Resource Allocation and Success of Housing Construction Project: A Case of Rubirizi Center of Excellence, Rwanda

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Abstract: This study investigates the impact of resource allocation on the performance of housing construction projects in Rubirizi, Rwanda. Utilizing a descriptive research design, the study examines how effective resource planning, scheduling, tracking, and utilization contribute to project success. The research is grounded in the Resource-Based View (RBV) theory and contingency theory, emphasizing the importance of leveraging valuable, rare, and inimitable resources to gain a competitive advantage. The sample comprised 128 respondents from various construction companies and regulatory authorities in Rwanda, selected using purposive sampling. Data was collected using structured questionnaires and analyzed through descriptive statistics, correlation analysis, and multiple regression models. The results show that resource planning and management have a significant positive impact on project success, with a high level of agreement among respondents that proper resource allocation contributes to meeting project goals and adhering to budgets. The findings indicate a strong correlation between resource planning and project success (r = 0.668, p < 0.01). It is recommended that construction firms invest in improving resource management practices, strengthen supply chain coordination, and adopt data-driven decision-making tools to enhance project outcomes.

Keywords: Resource allocation, Resource planning, Project success, Housing construction project, Rubirizi center

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1. Introduction

The construction sector is integral to economic growth globally, particularly in emerging economies where infrastructure development is essential for fostering sustainable development. Governments recognize the sector's critical role in driving progress by creating essential infrastructure, such as roads, energy systems, and housing, which are the foundation of a growing economy. For instance, Rwanda places significant emphasis on its construction industry as part of its broader economic strategy, aiming to meet the country's evolving infrastructure needs (Rwanda Development Board, 2022). This sector is recognized not only for generating employment but also for stimulating other industries like manufacturing, transportation, and energy production, all of which contribute to economic prosperity (Wang, 2020).

Infrastructure development, particularly in emerging regions like Sub-Saharan Africa, plays a pivotal role in improving living standards, boosting trade, and attracting investment. In Africa, construction projects are seen as key drivers of economic growth, with the African Development Bank noting that such investments can increase GDP growth by up to 4% annually. Beyond economic benefits, infrastructure projects also lead to social improvements by enhancing access to essential services like healthcare, education, and clean water (International Monetary Fund, 2017). This broader impact underscores the significance of

construction as a cornerstone for regional development and integration.

Rwanda, located in East Africa, aligns with these regional trends by focusing heavily on infrastructure and housing projects as part of its national development strategy. As the second-largest job-creating sector in the country, construction plays a vital role in the economy, employing approximately 330,000 people (Rwanda Development Board, 2022). Notably, investments in roads, bridges, and utilities have not only spurred economic growth but also improved quality of life by providing access to crucial services in both urban and rural areas. Infrastructure projects such as highways and airports enhance Rwanda's connectivity with its regional neighbors, facilitating trade and supporting economic integration within East Africa (Rwanda Development Board, 2020).

Despite the sector's importance, challenges persist, particularly in financing large-scale projects and managing limited resources. Rwanda faces constraints related to budgetary allocations, the shortage of skilled labor, and delays in regulatory processes, which often lead to cost overruns and project delays (Ministry of Infrastructure, 2020). Moreover, maintaining the long-term sustainability of infrastructure projects remains a challenge, with inadequate funding for maintenance contributing to the premature failure of some infrastructure assets (Rwanda Green Fund, 2020). These issues not only hinder the successful completion of projects but also affect their overall impact on the economy and society.

The focus of this research is to explore the key factors influencing the success of housing construction projects in Rwanda, particularly in the context of resource allocation. By concentrating on aspects such as planning, resource gauging, scheduling, and tracking, the study aims to identify how these elements contribute to the timely completion of projects, adherence to budgets, and overall project quality. The research seeks to provide insights that could inform better strategies for managing resources in Rwanda's construction sector, ultimately enhancing efficiency and ensuring that infrastructure investments yield lasting economic and social benefits.

1.1. Problem Statement

The housing construction initiatives in Rwanda, particularly within the Rubirizi Center of Excellence, are confronted with formidable obstacles that impede the realization of successful outcomes (office of the Auditor General Rwanda, 2022). Audit Opinions on Compliance with laws and Regulations Regulating Public Spending Out of the 221 public institutions and projects audited, only 135 (representing 61%) entities had unqualified opinions, 77 (representing 35%) had qualified opinions while the remaining 9 (representing 4%) entities had adverse opinions on compliance with laws and regulations regulating public spending. The persistently observed delays and budgetary discrepancies have raised considerable concerns, prompting an in-depth examination of the overall effectiveness of resource allocation strategies in the specific context of housing construction projects in Rwanda.

This pressing issue is underscored by a growing body of literature that recognizes the significance of efficient resource allocation in the successful execution of construction projects (Liu & Smith, 2020). The importance of timely project completion and adherence to budget constraints cannot be overstated, especially in the realm of housing construction, where societal well-being and economic development are intricately linked to the availability of adequate housing (UN- Habitat, 2016).

