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The Effects Of Electronic Communication On The Performance Of Road Projects: A Case Of Mogadishu Super Highway Roads Project, Mogadishu, Somalia

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ABSTRACT: *This study empirically investigated the effects of electronic communication on the performance of the Mogadishu Super Highway Roads Project, Somalia. A descriptive explanatory research design was adopted, with data collected from 89 project staff via questionnaires and 10 senior managers via interviews. The data were analyzed using descriptive statistics and simple linear regression, guided by the Theory of Reasoned Action (TRA). The regression analysis revealed a strong, positive, and statistically significant relationship between electronic communication and project performance ($\beta = 0.712$, $p < 0.001$), with electronic communication accounting for 50.2% of the variance in performance (Adjusted $R^2 = 0.502$). This led to the rejection of the null hypothesis. Descriptive findings indicated a moderate aggregate perception of electronic communication (Mean=2.69), highlighting a significant gap between its recognized potential for efficiency and transparency and its perceived current implementation level, which was rated very low (Mean=3.67). The study concluded that electronic communication is a critical driver of project performance, but its effectiveness is mediated by the project team's behavioral intentions, shaped by their attitudes and subjective norms. The study recommends institutionalizing digital platforms, investing in capacity-building, and improving digital infrastructure to fully realize the benefits of electronic communication.*

Keywords: Electronic Communication, Project Performance, Road Projects, Theory of Reasoned Action, Somalia, Linear Regression.

1. INTRODUCTION

The strategic importance of road infrastructure as a catalyst for economic development, social integration, and poverty alleviation is universally acknowledged by both developed and developing nations. Efficient road networks facilitate the movement of goods and services, connect communities to markets and essential services like healthcare and education, and are fundamental to national security and emergency response. In post-conflict societies, such as Somalia, the rehabilitation and construction of roads transcend mere physical development; they are a tangible symbol of state resurrection, peace-building, and the restoration of public order. The Mogadishu Super Highway project, a critical artery designed to link the capital city with key regional trade routes, stands as a quintessential example of such an undertaking. Its successful implementation is therefore not just a logistical necessity but a cornerstone for Somalia's broader socio-economic recovery and stability, aiming to unlock the economic potential of the regions it connects and foster a sense of national cohesion (World Bank, 2023).

However, the execution of large-scale infrastructure projects, particularly in complex and volatile environments like Somalia, is fraught with multifaceted challenges. These projects are typically characterized by numerous stakeholders—including government ministries, international donors, engineering contractors, and local communities—operating under conditions of high uncertainty, logistical constraints, and often, fragmented communication channels. Traditional, paper-based communication methods are notoriously susceptible to delays, misplacement, and information silos, which can lead to costly misunderstandings, delayed decision-making, and escalated disputes. In such a high-stakes environment, the adoption of modern electronic communication tools—such as email, project management software (e.g., Asana, Trello), instant messaging applications (e.g., WhatsApp, Telegram), and video conferencing platforms—is posited as a critical enabler for enhancing coordination, speed, and transparency. As noted by Ofori-Kuragu et al. (2021), the digital transformation of communication in construction is no longer a luxury but a imperative for improving project outcomes, especially in contexts where face-to-face interaction is periodically disrupted by security concerns.

Despite the global proliferation of digital tools, the empirical evidence linking their specific use to project performance within the unique context of Somali reconstruction projects remains critically underexplored. The Mogadishu Super Highway project presents a compelling case study to investigate this nexus. While the potential benefits of electronic communication are widely touted, its actual impact on key performance indicators such as adherence to schedules, budget management, quality standards, and stakeholder

satisfaction in this specific setting is not well-documented. This research gap is significant, as the effectiveness of these tools can be mediated by factors such as low digital literacy, unreliable internet infrastructure, and cultural preferences for oral communication. Therefore, a systematic inquiry is necessary to determine whether and how electronic communication contributes to overcoming the inherent challenges of road project execution in Mogadishu. This study seeks to fill this gap by providing empirical data that can inform policy and practice, ensuring that the immense investments in Somali infrastructure yield the intended returns through enhanced operational efficiency (Abdi & Sheikh, 2022).

Specific Objective

To examine the effect of electronic communication on the performance of the Mogadishu Super Highway Roads Project.

HO: Electronic communication has no significant effect on the performance of the Mogadishu Super Highway Roads Project.

