

**Public Relations, Communication Strategies and Mining Project
Outcomes: Evidence from Nyakabingo Mine, Rulindo District, Rwanda**
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Abstract

Effective public relations (PR) communication is increasingly recognized as a pivotal driver of mining project outcomes, yet empirical evidence from Sub-Saharan Africa remains scarce. This study investigated the influence of public relations communication strategies on project outcomes at Nyakabingo Mine in Rulindo District, Northern Rwanda, one of Rwanda's flagship 3T (Tin, Tantalum, and Tungsten) mining operations. Anchored in Stakeholder Theory (Freeman, 1984), the Shannon-Weaver Communication Model (1949), and Benoit's Image Restoration Theory (1995), the study employed a mixed-methods descriptive survey and case study design. A sample of 346 respondents was drawn from a population of 1,800 stakeholders using stratified random sampling for mine workers ($n=327$), and census sampling for corporate management ($n=9$) and external stakeholders ($n=10$). Data were collected through pretested structured questionnaires, semi-structured interview guides, and document analysis. Quantitative data were analyzed using SPSS version 28 via descriptive and inferential statistics, while qualitative data were subjected to thematic analysis. Results revealed a strong, positive, and statistically significant effect of PR communication strategies on project outcomes ($\beta=2.280$; $R^2=0.724$; $F=20.948$; $p=0.002$). The regression model explained 72.4% of the variance in project outcomes, confirming PR as the strongest predictor among the communication variables examined. Key PR activities, including community engagement events, proactive crisis communication, and reputation management, were found to enhance stakeholder trust, collaboration, and social license to operate. The study recommends the institutionalization of strategic, proactive, and stakeholder-segmented PR frameworks in mining project management. These findings contribute original empirical evidence to the limited body of knowledge on communication-driven project success in Rwanda's extractive sector.

Keywords: Public relations strategies, mining project outcomes, stakeholder communication, social license to operate

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1. Introduction

Mining operations worldwide are characterized by intricate stakeholder networks, significant environmental and social impacts, and intense regulatory scrutiny. Within this complexity, the ability of mining companies to communicate effectively is not merely to disseminate information, but to manage perceptions, build trust, and foster collaborative relationships, has emerged as a critical determinant of project success. Public relations (PR) communication, in particular, occupies a strategic position in this communication ecosystem, serving as the primary mechanism through which mining entities engage diverse stakeholders, manage their corporate image, and navigate the social and political terrain of resource extraction.

Rwanda's mining sector has experienced significant formalization and expansion over the past decade, contributing over 2.5% to national GDP and serving as one of the country's largest sources of foreign exchange (Rwanda Mines, Petroleum and Gas Board [RMB], 2023). The Government of Rwanda, through the Rwanda Mining Policy (2021) and the National Strategy for Transformation (NST1) 2017–2024, has emphasized inclusive governance, transparency, and stakeholder collaboration as foundational pillars of sustainable mining. These policy imperatives directly implicate the quality and design of communication strategies employed by mining operators. Despite this policy momentum, empirical research examining how specific communication strategies, especially PR influence actual project outcomes in Rwandan mining contexts remains sparse.

Nyakabingo Mine, located in Rulindo District of Northern Rwanda and operated by Trinity Metals Ltd, presents a particularly instructive case study. As a flagship 3T (Tin, Tantalum, and Tungsten) operation, the mine operates within a web of stakeholders including government regulatory agencies, local communities across multiple cells, civil society, and international buyers. Preliminary observations prior to this study indicated that while the mine has generated employment and contributed to local infrastructure, persistent tensions related to environmental impacts, community consultation, and information asymmetry suggest potential gaps in communication strategy implementation. These dynamics make Nyakabingo Mine an ideal site for examining the relationship between PR communication and project outcomes.

