



## **RESOURCE PLANNING, DIGITAL RESOURCE ALLOCATION, AND PROJECT PERFORMANCE IN THE CONSTRUCTION SECTOR OF RIVERS STATE, NIGERIA**

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<b>ABSTRACT</b>	<b>KEYWORDS</b>
<p>This study examined the influence of resource planning and digital resource allocation on project performance in the construction sector of Rivers State, Nigeria. Guided by the positivist paradigm and anchored on the Resource-Based View (RBV) theory, the research aimed to determine the extent to which structured planning and digital tools drive cost, time, and quality outcomes in construction projects. A cross-sectional research design was adopted, and data were collected from 222 management staff across 10 construction firms using a structured 15-item questionnaire measured on a five-point Likert scale. Validity was ensured through expert review and literature grounding, while reliability was confirmed via a pilot study and Cronbach’s Alpha. Pearson Product-Moment Correlation Coefficient was used for data analysis. The findings revealed strong, positive, and statistically significant relationships between resource planning and project performance (<math>r = .709, p &lt; .05</math>), and between digital resource allocation and project performance (<math>r = .739, p &lt; .05</math>). These results demonstrate that effective planning and the integration of digital systems enhance coordination, resource utilization, and stakeholder satisfaction, ultimately improving project efficiency in resource-constrained environments. The study concluded that construction firms that adopt comprehensive planning frameworks and digital allocation platforms are better positioned to achieve competitive advantage through improved project delivery. It recommended that firms strengthen resource planning practices by institutionalizing adaptive planning frameworks, conducting resource audits, and deploying tools such as Microsoft Project for real-time monitoring. Furthermore, firms were advised to enhance digital resource allocation by adopting platforms like BIM and cloud-based systems, investing in staff training, conducting implementation audits, and integrating digital tools with existing workflows to minimize wastage and delays.</p>	<p>Resource Planning, Digital Resource Allocation, Project Performance, Construction Sector</p>

## Introduction

The construction sector in Nigeria is a cornerstone of the national economy, contributing significantly to the Gross Domestic Product (GDP), generating substantial employment opportunities, and facilitating foreign exchange earnings through infrastructure development and international partnerships (Mustapha et al., 2023). However, the industry faces persistent challenges, including resource scarcity, regulatory complexities, and political instability, which frequently lead to cost overruns, project delays, and compromised quality, thereby undermining project performance (Osamudiamen et al., 2022). These issues exacerbate inefficiencies in project performance.

Project performance, encompassing cost, time, and quality outcomes, serves as a critical measure of success for construction companies, directly influencing stakeholder satisfaction and organizational competitiveness (Buba, 2023). High-performing projects align with budgetary constraints, adhere to schedules, and meet or exceed quality standards, ensuring client satisfaction and sustainable business growth (Mustapha et al., 2023). Achieving robust project performance is vital for construction firms to navigate economic uncertainties and maintain a competitive edge. However, persistent issues such as resource unavailability, poor coordination, and slow decision-making continue to hinder performance (Osamudiamen et al., 2022). Effective resource management strategies, particularly resource planning and digital resource allocation, could serve as potential drivers of improved project outcomes. Resource planning, which involves the strategic identification, acquisition, and scheduling of resources like labor, materials, and equipment, minimizes delays and cost overruns by ensuring timely resource availability (Kibagendi & Sang, 2024; Gitau et al., 2020). Similarly, digital resource allocation leverages advanced tools like Building Information Modeling (BIM) to enable real-time monitoring and agile resource management, enhancing adaptability to project complexities and reducing wastage (Van Thuan & Hai, 2022; Ahsun & Elly, 2024).

