Journal of
Entreprenuership and
Project Management
(JEPM)

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CARI Journals

Journal of Entrepreneurship and Project Management
ISSN: 2520-9116 (Online)
Vol.9, Issue No.2, pp 26 – 37, 2024
www.carijournals.org

Resource Planning and Collapse of Buildings in Kiambu County, Kenya

[1]Rehema Kemuma Nyabuga, [2]Dr. Benard Lango, PhD

[1]Scholar, Jomo Kenyatta University of Agriculture and Technology, Kenya

https://orcid.org/ 0009-0001-8165-3454

[2]Senior Lecturer, Jomo Kenyatta University of Agriculture and Technology, Kenya

Department of Entrepreneurship, Technology Leadership and Management,

Faculty of Social and Management Sciences

Accepted: 16th Sep 2024 Received in Revised Form: 26th Sep 2024 Published: 15th Oct 2024

Abstract

Purpose: The research sought to find out the impacts of resource planning on building collapse in Kiambu County, Kenya. Therefore, this research aimed to establish the impact of resource planning on building collapse in Kiambu to be able to advise on how to contain the problem and enhance the non-collapse of such buildings.

Methodology: In this study, the authors adopted a simple random sampling technique to identify construction projects in Kiambu County based on Kahneman and Tversky's Scheduling Fallacy Theory that covers problems such as over-optimism and false resource forecasting on resource requirement necessary for efficient completion of the project. The descriptive research method was also used in the study since it included both qualitative and quantitative data. The population of the study consisted of 545, which included the employees from the physical planning department, architects, surveyors, engineers, and contractors' builders, and finally the sample size came to 231 as estimated By Yamane, 1967.

Findings: The research findings revealed that poor resource management has partly influenced building failures. Attempts by the contractors to solve the problem and eradicate the vice have been frustrated by the locals and politicians for their selfish reasons which have not been highlighted in this study. The research also pointed out that handling of resources reveals the highest mean score of 4.1773 this means that most respondents hold positive attitudes towards their practice of resource planning.

Unique Contribution to Theory, Policy, and Practice: The Scheduling Fallacy Theory of 1979 by Kahneman and Tversky was utilized to examine the construction collapses of Kiambu County and the cognitive biases of underestimating time, resources, and costs in construction projects. The study suggested that strict adherence to building codes, better regulatory standards, risk evaluation, and better resource allocation are needed. Prevention was recommended through cross-sector collaboration of government, developers, contractors, and regulatory bodies alike. Empirical research into resource planning faults and their impact on structural integrity was proposed.

Keywords: *Resource Planning, Feasibility Studies, Resource Management Audits, Collapsing of Buildings.*

1.1 Background

Out of all the counties in Kenya, Kiambu has received a lot of attention within the last twenty years over the many building failures and collapses especially ten of them. Given these challenges, the construction sector remains to be one of the significant sub-sectors in Kiambu County contributing immensely to its Gross County Product (GCP). The sector has an output of KSH 120 million thus contributing KSH 16.8% of the county's estimated Gross County Product (GCP) of KSH 721 million (KNBS, 2022). This implies a vigorous construction industry that could be attributed to a combination of residential and business building activities and presumably endowed on Kiambu's strategic position as a transit center for commuter transport to Nairobi and as a producer of horticultural products. Nonetheless, Nairobi shows a higher level of construction output than does Kiambu but as a proportion of gross construction production, Kiambu reveals itself to have a considerably higher dependency.

Aminah and Minato (2017) investigated the relationship between insufficient feasibility studies and the prevalence of construction defects. The objective of the investigation was to pinpoint particular deficiencies in feasibility studies that lead to building failures, emphasizing the significance of thorough feasibility evaluations in enhancing the results of construction projects. The study utilized a case study approach, examining three failed construction projects in Indonesia. The study uncovered significant findings regarding the critical elements contributing to construction failures. In all three case studies, insufficient evaluation of soil conditions resulted in foundation issues and structural instability, underscoring a notable lapse in planning. Secondly, costs were not accurately estimated in the course of achieving feasibility; this resulted in problems of too expensive costs, thereby reducing the quality of the materials used and the quality of workmanship thus affecting the generalized outcomes of the project.

Thirdly, several feasibility gaps were evident in project timing leading to hasty constructions and compromising structures to reduce the emission of lighter materials, increasing the chances of defects. Finally, it was found that there was poor participation of the stakeholders in the feasibility phase to help in the early identification of risks. In light of the foregoing, one can suggest the following ways through which the impending risks associated with building collapses in future projects can be managed; It is very critical to pay adequate attention to some vital areas like soil investigation, cost control, schedules, and stakeholders. In the context of sustainable construction, Alwan and Lingard (2023) aimed at an improved integration of resource management audits (RMAs). The authors produced a conceptual paper, which analyses the existing literature and industry practices associated with RMAs and sustainability in construction, while emphasizing the essential function of RMAs in identifying potential for resource management, minimization of waste materials, and sustainable procurement of resources.