The purpose of this study is therefore to investigate the influence of public relations communication strategies on project outcomes at Nyakabingo Mine. Specifically, the study examines how community engagement events, responsiveness to stakeholder concerns, and reputation management; the core dimensions of PR in this context shape measurable project outcomes, including stakeholder satisfaction, conflict resolution, attainment of social license to operate, environmental sustainability, and economic benefits. By providing empirical evidence from a context where such research is notably absent, this paper contributes original insights that are relevant to mining practitioners, policymakers, and academics interested in stakeholder-communication-outcome nexuses in Sub-Saharan Africa's extractive sector.

2. Literature Review

2.1 Theoretical Framework

This study draws upon three complementary theoretical frameworks. Stakeholder Theory, advanced by Freeman (1984), posits that organizational success is contingent upon the effective management of relationships with all relevant parties who can affect or are affected by organizational decisions. In the mining context, stakeholders range from government regulators and local communities to employees and international partners. The theory underpins the premise that PR strategies must engage this diversity of stakeholders meaningfully and equitably, not merely as a formality, but as a strategic imperative for legitimacy and project continuity.

The Shannon and Weaver (1949) Communication Model provides a structural lens for examining information flow between mining entities and their publics. The model's components; sender, message, channel, receiver, and feedback, illuminate the mechanics of effective PR communication, particularly regarding channel selection, message clarity, and the critical role of feedback loops in two-way engagement. While critics note the model's linear limitations (Lorena, 2019), its systematic framework remains useful for diagnosing communication failures and evaluating the technical adequacy of information dissemination. Benoit's Image Restoration Theory (1995) is particularly germane to PR strategy in the mining industry, where organizations frequently face public scrutiny, environmental concerns, and community grievances. The theory outlines strategies ranging from denial and evasion to corrective action and mortification that organizations employ to manage their public image during periods of reputational threat. Critically, the theory also underlines the importance of proactive PR that prevents reputational damage from escalating, making it directly applicable to mining contexts where community relations can shift rapidly.

2.2 Public Relations and Project Outcomes in Mining Contexts

Public relation in institutional and project contexts has evolved considerably beyond promotional communication to encompass strategic relationship management, crisis communication, and community development facilitation (Chartered Institute of Public Relations [CIPR], 2019). In the extractive sector, the International Finance Corporation (IFC, 2015) explicitly recommends that PR strategies be integrated into broader stakeholder engagement frameworks to minimize social risks and sustain the social license to operate (SLO), a concept that captures the ongoing approval of host communities for mining operations.

Empirical research affirms the centrality of PR to mining project outcomes. Blesia (2021) demonstrated in a Papua New Guinea case study that proactive, community-inclusive PR strategies significantly reduced project conflicts and enhanced operational continuity. Pratama et al. (2022) found that PR campaigns centered on environmental stewardship improved community trust and reduced opposition to mining activities in Indonesian contexts. Wambugu and Murithi (2022) in Kenya established that dialogue-based PR strategies led to smoother project operations and sustained local community support, attributing this success to the early and genuine integration of community voices into project decision-making.

Conversely, reactive PR characterized by communication efforts triggered primarily by crises rather than proactive planning, has consistently demonstrated limited effectiveness in sustaining positive stakeholder relationships (Wambu & Paul, 2023). The Project Management Institute (PMI, 2013) corroborated this, reporting that organizations with robust, proactive communication strategies experienced significantly fewer project failures and achieved better alignment with project goals, timelines, and budgets. In the African context, the African Development Bank (AfDB, 2020) emphasized that effective PR is particularly critical in regions where information asymmetry and weak institutional trust can rapidly erode community support for extractive projects.

In Rwanda specifically, prior studies have highlighted the importance of communication intermediaries such as local leaders and community forums in shaping perceptions of mining projects (Uwizeyimana & Mutangana, 2022; Musoni, 2021). However, these studies did not systematically examine the structural PR practices of mining companies or quantitatively assess their influence on measurable project outcomes. This study addresses that gap directly.

2.3 Research Gap

Despite the growing body of literature on stakeholder communication in mining, significant contextual and methodological gaps persist. Most empirical studies originate from Australia, Europe, or West Africa, with limited attention to East African and Rwandan contexts. Furthermore, existing studies tend to examine PR and community relations qualitatively, without deploying regression-based analyses to quantify the strength of the PR-outcome relationship. This study addresses both gaps by providing original quantitative evidence from a Rwandan mining context, while integrating qualitative narratives to enrich interpretation.