Despite the recognized importance of resource management, prior studies have given limited attention to the specific roles of resource planning and digital resource allocation in enhancing project performance within the construction sector of Rivers State, Nigeria. For instance, Ike and Onuoha (2024) focused on continuous improvement in South-South Nigeria but overlooked resource planning and digital tools, while Olasunkanmi et al. (2024) examined organizational culture without addressing these strategic resource management aspects. Buba (2023) concentrated on cost performance factors in Kaduna State, neglecting digital resource allocation and broader performance metrics, and Van Thuan and Hai (2022) explored organizational culture's impact on cost performance in Vietnam, lacking a Nigeria-specific focus. Osamudiamen et al. (2022) identified general performance barriers in Abuja but did not emphasize strategic resource planning or digital tools. This study, grounded in the Resource-Based View (RBV) theory, addresses this gap by investigating how leveraging valuable, rare, inimitable, and non-substitutable resources such as structured planning processes and digital systems, can drive project performance (Barney, 1991; Teece et al., 1997). The RBV framework posits that effective resource utilization fosters competitive advantage, making it an ideal lens for examining how these strategies enhance cost, time, and quality outcomes in a challenging context (Grant, 1991).

The research problem lies in the persistent poor project performance in Rivers State's construction sector, despite scholarly efforts to identify predictors of success. Cost overruns, delays, and quality issues continue to plague projects, undermining organizational efficiency and stakeholder trust (Osamudiamen et al., 2022). While factors like project management and organizational culture have been explored, the specific contributions of resource planning and digital resource allocation remain

underexamined in this region (Buba, 2023; Olasunkanmi et al., 2024). This gap is critical, as the construction sector's competitiveness hinges on optimizing resources in a resource-scarce environment marked by economic and regulatory challenges (Khatun et al., 2021; Sulistiyowati et al., 2023). Consequently, this study sort to ascertain the influence of resource planning and digital resource allocation of project performance in the construction industry in Rivers State.

## Hypotheses

**H01:** There is no significant relationship between resource planning and project performance.

**H02:** No significant relationship exist between digital resource allocation and project performance.

## Literature Review

### Conceptual Review

**Resource Planning:** Resource planning is a foundational element of project management in the construction sector. It involves identifying, acquiring, and scheduling resources such as labor, materials, equipment, and finances to meet project objectives while ensuring timely availability and optimal utilization (Kibagendi & Sang, 2024). Effective resource planning minimizes delays, controls costs, and enhances project outcomes by ensuring resources are available when needed, as highlighted by the use of tools like Gantt charts and techniques such as resource leveling and smoothing (Gitau et al., 2020). In a dynamic construction environment, challenges such as inaccurate resource estimation and stakeholder misalignment often complicate planning efforts, necessitating thorough initial resource analysis and continuous monitoring to adapt to changing project demands (Mustapha et al., 2023). By aligning resources with project timelines and priorities, construction firms can mitigate risks like cost overruns and schedule delays, thereby improving overall project efficiency and stakeholder satisfaction in a resource-constrained setting (Kiungo & Otieno, 2023).

**Digital Resource Allocation:** Digital resource allocation has emerged as a transformative strategy in the construction industry, given that it enhances project adaptability and efficiency in managing complex projects. This approach leverages digital tools to enable real-time monitoring, reassessment, and reallocation of resources, allowing project managers to respond swiftly to evolving project conditions such as scope changes or supply chain disruptions (Van Thuan & Hai, 2022). By employing techniques like just-in-time allocation and agile resource management, digital systems reduce waste, prevent resource conflicts, and optimize utilization, which is critical in the face of Nigeria's economic and regulatory challenges (Khatun et al., 2021). Despite its benefits, the implementation of digital resource allocation faces hurdles such as the need for accurate data inputs and significant investments in technology and training, which can be barriers for some firms (Sulistiyowati et al., 2023). Nonetheless, the ability to track resource usage in real-time and make data-driven adjustments positions digital resource allocation as a vital tool for improving project performance and achieving cost, time, and quality objectives (Ahsun & Elly, 2024).