The Rubirizi Center of Excellence, serving as a focal point for this investigation, has been particularly affected by prolonged delays in project completion and unexpected budget overruns, (Office of the Auditor General Rwanda, 2022) Such challenges are not unique to Rwanda, and literature on global construction project management highlights the pervasive nature of delays and cost overruns in the industry (Ogunlana, 2018, 2019). However, the specific contextual factors influencing these challenges in Rwanda, and more precisely in the Rubirizi Center of Excellence, remain underexplored.

To address this critical gap in understanding, the proposed research aims to conduct a comprehensive investigation into the intricate relationships between resource allocation practices and project success in housing construction projects in Rwanda. By examining the specific factors contributing to project delays and budget overruns (Office of the Auditor General Report Rwanda, 2022), the research seeks to provide valuable insights that can inform future decision-making processes. This endeavor aligns with the broader goal of enhancing the efficiency and success of housing construction projects, thereby contributing to the overall development objectives of Rwanda.

The ultimate goal of this research is to offer informed recommendations and strategic interventions that can be implemented to mitigate the challenges faced by housing construction projects in Rwanda, with a specific focus on the Rubirizi Center of Excellence. By doing so, this study aspires to contribute not only to the academic discourse on construction project management but also to provide actionable insights for policymakers, industry professionals, and other stakeholders involved in the development and implementation of housing construction initiatives in Rwanda.

This study sought to achieve the following Research objective:

To assess the effect of resource planning on the success of housing construction project of Rubirizi Centre of Excellence Rwanda.

2. Literature Review

A conceptual review delves into the foundational theories and principles that underpin a specific field of study, aiming to clarify key concepts and frameworks. By examining existing literature, it provides a deeper understanding of the subject while identifying gaps in knowledge and areas that require further exploration. This section will explore the core ideas related to resource allocation, community engagement, and project performance, shedding light on their interconnections and relevance to the successful management of projects.

Resource Allocation

Resource allocation is a critical process in both strategic management and project management, involving the distribution of resources to support organizational goals and project objectives efficiently. Ben (2022) defines resource allocation as the process of assigning and managing assets, both tangible (such as hardware) and intangible (like human capital), to maximize returns on investment. The goal of resource allocation is to balance competing needs and priorities, ensuring that resources are used in the most effective way to achieve desired outcomes. Strategic management scholars, such as Barney (2020) and Hill (2020), emphasize that resource allocation is a fundamental element of strategy, involving not only goal setting but also determining the resources required to carry out these goals. A comprehensive "resource budget" is crucial for successful strategy implementation, highlighting the importance of aligning resource distribution with strategic objectives.

In the context of project management, resource allocation focuses on assigning available resources to specific tasks or activities within a project to ensure efficient execution. The Project Management Institute (2008) defines resource allocation as the process of assigning and scheduling resources in the most effective and economical way to achieve project goals. Kerzner (2017) takes a similar approach, emphasizing the need to assign resources to specific project tasks, while Larson and Gray (2018) highlight both the assignment and timely availability of resources. Gido and Clements (2014) add that resource allocation also involves the strategic assignment of human resources, underlining the importance of team members in project execution. Overall, the allocation process ensures that the necessary resources are available and optimally utilized to meet project deadlines and objectives.

Resource allocation is not only about distributing resources efficiently but also about making strategic decisions across multiple projects or tasks. Cleland (2007) views resource allocation in the context of project portfolio management, where it involves determining which resources will be used for each project and in what quantities. This broader perspective highlights the importance of managing resources across various projects, ensuring that priorities are met, and that resource constraints are addressed. In summary, resource allocation is a strategic process that involves the careful distribution of human, financial, and physical resources to maximize efficiency and achieve both organizational and project-specific goals.

Resource Planning

Resource planning is the process of identifying, allocating, and managing the resources necessary to achieve project or organizational goals efficiently. It involves determining the required resources—such as people, equipment, and materials, how they will be allocated, and when they will be available to ensure successful project completion. According to Kerzner (2017), resource planning is crucial for ensuring that the right resources are in place at the right time, a perspective shared by various scholars. For instance, the Project Management Institute (2017) defines resource planning as the process of identifying project roles, responsibilities, and required skills, alongside creating a staffing management plan. Gido (2014) broadens this definition by emphasizing that resource planning also includes allocating equipment and materials, not just human resources.

Resource planning is vital across industries, playing a key role in project management and organizational planning. Strategic Management Insight (2017) highlights the importance of allocating the right resources at the right cost to ensure project success, while Harmon (2022) discusses its role in business process reengineering to improve efficiency. In construction, Boateng (2019) underscores the importance of resource planning in project execution, particularly in terms of identifying and acquiring the necessary resources. Overall, resource planning is a multifaceted process that directly influences project success by ensuring the strategic alignment and effective use of resources throughout the project lifecycle.