3. Methodology

3.1 Research Design

The study employed a convergent parallel mixed-methods design, integrating descriptive survey and case study approaches (Creswell & Creswell, 2018). This design enabled simultaneous collection of quantitative data (structured questionnaires) and qualitative data (semi-structured interviews and document analysis), which were subsequently triangulated to yield comprehensive insights. The case study approach facilitated contextually rich analysis of communication dynamics unique to Nyakabingo Mine, while the descriptive survey enabled statistical generalization within the studied population.

3.2 Study Site and Population

The study was conducted at Nyakabingo Mine in Rulindo District, Northern Province, Rwanda, a strategically significant 3T mining operation managed by Trinity Metals Ltd under the oversight of the Rwanda Mines, Petroleum and Gas Board (RMB). The total target population comprised 1,800 stakeholders, distributed as follows: 1,781 mine workers (permanent and casual), 9 corporate management team members, and 10 external stakeholders including school principals, health center administrators, district RMB representatives, community leaders, and representatives from public security and labor organizations.

3.3 Sampling

A multi-stage sampling procedure was adopted to ensure both statistical representativeness and qualitative depth. For the mine workers, Yamane's (1967) formula was applied to determine an appropriate sample size from the population of 1,781 workers at a 95% confidence level and 5% margin of error, yielding a sample of 327 respondents. Simple random sampling was then used for selection within this stratum. Corporate management (n=9) and external stakeholders (n=10) were included in their entirety using a census approach, given their small numbers and the critical qualitative insights they possess (Etikan et al., 2016). The total study sample therefore comprised 346 respondents.

3.4 Data Collection and Instruments

Three instruments were employed. First, structured questionnaires using a five-point Likert scale (1=Strongly Disagree to 5=Strongly Agree) were administered to mine workers. The PR communication scale comprised six items measuring community engagement events, responsiveness to concerns, and reputation management. The project outcomes scale comprised six items assessing timely completion, stakeholder satisfaction, conflict resolution, social license to operate, environmental sustainability, and economic benefits. Second, semi-structured interview guides were used with the 19 key informants (9 management and 10 external stakeholders).

Third, document analysis was conducted on project reports, communication logs, and policy documents. Prior to the main data collection, a pilot study was conducted with 33 respondents (approximately 10% of the main sample), following recommendations by In (2017). Validity was assessed through expert review (content validity), pilot testing (construct validity), and peer appraisal (face validity). Reliability was assessed using Cronbach's alpha. The PR Communication Strategies scale attained $\alpha=0.811$, and the Project Outcomes scale attained $\alpha=0.744$, both exceeding the accepted threshold of 0.70 (Nunnally & Bernstein, 1994), confirming sufficient internal consistency.

3.5 Data Analysis

Quantitative data were analyzed using SPSS version 28. Descriptive statistics (means, frequencies, standard deviations) characterized the distribution of responses. Pearson correlation and linear regression analysis were employed to assess the strength, direction, and significance of the relationship between PR communication strategies (independent variable) and project outcomes (dependent variable). The regression model controlled for one predictor at a time, consistent with the study's objective-based analysis design. Qualitative data were analyzed thematically following Braun and Clarke's (2006) six-phase framework, generating themes that were triangulated with quantitative results to enhance validity.

4. Results and Discussion

4.1 Socio-Demographic Profile of Respondents

Table 1 presents the socio-demographic characteristics of the 327 questionnaire respondents. The majority were male (73.7%), reflecting the gender composition typical of Rwanda's mining sector, though the notable female representation (26.3%) aligns with Rwanda's National Gender Policy's emphasis on women's inclusion in the labor force. The dominant age cohorts were 25–34 years (36.7%) and 35–44 years (31.5%), indicating a relatively young and productive workforce. A significant proportion held primary school education (63.0%), underscoring the importance of accessible and culturally appropriate communication strategies. The majority of respondents occupied operational positions (mine staff: 89.6%), with smaller proportions in management, administration, and community liaison roles.