The result of the research was formulated in the idea that integration of RMAs with LCA and BIM helps to enhance their impact on the sustainability agenda. The authors pointed out that case studies help demonstrate how RMAs can be used in generating practical solutions for achieving

sustainable construction outcomes and create a foundation for the dissemination of such concepts in the construction industry. Based on the mixed-methods study conducted by Hasimoglu et al. (2023), the research objectives were to understand the safety culture relationship with the management of resources in construction projects. The study comprised quantitative questionnaires and qualitative interviews involving specialists in the construction industry as well as identifying improved resource management practices including RMAs as safety improvement factors. Some of the issues that were deemed relevant corresponding to those listed in the research hypotheses include the adequacy of equipment maintenance, training, and resource deployment.

This piece of research pointed out that there is a mutual dependency between the relationship. A strong safety culture connects efficiency with the careful usage of a resource, pointing out that the efficient use of resources strengthens the safety climate. Recommendations included the setting up of safety-oriented RMAs; the pursuit of cooperation between safety and resource management; and the prioritization of resource expenditure towards training endeavors that enhance resource utilization within the construction industry.

1.2 Statement of problem

The construction sector helps advance a nation's economy; hence, adequate execution of projects requires well-coordinated resources (Corbett, 2020). Resource planning is a key guiding framework to ensure that all financial, operational, legal, and regulatory aspects of a project are well coordinated with the design, approval acquiring resources, and construction phases of a project. Fundamental to the optimum course of construction projects is the efficient use of resources such as materials, human resources, and time (Gigado, 2021). For instance, resource management allows architects, surveyors, and contractors, among others, to improve coordination, hence averting comprise, time lag, and cost in construction.

Kenya has in the recent past seen many building collapses with Kiambu County recording more than ten cases in the last decade. In 2009, a five-story building collapsed because of loosely constructed ground, and ten people died, and seventeen were injured. However, a different four-storied building that had been under construction in 2014, broke down and led to three deaths and four cases of injuries (Mwanza, Namusonge, and Makokha, 2020). Nevertheless, the occurrence of these periodic breaks can be determined as rather common, whereas the investigation of the causes of such phenomena is rather limited.

Other researchers who closely studied the impact of planning strategies concerned with projects were Mwanza et al. (2020), and Muute (2019) but none targeted the relation between the planning of resources and collapses in Kiambu County. The research therefore seeks to fill the above gap by establishing the effects of resource planning on structural failures in Kiambu County-Kenya.

1.3 Research Objectives

1.3.1 General Objective

To establish the influence of resource planning on the collapse of buildings in Kiambu County, Kenya.

1.3.2 Specific Objectives

1. To assess the relationship between feasibility study and collapse of buildings in Kiambu County, Kenya

1.4 Research Questions

1. To what extent does a feasibility study affect the collapse of buildings in Kiambu County, Kenya?

2.0 LITERATURE REVIEW

2.1 Introduction

The study reviewed literature related to the influence of resource planning on the collapse of buildings.

2.2 Theoretical Foundation

The Scheduling Fallacy Theory is similar to the concept called the Planning Fallacy developed by Kahneman and Tversky (1979) which outlines a systematic tendency to underestimate time, cost, and risk and overestimate benefits which results in projects running beyond set budgets and time estimates. This theory brings to light some problems due to an ideal schedule that does not capture the real requirements for time and resources for the safe and efficient performance of projects appropriately. This desire to achieve those lofty goals results in all sorts of terrible ramifications.

The desire to avoid any time wastage by arriving at the set project deadlines undermines the project management aspect especially where the project manager might bypass some critical steps and opt for any other faster way of constructing the project merely knowing that the project is due for delivery ignoring the structural and cost implications it has on the project (Yaghootkar & Gil, 2010). For example, concrete curing which is a significant process that takes a lot of time is politically hurried to fit short set schedules resulting in future construction dangers.

2.3 The Concept of Resource Planning and Collapse of Buildings

Aminah and Minato (2017) pointed to the correlation between feasibility studies that are most of the time missed and building flaws frequency. To achieve the stated objectives of the research, which is the demonstration of how the construction projects' feasibility studies enhance the success or failure of constructions, the research aimed at establishing specific shortcomings in the feasibility studies that led to building failure. The studies taken for the research were focused on three construction project failures in Indonesia and the research method used for studies was a case

study. New details on the actual causes of building failures were also discovered in the course of the hearing. First, the observation we made which seems to be common to all three case studies is the fact that Mitchell, Rochelle, and Bel Air's foundation issues and structural instability stemmed from an insufficient or wrong analysis of the soil condition.