**Project Performance:** Project performance serves as a critical measure of success, encompassing cost, time, and quality outcomes that align with project objectives and stakeholder expectations. It is influenced by effective resource allocation strategies and organizational practices, with efficient management of resources directly impacting a project's ability to meet budgetary, scheduling, and quality targets (Buba, 2023). Project performance is often challenged by factors such as resource

scarcity, regulatory complexities, and political instability, which can lead to cost overruns, delays, and compromised quality (Osamudiamen et al., 2022). The adoption of modern technologies, such as Building Information Modeling (BIM), and robust stakeholder management are essential for mitigating these challenges and enhancing performance outcomes (Ikwueze & Nnadi, 2024). By integrating strategic resource planning and digital tools, construction firms can address these issues, ensuring projects are delivered efficiently and sustainably, thereby boosting organizational competitiveness and client satisfaction (Mustapha et al., 2023).

## Theoretical Framework

**Resource-Based View (RBV) Theory:** The Resource-Based View (RBV) Theory, first introduced by Edith Penrose in 1959 and later formalized by Jay Barney in 1991, is a strategic management framework that emphasizes the role of a firm's internal resources in achieving sustained competitive advantage. The core tenet of RBV is that firms can outperform competitors by leveraging unique resources that are valuable, rare, inimitable, and non-substitutable (VRIN), as outlined by Barney (1991). These resources, which include tangible assets like equipment and intangible assets like organizational culture or expertise, form the basis for creating strategic advantages when bundled effectively (Grant, 1991). The theory posits that differences in firm performance stem from the effective utilization of these resources, with dynamic capabilities allowing firms to adapt their resource base to changing environments (Teece et al., 1997). However, RBV has faced criticism for its heavy focus on internal resources while underemphasizing external factors such as market dynamics or competitive forces, as noted by Porter (1985), who argues that industry structure plays a significant role in performance. Despite this, RBV remains a robust framework, often integrated with other theories to provide a holistic view of strategic management.

RBV provides a critical lens for understanding how construction firms can optimize project outcomes through strategic resource management. The theory underscores the importance of leveraging unique resources, such as skilled labor, advanced digital tools, and organizational expertise, to enhance resource planning and digital resource allocation, which directly influence project performance metrics like cost, time, and quality (Barney, 1991). For instance, firms that invest in rare and inimitable resources, such as specialized project management software or trained personnel, can improve resource allocation efficiency, leading to better project execution in a region marked by resource scarcity and economic challenges (Teece et al., 1997). Additionally, RBV's emphasis on dynamic capabilities supports the adoption of digital resource allocation strategies, enabling firms to adapt to project complexities and regulatory changes, thereby enhancing competitiveness and sustainability in the construction sector (Pratama et al., 2023). Thus, RBV underpins the study's exploration of how effective resource management drives superior project performance in this context.