Project Success

Project success is a multifaceted concept in project management, encompassing a range of dimensions such as meeting objectives, stakeholder satisfaction, and delivering value. Traditional models of project success, such as the "iron triangle" (Schwalbe, 2020), emphasize the importance of completing a project within time, cost, and

quality constraints. However, success extends beyond these basic parameters to include the satisfaction of the client or user, as well as the actual use and effectiveness of the project deliverables. For example, Marnewick (2020) argues that delivering an information system "on time, within budget, and to specification" may not be sufficient if the system is not accepted or used by the intended users. Similarly, Olawale (2021) applies this concept to construction projects, where the project's success is also measured by its fitness for use and the benefits it brings to users, beyond just meeting the triple constraints.

Scholarly perspectives on project success offer a variety of definitions, each highlighting different dimensions. The Project Management Institute (PMI, 2017) defines success as the degree to which a project meets its objectives, is completed within cost, and delivers the intended benefits. Heagney (2022) expands this view, considering additional factors like achieving technical performance and maintaining team harmony. The "project success cube" introduces broader impact criteria, such as project efficiency, customer impact, and preparation for the future. Cooke-Davies (2002) emphasizes stakeholder satisfaction as a key factor in defining success, alongside adherence to project constraints. In sum, project success requires a comprehensive, multidimensional evaluation that goes beyond basic completion metrics to include user satisfaction and broader organizational impact.

2.1 Theoretical Review

Resource allocation is a crucial component of project management, especially in housing construction projects, where the effective distribution of resources plays a key role in determining project success. Several theoretical frameworks provide valuable insights into how resource allocation influences the outcome of such projects.

Resource-Based View (RBV) Theory

The Resource-Based View (RBV) theory provides a valuable framework for understanding how resource planning influences the success of construction projects. According to RBV, a firm's resources encompassing human, financial, and physical assets—are the core determinants of its competitive advantage and performance (Barney, 2023). In the context of housing construction projects, effective resource planning entails identifying, acquiring, and strategically allocating these resources to maximize project success. By leveraging its unique resources and capabilities, a firm can ensure that the right resources are assigned to the appropriate tasks at the right time, which is crucial for achieving project goals.

In housing construction, resource planning directly impacts project efficiency and outcomes. The RBV suggests that a firm's competitive advantage is built upon resources that are rare, valuable, and difficult to imitate. By focusing on securing such resources, firms can enhance the likelihood of delivering high-quality projects on time and within budget. This theory emphasizes the importance of aligning resource allocation with the project's specific needs, ensuring that critical resources, such as skilled labor, materials, and financial capital, are available when required, ultimately reducing delays and cost overruns.

From the perspective of this study, the RBV highlights the critical role of efficient resource management in ensuring the successful completion of housing construction projects. The theory posits that by acquiring and effectively utilizing valuable resources, firms can not only achieve project objectives but also sustain their competitive edge in the market. Therefore, resource planning based on RBV principles contributes significantly to the timely and cost-effective completion of construction projects, reinforcing the importance of strategic resource allocation for overall project success.

Contingency Theory

The Contingency Theory was first developed by Fred Fiedler in 1964. Fiedler's research initially focused on leadership styles and how they interacted with different situations to affect organizational outcomes (Maria, 2020). Over time, the theory expanded to include broader organizational contexts, emphasizing that there is no single best way to manage or organize a project. Instead, the most effective management approach is contingent upon the specific circumstances faced by the project or organization. Fiedler's work laid the foundation for many studies in organizational behavior, including its application in project management (Briellah, 2020)

The Contingency Theory asserts that the effectiveness of a management strategy, including resource planning, depends on the unique characteristics of the environment in which the organization or project operates (Thadee, 2020). It suggests that there is no one-size-fits-all approach to managing resources, as the best course of action is influenced by factors such as project complexity, team dynamics, available resources, external constraints, and technological needs. In the context of construction projects, this means that the way resources are planned and allocated should vary depending on factors like project size, scope, urgency, or external market conditions. The theory emphasizes the need for flexibility and adaptability in management practices, ensuring that decisions are aligned with specific project requirements.

The Contingency Theory is highly relevant to resource planning in construction projects because it highlights the importance of tailoring resource management strategies to the specific demands of each project. In construction, factors such as the scale of the project, timelines, budget constraints, and the availability of skilled labor can all influence how resources should be allocated. For example, a large-scale housing development might require a more complex and structured resource allocation strategy compared to a smaller, residential project. By applying the principles of Contingency Theory, project managers can assess the unique conditions of the project and make informed decisions about resource allocation that are best suited to the current context, thereby increasing the likelihood of project success. This adaptive approach helps ensure that resources are used efficiently, challenges are addressed proactively, and project outcomes are optimized.

