JRIIE Journal of Research Innovation and Implications in Education
Center for Research Implications & Practice

Website: www.jriiejournal.com ISSN 2520-7504 (Online) Vol.10, Iss.4, 2026 (pp. 1528 – 1537)

The effect of Project Communication Systems on Efficient Project Delivery in World Vision Rwanda's Community Water Supply Projects in Kigali City

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Abstract: *This study examined the effect of project communication systems on efficient project delivery in World Vision Rwanda's community water supply projects in Kigali City. It specifically determined the effects of communication channels, communication frequency and feedback mechanisms on efficient project delivery. A quantitative descriptive-correlational case study design was adopted. The target population was 150 personnel from eight departments involved in the projects between 2021 and 2025. Yamane's formula gave a sample of 109, allocated through proportionate stratified random sampling. A structured five-point Likert questionnaire (Cronbach's alpha = .819 to .840) was administered, and 96 usable questionnaires (88.1%) were analyzed in SPSS using means, standard deviations, Pearson correlation and simple linear regression at the 5% significance level. Respondents expressed high agreement on communication channels (M = 4.36), communication frequency (M = 4.34) and feedback mechanisms (M = 4.26). Each dimension had a strong, positive and statistically significant relationship with efficient project delivery: channels (r = .69, R^2 = .476), frequency (r = .66, R^2 = .436) and feedback mechanisms (r = .72, R^2 = .518), all p < .001. Feedback mechanisms showed the strongest association. The study concludes that structured channels, regular communication and responsive feedback are associated with efficient project delivery. It recommends project-specific communication matrices, scheduled meetings and updates based on information needs, and documented feedback procedures with defined response and escalation times.*

Keywords: Communication, Channels, Frequency, Feedback, Delivery, Water, Rwanda

How to cite this work (APA):

Uwineza, A. & Ssali, F. (2026). The effect of Project Communication Systems on Efficient Project Delivery in World Vision Rwanda's Community Water Supply Projects in Kigali City. *Journal of Research Innovation and Implications in Education, 10*(4), 1528 – 1537. **https://doi.org/10.59765/wud7w2**

1. Introduction

Project communication is a core project management function because it carries information, instructions and decisions among the people responsible for delivery. The Project Management Institute (2021) describes it as the processes of preparing, collecting, developing, distributing and managing project information. In community water supply projects the demands on these processes are high, since project managers, engineers, procurement and finance staff, contractors, local authorities, donors and beneficiary communities all depend on shared and timely information.

Globally, research on complex projects increasingly treats communication as an integrated system rather than a simple exchange of messages. Denicol et al. (2020) linked weak communication systems to delays and cost overruns in megaprojects; while Oyekunle et al. (2024) reported that formal channel, real-time information sharing and feedback mechanisms improved coordination in globally dispersed projects. Saxena and McDonagh (2022) likewise showed that communication breakdowns undermine

project outcomes and that communication must work across organizational levels.

Across Africa, similar patterns have been reported. Aziz (2022) established that communication supported stakeholder coordination and success in the SANRAL Gauteng e-tolling project in South Africa. Akintelu et al. (2023) found that communication planning and communication mediums had a significant effect on timely delivery of construction projects in Nigeria. Kipyegon et al. (2025) associated poor reporting structures and inadequate feedback mechanisms with delays, cost overruns and reduced quality in road projects in Kenya. In humanitarian interventions in Ethiopia, Kenya and Somalia, the CDAC Network (2023) documented persistent difficulties in information sharing, community engagement, coordination and feedback management.

In Rwanda, access to safe water is a national development priority aligned with Sustainable Development Goal 6, Vision 2050 and the National Strategy for Transformation, and non-governmental organisations contribute to this agenda through community water supply projects. Delivering such projects efficiently requires coordination among many actors. Singirankabo and Wanjiku (2023), studying international non-governmental organisation projects in Rwanda, found significant relationships between project communication practices and aspects of project performance. World Vision Rwanda implements community water supply projects in Kigali City whose delivery depends on appropriate channels, regular progress communication and responsive stakeholder feedback.

