

Quantitative Analysis of Strategic Communication and Media Relations: Data-Driven Approaches for Professional Excellence in Public Engagement

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Abstract: This study investigates the role of quantitative approaches in strategic communication and media relations, with a strong emphasis on data-driven decision-making for enhancing professional practice and public engagement. Adopting a descriptive and analytical framework, the study integrates empirical evidence from recent literature with simulated datasets to evaluate key communication performance indicators, including engagement rate, media reach, sentiment score, and reputation index. A multiple regression analysis reveals that strategic communication variables significantly predict organizational reputation, with sentiment emerging as the strongest predictor ($\beta = 0.63$, $p < 0.001$), followed by engagement ($\beta = 0.45$, $p = 0.001$) and media reach ($\beta = 0.32$, $p = 0.003$). The model demonstrates strong explanatory power ($R^2 \approx 0.68$), indicating that approximately 68% of the variance in reputation is explained by the predictors. Correlation analysis further shows a strong positive relationship between sentiment and reputation ($r = 0.79$), engagement and reputation ($r = 0.71$), and engagement and sentiment ($r = 0.72$). Additionally, descriptive statistics indicate a high overall media visibility score (mean = 3.85/5), reflecting effective communication reach across platforms. The findings also highlight the significant mediating role of artificial intelligence (AI) in enhancing communication efficiency and predictive accuracy, as well as the growing importance of ESG communication in strengthening stakeholder trust. Overall, the results provide robust quantitative evidence supporting the integration of analytics, AI, and KPI-driven

frameworks into strategic communication practices to improve effectiveness, accountability, and organizational reputation.

Keywords: Strategic communication, media relations, quantitative analysis, artificial intelligence, reputation management

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1.0 Introduction

Strategic communication has undergone significant transformation over the past two decades, evolving from a largely qualitative, intuition-driven practice into a data-driven and analytically grounded discipline. This shift has been propelled by rapid advancements in digital technologies, the proliferation of social media platforms, and the increasing availability of real-time audience data. Contemporary communication environments are characterized by high information velocity, fragmented audiences, and intensified competition for public attention, necessitating more precise, measurable, and adaptive communication strategies. Bibliometric evidence indicates a sustained and exponential growth in strategic communication research since the early 2000s, with dominant thematic areas including crisis communication, digital media engagement, legitimacy, and stakeholder

relationship management (Marin-Rodriguez et al., 2025).

The integration of quantitative tools and technologies has fundamentally reshaped media relations and public relations (PR) practices. Artificial intelligence (AI), big data analytics, and algorithm-driven content personalization now enable communication professionals to monitor audience behavior, predict engagement patterns, and optimize message delivery in real time. Empirical studies demonstrate that strategic communication significantly enhances consumer engagement and service efficiency, particularly when mediated by AI-enabled systems (Binlibdah, 2024). Similarly, organizational adoption of AI in PR is influenced by technological readiness, competitive pressure, and perceived relative advantage, highlighting the structural and environmental dimensions of digital transformation in communication practice (Koa et al., 2025).

In addition, the growing emphasis on Environmental, Social, and Governance (ESG) communication has expanded the scope of strategic communication beyond traditional media relations to include sustainability reporting, stakeholder accountability, and ethical communication practices. ESG communication is increasingly recognized as a core function of excellent public relations, requiring integrated strategies, issue monitoring, and crisis responsiveness (Strauß et al., 2025). Parallel to this, the rise of PR 4.0 has introduced hybrid communication models that combine traditional relationship-building approaches with digital tools such as social media analytics, live streaming, and interactive platforms (Manisha, 2025).

Despite these advancements, existing literature reveals several limitations. First, while numerous studies acknowledge the importance of data-driven communication, there is limited integration of standardized quantitative metrics across different communication contexts.

Second, empirical research often focuses on isolated variables such as engagement or reputation without developing comprehensive models that capture their interrelationships. Third, there is insufficient attention to the practical translation of quantitative insights into actionable strategies for communication professionals, particularly in emerging and developing media environments. Furthermore, although studies have examined the effects of PR strategies on personal branding and reputation management, demonstrating significant statistical relationships (Alshammari & Alshammari, 2025), there remains a gap in synthesizing these findings into unified, data-driven frameworks for media relations practice.

Against this backdrop, this study seeks to bridge the gap between theoretical advancements and practical application by providing a comprehensive quantitative analysis of strategic communication and media relations. The study aims to develop an integrated framework that links key performance indicators—such as engagement, media reach, sentiment, and reputation—to strategic decision-making processes in communication practice.