2.2 Empirical Literature

The empirical literature on resource allocation in construction projects offers valuable insights into the practical application of resource planning and its impact on project outcomes. Numerous studies have explored how effective resource management can influence project efficiency, cost control, and overall success. This section reviews key empirical studies that examine the relationship between resource allocation strategies and project performance in the context of construction, with a particular focus on housing and infrastructure projects.

Resource Planning and Project Success

Empirical studies on resource allocation in construction projects highlight the crucial role of effective resource planning in determining project outcomes. One notable study by Kerzner (2017) examined the relationship between resource allocation practices and project success in the construction industry. The study found that projects that employed strategic resource allocation techniques, such as early identification of resource needs, better scheduling, and prioritization of critical tasks, were more likely to complete on time and within budget. Kerzner emphasized that construction projects with effective resource management practices, including human resources, equipment, and materials, had a higher rate of success in terms of meeting performance expectations and client satisfaction. This study underscores the importance of planning and monitoring resources throughout the project lifecycle.

In a different context, Choi and Kim (2019) focused on the impact of resource allocation in large-scale infrastructure projects. They conducted a quantitative analysis of several high-profile infrastructure projects in South Korea and found that resource allocation practices had a direct influence on project efficiency and cost management. The study showed that improper resource allocation, such as underestimating labor requirements or misjudging the material needs, led to cost overruns and project delays. On the other hand, projects that had clear resource management frameworks and adaptive strategies in place were able to minimize resource shortages and delays, thereby reducing overall costs. The authors concluded that a flexible approach to resource allocation, where adjustments can be made in response to unforeseen challenges, is essential for the success of large infrastructure projects.

Another significant study by Olawale (2021) examined the role of resource allocation in housing construction projects across several African countries. The study highlighted how limited access to financial resources, skilled labor, and materials often hindered the timely completion of housing projects. Olawale's research pointed to the importance of stakeholder engagement and the efficient use of resources to minimize waste and ensure projects meet deadlines. The findings indicated that a lack of coordination between contractors, suppliers, and project managers contributed to inefficient resource allocation, leading to delays and cost overruns. However, when projects had a well-defined resource management plan that accounted for local conditions and available resources, they were more likely to achieve desired outcomes. This study illustrates the critical role of proper resource planning in overcoming the unique challenges faced in the housing sector, particularly in developing economies.

3. Methodology

This section outlines the research methodology employed in this study, detailing the systematic approach adopted to collect and analyze data. It includes discussions on research design, study population, sampling techniques, data collection instruments, and the analytical methods applied. Furthermore, it addresses the limitations encountered during the research process and the ethical considerations followed to ensure that the study adhered to the highest standards of integrity and accountability in research (Bryman, 2016).

The research utilized descriptive research design, a method ideal for capturing detailed, information without influencing or manipulating the study variables. Descriptive research aims to systematically observe and describe the characteristics, behaviors, or attitudes of a sample or population, and is well-suited to answer questions about the current state of affairs, such as "what," "where," "how," and "when" (Neuman, 2014). In this study, the researcher sought to gather information on

resource allocation planning and their impact on the success of a housing construction project in Rwanda.

The study's target population comprised 132 individuals, with 130 employees from three registered companies, which included two contractors and one consultancy firm, along with two project managers from regulatory bodies: Rubirizi Center and the Rwanda Agricultural Board (RAB). This specific group was selected based on their direct involvement in the housing construction project and their ability to provide relevant insights into resource allocation practices (Babbie, 2016). A purposive sampling method was employed to ensure that the sample represented individuals with the necessary experience and knowledge to address the research objectives. Purposeful sampling is particularly useful when a researcher aims to focus on specific individuals who can offer rich and detailed information about the topic under study (Creswell & Creswell, 2017).

To collect primary data, the study employed both questionnaires and document analysis. The questionnaire, designed using a Likert scale, was administered to 132 respondents. This tool allowed for the collection of quantitative data on various aspects of resource allocation and project success (Babbie, 2016). In addition, document analysis was conducted to review secondary data from reports and official documents related to the selected housing construction project. This method allowed the researcher to corroborate the findings from the primary data and gain further insights into existing resource allocation practices (Bowen, 2009). A pilot test was conducted with a small subset of participants to refine the questionnaire and ensure its reliability and validity. Feedback from the pilot test helped identify and address any issues in the questionnaire design, improving its accuracy before full-scale distribution (Creswell & Creswell, 2017).

Data processing involved several stages, including editing, coding, tabulation, and synchronization to ensure data accuracy, consistency, and completeness (Kline, 2013). After the data were cleaned and coded, they were analyzed using both qualitative and quantitative methods. Descriptive statistics were applied via SPSS software to summarize the data, while a multiple linear regression model was used to examine the relationships between various resource allocation factors (e.g., planning, scheduling, gauging, and tracking) and the success of the housing construction project. Ethical considerations were rigorously followed throughout the study, including obtaining informed consent from all participants, ensuring their confidentiality, and maintaining transparency in reporting the findings. The study adhered to the ethical standards of research integrity, with proper acknowledgment of sources and careful handling of the data (Beck, 2006).