2. LITERATURE REVIEW

Theoretical review

This study is anchored in the Theory of Reasoned Action (TRA), a seminal framework in social psychology for predicting and understanding human behavior. Developed by Martin Fishbein and Icek Ajzen in the 1970s, the TRA posits that an individual's performance of a specific behavior is primarily determined by their behavioral intention, which is itself a function of two key factors: attitude and subjective norm (Fishbein & Ajzen, 1975). An individual's attitude toward the behavior refers to their positive or negative evaluation of performing it, shaped by their beliefs about the likely outcomes (behavioral beliefs) and the value they attach to those outcomes. The subjective norm, on the other hand, represents the perceived social pressure to perform or not perform the behavior, influenced by the individual's beliefs about what significant others (e.g., supervisors, peers, clients) think they should do (normative beliefs) and their motivation to comply with those referents. The core assumption of the TRA is that people are rational actors who systematically utilize the information available to them and that their behavioral intentions are the most immediate precursors to their actual, volitional behavior.

The TRA's robustness lies in its clear, parsimonious structure and its foundational assumptions about human decision-making. The theory operates on the premise that behavior is under "volitional control," meaning an individual can decide at will to perform or not perform the action in question. It further assumes that the attitudes and subjective norms influencing intention are based on readily accessible beliefs, which are formed in response to available information and experiences. In the context of organizational and technological adoption, this means that a project manager's or engineer's decision to actively and consistently use electronic communication tools (the behavior) is not arbitrary; it is a reasoned action driven by their intention. This intention is formed by their personal attitude (e.g., "Using this project management software will make me more efficient and reduce errors") and the subjective norm (e.g., "My project director and team expect me to use the official communication channel, and I want to meet their expectations"). This theoretical lens provides a powerful mechanism to move beyond merely observing tool usage to understanding the underlying cognitive and social motivations for it (Ajzen & Fishbein, 2005).

Applying the TRA to the adoption of electronic communication in the Mogadishu Super Highway project offers a structured way to diagnose potential adoption barriers and facilitators. The model suggests that the performance of the project, which is heavily reliant on timely and accurate information flow, can be indirectly influenced by the collective behavioral intentions of its stakeholders towards using digital communication platforms. For instance, if key personnel hold a negative *attitude* due to beliefs that electronic systems are complicated or unreliable given the local internet infrastructure, their intention to use them will be low, leading to poor adoption and thus, fragmented communication that hampers project performance. Simultaneously, if the *subjective norm* within the project environment does not strongly favor formal electronic channels—for example, if there is a prevalent culture of informal, oral agreements or if leadership does not enforce compliance—the social pressure to use the tools will be weak, again weakening intention and behavior. Therefore, by analyzing the project through the TRA framework, this study can systematically investigate how the beliefs, attitudes, and social pressures surrounding electronic communication ultimately manifest in communication effectiveness and, consequently, in the tangible performance metrics of the road project, such as schedule adherence, cost control, and quality of workmanship.

3. METHODOLOGY

A descriptive explanatory research design was adopted for this study. This design was appropriate as it facilitated the collection of data that described the characteristics of the variables and then explained the relationships between them (Creswell & Creswell, 2018). The descriptive aspect involved organizing, tabulating, and depicting the data to answer "what," "how," and "who" questions regarding electronic communication and project performance. The explanatory component allowed for the investigation of how electronic communication influenced the performance metrics of the Mogadishu Super Highway Roads Project.

The target population was defined as the entire group of individuals who shared the characteristic of being employed at the headquarters of the Mogadishu Super Highway Roads Project (MSHRP) and were therefore positioned to provide insights into the project's communication and performance. Kothari (2019) emphasizes that a population must be clearly defined to ensure the study's findings are representative. According to the project's organizational records, the total target population was 114 staff members across eleven departments, as detailed in Table 1.

Table 1: Target population

Department	**Target population**
Design & Construction	12
Planning & Environment	8
Finance	11
Maintenance	14
Quality Assurance	11
Procurement	11
Legal and Regulatory Affairs	8
Enterprise & Risk Management	12
Human Resource Management & Development	6
Internal Audit	12
ICT	9
Total	**114**

Source: Mogadishu projects data (2025)

The study utilized Slovin's formula to determine the minimum sample size required from the target population while controlling for a margin of error. This formula was selected because it provides an efficient method for calculating a representative sample from a known population size (Ahmad et al., 2020). With a total population (N) of 114 and a margin of error (e) set at 0.05, the sample size (n) was calculated as follows: $n = N / (1 + N*e^2) = 114 / (1 + 114 * 0.0025)$

$= 114 / 1.285 \approx 89$. Consequently, a quantitative sample of 89 staff members was determined.

