. The model shows a strong predictive power, indicating that these three strategies together explain a significant portion of the variation in sustainable urban development. Previous research supports the critical role of these strategies in shaping sustainable settlements. For example, Kooiman (2023) stresses that integrated planning, which includes coordination, land use optimization through densification, and consideration of social-cultural factors (conviviality), is essential for sustainable urban development. Moreover, studies such as those by UN-Habitat (2021) emphasize that a combination of well-coordinated urban planning strategies leads to more resilient and sustainable cities. The ANOVA results in this study confirm the significance of these strategies, aligning with global urban planning frameworks that advocate for the integration of diverse approaches in achieving long-term sustainability. These findings reinforce the call for multi-stakeholder collaboration in urban planning, a theme that is central in the literature on urban sustainability.

5. Conclusion and Recommendations

5.1 Conclusion

In conclusion, the study highlights the significant impact of coordination strategy on sustainable human settlements in Nyarugenge District, with a strong statistical correlation between improved coordination and enhanced urban sustainability. The findings suggest that effective collaboration among various stakeholders, including government, private sector, and NGOs, plays a crucial role in promoting sustainable urban development. By prioritizing coordination efforts, policymakers can foster more cohesive and efficient planning, ensuring long-term sustainability. These results underscore the importance of integrated strategies in urban development and support the need for a coordinated approach to achieve sustainable, inclusive cities.

5.2 Recommendations

Based on the study findings, the following recommendations are made:

1. Urban planners, government agencies, and private sector entities should prioritize enhancing collaboration and communication between all stakeholders involved in urban development. Regular coordination meetings, joint planning sessions, and shared goals should be established to improve the overall effectiveness of urban strategies and ensure cohesive decision-making processes for sustainable human settlements.

2. Given the critical role of coordination in fostering sustainable urban development, it is recommended that local authorities and relevant institutions invest in capacity-building programs. These programs should focus on improving the skills and knowledge of urban planners, policymakers, and other stakeholders to better manage and implement coordination strategies effectively.

3. Urban planning processes should integrate data collection, analysis, and continuous monitoring to track the success of coordination strategies. By utilizing real-time data, policymakers can make informed decisions, adjust strategies as needed, and ensure that urban development remains aligned with sustainability goals. Implementing such systems can help anticipate challenges and address them proactively

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