Empirical Review and Gap Analysis

Table 1: Webometrics of Gap Analysis

S/N	Author(s)/ Year	Country	Topic/ Objectives	Methodology	Findings	Conclusion	Gaps	Comparison with Current Study
1	Ike & Onuoha (2024)	Nigeria	Examine the relationship between continuous improvement and project performance of construction firms in South-South, Nigeria.	Quantitative, cross-sectional design; population of 695 managers/supervisors; sample size of 248 using Krejcie and Morgan's (1970) table; simple random sampling; structured questionnaire; analyzed using Structural Equation Modelling (SEM) with Smart PLS 3.3.3.	Significant positive relationship between continuous improvement and project performance, indicating process enhancements improve outcomes.	Continuous improvement is critical for viable and successful project performance in South-South Nigeria's construction firms.	Lacks focus on resource planning and digital resource allocation; does not explicitly use RBV theory; limited to continuous improvement as a factor.	Current study uses RBV theory, focuses on resource planning and digital allocation, and employs Pearson Correlation with a smaller sample (222) across 10 firms, unlike SEM and larger sample in Ike & Onuoha.
2	Olasunkanmi et al. (2024)	Nigeria	Explore the influence of organizational culture on the success of construction projects in Nigeria, beyond time, cost, and quality metrics.	Quantitative survey; 1,233 respondents, 975 valid responses; analyzed using Kruskal Wallis Test; questionnaire-based data collection.	Innovative culture, supportive leadership valuing creativity, and fair service conditions significantly contribute to project success.	Organizational culture is essential for successful project outcomes in Nigeria's construction industry.	Does not address resource planning or digital resource allocation; no explicit RBV framework; focuses solely on cultural factors.	Current study integrates RBV, examines resource planning and digital allocation alongside performance, uses Pearson Correlation with 222 respondents, contrasting with broader cultural focus and Kruskal Wallis Test.
3	Buba (2023)	Nigeria	Investigate factors influencing cost performance in construction projects in Kaduna State, Nigeria, for effective cost management.	Quantitative; population of 827; sample size of 270 via simple random sampling; 198 questionnaires returned; analyzed using exploratory factor analysis.	Seven factors (project management, expertise, market forces, contract management, socioeconomic, government policies, external factors) explain 75.782% of cost performance variance.	Focusing on identified factors reduces costs and enhances cost performance in construction projects.	Limited to cost performance; does not explore digital resource allocation or RBV theory; lacks emphasis on time and quality metrics.	Current study uses RBV, includes digital resource allocation, and assesses cost, time, and quality with Pearson Correlation, differing from Buba's cost-focused factor analysis.
4	Osamudiamen et al. (2022)	Nigeria	Examine factors affecting project performance in building construction projects in FCT, Abuja, Nigeria, and propose improvement modalities.	Cross-sectional questionnaire survey (2019–2022); purposive sampling; 100 questionnaires to contractors, architects, clients, engineers, builders; analyzed using frequency, percentile, and relative importance index (RII).	Cost factors (material price escalation, design changes, contract discrepancies), time factors (resource unavailability, slow decisions, variation orders), and quality factors (inexperienced personnel, poor coordination, limited managerial involvement) hinder performance.	Identified factors significantly impact project performance; regular reviews and leadership are key to improvement.	Does not focus on digital resource allocation or RBV theory; limited to general performance factors without strategic resource planning emphasis.	Current study uses RBV, emphasizes digital resource allocation and strategic planning, and employs Pearson Correlation with a larger sample (222) compared to purposive sampling and RII analysis.
5	Van Thuan & Hai (2022)	Vietnam	Investigate the impact of project organizational culture on cost performance in construction projects.	Survey of 199 completed projects; principal component factor analysis and Structural Equation Modelling (SEM).	Commitment orientation and shared understanding improve cost performance; commitment mediates leadership and supportive orientations.	Organizational culture is a critical determinant of cost performance in construction projects.	Focuses only on cost performance and culture; does not address resource planning, digital allocation, or RBV theory; not Nigeria-specific.	Current study uses RBV, includes digital resource allocation and broader performance metrics (cost, time, quality), uses Pearson Correlation, and is Nigeria-focused, unlike SEM and culture focus in Vietnam.

Methodology

The study adopted a cross-sectional research design underpinned by the positivist philosophical paradigm to systematically investigate the relationships between resource allocation strategies and project outcomes (Gray, 2018). A total of 222 management staff from 10 construction companies, varying in size and organizational structure, participated by completing a structured questionnaire, ensuring comprehensive coverage through a census approach that eliminated sampling bias (Baridam, 2001; Saunders et al., 2012). The questionnaire, designed with 15 items across three sections, captured demographic characteristics, resource allocation strategies (resource planning and digital resource allocation), project performance, with responses measured on a five-point Likert scale adapted from Pratama et al. (2023) and Ahmed (2023).