1.2 Statement of the Problem

Efficient delivery of community water supply projects depends not only on financial and technical resources but also on the timely exchange of information among project teams, contractors, local authorities and beneficiaries. Communication-related weaknesses, such as inconsistent use of channels, irregular progress updates and delayed responses to stakeholder concerns, can disrupt coordination, slow decision-making and delay project activities.

Although communication is widely recognized as important, existing evidence has three limitations. First, most studies concern construction, infrastructure or information technology projects rather than NGO-funded community water supply projects (contextual gap). Second, communication is often examined as a single broad concept, so little is known about the separate contribution of channels, frequency and feedback (conceptual gap). Third, many studies are descriptive or qualitative and do not test the strength and significance of relationships statistically (methodological gap). Within Rwanda, no study was found that quantitatively tested these dimensions separately against efficient delivery in World Vision Rwanda's community water supply projects in Kigali City. This study addresses that gap, and its findings can guide communication planning, stakeholder coordination and feedback management in similar projects.

1.3 Research Objectives

The main purpose of the study was to examine the effect of project communication systems on efficient project delivery in World Vision Rwanda's community water supply projects in Kigali City. The specific objectives were as follows:

1. To determine the effect of communication channels on efficient project delivery.
2. To evaluate the influence of communication frequency on efficient project delivery.
3. To examine the effect of feedback mechanisms on efficient project delivery.

2. Literature Review

2.1 Theoretical Review

Three theories guided the study. Communication Theory, originating with Shannon and Weaver (1949), conceptualizes communication as a process involving a sender, message, channel, receiver and feedback, in which noise can distort meaning. It directly informs the first and third objectives: channels determine how project information is transmitted, and feedback allows senders to confirm understanding and correct problems early. Its limitation is that it focuses on message transmission and says little about stakeholder relationships or coordination among project functions.

Stakeholder Theory (Freeman, 1984) holds that success depends on identifying, engaging and balancing the interests of those who affect or are affected by an organization's activities. In community water supply projects, donors, staff, contractors, local authorities and beneficiaries differ in interests and technical knowledge. The theory explains why accessible feedback channels, through which stakeholders raise concerns and receive responses, matter for the third objective. It does not, however, prescribe a particular channel or frequency of communication.

Systems Theory (von Bertalanffy, 1968) views a project as a set of interdependent components in which a weakness in one part affects overall performance. Planning, procurement, engineering, finance, monitoring and

community engagement all depend on timely information from one another. The theory therefore underpins the second objective: regular meetings, progress updates and consultations keep the components aligned and allow problems to be detected early. It is broad, however, and does not specify the exact practices required in every setting.

Together, the theories offer complementary explanations: Communication Theory for channels and feedback, Stakeholder Theory for stakeholder feedback, and Systems Theory for frequency and coordination. They explain associations but, on their own, do not establish causation.

2.2 Empirical Literature

Denicol et al. (2020) identified weak communication and fragmented information flow as key causes of poor megaproject performance. Similarly, Oyekunle et al. (2024) found that structured communication systems incorporating formal channels, real-time information sharing and feedback improve project performance by reducing misunderstandings and strengthening decision-making. Saxena and McDonagh (2022) also demonstrated that communication breakdowns across organisational levels negatively affect project outcomes.

In Nigeria, Akintelu et al. (2023) established that communication planning and channels significantly influence timely project delivery in the construction industry. Kipyegon et al. (2025) associated weak reporting structures and feedback mechanisms in Kenyan road projects with delays, cost overruns and poor quality. Likewise, Aziz (2022) highlighted the importance of communication in stakeholder coordination in South African infrastructure projects. The CDAC Network (2023) further identified information-sharing, community engagement and feedback challenges in humanitarian responses in the Horn of Africa.

In Rwanda, Singirankabo and Wanjiku (2023) found significant relationships between communication practices, including multiple communication channels and feedback mechanisms, and the cost, schedule and quality performance of international NGO projects. However, their study did not specifically address community water supply projects in Kigali City.

Overall, existing evidence highlights the importance of structured communication channels, timely information sharing and effective feedback in improving project delivery. However, limited research has examined these dimensions within NGO-supported community water supply projects. This study therefore addresses this contextual and empirical gap by focusing on World Vision Rwanda's community water supply projects in Kigali City.