Table 1: Socio-Demographic Profile of Respondents (n=327)

Characteristic / Category	Frequency (n)	Percentage (%)
Gender		
Male	241	73.7%
Female	86	26.3%
Total	327	100%
Age Group		
18–24	53	16.2%
25–34	120	36.7%
35–44	103	31.5%
45–54	34	10.4%
55+	17	5.2%
Total	327	100%
Education Level		
Primary School	206	63.0%
Secondary School	102	31.2%
Diploma/Certificate	15	4.6%
Bachelor's Degree	2	0.6%
Master's Degree	2	0.6%
Total	327	100%
Position		

Characteristic / Category	Frequency (n)	Percentage (%)
Mine Staff (Miners & Technicians)	293	89.6%
Management	8	2.4%
Administrative Staff	9	2.8%
Community Liaison	4	1.2%
Other	13	4.0%
Total	327	100%

Source: Primary Data (2025)

4.2 Descriptive Statistics: PR Communication Strategies

Table 2 presents the descriptive statistics for the six items measuring public relations communication strategies at Nyakabingo Mine. Overall, respondents expressed strong agreement across all PR indicators, with item means ranging from 4.1543 to 4.3531 and an aggregate mean of 4.2408 (SD=0.8590), falling within the 'Strongly Agree' range on the Likert scale.

The highest level of agreement was recorded for the item concerning improved stakeholder collaboration through PR strategies (M=4.3531, SD=0.7657), suggesting that respondents perceive PR activities as having a tangible positive effect on inter-stakeholder relationships. Community trust-building received slightly lower agreement (M=4.1543, SD=1.0465), which, coupled with the higher standard deviation, indicates some variability in perceptions, notably among community members who may experience PR activities inconsistently. These findings are consistent with qualitative interview responses, where participants affirmed the existence of multiple PR channels at the mine including community forums, awareness campaigns, and CSR activities, but noted that engagement quality could be made more proactive and systematically targeted.

Table 2: Descriptive Statistics: PR Communication Strategies (n=327)

Statements	N	Min	Max	Mean	Std. Dev.
PR efforts at Nyakabingo Mine focus on building trust with surrounding communities.	327	1.00	5.00	4.1543	1.0465
PR initiatives effectively address local community concerns related to the mining project.	327	1.00	5.00	4.2315	0.8237
Stakeholder feedback is actively integrated into PR strategies.	327	1.00	5.00	4.2226	0.7721
The mine has a dedicated PR team that works to improve relations with all stakeholders.	327	1.00	5.00	4.2404	0.8009
PR activities contribute significantly to maintaining a positive image of the mine.	327	1.00	5.00	4.2433	0.9450
PR strategies employed have led to improved collaboration between stakeholders.	327	1.00	5.00	4.3531	0.7657
Overall / Valid N (listwise)	327	1.00	5.00	4.2408	0.8590

Source: Primary Data (2025)

4.3 Regression Analysis: PR Communication Strategies and Project Outcomes

To test the null hypothesis that 'Public relations strategies have no significant influence on project outcomes at Nyakabingo Mine,' simple linear regression was performed with PR communication strategies as the predictor and project outcomes as the dependent variable.

Table 3: Model Summary — PR Communication Strategies and Project Outcomes

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.851a	.724	.689	.09019
a. Predictors: (Constant), Public Relations Communication Strategies				

Source: Primary Data (2025)

Table 3 reveals a strong correlation between PR communication strategies and project outcomes ($R=.851$). The coefficient of determination ($R^2=0.724$) indicates that PR communication strategies explain 72.4% of the variance in project outcomes at Nyakabingo Mine. The adjusted R^2 of 0.689 confirms that this explanatory power holds when accounting for the number of predictors, indicating a robust model fit.