Face validity was established by consulting experts in construction project management to ensure questionnaire items were clear and relevant, while content validity was achieved through a thorough literature review and expert feedback to comprehensively cover all dimensions of the variables (Bolarinwa, 2015; Polit & Beck, 2017). A pilot study involving 25 management staff from non-participating construction firms tested the instrument's reliability using Cronbach's Alpha, confirming

its consistency in measuring the intended constructs (Taherdoost, 2016). The use of primary data from a structured questionnaire facilitated direct engagement with respondents, ensuring data specificity and minimizing ambiguity, which is critical for quantitative studies within a positivist paradigm (Creswell & Creswell, 2018; Zikmund et al., 2013). Data analysis was conducted using the Pearson Product-Moment Correlation Coefficient to test hypotheses, aligning with the positivist emphasis on objective, statistical analysis to identify variable relationships (Bryman, 2016).

**Results and Discussion**

**Results and Analyses**

**Table 1: Demographic Analyses**

<b>Age Group Distribution</b>				
	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
Less than 35 years	47	21.2	21.2	21.2
35 - 45 years	72	32.4	32.4	53.6
46 - 55 years	75	33.8	33.8	87.4
56 years and above	28	12.6	12.6	100.0
<b>Total</b>	<b>222</b>	<b>100.0</b>	<b>100.0</b>	
<b>Educational Level Distribution</b>				
B.Sc. or Equivalent	54	24.3	24.3	24.3
Masters or Equivalent	146	65.8	65.8	90.1
PhD or Equivalent	22	9.9	9.9	100.0
<b>Total</b>	<b>222</b>	<b>100.0</b>	<b>100.0</b>	
<b>Length of Time in Construction Industry Distribution</b>				
1 - 5 years	82	36.9	36.9	36.9
6 - 10 years	66	29.7	29.7	66.7
10 years and above	74	33.3	33.3	100.0
<b>Total</b>	<b>222</b>	<b>100.0</b>	<b>100.0</b>	

Table 1 presents the demographic profile of the 222 management staff from 10 construction companies in Rivers State, Nigeria, providing insights into the workforce composition. The age distribution shows a balanced representation, with 33.8% (75 respondents) aged 46–55 years, 32.4% (72 respondents) aged 35–45 years, 21.2% (47 respondents) less than 35 years, and 12.6% (28 respondents) 56 years and above. This distribution suggests a mix of experienced and younger professionals, potentially influencing the adoption of innovative practices like digital resource allocation, as younger staff may be more receptive to technological advancements. The educational level distribution indicates a highly educated workforce, with 65.8% (146 respondents) holding a Master’s degree or equivalent, 24.3% (54 respondents) with a B.Sc. or equivalent, and 9.9% (22 respondents) with a PhD or equivalent. This high educational attainment supports the capacity for strategic resource planning and complex decision-making. Regarding industry experience, 36.9% (82 respondents) had 1–5 years, 29.7% (66 respondents) had 6–10 years, and 33.3% (74 respondents) had over 10 years, indicating a blend of early-career and seasoned professionals capable of providing diverse perspectives on resource allocation and project performance.

Univariate Analyses

Table 2: Descriptive Statistics on Resource Planning

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error	
Our company conducts comprehensive resource planning before initiating construction projects.	222	1	5	3.88	1.006	-1.287	.163	1.675	.325
Resource planning in our organization ensures the availability of materials, labor, and equipment as needed.	222	1	5	3.62	1.047	-.888	.163	.395	.325
We consistently review and adjust our resource plans to address unforeseen project challenges.	222	1	5	3.53	1.023	-.918	.163	.405	.325
The resource planning process in our company is guided by accurate project forecasts and timelines.	222	1	5	3.60	1.031	-.843	.163	.252	.325
Adequate resource planning in our organization has contributed to improved project performance.	222	1	5	3.55	1.074	-.894	.163	.350	.325
Valid N (listwise)	222								