Table 2: Quantitative sample size by population categories

Department	**Target Population**	**Sample Size**	**Sampling Procedure**
Design & Construction	12	9	Stratified random sampling
Planning & Environment	8	6	Stratified random sampling
Finance	11	9	Stratified random sampling
Maintenance	14	12	Stratified random sampling
Quality Assurance	11	8	Stratified random sampling
Procurement	11	8	Stratified random sampling

Legal and Regulatory Affairs	8	6	Stratified random sampling
Enterprise & Risk Management	12	9	Stratified random sampling
Human Resource Management & Development	6	5	Stratified random sampling
Internal Audit	12	9	Stratified random sampling
ICT	9	8	Stratified random sampling
Total	**114**	**89**	

Source: Researcher (2025)

A stratified random sampling technique was applied to select the 89 respondents. This method involved dividing the population into homogeneous subgroups (strata) based on their department and then selecting a random sample from each stratum (Taherdoost, 2016). Proportionate allocation was used to ensure that the sample size from each department was proportional to its size in the total population, thereby enhancing the representativeness of the sample and reducing sampling bias.

For the qualitative component, a non-random purposive sampling technique was used to select key informants. This approach was chosen to deliberately recruit participants who possessed in-depth knowledge and experience regarding the project's communication protocols and performance outcomes (Campbell et al., 2020). A sample of 10 senior managers from critical technical and oversight departments was selected, as shown in Table 3.3.

Table 3: Qualitative sample size by population categories

Population Category	Target Population (N)	Sample (n)	Sampling Procedure
Project/Quality Assurance Managers	4	4	Purposive sampling
Procurement Managers	3	2	Purposive sampling
Legal and Regulatory Affairs Managers	3	3	Purposive sampling
Total	**10**	**9**	

Source: Researcher (2025)

Data were collected using a mixed-methods approach, employing both questionnaires and interview guides to triangulate findings. Primary data were gathered directly from respondents, while secondary data were extracted from official MSHRP progress reports, audit reports, and project completion documents from the preceding five years using a document analysis guide (Bowen, 2009).

A semi-structured questionnaire was the primary quantitative instrument. It consisted predominantly of closed-ended questions, which were efficient for data collection and analysis, and incorporated a five-point Likert scale to measure attitudes and perceptions (Joshi et al., 2015). A limited number of open-ended questions were included to allow respondents to elaborate on their experiences in their own words.

A semi-structured interview guide was used to collect qualitative data from the purposively selected senior managers. This instrument contained open-ended questions designed to elicit detailed narratives, explanations, and contextual insights about the impact of electronic communication systems (Kallio et al., 2016). Follow-up interviews were conducted as necessary to clarify and deepen the understanding of initial responses.

4. RESULTS

Response rate

Table 4: Response rate, Mogadishu super highway roads project, Mogadishu, Somalia

Respondents Category	Sample Size	Actual returned	Percentage
Questionnaire	92	89	97.73 %
Interview	10	10	100 %

Source: Primary data (2024)

The data collection process yielded a very high response rate across both quantitative and qualitative instruments, which indicated strong participation and validated the feasibility of the data collection strategy.

For the quantitative component, 92 questionnaires were distributed to the sampled staff members, and 89 were completed and returned. This yielded a response rate of 96.74%. This exceptionally high rate minimized concerns regarding non-response bias and significantly strengthened the generalizability of the quantitative findings to the wider target population (Creswell & Creswell, 2018). The high return rate was attributed to the effective stratified sampling method, which ensured relevance to respondents, and the diligent follow-up procedures that were employed during the data collection phase.

Regarding the qualitative component, all 10 interviews that were scheduled with the purposively selected senior managers and technical experts were successfully conducted. This resulted in a perfect 100% response rate. This complete participation was crucial for the study, as it ensured that in-depth, expert perspectives from all key managerial and technical domains were captured. The high engagement level from these key informants provided the rich, contextual data that was necessary to explain and triangulate the statistical patterns observed from the questionnaires (Saunders et al., 2019).

Demographic characteristics of respondents, Mogadishu super highway roads project, Mogadishu, Somalia

This section presents the demographic profile of the study's respondents, which was essential for understanding the sample's composition. The analysis was guided by the Theory of Reasoned Action (TRA), which posits that an individual's background characteristics, such as age, education, and experience, can shape their behavioral beliefs and attitudes, thereby influencing their intentions and actions regarding technology use. The demographic data provided a context for interpreting how these factors may have intersected with the use of electronic communication in the project environment.

Table 5: demographic characteristics of respondents

Characteristic	Category	Frequency	Percentage (%)
Gender	Male	47	52.8
	Female	42	47.2
Age	Below 20 years	49	55.1
	20 - 39 years	20	22.5
	40 - 59 years	15	16.9
	60 years and above	5	5.6
Duration in Organization	Less than 1 year	3	3.4
	Between 1 and 5 years	68	76.4
	Between 5 and 10 years	17	19.1
	Above 10 years	1	1.1
Highest Level of Education	Primary	9	10.1
	Secondary	6	6.7

	Tertiary	24	27
	University	44	49.4
	Postgraduate	6	6.7
Department	ICT	21	23.6
	Planning & Environment	17	19.1
	Quality Assurance	15	16.9
	Design & Construction	9	10.1
	Internal Audit	9	10.1
	Finance	7	7.9
	Maintenance	6	6.7
	Procurement	5	5.6

Source: Primary data (2025)

The gender distribution of the respondents was nearly balanced, with 52.8% male and 47.2% female. This equitable representation suggested that the findings on electronic communication practices were not skewed toward the perspective of a single gender, enhancing the generalizability of the results across the project's workforce.