Table 4: ANOVA — PR Communication Strategies and Project Outcomes

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	.170	1	.170	20.948	.002b
Residual	.065	8	.008		
Total	.235	9			
<i>a. Dependent Variable: Project Outcomes b. Predictors: (Constant), Public Relations Communication Strategies</i>					

Source: Primary Data (2025)

The ANOVA results in Table 4 confirm the overall statistical significance of the regression model ($F=20.948$; $p=0.002 < 0.05$). This demonstrates that the relationship between PR communication strategies and project outcomes is not attributable to chance, and that PR communication explains a meaningful proportion of the systematic variation in project outcomes.

Table 5: Regression Coefficients — PR Communication Strategies and Project Outcomes

Model	B (Unstandardized)	Std. Error	Beta (Standardized)	t	Sig.
(Constant)	5.414	2.121	—	-2.552	.034
PR Communication Strategies	2.280	.498	.851	4.577	.002
<i>a. Dependent Variable: Project Outcomes</i>					

Source: Primary Data (2025)

Table 5 presents the regression coefficients. The unstandardized regression coefficient ($B=2.280$) indicates that for every one-unit improvement in the effectiveness of PR communication strategies, project outcomes increase by 2.280 units, holding other factors constant. The standardized coefficient ($\beta=0.851$) confirms a very strong positive relationship. The t-value of 4.577 ($p=0.002 < 0.05$) confirms that this relationship is highly statistically significant, leading to the rejection of the null hypothesis. Accordingly, the alternative hypothesis, that PR communication strategies significantly influence project outcomes at Nyakabingo Mine is accepted.

Notably, among the three communication strategy dimensions examined in the broader study (purposeful communication: $\beta=1.041$; adequate reporting: $\beta=1.291$; PR strategies: $\beta=2.280$), PR communication strategies emerged as the strongest predictor of project outcomes. This finding underscores the outsized role of external-facing, relationship-oriented communication in determining the success trajectory of mining projects.

4.4 Qualitative Insights

Interview responses from both internal and external stakeholders richly contextualised the quantitative findings. Management respondents highlighted multiple PR channels deployed at the mine, including monthly community meetings, safety awareness campaigns, local event sponsorships, and media engagements. A community health center director noted that the mine's provision of mattresses to Shorong Health Center, construction of a kitchen, and support for a girls' dormitory at GS Shyong were concrete manifestations of PR-embedded CSR that had significantly improved community trust and reduced tensions between residents and mine operations.

Several external stakeholders, however, flagged an important limitation: PR activities were perceived as sometimes reactive rather than proactively designed. A community leader respondent indicated that communication from the mine typically intensified during periods of concern or protest, with less consistent engagement during routine operational phases. This observation is consistent with Wambu and Paul (2023), who cautioned that reactive PR is insufficient for sustaining long-term community confidence. Other interviewees suggested that a more deliberate stakeholder segmentation approach tailoring messages and engagement modalities to different community groups such as women, youth, and elderly residents would substantially enhance the effectiveness of PR efforts.

These qualitative insights reveal that while the structural conditions for effective PR exist at Nyakabingo Mine, their full potential remains constrained by insufficient proactivity, limited stakeholder segmentation, and inconsistent engagement cycles. Addressing these gaps would likely amplify the already substantial positive effect of PR communication on project outcomes.

5. Discussion

The findings of this study establish, with statistical strength, that PR communication strategies are a powerful determinant of mining project outcomes in the Rwandan context. The regression coefficient of $\beta=2.280$ and the model's explanatory power of 72.4% ($R^2=0.724$) are findings of considerable practical significance: they demonstrate that strategic improvements in how a mining company communicates with, engages, and manages the perceptions of its stakeholders translate directly into improved project performance outcomes including stakeholder satisfaction, conflict reduction, and social license to operate.