The descriptive statistics for resource planning, as shown in Table 2, indicate strong agreement among respondents regarding the implementation of resource planning practices in construction firms. The highest mean score was for “Our company conducts comprehensive resource planning before initiating construction projects” (M = 3.88, SD = 1.006), suggesting that firms prioritize thorough planning, with a negative skewness (-1.287) indicating a tendency toward agreement. Other items, such as “Resource planning in our organization ensures the availability of materials, labor, and equipment as needed” (M = 3.62, SD = 1.047) and “The resource planning process in our company is guided by accurate project forecasts and timelines” (M = 3.60, SD = 1.031), also reflect positive perceptions, though with slightly lower agreement and moderate variability (SDs ranging from 1.023 to 1.074). The negative skewness values (ranging from -0.843 to -1.287) and positive kurtosis (up to 1.675) suggest a concentration of responses toward higher agreement, indicating robust resource planning practices.

Table 3: Descriptive Statistics on Digital Resource Allocation

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Std. Error
Our company uses digital tools to monitor and allocate resources across ongoing projects.	222	1	5	2.83	1.103	.151	.163	-.679	.325
The use of digital platforms for resource allocation has reduced wastage in our organization.	222	1	5	2.90	1.149	.141	.163	-.877	.325
We rely on real-time digital data to make informed decisions about resource allocation.	222	1	5	3.15	1.123	-.286	.163	-.800	.325
Digital resource allocation tools in our company enhance communication and coordination among teams.	222	1	5	3.15	1.086	-.138	.163	-.755	.325
Our adoption of digital resource allocation systems has improved the efficiency of our operations.	222	1	5	3.60	.911	-.860	.163	.854	.325
Valid N (listwise)	222								

Table 3 presents the descriptive statistics for digital resource allocation, revealing mixed perceptions among respondents. The highest mean score was for “Our adoption of digital resource allocation systems has improved the efficiency of our operations” (M = 3.60, SD = 0.911), indicating strong agreement that digital tools enhance operational efficiency, with negative skewness (-0.860) suggesting a tendency toward agreement. However, lower mean scores for items like “Our company uses digital tools to monitor and allocate resources across ongoing projects” (M = 2.83, SD = 1.103) and “The use of digital platforms for resource allocation has reduced wastage in our organization” (M = 2.90, SD = 1.149) suggest moderate agreement and higher variability in responses (SDs from 0.911 to 1.149). The positive skewness for some items (e.g., 0.151 for digital tool usage) indicates a slight tendency toward disagreement, while negative kurtosis values (e.g., -0.877) suggest a flatter distribution of responses.

Table 4: Descriptive Statistics on Project Performance

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Std. Error
Our projects are completed within the approved budget.	222	1	5	3.14	1.052	-.212	.163	-.407	.325
Delays in project execution are minimized through effective resource allocation.	222	1	5	2.87	1.098	.066	.163	-.578	.325
Our company consistently delivers projects that meet or exceed quality standards.	222	1	5	2.82	1.106	.090	.163	-.747	.325
Effective resource allocation has helped our company reduce project costs.	222	1	5	2.97	1.133	-.172	.163	-.840	.325
Timely resource allocation ensures smooth workflow across all project phases.	222	1	5	2.84	1.093	.096	.163	-.640	.325
Valid N (listwise)	222								

The descriptive statistics for project performance, shown in Table 4, indicate moderate agreement among respondents regarding cost, time, and quality outcomes. The highest mean score was for “Our projects are completed within the approved budget” (M = 3.14, SD = 1.052), suggesting moderate success in cost performance, with slight negative skewness (-0.212) indicating a tendency toward agreement. Other items, such as “Our company consistently delivers projects that meet or exceed quality standards” (M = 2.82, SD = 1.106) and “Delays in project execution are minimized through effective resource allocation” (M = 2.87, SD = 1.098), received lower mean scores, reflecting less consistent performance in quality and time metrics. The standard deviations (1.052 to 1.133) indicate moderate variability, and slight positive skewness (e.g., 0.090 for quality performance) suggests some disagreement, possibly due to resource constraints or coordination issues. Negative kurtosis values (e.g., -0.840) suggest a flatter distribution, indicating diverse perceptions of project performance outcomes.

