

PERCEIVED EFFECT OF GEOGRAPHIC INFORMATION SYSTEMS (GIS) ON PROJECT COMMUNICATION MANAGEMENT IN SELECTED CONSTRUCTION FIRMS IN NAIROBI

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ABSTRACT

Purpose of the study: The study sought to establish the perceived effect of GIS on project communication management in selected construction firms in Nairobi County, Kenya. The study was anchored on diffusion of innovation theory.

Statement of The Problem: Project communication management (PCM) is one of the most important but poorly managed aspects of the construction industry in Kenya. Statistical evidence illustrates the wider project delivery challenges associated with this problem

Research Methodology: An explanatory research design was employed. A census approach targeted 90 permanent employees from six selected National Construction Authority Category 1 construction firms. Data were collected using a structured questionnaire incorporating a five-point Likert scale, and 64 usable responses were obtained, representing a response rate of 71.1%. Descriptive statistics, Pearson correlation and multiple regression analysis were conducted using the Statistical Package for Social Sciences, Version 25.

Findings: Respondents rated GIS favourably for enhancing stakeholder understanding through participatory visualisation ($M = 4.63$) and improving data accessibility ($M = 4.06$), while progress tracking received a lower rating ($M = 3.02$). Correlation analysis revealed a strong, positive and statistically significant relationship between GIS and project communication management ($r = .671$, $p < .001$). GIS also retained a positive and statistically significant association in the original multiple regression model after accounting for social media tools and robotics ($B = .289$, $\beta = .368$, $p = .001$).

Conclusion: The study concludes that favourable employee perceptions of GIS were associated with better project communication management, although its perceived benefits varied across applications.

Recommendations: The study recommends integrating regularly updated GIS dashboards into project communication systems, strengthening participatory spatial visualisation and providing practical GIS training, with emphasis on progress tracking. Future research should examine GIS implementation over time and account for the clustering of employees within construction firms.

Keywords: *Geographic Information Systems, project communication management, spatial visualisation, construction firms, Nairobi County.*

BACKGROUND OF THE STUDY

Project communication management concerns the planning, sharing and monitoring of project information to ensure that stakeholders receive and understand information relevant to their responsibilities (Project Management Institute [PMI], 2021). In construction projects, these activities connect clients, consultants, contractors, suppliers and employees whose decisions depend on coordinated information exchange. Research on housing programmes in Nairobi demonstrates the relevance of communication channels and systems to project sustainability, highlighting the importance of accessible information and organised feedback arrangements (Nyangena & Mungai, 2024). Effective communication therefore requires more than distributing reports; it involves presenting information clearly,

identifying its intended recipients and supporting a shared understanding of project objectives, responsibilities and progress.

Geographic Information Systems (GIS) offer a means of organising and presenting geographically referenced information that can support communication within construction projects. Akindele *et al.* (2025) identified spatial planning and design, construction task tracking, defect detection and safety monitoring as major GIS application areas. By connecting project information to identifiable locations, GIS can provide a visual reference for discussing activities, resource requirements and progress across different parts of a construction site. Evidence from Kenyan community development projects also associates GIS information sharing, data sharing and progress tracking with project performance, suggesting that its usefulness extends beyond producing maps to supporting the interpretation and use of project information (Atandi & Ngugi, 2020).

The relationship between GIS and project communication management centres on how spatial information becomes accessible and meaningful to project stakeholders. GIS research identifies opportunities for exchanging information across digital platforms, while also showing that limited interoperability can obstruct the effective use of these systems (Akindele *et al.*, 2025). Within construction projects, shared maps could help technical and nontechnical participants discuss the same locations, interpret planned activities and identify areas requiring attention. These potential communication benefits provide a basis for examining spatial visualisation, stakeholder understanding, progress tracking and data accessibility, while recognising that evidence of GIS applications does not automatically establish improvements in communication within every organisational setting (Atandi & Ngugi, 2020; Akindele *et al.*, 2025).