4. Results and Discussion

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

4.1 Findings

4.1.1 Pilot Test Results

Pilot testing was done on 5 respondents to test the research instruments for clarity, understanding, and ease of response. Most respondents found the questions clear, Survey completion times ranged from 10 to 15 minutes, which is within an acceptable range. The instrument was generally effective but required minor adjustments such as language due to a few technical terms that were identified as potentially challenging.

4.1.2 Descriptive Statistics of Resource Planning

Table 1 presents an overview of respondents' perceptions regarding the influence of resource allocation on the performance of housing construction projects in Rubirizi, Rwanda. The table utilizes a response scale where SD stands for Strongly Disagree, D for Disagree, N for Neutral, A for Agree, and SA for Strongly Agree. It provides the mean and standard deviation for each response category, which helps in understanding how respondents view the relationship between resource allocation practices and overall project success.

Table 1: Resource planning in Housing Construction Projects

Statement	N	Mean	Standard Deviation
Effective resource allocation in housing construction projects	128	4.2	0.87
Readily available resources when needed in your project	128	4.1	0.92
Resources utilization to maximize project outcomes	128	4.0	1.01
Project expenditures adhere to the allocated budget	128	4.3	0.85
Enhanced cost control	128	4.1	0.89
Meeting project goals	128	4.0	1.05
Making informed decisions based on accurate data	128	4.0	0.98
Enhanced safety of the construction site	128	3.9	1.03

Source: Primary data, 2025

The findings from the data on resource planning in housing construction projects show that effective resource allocation is considered highly important. With a mean of 4.2 and a relatively low standard deviation of 0.87, most respondents strongly agree that proper resource allocation significantly contributes to the success of these projects. The low variability in responses indicates a general consensus among participants, reflecting the critical role of efficient resource distribution in meeting project goals. This consistency highlights the universal importance of resource allocation across different project teams, suggesting that effective management of resources is central to achieving project outcomes.

Respondents also strongly agreed that resources are generally available when needed in the course of their projects, with a mean score of 4.1 and a standard deviation of 0.92. The slightly higher standard deviation suggests that while most respondents are satisfied with resource availability, there is some variation depending on the project context. Some respondents might experience challenges in accessing resources on time, which may be attributed to specific issues like supply chain disruptions or logistical constraints. Overall, though, resource availability was seen as a significant factor contributing to successful project execution.

The data also reveals that resource utilization to maximize project outcomes is important, with a mean of 4.0 and a higher standard deviation of 1.01. While the majority of respondents agreed that effective resource utilization is key to project success, the greater variability in responses suggests that experiences with resource utilization can vary widely across projects. Some projects may have more structured or efficient systems for utilizing resources, while others might face challenges in aligning resource use with project objectives. This variability indicates that while the concept of resource optimization is widely acknowledged, its implementation may differ in practice depending on the project environment and management practices.

Furthermore, the adherence to budget was a significant factor, with a mean score of 4.3 and a standard deviation of 0.85, indicating a high level of agreement that project expenditures generally stay within allocated budgets. This suggests that the projects under consideration have strong financial controls, with few respondents reporting discrepancies between planned and actual expenditures. Similarly, enhanced cost control received a mean score of 4.1 with a standard deviation of 0.89, suggesting that cost control measures are seen as largely effective, though there is some variation in how respondents perceive their impact.

Lastly, while resource planning is viewed as essential for making informed decisions and enhancing safety, the mean scores for these statements were slightly lower, at 4.0 and 3.9, respectively. The higher standard deviations for both statements (0.98 and 1.03) suggest that there is more variation in respondents' views regarding these aspects of resource planning. While most respondents agreed that accurate data aids decision-making and that resource planning contributes to safety, some respondents appear to place more importance on these areas than others, possibly reflecting differences in project management approaches or the resources allocated to safety and decision-making tools.

4.1.3 Correlation Analysis

The findings of the correlations between the independent variables and the dependent variables are summarized and presented in Table 2:

Table 2: Correlations coefficients matrix

		Resource planning	Project Success
Resource planning	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	128	
Project Success	Pearson Correlation	.668**	1
	Sig. (2-tailed)	.000	
	N	128	128

Source: Primary data, 2025

The correlation analysis in Table 2 reveals a significant positive relationship between resource planning and project success in housing construction projects. The Pearson correlation coefficient of 0.668 indicates a moderately strong positive correlation between the two variables, meaning that as the effectiveness of resource planning improves, project success tends to increase as well. The significance level (p-value = 0.000) confirms that this correlation is statistically significant, suggesting that the relationship observed is unlikely to have occurred by chance.

4.1.5 Multiple Regression

The multiple regression analysis was conducted to examine the impact of various factors of resource planning on the success of housing construction projects. The independent variables assessed was resource planning (X1), while the dependent variable was project success (Y). The results of the regression analysis provide valuable insights into how each resource-related factor contributes to the overall success of the housing construction projects in Rwanda.