**Bivariate Analysis**

**Table 5: Test of Relationships between Resource Planning, Digital Resource Allocation, and Project Performance**

		Resource Planning	Digital Resource Allocation	Project Performance
Resource Planning	Pearson Correlation	1	.679**	.709**
	Sig. (2-tailed)		.000	.000
	N	222	222	222
Digital Resource Allocation	Pearson Correlation	.679**	1	.739**
	Sig. (2-tailed)	.000		.000
	N	222	222	222
Project Performance	Pearson Correlation	.709**	.739**	1
	Sig. (2-tailed)	.000	.000	
	N	222	222	222

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

The correlation analysis in Table 5 provides empirical evidence for the relationships between resource planning, digital resource allocation, and project performance, supporting the rejection of null hypotheses. Resource planning shows a strong positive correlation with project performance (r = .709, p < .01), indicating that effective planning significantly enhances cost, time, and quality outcomes. Digital resource allocation also exhibits a strong positive correlation with project performance (r = .739, p < .01), suggesting that digital tools significantly contribute to better project outcomes.

**Discussion of Findings**

**Resource Planning and Project Performance**

The finding of a strong positive and statistically significant relationship between resource planning and project performance (r = .709, p < .05) underscores the critical role of strategic resource planning in enhancing project outcomes in the construction sector of Rivers State, Nigeria. This result aligns with the Resource-Based View (RBV) theory, which posits that effective deployment of valuable and inimitable resources, such as structured planning processes, drives competitive advantage and superior performance (Barney, 1991). Resource planning, involving the identification, acquisition, and scheduling of labor, materials, equipment, and finances, ensures resource availability and minimizes

delays, as evidenced by Kibagendi and Sang (2024), who found that comprehensive planning mitigates project delays and cost overruns in Kenyan construction projects. Similarly, Gitau et al. (2020) highlighted the use of tools like Gantt charts and resource leveling to align resources with project timelines, enhancing efficiency in resource-constrained environments like Rivers State. The strong correlation suggests that firms with robust planning processes can address challenges such as inaccurate resource estimation and stakeholder misalignment, as noted by Mustapha et al. (2023), thereby improving cost, time, and quality outcomes. This is particularly relevant in Rivers State, where resource scarcity and economic challenges necessitate meticulous planning to avoid cost overruns and schedule delays, as supported by Osamudiamen et al. (2022), who identified resource unavailability as a key barrier to project performance in Nigeria.

The significant relationship also reflects the dynamic capabilities aspect of RBV, where firms adapt resource plans to meet changing project demands, as emphasized by Teece et al. (1997). In the context of Rivers State, continuous monitoring and adjustment of resource plans, as suggested by Mustapha et al. (2023), enable firms to respond to unforeseen challenges like regulatory complexities or material shortages, thereby enhancing project efficiency. Unlike Ike and Onuoha (2024), who focused on continuous improvement without explicitly addressing resource planning, this study's emphasis on strategic planning aligns with RBV's focus on leveraging organizational expertise to achieve project success. Furthermore, Buba's (2023) identification of project management as a key factor influencing cost performance supports the notion that structured resource planning is essential for financial efficiency, though this study extends the scope to include time and quality metrics. The findings suggest that construction firms in Rivers State can enhance project performance by prioritizing comprehensive resource planning, aligning with Kiungo and Otieno's (2023) assertion that proactive planning improves stakeholder satisfaction and project outcomes in resource-constrained settings.