3. Methodology

3.1 Research Design

The study adopted a quantitative descriptive-correlational case study design. The descriptive component summarized respondents' perceptions of communication practices and project delivery, while the correlational component established the strength and direction of the relationship between each communication dimension and efficient project delivery without manipulating any variable. The case was the set of community water supply projects implemented by World Vision Rwanda in Kigali City between 2021 and 2025. Kigali City was selected because the projects involved multiple stakeholders and required continuous coordination, information sharing and timely decision-making.

3.2 Population and Sampling Procedures

The target population comprised 150 individuals directly involved in the planning, coordination, implementation, monitoring and management of the selected projects, drawn from eight departments. Because it was not feasible to survey all of them, the sample size was determined using Yamane's (1967) formula at a 5% margin of error: $n = 150 / (1 + 150 \times 0.05^2) = 109.09$, rounded to 109. Proportionate stratified random sampling was used so that each department was represented in proportion to its size ($n_i = N_i / N \times n$). Table 1 presents the distribution.

Table 1: Target Population and Sample Distribution

Department	Population	Sample
Project management	20	15
Engineering and technical team	30	22
Monitoring and evaluation	15	11
Finance	20	15
Procurement and logistics	15	11
Community development	25	18
Administration and human resources	10	7
Senior management	15	10
Total	150	109

3.3 Instruments, Validity and Reliability

Primary data were collected with a structured questionnaire containing socio-demographic items and closed-ended statements on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) covering communication channels, communication frequency, feedback mechanisms and efficient project delivery. The questionnaire was administered physically and electronically after permission was obtained from Mount Kigali University and World Vision Rwanda. Secondary data from journals, books and organisational documents provided background and supported interpretation.

The questionnaire was piloted with respondents who resembled the study participants but were excluded from the final sample, and the feedback was used to refine ambiguous or repetitive items. Content validity was strengthened through expert review by academic supervisors and specialists in project management and research methodology. Construct validity was supported by aligning items with the study objectives and the theoretical and conceptual frameworks, and face validity was confirmed through the pilot. Internal consistency was assessed with Cronbach's alpha, with values of .70 or above treated as acceptable (Field, 2018). Table 2 shows that all scales exceeded this threshold.

Table 2: Reliability of the Study Scales

Variable	Cronbach's alpha	Interpretation
Communication channels	.819	Acceptable
Communication frequency	.827	Acceptable
Feedback mechanisms	.840	Acceptable
Efficient project delivery	.821	Acceptable

3.4 Data Analysis and Ethical Considerations

Responses were coded and analyzed in the Statistical Package for the Social Sciences (SPSS). Frequencies and percentages summarized categorical data, and means and standard deviations described agreement with the Likert statements (Pallant, 2020). Means were interpreted as very low (1.0–1.8), low (1.9–2.6), neutral (2.7–3.4), high (3.5–4.2) or very high (4.3–5.0). Pearson's correlation coefficient assessed the strength and direction of the relationship between each communication dimension and efficient project delivery; coefficients of .60 to .79 were described as strong. Separate simple linear regression models, one per dimension, produced R^2, F, standardized

coefficients and t-values. Each null hypothesis was rejected where $p \leq .05$. Because each model contained a single predictor, the R^2 values come from separate models and cannot be added together.

Participation was voluntary, informed consent was obtained, respondents could withdraw without penalty, names were excluded from the analysis, and the data were used only for academic purposes.

4. Results and Discussion

The results are presented according to the three research questions. Of the 109 questionnaires distributed, 96 were returned complete and usable (88.1%), and the remaining 13 (11.9%) were incomplete and excluded.

4.1 Profile of Respondents

Table 3 shows that the respondents were mature and well qualified. Most (n = 90, 93.7%) were aged 26 years and above, 84 (87.5%) held at least a bachelor's degree, and 58 (60.4%) had more than five years of professional experience. All eight departments were represented, with the engineering and technical team the largest group (n = 19, 19.8%), followed by community development (n = 16, 16.7%). Respondents were therefore well placed to judge the communication practices used in the projects.