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.927a	.859	.854	.11595

a. Predictors: (Constant), Resource planning

The Model Summary in Table 3 reveals a strong positive relationship between resource management practices and project success in housing construction projects, with a correlation coefficient (R) of 0.927. This high value suggests that resource planning, scheduling, gauging, and tracking are closely linked to project success. The R^2 value of 0.859 indicates that approximately 85.9% of the variation in project success is explained by the model, reflecting the significant role of resource management in driving project outcomes. The adjusted R^2 of 0.854 further supports the model's robustness by accounting for the number of predictors, showing that the model remains strong without overfitting. Additionally, the standard error of the estimate (0.11595) is relatively low, suggesting accurate predictions of project success based on the resource variables. Overall, the findings underscore the importance of effective resource planning and management in ensuring the success of housing construction projects.

Table 4. ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.061	4	2.515	187.088	.000b
	Residual	1.654	123	.013		
	Total	11.714	127			

a. Dependent Variable: Resource Planning
b. Predictors: (Constant), Project success

Table 4 presents the ANOVA results for the regression model examining the relationship between project success and resource planning. The F-value of 187.088 is highly significant, with a p-value of 0.000, indicating that the model is statistically significant and that the independent variables (resource planning, scheduling, gauging, and tracking) collectively have a strong effect on project success. The Sum of Squares for the regression is 10.061, while the residual sum of squares is 1.654, demonstrating

that most of the variation in project success is explained by the predictors. The Mean Square values of 2.515 for the regression and 0.013 for the residual further support the robustness of the model, showing that the regression model provides a substantial explanation of the variability in project success compared to the residual error. These results confirm that resource planning is a significant predictor of housing construction project success.

Table 5: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.010	.149		.065	.949
	Resource planning	.278	.020	.491	13.900	.000

a. Dependent Variable: Project success

Table 5 presents the coefficients for the regression model analyzing the impact of resource planning on project success. The unstandardized coefficient (B) for resource planning is 0.278, with a standard error of 0.020, indicating that for every one-unit increase in resource planning, project success is expected to increase by 0.278 units. The standardized coefficient (Beta) is 0.491, showing a moderate to strong positive relationship between resource planning and project success. The t-value for resource planning is 13.900, which is highly significant, with a p-value of 0.000, confirming that resource planning is a statistically significant predictor of project success. The constant term has a coefficient of 0.010, but it is not statistically significant (p-value = 0.949), implying that the intercept does not have a meaningful impact on the model. These results suggest that effective resource planning has a substantial influence on the overall success of housing construction projects.

4.2 Discussion

The analysis of the data from this study highlights several important insights regarding the relationship between resource planning and project success in housing construction projects. The findings from the descriptive statistics show that resource planning in housing construction projects, reveal that resource allocation is widely regarded as a crucial factor for project success. Respondents generally agree that effective resource distribution, resource availability, and adherence to budgets significantly contribute to meeting project objectives. However, there is variation in how these factors are experienced across projects, with some respondents noting challenges like delays in resource procurement or inefficiencies in resource utilization. While data-driven

decision-making and enhanced safety are also recognized as important, perceptions about their impact vary, likely due to differences in project priorities and resource allocation for these areas. Overall, while the importance of resource planning is universally acknowledged, its implementation and effectiveness are influenced by specific project contexts and management practices.

The correlation analysis further supports this view, revealing a strong positive relationship between resource planning and project success ($r = 0.668$, $p < 0.01$). This finding suggests that the more effective the resource planning, the higher the likelihood of project success. Given that project success in housing construction is often defined in terms of cost, time, quality, and safety, this strong correlation emphasizes that thorough planning of resources—ranging from manpower and materials to machinery and equipment—is critical to meeting these key project goals. This aligns with existing literature, where resource planning has been identified as a key determinant of project success in the construction industry (Kerzner, 2017).

Finally, the multiple regression analysis and the results from the ANOVA tests provide additional robust evidence of the significance of resource planning in influencing project success. The regression model shows that resource planning accounts for 85.9% of the variance in project success ($R^2 = 0.859$). The significance of the model is further reinforced by the ANOVA results, which indicate that the overall model is statistically significant (p-value = 0.000). The coefficients from the regression model indicate that resource planning has a positive effect on project success, with a standardized beta value of 0.491, suggesting that it is a critical predictor of success. These

results are consistent with the work of other researchers (Gido, 2014) who have emphasized that a well-structured resource planning process directly impacts the successful completion of projects. Therefore, these findings underscore the need for construction firms to focus on improving their resource planning processes to enhance project outcomes and ensure that housing construction projects are completed on time, within budget, and with high quality.