Second, the total amount of results of the projects was affected by the reduction of material and workmanship quality due to incorrect cost estimations during feasibility studies and their overestimated indicative prices. Thirdly, there were several issues related to hasty building techniques that compromised structural quality, and have a high probability of issues identified where possibilities were related to unrealistic project schedules in feasibility study. Lastly, getting the prompt identification of hazards became difficult because stakeholders were not involved enough during the feasibility phase. There is consequently a need to tackle several areas as follows to reduce likely building collapse in future projects; Looking at the contribution of the soil studies and cost estimates and the impact of the project schedules as well as the participation of the stakeholders.

Ling and Wong's (2018) study investigated the performance of construction projects based on scheduling and specifically focused on resource scheduling. This was done through the use of a quantitative method specifically a survey questionnaire on 172 construction professionals from Hong Kong of which they have different levels of experience and authority in their workplace. The results indicated that the amount of professional resource scheduling techniques used was directly proportional to all aspects of project performance. Interestingly, the specificity of the approaches and the extent of their linkages to other strategies were perhaps the most susceptible to the project's outcomes. However, the two more close-ended aspects that were manifested were the immediate outcomes showing an improved performance of projects which is attributed to improved use and communication or participation with resources. As the active mediating factors, this research underlined resource utilization and project collaboration as the factors that help turn efficient scheduling theories into improved project results.

Alwan and Lingard's (2023) research sought to enhance the incorporation of RMAs in sustainable construction practices. The authors through the analysis of the reviewed literature and studies in the construction industry underscored the importance of the role of RMAs in seeking solutions for better resource consumption, waste management, and sustainable procurement of materials. Such analysis suggested that RMAs may be still more powerful in their endeavors towards sustainability when integrated with LCA and BIM. That being said, the authors quite rightly stressed that to increase the construction industry's use of RMAs, there is a need for more practical case studies detailing how RMAs may be utilized to obtain more sustainable building results.

3.0 Methodology

This chapter outlines the research method used in achieving the goal of the research. More specifically, target population, and sample size.

3.1 Target Population

The study targets all the employees in the physical planning department of Kiambu County, Northern Corridor Authority, registered architects, quantity surveyors, structural engineers, contractors, and builders of Kiambu County. In the following Table, 1 illustrates the population distribution.

Table 1: Target Population

Department	Target Population
Physical planning department	61
National Construction Authority	73
Architects, Quantity surveyors, and Structural engineers	269
Contractors and Builders	142
Total	**545**

Source: County government of Kiambu (2023); NCA (2022); BORAQS (2022)

3.2 Sample Size

The sample size was ascertained using Yamane's 1967 formula.

$$n = \frac{N}{1 + N(e)^2}$$

Where: N = Population size n = sample size

e = Margin error of the study set at ±5%

Sample size was

n=1+545× (0.05)2545

=230.57

=231

4.0 RESULTS FINDINGS

4.1 Concept of Resource Planning

Table 2: Descriptive Results for Resource Planning

Statement	1(SD)	2(D)	3(MA)	4(A)	5(SA)	Std. Devi	Variance
The feasibility studies conducted before building projects are adequate	0(0%)	3(1.4%	5(2.3%)	116(52.7%)	96(43.6%)	.605	.366
The planning processes effectively address resource allocation for building projects	0(0%)	7(3.2%)	26(11.8%)	112(50.9%)	75(34.1%)	.751	.564
The collaboration between stakeholders during feasibility studies enhances resource planning for building projects	0(0%)	2(0.9%)	19(8.6%)	114(51.8%	85(38.6%)	.657	.432
The resource scheduling mechanisms adequately allocate time and resources for building projects	6(2.7%)	17(7.7%)	51(23.2%)	88(40.0%)	58(26.4%)	1.006	1.013
Architects and quality surveyors are actively involved in the resource scheduling process for building projects	0(0%)	5(2.3%)	27(12.3%)	111(50.5%)	77(35.0%)	.730	.533
County Governments ensure that resource scheduling aligns with the overall project timelines	1(0.5%)	7(3.2%)	31(14.1%)	106(48.2%)	75(34.1%)	.799	.638
Regular resource management audits contribute to identifying and addressing potential issues in building projects	0(0%)	4(1.8%)	26(11.8%)	108(49.1%)	82(37.3%)	.720	.518
The feedback from resource management audits is effectively utilized to improve future resource planning	1(0.5%)	4(1.8%)	22(10.0%)	112(50.9%)	81(36.8%)	.733	.537
Architects and quality surveyors actively participate in resource management audits	2(0.9%)	3(1.4%)	19(8.6%)	114(51.8%)	82(37.3%)	.738	.544