Globally, digital construction research has increasingly examined how technology supports the exchange and interpretation of project information, including the integration of GIS with other information systems (Akindele *et al.*, 2025). This development reflects the need to connect spatial information with the activities and decisions that project teams coordinate. Research involving experienced Building Information Modelling users found

perceived improvements in information accuracy, understanding, timeliness and dissemination, although some communication difficulties, including information overload and gatekeeping, remained unresolved (Kwofie *et al.*, 2020). Such findings demonstrate why communication outcomes should be examined directly: digital tools may improve particular information processes while leaving other organisational difficulties unchanged, and evidence concerning one technology cannot establish the specific contribution of GIS.

Within the African context, research provides relevant but varied evidence on digital information use and project communication. Kwofie *et al.* (2020) highlighted the communication benefits and remaining limitations associated with digital modelling, while Atandi and Ngugi (2020) linked GIS integration to community development project performance in Kenya. Together, these studies suggest that the value of digital information depends on the functions examined, the users involved and the organisational setting in which the technology operates. Their different technologies and outcome measures also leave room for a focused investigation of GIS and communication management among construction employees, rather than assuming that findings on digital modelling or community development performance apply directly to construction firms.

In Kenya, construction provides an important setting for examining information coordination because project delivery involves interconnected design, management and implementation activities. The Kenya National Bureau of Statistics (KNBS, 2024) reported that the construction sector grew by 3.0% in 2023, compared with 4.1% in 2022, with activity supported by housing expenditure, road maintenance and lending to the sector. These figures establish the economic context without demonstrating that communication practices caused changes in sector performance. At the project level, Maruti *et al.* (2024) reported benefits associated with selected digital technologies in construction design, management and quality in Nairobi, while Nyangena and Mungai (2024) identified positive relationships between communication systems and affordable housing programme sustainability.

Nairobi County provided a relevant setting for examining the specific relationship between GIS and project communication management, given the local evidence concerning digital construction practices and communication systems (Maruti *et al.*, 2024; Nyangena & Mungai, 2024). The study focused on permanent employees in six selected construction firms, whose responsibilities placed them within organisational reporting and information sharing processes. Existing research addressed broader construction performance or GIS applications in other project settings, leaving a contextual and outcome specific question concerning employees' perceptions of GIS communication benefits (Atandi & Ngugi, 2020; Maruti *et al.*, 2024). Accordingly, the study examined the perceived effect of GIS on project communication management through spatial visualisation, progress tracking, stakeholder understanding, resource mobilisation and allocation, and data accessibility within the selected firms.

STATEMENT OF THE PROBLEM

Project communication management (PCM) is one of the most important but poorly managed aspects of the construction industry in Kenya. Statistical evidence illustrates the wider project delivery challenges associated with this problem. Samo and Shale (2026) reported average cost overruns of 45% and average delays of 21 months in road construction projects in Kenya. An analysis by the Institute of Economic Affairs Kenya (2025) also indicated that of the KSh515.1 billion allocated to flagship projects between FY2019 and FY2024, KSh304.4 billion (59%) was not utilised, highlighting weaknesses in project planning and oversight. Ngugi and Gachengo (2024) further found that stakeholder communication was positively and significantly associated with the implementation of road construction projects by the Kenya Urban Roads Authority (KURA) in Nairobi City County ($t = 36.773$, $p < .05$), demonstrating the relevance of communication management to project delivery in the sector.

Digital tools have been suggested and are increasingly being used as a solution to PCM deficiencies in the construction industry. Maruti *et al.* (2024) found that selected digital technologies, including Building Information Modelling (BIM), Geographic Information

Systems (GIS), mobile computing and cloud-based platforms, contributed positively to the design and management of construction projects in Nairobi City County. Within these technologies, GIS offers opportunities to support communication through spatial visualisation, progress tracking and shared access to project information. However, evidence on digital technologies collectively does not isolate the perceived contribution of GIS to communication management, while a review by Akindele *et al.* (2025) identified interoperability barriers affecting GIS applications in construction. These findings suggest a need to examine whether the communication benefits associated with GIS are reflected in employees' perceptions of PCM within construction firms.