Regarding age, the majority of respondents (55.1%) were below 20 years old, indicating a predominantly youthful workforce. From the perspective of the Theory of Reasoned Action, this demographic characteristic could imply a workforce with behavioral beliefs shaped by greater exposure to digital technology, potentially leading to more positive attitudes and a stronger intention to adopt electronic communication tools spontaneously.

The data on organizational tenure revealed that an overwhelming majority (76.4%) had been with the organization for between 1 and 5 years. This suggested a workforce with moderate experience, likely long enough to be familiar with project protocols but potentially lacking the deep institutional knowledge of longer-serving employees. Their normative beliefs regarding communication would have been formed within the recent operational context of the project.

The respondents' educational backgrounds were highly qualified, with 49.4% holding university degrees and 27.0% having tertiary education. This high level of education was a critical factor, as the TRA suggests that educational attainment influences an individual's behavioral beliefs and their ability to comprehend and evaluate the outcomes of using complex systems, such as electronic communication platforms.

The distribution across departments showed significant representation from ICT (23.6%), Planning & Environment (19.1%), and Quality Assurance (16.9%). This diversity ensured that the data reflected the views of both technical core teams and support units, capturing a holistic picture of the subjective norms and communication pressures that exist across different project functions.

Descriptive statistics of electronic communication road projects in Mogadishu, Somalia

This section presents the findings on the perceived effect of electronic communication on the performance of the Mogadishu Super Highway Roads Project. The data, gathered using a five-point Likert scale, were analyzed through descriptive statistics (mean and standard deviation). The interpretation of these findings is guided by the Theory of Reasoned Action (TRA), which helps explain how the respondents' attitudes (evaluative beliefs) toward these electronic communication tools influenced their overall behavioral intention to support their use for project performance.

Table 6: Descriptive statistics of electronic communication

Item Code	Statement	SA %	A %	N %	D %	SD %	Mean	Std Dev	Interpretation

EC1	Electronic communication tools can improve the efficiency of road project performance in Somalia	19.1	58.4	2.2	4.5	15.7	2.39	1.29	High
EC2	The ability of electronic communication platforms to enhance collaboration among stakeholders involved in road projects in Somalia	64	6.7	2.2	10	16.9	2.09	1.61	High
EC3	Perceive electronic communication technology as an effective tool for real-time monitoring and reporting of road project progress in Somalia	25.8	0	19	38	16.9	3.2	1.44	Low
EC4	With the current level of implementation and utilization of electronic communication tools in road project performance in Somalia	10.1	1.1	2.2	84	2.2	3.67	0.95	Very Low
EC5	Perceive electronic communication systems as facilitating transparency and accountability in road project performance practices in Mogadishu, Somalia	4.5	76.4	3.4	2.2	13.5	2.44	1.1	High
EC6	Electronic communication platforms are effective in addressing communication barriers and facilitating information sharing among project stakeholders in Mogadishu, Somalia	10.1	12.4	43	20	14.6	3.17	1.14	Low
EC7	Investing in training and capacity-building initiatives for electronic communication technologies would improve road project performance outcomes in Somalia	73	0	7.9	4.5	14.6	1.88	1.52	Very High
	Average Mean						**2.69**	**1.29**	**Moderate**

Source: Primary data (2025)

EC1: "*Electronic communication tools can improve the efficiency of road project performance in Somalia"*. This item received a High rating (Mean=2.39). A strong majority of respondents (77.5% combined agree/strongly agree) believed in the efficiency-improving potential of these tools. This indicates a fundamentally positive *attitude* toward the concept, which, according to the TRA, is a primary antecedent to the intention to adopt them.

EC2: "*The ability of electronic communication platforms to enhance collaboration among stakeholders involved in road projects in Somalia".* This item also received a High rating (Mean=2.09), though it revealed a polarized view. A very high proportion (64.0%) strongly agreed, yet a significant minority (27.0%) disagreed. This suggests that while the *behavioral belief* in the tool's collaborative benefit is strong for many, a conflicting subjective norm exists within the project environment.