The results shown in the above table 2 underline the importance of resource management in deciding the successful outcomes of any project especially construction projects which are characterized by scarce resources. Further, the concern with general first investigations, like feasibility studies, underscores the importance of the contemplative phases to avoid possible risk factors as well as to ensure adequate resource allocation. As mentioned in the articles under the integrated project development (IPD), much emphasis is placed on the stakeholders and architects and the quality inspectors. Through a review performed by El Asmar, Wang, and Hammad in 2016, it is shown that ‘’IPD systems enhance the consistent collaboration of the key actors to increase project time and resources efficiency.’’ The data strengthens the concept that variability in the specificity and suitability of resource schedule systems fit with Lock's (2020) remarks on this as being a multifaceted area of project management that often requires upgrading procedures to attain optimal working time and resource allocation.

The three focal concepts that Knyziak (2019) encapsulate as important, including the idea of sustainability in project management align with the appreciation of feedback as well as more frequent evaluations of the management of resources. This method is particularly beneficial in industries such as construction, where and dynamic and changing environment can make it difficult to continually align these processes with the broader goals of the project. Thus, implications for the specific knowledge and current body of knowledge are the importance of comprehensive, integrated, and iterative approaches regarding resource planning and management for construction project success.

Table 3: Resource Planning

Variable	N	Mean	Std Deviation	Variance
Resource Planning	220	4.1773	.35272	.124

The results in Table 3 show the result of descriptive analysis on the number of resources planned within a range of samples with 220. The highest mean score of 4.1773 is reported under Resource Planning hence an implication that the respondents have a positive attitude towards their resource planning practices. The result is comparable to the previous calculation of the standard deviation of .35272, which shows that the responses are relatively close to the mean with a variance of .124, which highlighted homogeneity in the perception of the respondents.

4.2 Collapse of Building

Table 4: Correlation Summary Matrix

		Collapse of Buildings	Resource Planning
Collapse of Buildings	Pearson Correlation	1	
	Sig. (2-tailed)		
	The sum of Squares and Cross-products	55.786	
	Covariance	.255	
	N	220	
Resource Planning	Pearson Correlation	.314**	1
	Sig. (2-tailed)	.000	
	The sum of Squares and Cross-products	12.253	27.247
	Covariance	.056	.124
	N	220	220

From Table 4, Resource planning shows a moderate positive correlation with building collapse ($r = .314$, $p < .001$), indicating that effective resource allocation can potentially reduce the incidence of building failures.

Table 5: Linear Regression Analysis between Resource Planning and Collapse of Buildings in Kiambu County

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.314[a]	.099	.095	.48023

a. Predictors: (Constant), Resource Planning

b. Dependent Variable: Collapse of Buildings

As shown in Table 5, The values obtained for R Square show that a unit increase in resource planning affects the collapse of the buildings by 9.9%, Thus resource planning has a statistically significant relationship with the response variable/dependent variable (collapse of building) in Kiambu County, Kenya.

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Thus, the focus is made on inclusion and engagement in project management, and, therefore, the involvement of stakeholders during the feasibility studies contributes to proper resource estimation. Those in the architect and quality surveyors are perfect when it comes to resource scheduling and management audits. They may not be able to actively improve even if they have a positive attitude toward their performance to ensure that assignments are completed correctly. Nevertheless, to some extent, coordinating resource schedules with the project calendar of the county government is considered helpful. Deficiencies may emerge during a resource management audit conducted from time to time, and any discrepancies discovered should be correct to preserve the IIER project's integrity and productivity. Some of these changes may assist in optimizing the use of audit data for better practice. The study reveals that building projects require good planning, and exceptional coordination and must be regularly reviewed. There is a need to have constant feedback for audit input and the participation of a critical expert in the completion of the project and its progression.

5.2 Recommendations

The various types of communication channels that were suggested in this study are related to the notion that appropriate official means of interaction and collaborative tools should enhance the existing flow of information and decision-making processes. The roles in architectural and quality surveying of responsibilities in resource planning and audits should be expanded and distinguished more sharply. If these people are provided with more tools and directions then they can play a competent part in their capacity as experts. There is a need for county governments to incorporate more integrated project management systems to have flexibility between resource and project schedules. Continual evaluations, and shifts throughout the progress of projects, or adaptations based on changes in focus, can also help in the cause of keeping alignment. While getting regular resource management audits is critical getting the effect of it may be heightened by ensuring the comments are systematically incorporated in the next development projects. Continual enhancement can also stem from making audit outcomes the key drivers of project improvements. It is essential to have continual professional growth for every participant in a construction project. Competence with modern practices as well as tools and technologies, encompasses training in the latest trends in project management. Adopting these suggestions can go a long way in revamping the existing project management skills, hence generating improved, efficient results.

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