## **Digital Resource Allocation and Project Performance**

The strong positive and statistically significant relationship between digital resource allocation and project performance ( $r = .739$ ,  $p < .05$ ) highlights the transformative impact of digital tools on construction project outcomes in Rivers State, Nigeria. This finding supports the RBV theory's emphasis on leveraging unique resources, such as advanced digital systems, to achieve competitive advantages in project execution (Barney, 1991). Digital resource allocation, through real-time monitoring and data-driven decision-making, enhances project adaptability and efficiency, as noted by Van Thuan and Hai (2022), who found that digital tools improve cost performance by enabling swift responses to project changes. Similarly, Khatun et al. (2021) emphasized that digital systems, such as just-in-time allocation, reduce resource wastage and conflicts, which is critical in Nigeria's challenging economic and regulatory environment. The strong correlation in this study suggests that firms utilizing digital platforms can better manage scope changes and supply chain disruptions, aligning with Ahsun and Elly's (2024) findings that digital tools enhance operational efficiency in construction projects. This is particularly relevant in Rivers State, where Osamudiamen et al. (2022) identified resource unavailability and coordination issues as significant barriers to project performance, which digital tools can mitigate through improved communication and resource tracking.

Despite these benefits, the adoption of digital resource allocation faces challenges, such as the need for accurate data inputs and significant investments in technology and training, as highlighted by Sulistiyowati et al. (2023). These barriers may explain variations in digital tool effectiveness across

firms in Rivers State, yet the strong correlation with project performance underscores their potential to enhance cost, time, and quality outcomes when implemented effectively. Unlike Olasunkanmi et al. (2024), who focused on organizational culture without addressing digital tools, this study's emphasis on digital resource allocation aligns with RBV's dynamic capabilities, where firms leverage technology to adapt to complex project environments (Teece et al., 1997). Additionally, Ikwueze and Nnadi's (2024) advocacy for modern technologies like Building Information Modeling (BIM) supports the finding that digital tools are critical for achieving project objectives in Nigeria's construction sector. The results suggest that construction firms in Rivers State should invest in digital infrastructure and training to maximize the benefits of digital resource allocation, thereby improving project performance and competitiveness in a resource-constrained context.

## Conclusion

The study demonstrated that both resource planning and digital resource allocation have strong, positive, and statistically significant relationships with project performance, with correlation coefficients of  $r = .709$  and  $r = .739$ , respectively ( $p < .05$ ). Grounded in the Resource-Based View (RBV) theory, these findings highlight the critical role of strategic resource management and digital tools in enhancing cost, time, and quality outcomes in a resource-constrained environment. In other words, leveraging structured planning and digital systems, can assist construction firms mitigate challenges like resource scarcity and coordination issues, thereby improving project efficiency and stakeholder satisfaction, and reinforcing the importance of aligning unique resources with project objectives to achieve competitive advantage.

## Recommendations

The following recommendations were made:

1. The strong positive relationship between resource planning and project performance underscores the need for construction firms in Nigeria to prioritize comprehensive and adaptive resource planning to enhance project outcomes. To achieve this, management should implement structured resource planning frameworks that integrate tools like Gantt charts and resource leveling. Practical actions include conducting pre-project resource audits to accurately estimate labor, materials, and equipment needs, ensuring alignment with project timelines. Firms should establish dedicated planning teams to continuously monitor and adjust resource plans in response to unforeseen challenges, such as material shortages or regulatory changes.
2. The significant correlation between digital resource allocation and project performance indicates that construction firms should invest in digital tools to improve resource management efficiency. To implement this, management should prioritize the adoption of digital platforms like Building Information Modeling (BIM) and cloud-based resource management systems to enable real-time monitoring and data-driven decision-making. Practical steps include allocating budgets for acquiring digital tools and providing comprehensive training programs to ensure staff proficiency. Firms should also integrate digital systems with existing workflows to enhance coordination and reduce wastage. Regular audits of digital tool performance and feedback sessions with project teams can also help identify and resolve implementation challenges, ensuring sustained improvements in cost, time, and quality outcomes.

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