In Kenya, research on GIS and project communication in the construction industry remains limited and contextually narrow. Nyangena and Mungai (2024) studied project communications management and the sustainability of affordable housing programmes in Nairobi City County but considered one type of project and did not isolate the perceived effect of GIS on PCM. Nduko and Mukhongo (2024) examined communication planning and the implementation of public housing construction projects in Mombasa County but did not explore GIS, while Atandi and Ngugi (2020) investigated GIS integration in monitoring and evaluation and the performance of community development projects at World Vision Kenya. These studies leave a contextual and conceptual gap concerning the perceived effect of GIS on PCM outcomes, namely communication planning, information sharing, timely feedback and information dissemination, in selected construction firms in Nairobi County. The present study therefore sought to address this gap by establishing the perceived effect of GIS on project communication management in selected construction firms in Nairobi County, Kenya.

OBJECTIVE OF THE STUDY

To establish the perceived effect of Geographic Information Systems (GIS) on project communication management in selected construction firms in Nairobi County, Kenya.

LITERATURE REVIEW

This section examines the theoretical and empirical foundations of the relationship between Geographic Information Systems and project communication management and presents the conceptual framework guiding the analysis.

Theoretical Review

The study was informed by Diffusion of Innovation Theory, developed by Everett M. Rogers in 1962, which explains how innovations spread through communication channels over time within a social system (Rogers, 2003). The theory identifies relative advantage, compatibility, complexity, trialability and observability as attributes influencing the acceptance and adoption of an innovation. It proposes that people are more likely to embrace an innovation when its benefits are apparent, it fits their existing practices, it is understandable, and its usefulness can be demonstrated through experimentation and observable results. In construction organisations, these attributes provide a framework for understanding employees' responses to Geographic Information Systems (GIS) and their willingness to incorporate spatial information into project communication activities.

The theory supported the objective of establishing the perceived effect of GIS on project communication management in selected construction firms in Nairobi County, Kenya. Relative advantage provided a basis for examining whether employees regarded spatial visualisation, progress mapping and data sharing as useful improvements to the way project information was communicated. Compatibility directed attention to how these functions fitted existing reporting procedures and stakeholder information needs, while complexity highlighted whether intended users could understand and interpret GIS outputs. This perspective explained why the availability of GIS alone might not translate into effective communication, since its practical value also depended on employees recognising its benefits and integrating spatial information into their routine responsibilities.

Within this framework, shared maps could provide a common reference through which employees and stakeholders interpreted project locations, discussed resource requirements

and clarified progress towards agreed objectives. Participatory visualisation offered opportunities to make these benefits visible, while access to spatial data could support informed discussions between technical teams and other stakeholders. These applications provided the conceptual basis for examining whether employees who perceived greater GIS benefits also reported more favourable project communication management. The theory consequently guided interpretation of the relationship between the study variables, while the analysis remained focused on perceived communication benefits rather than directly testing the five innovation attributes or classifying respondents into adoption stages.

Empirical Review

Research on Geographic Information Systems (GIS) and project communication management (PCM) has identified several applications through which spatial information may support information exchange in construction settings. The present objective is informed by evidence concerning spatial visualisation, progress tracking, information sharing and stakeholder engagement. Diffusion of Innovation Theory provides a framework for interpreting employees' perceptions of the usefulness and integration of GIS, while the reviewed studies establish the empirical context for examining its association with PCM.

The literature review reveals that GIS is used in four major areas in the construction industry: spatial planning and design, construction-task tracking, defect detection, and safety monitoring (Akindele *et al.*, 2025). Construction-task tracking and spatial planning are most directly relevant to PCM, as they enable the generation, sharing and understanding of project progress information among various stakeholders. According to Akindele *et al.* (2025), a systematic review of 60 articles published between 2011 and 2022, GIS can facilitate communication among construction stakeholders by offering a shared spatial reference platform for data visualisation, thereby enhancing the quality of decision-making and coordination among project teams. The study suggested that stakeholders should be educated and trained on GIS and its integration with other systems to maximize the

potential of GIS as a PCM tool, which aligns with the DOI Theory's emphasis on compatibility and trialability as factors influencing the adoption and perceived effectiveness of digital tools.