EC3: "*Perceive electronic communication technology as an effective tool for real-time monitoring and reporting of road project progress in Somalia"*. This item was rated Low (Mean=3.20). Respondents were skeptical about this specific function, indicating a neutral-to-negative *attitude*. This suggests that respondents' behavioral beliefs about the tools' practical utility for key project control activities are not yet firmly positive, potentially hindering their intention to rely on them for critical reporting.

EC4: "*With the current level of implementation and utilization of electronic communication tools in road project performance in Somalia*". This item received a Very Low rating (Mean=3.67), demonstrating a clear consensus (84.3% disagreeing) that the *current level of implementation* is insufficient. This finding is crucial for the TRA, as it highlights a significant gap between a positive attitude toward the concept and the negative perception of its current execution, which severely hinders the actual *behavior* of using the systems effectively.

EC5: "*Perceive electronic communication system as facilitating transparency and accountability in road project performance practices in Mogadishu, Somalia"*. This item was rated High (Mean=2.44). A large majority (80.9%) agreed with this statement, representing a strong positive *behavioral belief* regarding a key ethical outcome. This would positively influence their attitude and intention to use the systems for promoting transparent project practices.

EC6: "*Electronic communication platforms are effective in addressing communication barriers and facilitating information sharing among project stakeholders in Mogadishu, Somalia"*. This item received a Low rating (Mean=3.17). The response was highly uncertain, with the largest group (42.7%) being neutral. This indicates ambivalence regarding the tools' actual effectiveness in overcoming local barriers, implying that the *normative beliefs* about their practical benefit are not yet fully formed or universally accepted.

EC7: "*Investing in training and capacity-building initiatives for electronic communication technologies would improve road project performance outcomes in Somalia".* This item received a Very High rating (Mean=1.88). An overwhelming 73.0% strongly agreed, underscoring a powerful shared *behavioral belief* that capacity building is a critical enabling condition. From a TRA perspective, this strong belief directly supports a positive attitude and intention to participate in and endorse such training initiatives.

The overall average mean of 2.69 for the section suggests a Moderate aggregate perception of the role of electronic communication. This indicates that while respondents see potential value, their positive attitudes and intentions are significantly tempered by the very low perception of current implementation levels and low confidence in specific functionalities like real-time monitoring.

This is further confirmed by the qualitative data responses from the key informants, where respondents 3, 5, and 6 asserted that –

> *The mandatory use of a centralized project management portal for daily reporting and document sharing was instrumental in preventing costly rework and keeping the project on schedule, directly linking the tool to timeliness and quality outcomes. They elaborated that having a single source of truth for all design documents and progress photos eliminated the confusion that previously arose from using multiple, conflicting versions of drawings. This immediate access to updated information allowed field teams to rectify potential errors within hours, rather than discovering them weeks later during formal inspections. The portal's audit trail also created accountability, ensuring that all team members were working from the latest approved plans.*

Descriptive Statistics on Road Project Performance

This section presents the findings on the perceived performance of road projects in Mogadishu, Somalia, based on key performance indicators such as timeliness, budget adherence, quality, and stakeholder satisfaction. The analysis is guided by the Theory of Reasoned Action (TRA), which helps explain how stakeholders' behavioral beliefs and attitudes toward project management practices influence their perceptions of project outcomes. The data, gathered using a five-point Likert scale, provide a multifaceted view of project outcomes as reported by the respondents

Table 7: Descriptive Statistics on Road Project Performance

Item Code	Item	SA %	A %	N %	D %	SD %	Mean	Interpretation

PP1	Road projects in Mogadishu, Somalia, are completed within the scheduled time frame	67.4	4.5	0	12.4	15.7	2.04	High
PP2	The adherence to budget constraints during the completion of road projects influenced their performance	25.8	43.8	7.9	12.4	10.1	2.37	High
PP3	Road projects in Mogadishu, Somalia, meet the specified quality requirements and standards	33.7	42.7	7.9	6.7	26.7*	2.42	High
PP4	Road projects in Mogadishu, Somalia, align with the defined project scope and objectives	19.1	50.6	9	9	12.4	2.45	High
PP5	The sustainability of road infrastructure developed through projects in Somalia	14.6	59.6	3.4	6.7	15.7	2.49	Moderate
PP6	Road projects in Mogadishu, Somalia, serve their intended purpose of improving transportation and connectivity	43.8	33.7	4.5	11.2	6.7	2.03	High
PP7	Road projects in Mogadishu, Somalia, contributed to achieving the business objectives set forth by stakeholders	23.6	50.6	6.7	15.7	3.4	2.25	High
PP8	Stakeholders are satisfied with the overall quality and functionality of road infrastructure developed through these projects in Mogadishu, Somalia	16.9	50.6	11	11.2	10.1	2.47	Moderate
	Average Mean						**2.32**	**High**

Source: Primary data (2024)

PP1: *Road projects in Mogadishu, Somalia, are completed within the scheduled time frame*. This item received a High rating (Mean=2.04). A combined 71.9% of respondents agreed or strongly agreed that projects are completed on time. From a TRA perspective, this positive perception reflects strong behavioral beliefs among stakeholders that project teams are capable of executing their planned schedules, which reinforces positive attitudes toward project management effectiveness and strengthens intentions to support future project initiatives.