Table 3: Profile of Respondents

Characteristic	Category	f	%
Gender	Male	57	59.4
	Female	39	40.6
Age	20–25 years	6	6.3
	26–35 years	31	32.3
	36–45 years	32	33.3
	46 years and above	27	28.1
Education	Diploma	12	12.5
	Bachelor's degree	43	44.8
	Master's degree	35	36.5
	PhD	6	6.3
Experience	1–5 years	38	39.6
	6–10 years	31	32.3
	11–15 years	18	18.8
	16 years and above	9	9.4

4.2 Efficient Project Delivery

Table 4 shows that respondents agreed that delivery was efficient (overall M = 4.08). Communication was most strongly credited with improving project quality (M = 4.36). Reduction of time overruns (M = 3.83) and resolution of problems before they caused major delays (M = 3.79) were rated lowest, so schedule performance appears to be the area with most room for improvement.

Table 4: Respondents' Perceptions of Efficient Project Delivery

Statement	% Agree	M	SD
Projects are generally completed within planned schedules	75.0	4.15	0.91
Communication helps reduce project time overruns	74.0	3.83	1.28
Communication contributes to improved project quality	84.4	4.36	1.07
Effective communication helps control project costs	79.2	4.13	0.94
Communication supports timely decision-making	80.2	4.11	1.09
Project problems are resolved before causing major delays	68.8	3.79	1.28
Stakeholder coordination contributes to efficient delivery	83.3	4.16	1.17
Overall		**4.08**	

4.3 Communication Channels and Efficient Project Delivery

Respondents rated communication channels very highly (overall M = 4.36, SD = 1.00), with item means from 4.07 to 4.47 (Table 5). Virtual communication received the highest mean (M = 4.47, SD = 0.75), followed by clear communication through established channels, telephone communication for urgent information and the role of multiple channels in reducing misunderstandings (M = 4.43 each). Emails and written reports had the lowest mean (M = 4.07) and the lowest agreement (74.0%), although still within the high band.

Table 5: Communication Channels

Statement	% Agree	M	SD
Project information is communicated clearly through established channels	85.4	4.43	1.04
Well-established communication channels are used in the project	89.6	4.35	0.97
Meetings are effectively used to communicate project information	88.5	4.36	1.09
Emails and written reports support project communication	74.0	4.07	1.16
Telephone communication is used when urgent information is required	89.6	4.43	0.97
Virtual communication facilitates coordination among stakeholders	88.5	4.47	0.75
Different communication channels help reduce project misunderstandings	89.6	4.43	0.99
Overall		**4.36**	**1.00**

The relationship with delivery was strong, positive and significant: $r = .69$, $p < .001$, $N = 96$. The simple regression model was significant, $F(1, 94) = 85.42$, $p < .001$, with $\beta = .690$, $t = 9.24$, $R^2 = .476$ (adjusted $R^2 = .471$). Communication channels were therefore associated with 47.6% of the variation in efficient project delivery, and H_{01} was rejected.

The result agrees with Communication Theory (Shannon & Weaver, 1949), in which the channel carries the message from sender to receiver and a poorly chosen channel can introduce noise. It is consistent with Aziz (2022), who found communication to be important for coordinating stakeholders in a large South African infrastructure project, and with Akintelu et al. (2023), who found that communication mediums significantly affected timely delivery in Nigerian construction projects. It also supports

Singirankabo and Wanjiku (2023), whose evidence from Rwandan international non-governmental organisation projects associated multi-channel communication with performance, and Oyekunle et al. (2024), who emphasized formal channels for coordination.

The pattern across items is informative. The highest ratings went to virtual and telephone communication, which suit dispersed teams and urgent issues, while emails and written reports scored lowest. Written records are what preserve instructions and decisions, so their relatively weaker rating suggests that documentation may be the least developed part of the channel mix. This is important, as Saxena and McDonagh (2022) have shown that communication breakdowns can undermine project results if information is not shared consistently across the organization. Overall, the findings show that the implementation of projects does not depend on a single channel of communication but rather on a deliberate combination of channels appropriate to the urgency and target audience of the information.

4.4 Communication Frequency and Efficient Project Delivery

Communication frequency also received a very high rating (overall M = 4.34, SD = 0.95; Table 6). Stakeholders were reported to receive progress information frequently (M = 4.51), and respondents strongly agreed that regular communication helps identify problems early (M = 4.50). Regular project meetings (M = 4.35) and the other statements (M = 4.25 to 4.26) were rated slightly lower. Regular communication with community representatives had the lowest agreement (79.2%) and the widest spread (SD = 1.19), indicating less uniform practice at community level.