The integration of GIS with Building Information Modelling (BIM) and project management platforms may further support spatially informed communication. Evidence from infrastructure applications suggests that combining geospatial and project information can assist planning, design coordination and the sharing of relevant project records. In Kenya, the road-condition assessment framework reported by Nthaga *et al.* (2025) illustrates how remote sensing and GIS can improve the availability of spatial information. Although better information quality may support more timely communication, the findings do not, on their own, establish an improvement in communication management among employees of the construction firms examined in this study.

Practical applications also illustrate how GIS may support stakeholder engagement and collaborative project management. Hutchins *et al.* (2025) described the potential of construction GIS to link project documents with their spatial context, make information more accessible and support coordination across teams. The Regional Centre for Mapping of Resources for Development (2024) reported GIS corridor-mapping and monitoring training for Kenya National Highways Authority staff, illustrating the relevance of geospatial competencies to infrastructure operations in Kenya. These examples indicate practical interest in GIS, although training activities and industry guidance do not constitute direct empirical evidence of improved PCM outcomes.

Kenyan studies provide additional evidence on GIS use, although their settings and outcomes differ from those examined here. Atandi and Ngugi (2020) reported positive relationships between GIS-based monitoring and evaluation practices and performance in community development projects at World Vision Kenya. Okong'o (2023) examined GIS use in the implementation of road construction projects and identified technology access, data availability and staff capacity as relevant considerations. Nthaga *et al.* (2025) proposed an integrated remote sensing and GIS framework for road-condition assessment. Together,

these studies highlight the potential value of geospatial data but leave the relationship between employees' perceptions of GIS and PCM in construction firms less directly examined.

The reviewed literature therefore identifies a contextual and measurement gap. Existing work has examined GIS in community development programmes, road construction implementation and infrastructure assessment (Atandi & Ngugi, 2020; Okong'o, 2023; Nthaga *et al.*, 2025), whereas the present study focuses on employees' assessments of communication planning, information sharing, timely feedback and information dissemination within selected Nairobi construction firms. By distinguishing perceived communication outcomes from general project performance, the study provides a more specific basis for interpreting the relationship between GIS and PCM.

Conceptual Framework

The conceptual framework for this study explores the relationship between variables as summarized in Figure 1.

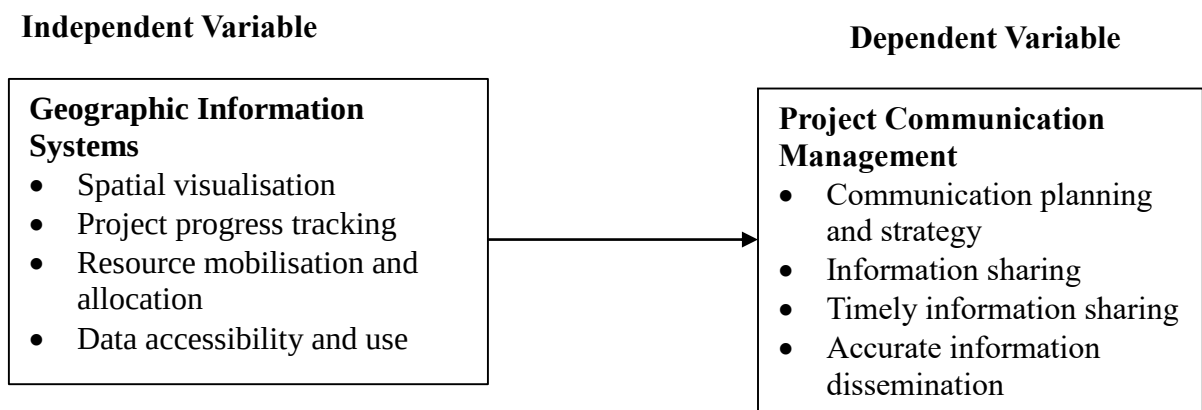


Figure 1: Conceptual Framework

RESEARCH METHODOLOGY

The study adopted an explanatory research design and a quantitative approach to examine the perceived effect of Geographic Information Systems (GIS) on project communication management in selected construction firms in Nairobi County, Kenya. The target

population comprised 90 permanent employees, including 8 top-level, 12 middle-level and 70 lower-level management staff from Epco Builders Limited, Seyani Brothers and Company Limited, Intex Construction Limited, Cementers Limited, Associated Construction Company Kenya Limited, and Landmark Holdings Limited. The six firms were selected based on their National Construction Authority Category 1 registration and engagement with digital tools in project operations. A census approach was adopted because the population was small and manageable, with all 90 employees invited to participate. The individual employee constituted both the unit of analysis and observation, and 64 usable responses were obtained, representing a response rate of 71.1%.