PP2: *The adherence to budget constraints during the completion of road projects influenced their performance***.** This item was also rated High (Mean=2.37). A significant majority (69.6%) acknowledged the importance of budget adherence. According to TRA, these findings suggest that stakeholders hold strong normative beliefs about financial discipline, creating social pressure that influences project teams' intentions to maintain budgetary control, ultimately leading to better financial performance outcomes.

PP3: *Road projects in Mogadishu, Somalia, meet the specified quality requirements and standards*. With a High rating (Mean=2.15), a majority (76.4%) agreed on quality compliance. The TRA framework helps explain this outcome, as positive behavioral beliefs about quality standards and strong subjective norms regarding construction excellence likely influence stakeholders' intentions to maintain quality control, resulting in generally positive quality perceptions.

PP4: *Road projects in Mogadishu, Somalia, align with the defined project scope and objectives*. This item received a High rating (Mean=2.45). A strong majority (69.7%) agreed that projects remain aligned with their initial goals. This alignment reflects the TRA

concept that clear project objectives create strong behavioral beliefs about project purpose, which guide stakeholders' intentions and actions toward achieving defined outcomes.

PP5: *The sustainability of road infrastructure developed through projects in Somalia*. This was rated Moderate (Mean=2.49), the lowest score in the set. While 74.2% agreed on sustainability, the higher mean suggests less confidence. From a TRA viewpoint, this indicates weaker behavioral beliefs about long-term maintenance capabilities and possibly less strong subjective norms prioritizing sustainability, affecting stakeholders' intentions to invest in durable infrastructure solutions.

PP6: *Road projects in Mogadishu, Somalia, serve their intended purpose of improving transportation and connectivity***.** This item earned a High rating (Mean=2.03). An overwhelming 77.5% of respondents affirmed that projects successfully achieve their primary purpose. This strong positive perception aligns with TRA, as successful outcomes reinforce positive behavioral beliefs about project value, strengthening future intentions to support similar infrastructure initiatives.

PP7: *Road projects in Mogadishu, Somalia, contributed to achieving the business objectives set forth by stakeholders*. This item was rated High (Mean=2.25). A large majority (74.2%) recognized the contribution of projects to broader business objectives. The TRA framework suggests that these positive outcomes create strong behavioral beliefs about project utility, influencing stakeholders' intentions to continue supporting road infrastructure development.

PP8: *Stakeholders are satisfied with the overall quality and functionality of road infrastructure*. This item received a Moderate rating (Mean=2.47). Although 67.5% of respondents reported stakeholder satisfaction, the relatively higher mean signals ambivalence. According to TRA, this mixed perception may stem from varying behavioral beliefs about quality outcomes and differing subjective norms among stakeholder groups, affecting their overall satisfaction levels.

In summary, the overall perception of road project performance in Mogadishu is positively high, with an average mean of 2.28. The results indicate strong performance in core areas such as meeting the intended purpose of improving connectivity, completing projects on time, and adhering to scope and budget. The Theory of Reasoned Action provides valuable insights into these outcomes, suggesting that positive behavioral beliefs and strong subjective norms about project management practices contribute to successful performance perceptions. However, the analysis also reveals critical areas for improvement, particularly concerning the sustainability of the infrastructure and the level of stakeholder satisfaction with quality and functionality, which were perceived more moderately. From a theoretical perspective, these moderate ratings may indicate weaker behavioral beliefs or conflicting subjective norms in these specific areas. These findings provide a clear performance baseline and highlight specific dimensions where project management interventions could be most impactful to strengthen stakeholders' positive beliefs and intentions toward project outcomes.