Table 6: Communication Frequency

Statement	% Agree	M	SD
Project meetings are held regularly	88.5	4.35	1.02
Progress updates are communicated regularly	86.5	4.25	1.09
Stakeholders receive information about project progress frequently	90.6	4.51	0.73
Communication increases when important project issues arise	84.4	4.26	0.94
Project teams communicate regularly with community representatives	79.2	4.26	1.19
Regular communication helps identify project problems early	88.5	4.50	0.75
Frequent communication improves project coordination	85.4	4.25	0.83
Overall		**4.34**	**0.95**

Communication frequency had a strong, positive and significant relationship with efficient project delivery: $r = .66$, $p < .001$, $N = 96$. The regression model was significant, $F(1, 94) = 72.55$, $p < .001$, with $\beta = .660$, $t = 8.52$ and $R^2 = .436$ (adjusted $R^2 = .430$), so 43.6% of the variation in delivery was associated with frequency. H_{02} was rejected.

The finding is consistent with Systems Theory (von Bertalanffy, 1968): in a project made up of interdependent components, regular exchange keeps planning, procurement, engineering, finance and community engagement aligned, and allows delays in one component to be noticed before they spread. The high rating for early identification of problems reflects this logic. Denicol et al. (2020) similarly linked weak, fragmented information flow to delays and cost overruns in megaprojects, and Oyekunle et al. (2024) reported that real-time information sharing improved coordination.

Frequency recorded the lowest correlation and R^2 of the three dimensions, which suggests that how often information is shared matters somewhat less than how well it is routed and answered. The weaker, more varied rating for communication with community representatives points to an uneven rhythm of engagement at the community level, where much of the practical information on water points and local conditions originates. Frequency should therefore be set by information needs rather than maximised, since additional communication that does not reach the right people at the right time adds little.

4.5 Feedback Mechanisms and Efficient Project Delivery

Respondents agreed that feedback mechanisms were in place (overall M = 4.26, SD = 1.08; Table 8), a rating at the

upper end of the high band. Corrective action after important feedback (M = 4.46) and the ability of community members to communicate concerns (M = 4.41) scored highest, and the support of monitoring and reporting systems for feedback was rated strongly (M = 4.35, 92.7% agreement). Lower ratings were recorded for feedback helping to identify implementation problems (M = 4.02, SD = 1.29) and for prompt response to concerns (M = 4.14, SD = 1.23), both with wide variation among respondents.

Table 7: Feedback Mechanisms

Statement	% Agree	M	SD
Stakeholders have opportunities to provide feedback	82.3	4.21	1.17
Project concerns are responded to promptly	86.5	4.14	1.23
Feedback is considered during project decision-making	87.5	4.26	0.90
Monitoring and reporting systems support feedback	92.7	4.35	0.99
Community members can communicate project concerns	92.7	4.41	0.96
Feedback helps identify implementation problems	78.1	4.02	1.29
Corrective action is taken after important feedback is received	88.5	4.46	0.93
Overall		**4.26**	**1.08**

Feedback mechanisms showed the strongest relationship with efficient project delivery: $r = .72$, $p < .001$, $N = 96$. The regression model was significant, $F(1, 94) = 101.18$, $p < .001$, with $\beta = .720$, $t = 10.06$ and $R^2 = .518$ (adjusted $R^2 = .513$). Feedback mechanisms were thus associated with 51.8% of the variation in delivery, the largest share among the three dimensions, and H_{03} was rejected.

The result is consistent with both Communication Theory and Stakeholder Theory. In Shannon and Weaver's (1949) model, feedback closes the communication loop and lets senders correct misunderstanding, and Freeman (1984) argues that stakeholders' concerns must be heard and answered if cooperation is to be sustained. In practical terms, feedback converts information into action: the highest-rated item was corrective action after feedback, not merely the opportunity to give it. The result agrees with Kipyegon et al. (2025), who associated weak feedback mechanisms and reporting structures with delays, cost overruns and reduced quality in Kenyan road projects, and with Singirankabo and Wanjiku (2023), who linked results-driven communication with feedback on project costs, schedules and quality in Rwanda. Oyekunle et al. (2024) also identified feedback mechanisms as part of communication systems that improve performance.