Primary data were collected using a structured questionnaire, and this article draws on the sections covering respondents' demographic characteristics, GIS and project communication management. GIS was assessed through statements on spatial visualisation, progress tracking, stakeholder understanding, resource allocation mapping and data accessibility, while project communication management covered communication planning, information sharing, timely feedback and information dissemination. Respondents rated the statements on a five-point Likert scale ranging from 1, strongly disagree, to 5, strongly agree. The researcher distributed and collected questionnaires over four weeks between August and September 2025, making follow-up visits to encourage completion. Before data collection, authorisation was obtained from St. Paul's University, a research permit was secured from the National Commission for Science, Technology and Innovation, and permission was obtained from participating firms; respondents were informed that participation was voluntary and their responses would remain confidential.

Completed questionnaires were checked for completeness and consistency, coded and entered into the Statistical Package for Social Sciences, Version 25, for analysis. Descriptive statistics, including frequencies, percentages, means and standard deviations, summarised respondents' characteristics and their perceptions of GIS and project communication management. Pearson correlation analysis established the direction and strength of the relationship between GIS and project communication management. The GIS

regression coefficient was drawn from the original multiple regression model, which included social media tools and robotics alongside GIS, and therefore represented its association with project communication management after accounting for the other two digital tools. Findings were presented in tables and interpreted as employees' perceptions within the selected firms, while questionnaires excluded respondents' names and collected data were stored securely to protect confidentiality.

RESEARCH FINDINGS AND DISCUSSION

This section reports the responses from employees of the six selected construction firms in Nairobi County. It presents the response rate and descriptive statistics, followed by correlation and regression findings.

Response Rate

The study invited 90 employees from the six selected construction firms in Nairobi County, Kenya. Sixty-four completed questionnaires were returned, giving a response rate of 71.1%. Table 1 summarises the responses.

Table 1: Response Rate

Category	Frequency	Percentage
Responded	64	71
Did not respond	26	29
Total	90	100

Source: Researcher (2025)

The response rate of 71.1% provided 64 usable questionnaires for analysis. Babbie (2010) discusses response-rate benchmarks as one consideration in survey research. However, the response rate alone does not eliminate the possibility of nonresponse bias, and the findings remain specific to the participating employees and firms.

Descriptive Statistics Findings

This section summarises employees' responses concerning GIS and project communication management using means and standard deviations. Responses were recorded on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The reported composite mean was 3.85 for GIS and 4.12 for project communication management.

Geographic Information Systems

The study examined employees' perceptions of the relationship between GIS and project communication management. Table 2 reports responses to the GIS statements.

Table 2: Geographic Information Systems

Statement	M	SD
GIS data visualization in static and web maps helps in understanding the area program context	3.56	1.44
GIS data presentation helps track progress towards achieving project objectives	3.02	1.99
Participatory data visualization helps the stakeholders to understand the overall objectives of the project	4.63	0.49
GIS data presentation in web and static maps increases resource mobilization and allocation for the project	3.98	1.02
GIS data sharing increases access and use of data by the project staff and stakeholders	4.06	0.94
Cumulative Score	3.85	1.18

Source: Research Data (2025)

As shown in Table 2, the GIS statements had a reported cumulative mean of 3.85 (SD = 1.18), indicating generally favourable employee perceptions of GIS applications. The dispersion in responses suggests variation in employees' views, but the data presented do not establish the specific organisational reasons for that variation. Okong'o (2023) similarly identified GIS technology access, data availability and staff capacity as relevant considerations in a Kenyan road construction setting.