This is further confirmed by the qualitative data responses from the key informants, where respondents 13, 25, and 26 asserted that –

> *The establishment of dedicated communication channels, such as WhatsApp groups for rapid issue resolution between site engineers and headquarters, significantly accelerated decision-making and enhanced budget adherence by quickly addressing problems before they escalated in cost. They provided a specific example where a geotechnical inconsistency was discovered at a project site; instead of halting work for days to await a formal report, the site team immediately shared photos and videos via the group. This enabled senior engineers at headquarters to perform a virtual assessment and provide a solution on the same day, preventing a costly work stoppage. The instant messaging platform also fostered a culture of proactive problem-solving, where junior engineers felt empowered to report issues in real-time without bureaucratic delay. This seamless flow of information was critical for managing the project's tight budget in a volatile environment where delays quickly translated into financial overruns*

Simple linear regression electronic communication on project performance

Table 8: Simple linear regression of electronic communication on road project performance

Variables	Unstandardized Beta	Standardized Beta	t-values	Adjusted R^2	F-Value	p-values
(Constant)	1.215		5.822	0.502	89.441	0.001*

Electronic Communication	0.698	0.712	9.457			0.001*

*Note: * indicates significance at $p < 0.05$*

Source: Primary data (2025)

The simple linear regression analysis was conducted to empirically test the fundamental proposition of this study: that electronic communication significantly influences the performance of road projects. The results, as detailed in Table 4.9, provide robust statistical evidence to reject the null hypothesis (H0), which stated that electronic communication has no significant effect on the performance of the Mogadishu Super Highway Roads Project. The model yielded a statistically significant F-statistic of 89.441 ($p < 0.001$), confirming that the regression model is a good fit for the data. More critically, the analysis revealed a strong, positive, and statistically significant relationship, with a substantial standardized beta coefficient (β) of 0.712 ($p < 0.001$). This indicates that for every one standard deviation increase in the effective use of electronic communication, there is a corresponding increase of 0.712 standard deviations in project performance. This finding decisively refutes the null hypothesis and establishes electronic communication not merely as a peripheral tool, but as a powerful and central driver of performance outcomes, explaining a substantial 50.2% of the variance observed in the project's performance metrics.

These empirical findings offer strong validation for the Theory of Reasoned Action (TRA) as the guiding theoretical framework for this study. The TRA posits that an individual's behavior is driven by their behavioral intention, which is itself shaped by their attitude toward the behavior and the prevailing subjective norms. The powerful positive relationship uncovered by the regression analysis ($\beta = 0.712$) demonstrates that the collective behavioral intention of project staff to utilize electronic communication tools—an intention rooted in their positive attitudes regarding the tools' efficiency and the subjective norms encouraging their use—translates directly into tangible performance improvements. The high explanatory power of the model (Adjusted $R^2 = 0.502$) suggests that the cognitive and social factors outlined by the TRA are not just abstract concepts but have a measurable and direct manifestation in the project's operational success. The theory, therefore, provides a credible mechanism to explain *why* electronic communication is effective: because the project team holds strong behavioral beliefs about its benefits and operates within a normative environment that supports its use, leading to a high collective intention to engage in communication behaviors that enhance coordination, reduce errors, and accelerate decision-making.

In conclusion, the results of the simple linear regression provide conclusive evidence to support the central argument of this research. The rejection of the null hypothesis (H0) confirms that electronic communication is a critical and indispensable factor for enhancing the performance of the Mogadishu Super Highway Roads Project. Furthermore, the strength and significance of this relationship substantiate the applicability of the Theory of Reasoned Action in this context, illustrating how the attitudes and social pressures surrounding technology adoption directly catalyze improved project outcomes. This synthesis of statistical evidence and theoretical validation underscores the practical imperative for project management to intentionally foster a positive attitude towards digital tools and to cultivate strong subjective norms that mandate their use, as these factors are now demonstrably linked to superior project performance.

5. DISCUSSIONS

The findings of this study provided a robust empirical basis for rejecting the null hypothesis (H0), which posited that electronic communication has no significant effect on the performance of the Mogadishu Super Highway Roads Project. The simple linear regression analysis revealed a strong, positive, and statistically significant relationship ($\beta = 0.712$, $p < 0.001$), demonstrating that enhanced electronic communication directly and substantially improved project performance, accounting for 50.2% of its variance. This outcome decisively refuted the null hypothesis and underscored that electronic communication was not a peripheral administrative tool but a critical performance driver. The results indicated that improvements in the use of digital platforms were associated with superior outcomes in terms of schedule adherence, budget management, and quality standards, fundamentally altering the communication dynamics within a complex, post-conflict project environment.

The validation of the Theory of Reasoned Action (TRA) provided a compelling explanatory framework for these results. The study found that the behavioral intentions of project staff—shaped by their attitudes towards electronic communication and the subjective norms within the project—were a key mechanism driving its adoption and effectiveness. For instance, the strong positive attitudes towards the potential of these tools for improving efficiency and transparency (as seen in EC1 and EC5) fostered an intention to use them. Conversely, the very low perception of the current level of implementation (EC4) and skepticism towards specific functionalities like real-time monitoring (EC3) acted as significant barriers, illustrating how negative behavioral beliefs could weaken intention and, consequently, the effective behavior of using the tools. The high explanatory power of the regression model confirmed that the cognitive and social constructs of the TRA were directly manifest in the project's operational success.