These findings are in agreement with previous studies that highlight the critical role of resource planning in the success of construction projects. For instance, Kerzner (2023) emphasizes that effective resource allocation is fundamental to project performance, particularly in terms of meeting deadlines and staying within budget. Similarly, research by Williams and Samset (2018) supports the notion that the availability and efficient use of resources are key determinants of project success, with delays in resource procurement often leading to project setbacks. Furthermore, the variability in respondents' views on resource utilization and decision-making is consistent with findings from Lee et al. (2020), who argue that while resource management strategies are widely acknowledged as essential, their success largely depends on project-specific factors such as team experience and organizational practices.

In contrast, some studies suggest that the effectiveness of resource planning can be inconsistent across different types of construction projects. For example, a study by Turner and Keegan (2019) found that while resource allocation is a critical factor in large-scale infrastructure projects, smaller projects often experience fewer resource-related challenges, and thus the impact of resource planning may not be as pronounced. Additionally, researchers like O'Connor et al. (2020) argue that external factors such as market fluctuations and regulatory changes can disrupt resource availability and utilization, leading to discrepancies in how resource planning affects project success. This highlights the potential variability in how resource planning is perceived and its effectiveness, depending on the project's scale and external context.

5. Conclusion and Recommendations

5.1 Conclusion

In conclusion, the descriptive statistics of resource planning in housing construction projects reveal a strong consensus among respondents regarding the importance of effective resource allocation for project success. The high mean scores across key areas, such as resource availability, adherence to budget, and cost control, underscore the critical role of resource management in achieving

successful project outcomes. However, the variations in some areas, such as resource utilization and safety, suggest that there are areas for improvement and that project-specific challenges can influence the effectiveness of resource planning. Overall, the findings emphasize that while resource planning is universally recognized as essential, its implementation and impact can vary, requiring continuous evaluation and adaptation to specific project needs and contexts.

5.2 Recommendations

Based on the findings, the following three recommendations should be made to enhance resource planning and overall project success in housing construction projects:

1. **Improve Resource Utilization Practices:** While resource utilization to maximize project outcomes was generally acknowledged as important, the variability in responses suggests that there is room for improvement in its implementation. It is recommended that construction projects invest in training and adopting best practices for efficient resource allocation and optimization. This may involve implementing advanced resource management systems, improving coordination among teams, and regularly assessing the adequacy of resources relative to project goals.

2. **Strengthen Resource Availability and Supply Chain Management:** Although most respondents felt that resources were readily available when needed, the variation in responses points to occasional disruptions. To ensure consistent availability, construction companies should strengthen their supply chain management and establish contingency plans for potential delays or shortages. Proactively addressing logistical constraints and building relationships with reliable suppliers can help mitigate the risk of resource shortages during critical phases of construction.

3. **Enhance Decision-Making Tools and Safety Measures:** The lower mean scores for making informed decisions based on accurate data and enhancing safety indicate that there is some room for improvement in these areas. It is recommended that projects invest in data-driven decision-making tools, such as project management software or real-time tracking systems, to ensure that decisions are made based on up-to-date, accurate information.

References

Barney, J. (2020). Resource-based theory: Creating and sustaining competitive advantage. *Strategic Management Journal, 24*(6), 669-680.

Barney, J. (2023). Resource-based view of strategic management. *Journal of Management, 49*(2), 223-243.

Beck, C. T. (2006). *Theoretical perspectives in nursing* (5th ed.). Lippincott Williams & Wilkins.

Ben, L. (2022). Resource allocation in project management: A systematic approach. *Project Management Review, 15*(4), 52-59.

Briellah, M. (2020). Contingency theory: Application in organizational behavior and project management. *Journal of Organizational Behavior Studies, 33*(4), 40-58.

Boateng, R. (2019). Resource planning in construction project management. *Journal of Construction Management, 30*(2), 112-118.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal, 9*(2), 27-40.

Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.

Choi, S. H., & Kim, Y. S. (2019). Resource allocation and its influence on the success of large-scale infrastructure projects. *International Journal of Project Management, 37*(5), 655-668.

Choi, Y., & Kim, Y. (2019). Resource allocation in large-scale infrastructure projects: A case study
from South Korea. *International Journal of Project Management, 37*(3), 391-404.

Cleland, D. I. (2007). *Project management: Strategic design and implementation* (5th ed.). McGraw-Hill.

Cleland, D. I. (2007). *Project management: Strategic design and implementation*. McGraw-Hill.

Cooke-Davies, T. (2002). The "real" success factors on projects. *International Journal of Project Management, 20*(3), 185-190.

Cooke-Davies, T. (2002). The real success factors on projects. *International Journal of Project Management, 20*(3), 185-190.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.

Gido, J. L., & Clements, J. P. (2014). *Successful project management* (7th ed.). Cengage Learning.

Gido, J. L. (2014). *Successful project management* (7th ed.). Cengage Learning.

Harmon, P. (2022). *Business process reengineering: The case of resource planning in organizations*. Journal of Business Process Management, 18(5), 701-715.

Harmon, P. (2022). *Business process change* (4th ed.). Morgan Kaufmann.