The statement most strongly agreed upon was that participatory data visualisation helps stakeholders to understand the overall objectives of the project (M = 4.63, SD = 0.49), recording the highest mean and the lowest standard deviation among all GIS statements, indicating the strongest and most consistent consensus. This was followed by GIS data sharing increases access and use of data by project staff and stakeholders (M = 4.06, SD = 0.94), and GIS data presentation in web and static maps increases resource mobilisation and allocation for the project (M = 3.98, SD = 1.02). The statement with the lowest mean was GIS data presentation helps track progress towards meeting project objectives (M = 3.02, SD = 1.99), which also recorded the highest standard deviation among all statements in the study, indicating the widest divergence of opinion among respondents and suggesting that the use of GIS for progress tracking is not yet consistently practiced across the selected construction firms.

The findings suggest that employees associated GIS with improved stakeholder understanding through participatory visualisation and greater accessibility of project data. Atandi and Ngugi (2020) likewise associated GIS information sharing with project performance, although their outcome and organisational setting differed from those of the present study. Akindele *et al.* (2025) identified spatial planning and construction-task tracking among the principal GIS application areas, supporting the relevance of shared spatial information to project-team coordination.

Nthaga *et al.* (2025) described the integration of remote sensing and GIS in road-condition assessment, illustrating how spatial information may support infrastructure monitoring. Hutchins *et al.* (2025) also described the value of linking construction records to

geographic context. These sources provide practical and technical context for the favourable employee ratings of GIS data accessibility ($M = 4.06$, $SD = 0.94$), but they should not be interpreted as independent verification of the communication outcomes reported in the selected firms.

Project Communication Management

Project communication management was assessed using statements addressing communication planning, collaboration, timeliness, information accuracy and communication strategy. Table 3 presents the descriptive results.

Table 3: Project Communication Management

Statement	M	SD
Communication planning in the construction industry ensures the information needs of all stakeholders are met	4.61	0.49
Sharing of information enhances collaboration between the project implementers and stakeholders	4.12	0.86
Timely sharing of information promotes trust among all the parties involved in the construction project	3.69	1.32
Well-disseminated information in a construction project enhances information accuracy to the stakeholders	4.09	0.90
A well-crafted communication strategy is key in achieving the desired project goals in an organization	4.09	0.90
Cumulative Score	4.12	0.90

Source: Research Data (2025)

Table 3 reports a cumulative mean of 4.12 ($SD = 0.90$) for project communication

management, suggesting generally favourable responses to the communication practices assessed. The standard deviation summarises the variation in individual responses and should not, by itself, be treated as evidence of uniformly effective practices across all six firms. The statement most strongly agreed upon was that communication planning in the construction industry ensures the information needs of all stakeholders are met ($M = 4.61$, $SD = 0.49$), recording the highest mean and lowest standard deviation among all project communication management statements, indicating the strongest and most consistent consensus. This was followed by sharing of information enhances collaboration between the project implementers and stakeholders ($M = 4.12$, $SD = 0.86$), a well-crafted communication strategy is key in achieving the desired project goals in an organisation ($M = 4.09$, $SD = 0.90$), and well-disseminated information in a construction project enhances information accuracy to the stakeholders ($M = 4.09$, $SD = 0.90$). The statement with the lowest mean was that timely sharing of information promotes trust among all the parties involved in the construction project ($M = 3.69$, $SD = 1.32$), which also recorded the highest standard deviation among project communication management statements, indicating the widest divergence of opinion and suggesting that timely information sharing remains an inconsistently practiced dimension of project communication management across the selected construction firms.

These findings are consistent with the emphasis placed on communication planning and information exchange in the Project Management Institute (2021) framework. Nduko and Mukhongo (2024) examined communication planning in public housing projects, while Nzuki and Mutuku (2023) considered communication in road construction implementation in Nairobi City County. These studies offer contextual support for examining communication processes in construction, although the present survey measured respondents' perceptions rather than independently verified project outcomes.

Senaratne and Ruwanpura (2016) examined communication in construction from a management perspective, highlighting the importance of how project information is created, distributed and interpreted. Their discussion is relevant to the present finding that

the statement on timely information sharing and trust received a comparatively lower mean ($M = 3.69$, $SD = 1.32$). The result indicates less agreement on this item than on communication planning and suggests an area for further managerial attention, without establishing the causes of the differing ratings.

Correlation Analysis

Pearson correlation analysis was conducted to establish the relationship between GIS and project communication management. Table 4 presents the results.