The results of this study were consistent with a growing body of international research that highlighted the transformative role of digital communication in construction and infrastructure projects. Ofori-Kuragu et al. (2021) similarly found that digital transformation was imperative for project success, especially in environments with disrupted face-to-face interactions. A study by Danso et al. (2023) in Ghana confirmed that digital collaboration platforms significantly enhanced stakeholder integration and project delivery timelines. Furthermore, research by El-Sayed et al. (2022) in Egypt demonstrated a strong correlation between the use of project management software and improved budget adherence. Ali and Khan (2024), in a post-conflict context akin to Somalia, reported that mobile communication apps were crucial for maintaining project momentum amidst logistical challenges. The emphasis on training, echoed by the very high rating for EC7 in this study, was also a central finding in a global review by Ikuabe et al. (2023), which identified capacity building as the most critical success factor for technology adoption. Lastly, a meta-analysis by Chen and Liu (2024) consolidated evidence from multiple studies, concluding that electronic communication was a primary determinant of project performance, particularly in complex, multi-stakeholder environments, thereby reinforcing the generalizability of the current study's findings.

Despite the clear overall benefits, the discussion also had to contend with the nuanced and sometimes contradictory perceptions captured in the descriptive statistics. The moderate aggregate perception of electronic communication (Average Mean = 2.69) and the low confidence in its effectiveness for real-time monitoring and overcoming communication barriers revealed a significant gap between recognizing its potential and realizing its full utility in practice. This gap was attributed to contextual challenges specific to the Somali environment, including unreliable internet infrastructure, varying levels of digital literacy, and a possible cultural preference for oral communication that was not fully supplanted by digital channels. Therefore, while the quantitative model confirmed a powerful relationship, the qualitative nuances suggested that the effect of electronic communication was mediated by underlying infrastructural and human capacity factors, indicating that its benefits were not automatic but required a supportive ecosystem to be fully actualized.

6. CONCLUSIONS

This study established that electronic communication exerted a significant and substantial positive effect on the performance of the Mogadishu Super Highway Roads Project, leading to the definitive rejection of the null hypothesis. The research successfully validated the Theory of Reasoned Action, demonstrating that the project team's behavioral intentions, shaped by their attitudes and the prevailing subjective norms, were the underlying psychological mechanisms that translated the use of digital tools into enhanced project outcomes. While stakeholders recognized the profound potential of these tools for fostering efficiency, collaboration, and transparency, their actual effectiveness was hampered by a perceived inadequacy in current implementation levels and specific functional limitations. The findings, therefore, present a dual narrative: a clear, statistically proven benefit on one hand, and a critical need for strategic investment in the enabling environment on the other, highlighting that the mere presence of technology is insufficient without the requisite structural and cultural support to ensure its optimal utilization.

7. RECOMMENDATIONS

Based on the findings, the following recommendations are proposed for key stakeholders:

To project management and the Somali government: Institutionalize the use of integrated electronic communication platforms (e.g., dedicated project management software) as mandatory for all official correspondence, reporting, and document control. Develop and enforce a clear digital communication protocol to create a strong subjective norm favoring their use.

To international donors and funding agencies: Earmark funds specifically for digital infrastructure support, including the provision of reliable internet connectivity and hardware for the project team. Condition continued funding on the demonstration of improved digital transparency and reporting.

To human resource management & development: Implement comprehensive and continuous training programs focused on building digital literacy and specific competencies in using the adopted project management software. This addresses the overwhelmingly identified need for capacity building (EC7) and helps foster positive attitudes by increasing user confidence and competence.

8. CONTRIBUTION TO KNOWLEDGE

This study made a significant contribution to the body of knowledge by providing some of the first empirical evidence on the nexus between electronic communication and project performance within the unique context of a post-conflict Somali infrastructure project. It extended the application of the Theory of Reasoned Action from individual technology adoption to collective performance outcomes in a high-stakes project environment, demonstrating its utility in diagnosing adoption barriers. Furthermore, it identified and quantified the critical "implementation gap", the chasm between the recognized potential of digital tools and their perceived current effectiveness, offering a new conceptual lens for understanding technology integration in developing and fragile contexts.

9. AREAS FOR FURTHER RESEARCH

I. A longitudinal study to investigate the long-term impact of specific electronic communication tools on the operational maintenance and sustainability of road infrastructure post-construction.

II. An in-depth qualitative inquiry into the socio-cultural and institutional barriers that hinder the effective adoption of electronic communication in Somali public sector projects, beyond the infrastructural limitations.

III. A comparative study across multiple infrastructure projects in East Africa to identify regional best practices and contextual factors that moderate the relationship between electronic communication and project performance.

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