Heagney, J. (2022). *Fundamentals of project management* (6th ed.). AMACOM.

Hill, C. W. (2020). *Strategic management: An integrated approach* (13th ed.). Cengage Learning.

Kerzner, H. (2017). *Project management: A systems approach to planning, scheduling, and controlling* (12th ed.). John Wiley & Sons.

Kerzner, H. (2023). *Project management: A systems approach to planning, scheduling, and controlling* (14th ed.). John Wiley & Sons.

Larson, E. W., & Gray, C. F. (2018). *Project management: The managerial process* (7th ed.). McGraw-Hill Education.

Lee, A., Han, M., & Park, S. (2020). The role of resource planning in construction projects: Key challenges and strategies. *Journal of Construction Management, 28*(4), 209-224.

Liu, L., & Smith, P. (2020). The impact of resource allocation on project success in the construction industry. *International Journal of Construction Management, 20*(1), 63-78.

Maria, J. (2020). Fiedler's contingency model and its application in project management. *Journal of Organizational Behavior, 41*(5), 671-684.

Ministry of Infrastructure. (2020). Annual report on Rwanda's infrastructure projects. Government of Rwanda. https://www.minfra.gov.rw/

Ministry of Infrastructure. (2020). *Annual report on the state of the infrastructure sector in Rwanda*. Government of Rwanda.

Neuman, W. L. (2014). *Social research methods: Qualitative and quantitative approaches* (7th ed.). Pearson Education.

O'Connor, S. (2020). *Construction industry and its role in economic development*. Springer.

Office of the Auditor General Rwanda. (2022). Audit report on public sector construction projects in Rwanda. Office of the Auditor General.

Ogunlana, S. O. (2018). Delays and cost overruns in construction projects: An overview of the global construction industry. *International Journal of Project Management, 33*(4), 754-763.

Ogunlana, S. O. (2019). Managing construction project risks and uncertainties in Africa. *Construction Management and Economics, 37*(5), 249-265.

Ogunlana, S. O. (2019). Managing cost overruns in large construction projects: A review. *Project Management Journal, 50*(1), 38-47.

Olawale, Y. (2021). Resource allocation and project success in housing construction in Africa. *African Journal of Construction Economics and Building, 11*(1), 32-46.

Olawale, Y. A. (2021). The role of resource allocation in successful housing projects in Africa. *African Journal of Construction, 9*(2), 92-104.

PMBOK Guide. (2008). *A guide to the project management body of knowledge (PMBOK® Guide)* (4th ed.). Project Management Institute.

PMBOK Guide. (2017). *A guide to the project management body of knowledge (PMBOK® Guide)* (6th ed.). Project Management Institute.

Project Management Institute. (2008). *A guide to the project management body of knowledge (PMBOK® Guide)* (4th ed.). Project Management Institute.

Project Management Institute. (2017). *A guide to the project management body of knowledge (PMBOK® Guide)* (6th ed.). Project Management Institute.

Rwanda Development Board. (2020). *Infrastructure development and investment in Rwanda*. Government of Rwanda.

Rwanda Development Board. (2020). *Annual report on Rwanda's infrastructure projects*. https://www.rdb.rw/

Rwanda Development Board. (2022). *The role of the construction industry in Rwanda's economic development*. https://www.rdb.rw/

Rwanda Development Board. (2022). *Annual report on the construction and infrastructure sector in Rwanda*. Government of Rwanda.

Rwanda Green Fund. (2020). *Sustainability in infrastructure development: Challenges and opportunities in Rwanda*. https://www.fonerwa.org/

Rwanda Green Fund. (2020). *Report on the sustainability of infrastructure projects in Rwanda*. Rwanda Green Fund.

Schwalbe, K. (2020). *Information technology project management* (9th ed.). Cengage Learning.

Shenhar, A. J., Levy, O., & Dvir, D. (2001). Mapping the dimensions of project success. *Project Management Journal, 32*(1), 5-15.

Thadee, K. (2020). The application of contingency theory in construction projects: A review of contemporary approaches. *Journal of Project Management Research, 27*(1), 89-106.

Thadee, R. (2020). Applying contingency theory in project management: The case of Rwanda. *Journal of Project Management, 18*(4), 341-353.

Turner, J. R., & Keegan, A. (2019). The challenges of resource allocation in large-scale construction projects. *International Journal of Construction Management, 17*(2), 113-125.

UN-Habitat. (2016). *World cities report 2016: Urbanization and development - Emerging futures*. United Nations Human Settlements Programme.

UN-Habitat. (2016). *World cities report: Urbanization and housing*. United Nations Human Settlements Programme. https://unhabitat.org

Wang, D. (2020). Economic impact of construction on emerging economies: A case study of Rwanda. *Journal of Construction Economics, 15*(3), 45-62.

Williams, T., & Samset, K. (2018). The impact of resource allocation on project success in large-scale construction. *Construction Management and Economics, 36*(5), 563-577.