These results align with and extend the international literature. Blotnicky and Thurlow (2021) demonstrated that integrating PR functions into strategic decision-making positively affects organizational success, innovation, and reputation. Al Hadeed (2024) found that effective PR practices, including two-way communication and new media adoption, significantly boost audience engagement and project performance. The PMI (2013) similarly reported that organizations with robust communication strategies experience fewer project failures. The current study adds a crucial African and specifically Rwandan dimension to this body of evidence, confirming that these dynamics operate with particular force in contexts characterized by significant information asymmetry, diverse literacy levels, and complex community-company relationships.

A theoretically significant finding is the magnitude of PR's effect relative to other communication strategies. The fact that PR ($\beta=2.280$) exerts a stronger effect than purposeful communication ($\beta=1.041$) and adequate reporting ($\beta=1.291$) suggests that the relational and image management dimensions of communication, which directly shape stakeholder perceptions and trust, carry greater weight in determining project outcomes than internal information quality alone. This insight challenges the tendency in project management practice to prioritize reporting and internal communication over external relationship-building, and argues for a rebalancing toward strategic PR as a core project management competency.

The study's theoretical framework further illuminates these results. From a Stakeholder Theory perspective (Freeman, 1984), the findings affirm that proactive engagement of diverse stakeholder interests, operationalized through strategic PR, generates the trust and cooperation necessary for project success. Image Restoration Theory (Benoit, 1995) contributes an additional lens: the data suggest that Nyakabingo Mine's PR strategies, while functioning reactively in some instances, have nevertheless been sufficient to maintain a positive operational image and prevent trust deficits from escalating into project-disrupting conflicts. Transitioning from reactive to proactive PR, as the qualitative data recommend, would represent a move from image restoration to image maintenance, a more sustainable and less costly communication posture.

6. Conclusions and Recommendations

6.1 Conclusions

This study provides robust empirical evidence that PR communication strategies exert a strong, positive, and statistically significant influence on project outcomes at Nyakabingo Mine in Rwanda ($\beta=2.280$; $R^2=0.724$; $p<0.05$). PR communication explains nearly three-quarters of the variation in project outcomes, making it the strongest communication predictor identified in this study. Both quantitative data and qualitative insights converge on the conclusion that well-executed PR activities, encompassing community engagement, stakeholder responsiveness, and reputation management, enhance trust, collaboration, conflict resolution, and social license to operate, ultimately contributing to successful project delivery.

These findings have implications that extend beyond Nyakabingo Mine. They establish a precedent for conceptualizing PR not merely as a peripheral corporate activity but as a central project management function in Rwanda's mining sector. The social license to operate, upon which mining projects fundamentally depend, is a product of sustained, strategic, and authentic communication; and PR is its primary vehicle.

6.2 Recommendations

Based on the study's findings, the following recommendations are advanced:

1. Institutionalize proactive PR frameworks: Mining companies should develop structured, proactive PR communication plans with clear timelines, defined stakeholder segments, and multi-channel engagement strategies. PR activities should precede, not merely respond to, community concerns.
2. Invest in stakeholder segmentation: PR messages and engagement modalities should be tailored to distinct stakeholder groups, accounting for differences in literacy, gender, age, and proximity to mining operations. Generic communication fails to address the specific concerns and expectations of diverse community segments.
3. Build PR capacity within project teams: Continuous training in public relations, community engagement, and stakeholder management should be incorporated into professional development programs for mining project staff, ensuring that PR principles are embedded across organizational levels.
4. Policy integration: Regulatory bodies such as the RMB should incorporate mandatory PR strategy requirements into mining licensing frameworks, ensuring that communication quality is assessed alongside technical and environmental compliance.

6.3 Limitations and Future Research

This study is delimited to Nyakabingo Mine and its immediate stakeholder community. While the findings provide strong within-case insights, their generalizability to other mining operations should be approached with caution and tested through comparative research. Future studies should explore the differential effectiveness of specific PR modalities (e.g., digital platforms, traditional media, face-to-face engagement) in mining contexts; the longitudinal trajectory of PR effects on project outcomes; and comparative analyses across different African mining jurisdictions to build a broader evidence base. Mixed-methods and longitudinal designs are particularly recommended to capture the evolving nature of stakeholder relationships across project lifecycle phases.

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