Two cautions apply. First, the lower and more variable ratings for prompt response and for problem identification show that responsiveness is not yet uniform, which is notable because the CDAC Network (2023) identified feedback management as a recurring weakness in community-facing interventions in the Horn of Africa. Second, respondents were project personnel rather than beneficiaries, so the findings describe how staff perceive feedback processes, not necessarily how communities experience them.

4.6 Summary of Inferential Results and Hypothesis Testing

Table 8 summarizes the inferential results. All three dimensions had strong, positive and significant relationships with efficient project delivery, and all three null hypotheses were rejected at the 5% level. Feedback mechanisms had the strongest association, followed by communication channels and communication frequency. The correlations show association, not proof of causation, and the regression results come from three separate models, so they do not show each dimension's independent contribution once the others are controlled.

Table 8: Correlation, Regression and Hypothesis Testing Results

Dimension	r	R^2	Adjusted R^2	F(1, 94)	β	t	p	Decision
Communication channels	.69	.476	.471	85.42	.690	9.24	< .001	Reject H_{01}
Communication frequency	.66	.436	.430	72.55	.660	8.52	< .001	Reject H_{02}
Feedback mechanisms	.72	.518	.513	101.18	.720	10.06	< .001	Reject H_{03}

Taken together, the results suggest that efficient delivery is associated not with one communication practice but with the combination of an appropriate channel mix, a purposeful rhythm of information sharing and responsive feedback. Feedback is the element that most clearly connects communication to action, which may explain why it showed the strongest link. Two features of the data should also be noted. The delivery scale includes items that refer to communication, which may raise the observed correlations, and all data are self-reported perceptions from one organisation. The findings should therefore be read as strong associations within this case rather than as proof of effect, and generalised to other NGOs or sectors with caution.

5. Conclusions and Recommendations

5.1 Conclusion

The study examined the relationship between communication channels, communication frequency, feedback mechanisms and efficient project delivery in World Vision Rwanda's community water supply projects in Kigali City. Based on 96 usable questionnaires, all three dimensions demonstrated strong, positive and statistically significant relationships with efficient project delivery ($p < .001$). Feedback mechanisms had the strongest relationship ($r = .72$; $R^2 = .518$), followed by communication channels ($r = .69$; $R^2 = .476$) and communication frequency ($r = .66$; $R^2 = .436$). These findings demonstrate that efficient project delivery depends on an integrated communication system combining appropriate communication channels, regular and purposeful information exchange, and responsive feedback mechanisms rather than relying on any single dimension. However, weaknesses in written documentation, communication with community representatives and timely responses to stakeholder feedback require improvement. The study therefore concludes that effective project communication systems play an important role in strengthening information sharing, stakeholder coordination and timely corrective action, thereby supporting efficient delivery of community water supply projects. Consequently, all three null hypotheses were rejected.

5.2 Recommendations

Based on the study findings, the following recommendations were made:

1. World Vision Rwanda should develop a communication matrix for each project specifying who communicates what, to whom, through which channel and within what timeframe. Meetings and written reports should support routine updates, while telephone calls and digital platforms should facilitate urgent communication. Emails and formal reports should consistently document key instructions and decisions.
2. World Vision Rwanda should establish clear communication schedules covering coordination meetings, progress updates, stakeholder consultations and reporting. Meetings should focus on reviewing progress, identifying risks, clarifying responsibilities and agreeing on follow-up actions. Regular engagement with community representatives should also be prioritized.
3. World Vision Rwanda should establish clear feedback and complaint procedures defining submission channels, responsible officers, response timelines and escalation processes. All feedback should be documented, addressed promptly and used to inform corrective action. The outcomes should also be communicated to stakeholders, while regular consultations with community members should assess the effectiveness of these mechanisms.

5.3 Limitations and Further Research

The study was limited to one organization and one city, relied on self-reported data, and examined each communication dimension separately, limiting causal and independent effect assessments. Future research should include multiple NGOs and government-funded projects, apply multiple regression, incorporate objective project performance records and beneficiaries' perspectives, and

examine factors such as project complexity and management support.

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