Table 4: Correlation between GIS and Project Communication Management

Variable	Statistic	Project communication management	Geographic Information Systems
Project communication management	Pearson correlation	1.000	
	Sig. (2-tailed)		
Geographic Information Systems	Pearson correlation	.671	1.000
	Sig. (2-tailed)	< .001	—

Source: Research Data (2025)

The results in Table 4 show a strong, positive and statistically significant relationship between GIS and project communication management ($r = .671$, $p < .001$). Respondents who rated GIS more favourably also tended to report better project communication management. This finding suggests that the perceived benefits of spatial visualisation, progress tracking and shared access to project information were associated with more favourable communication outcomes. The finding is consistent with the construction applications reviewed by Akindele *et al.* (2025), including spatial planning and task tracking, which provide a basis for understanding the communication value of GIS. However, the correlation establishes an association rather than a causal effect.

Regression Analysis

Multiple regression analysis examined the association between GIS and project communication management after accounting for social media tools and robotics in the original model.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.765	.584	.564	.517

Source: Research Data (2025)

The model summary in Table 5 indicates that GIS, social media tools and robotics jointly accounted for 58.4% of the variation in project communication management ($R^2 = .584$). The adjusted coefficient of determination was .564, accounting for the number of predictors and observations in the model. The remaining 41.6% represented variation not explained by the fitted model. These statistics describe the explanatory power of the complete model and cannot be attributed to GIS alone.

Table 6: Analysis of Variance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	22.567	3	7.522	28.135	< .001
Residual	16.042	60	.267		
Total	38.609	63			

Source: Research Data (2025)

The analysis of variance results in Table 6 show that the overall regression model was statistically significant, $F(3, 60) = 28.135$, $p < .001$. This indicates that the three predictors collectively provided a statistically significant improvement in explaining project

communication management compared with an intercept-only model. The specific contribution of GIS was assessed through its regression coefficient.

Table 7: GIS Coefficient from the Regression Model

Predictor	Unstandardised B	Std. Error	Standardised Beta	t	Sig.
Geographic Information Systems	.289	.085	.368	3.409	.001

Source: Research Data (2025)

The results in Table 7 indicate that GIS had a positive and statistically significant association with project communication management ($B = .289$, $\beta = .368$, $t = 3.409$, $p = .001$). A one-unit increase in the GIS score was associated with a .289-unit increase in the predicted project communication management score, holding social media tools and robotics constant. The standardised coefficient indicates that a one-standard-deviation increase in GIS was associated with a .368-standard-deviation increase in project communication management, conditional on the other predictors. These findings support the study's objective by demonstrating a significant positive relationship between employees' perceptions of GIS and communication management in the selected firms.

The findings are consistent with Atandi and Ngugi (2020), who reported positive relationships between GIS integration in monitoring and evaluation and community development project performance at World Vision Kenya. Although their study examined a different organisational context and outcome, it supports the relevance of GIS tracking, data integration and information sharing to project activities. The present study extends this evidence to perceived project communication management within selected construction firms in Nairobi County.

CONCLUSION

The findings indicate a positive and statistically significant association between employees' perceptions of GIS and project communication management in the selected Nairobi construction firms. The correlation ($r = .671$, $p < .001$) and the GIS coefficient from the multiple regression model ($\beta = .368$, $p = .001$) support this interpretation, including after accounting for social media tools and robotics. Participatory visualisation and data accessibility received favourable ratings, whereas progress tracking had the lowest GIS mean ($M = 3.02$). These results suggest opportunities to strengthen GIS-supported communication, although the survey design does not establish causality or directly measure changes in project delivery performance.

RECOMMENDATIONS

The study recommends that construction firms in Nairobi County should consider integrating regularly updated GIS dashboards into existing communication arrangements, giving attention to progress tracking, which received the lowest mean rating among the GIS statements. Project managers could use participatory spatial-visualisation sessions to improve shared understanding of project scope, locations and activities, alongside procedures for updating and validating geospatial data. The National Construction Authority and relevant training institutions could support practical GIS training for construction professionals. Firms should evaluate whether such measures improve the accessibility, timeliness and clarity of information shared with stakeholders.

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