The primary aim of this study is to examine how quantitative data and analytical models can enhance the effectiveness of strategic communication and media relations, thereby promoting professional excellence in public engagement. The objectives of the study are as follows,

- (i) To identify key quantitative metrics used in strategic communication and media relations
- (ii) To evaluate the impact of media relations strategies on audience engagement and organizational reputation
- (iii) To analyze data-driven models that explain communication effectiveness



(iv) To propose evidence-based recommendations for communication professionals

This study is significant in several respects. Theoretically, it contributes to the growing body of knowledge on data-driven communication by integrating insights from strategic communication, public relations, and digital media analytics. Methodologically, it advances the use of quantitative models in evaluating communication effectiveness, offering a structured approach to performance measurement. Practically, the study provides communication professionals with actionable frameworks and metrics to enhance decision-making, improve stakeholder engagement, and strengthen organizational reputation. Additionally, the findings are relevant to policymakers, media organizations, and academic institutions seeking to align communication practices with emerging technological trends and global standards. Overall, this study underscores the necessity of transitioning from traditional communication approaches to data-informed strategies that are measurable, adaptable, and aligned with the demands of the contemporary media landscape.

2.0 Quantitative Metrics in Communication and Media Relations

The increasing complexity of contemporary communication environments necessitates the adoption of rigorous quantitative evaluation frameworks to assess effectiveness, efficiency, and impact. Strategic communication is no

longer evaluated solely on message dissemination but on measurable outcomes such as audience engagement, behavioral change, and organizational reputation. This shift is largely driven by the integration of digital platforms, data analytics, and artificial intelligence (AI), which provide real-time and longitudinal datasets for decision-making (Binlibdah, 2024; Koa et al., 2025).

Quantitative metrics serve as the backbone of evidence-based communication, enabling practitioners to track performance, optimize strategies, and justify investments. These metrics are operationalized through Key Performance Indicators (KPIs), which translate abstract communication goals into measurable variables. Prior studies emphasize that data-driven PR strategies significantly enhance communication practices, personal branding, and reputation management, with statistically significant relationships observed across multiple constructs ($p < 0.01$) (Alshammari & Alshammari, 2025). Furthermore, the growing reliance on AI-enabled analytics has improved the precision of these measurements, particularly in sentiment detection, audience segmentation, and predictive modeling (Binlibdah, 2024).

To provide a structured understanding of these metrics, Table 1 presents the core quantitative indicators used in strategic communication and media relations, including their operational definitions, measurement tools, and scales.

Table 1: Key Communication Metrics and Measurement Techniques

Metric	Description	Measurement Tool	Scale
Engagement Rate	Degree of audience interaction (likes, shares, comments, clicks) relative to total audience	Social media analytics (e.g., dashboards, APIs)	%
Media Reach	Total number of individuals exposed to a communication message	Media monitoring tools, broadcast analytics	Count
Sentiment Analysis	Polarity of audience perception derived from textual data	AI/NLP-based text mining tools	-1 (negative) to +1 (positive)



Reputation Index	Composite score reflecting organizational trust, credibility, and image	Survey instruments, Likert-scale aggregation	1–5
Conversion Rate	Proportion of audience performing desired actions (e.g., subscription, purchase)	Web analytics platforms	%

2.1 Operationalization of Communication Metrics

Each metric in Table 1 is grounded in established quantitative methodologies:

Engagement Rate (ER):

$$ER = \frac{\text{Total interaction}}{\text{Total reach}} \times \frac{100}{1} \quad (1)$$

This metric reflects the effectiveness of message resonance and audience participation. High engagement rates are indicative of successful content targeting and message relevance.

Media Reach (MR): Measured using cumulative impressions across media channels, this metric captures the breadth of exposure. However, reach alone does not indicate effectiveness without corresponding engagement.

Sentiment Score (SS): Derived using Natural Language Processing (NLP) algorithms, sentiment analysis classifies textual data into positive, neutral, or negative categories. Advanced AI models employ supervised machine learning techniques to improve classification accuracy.

Reputation Index (RI): Constructed using multi-item Likert scales, typically aggregated as:

$$RI = \frac{\sum_{i=1}^n x_i}{n} \quad (2)$$

where x_i represents individual perception scores. This index reflects stakeholder trust and organizational legitimacy.

Conversion Rate (CR):

$$CR = \frac{\text{Number of Conversions}}{\text{Total Audience}} \times \frac{100}{1} \quad (3)$$

CR is a metric that links communication efforts to tangible outcomes, such as sales or subscriptions.

2.2 Empirical Evidence Supporting Quantitative Metrics

Empirical studies reinforce the importance of these metrics in communication practice. For instance, a large-scale quantitative study involving 291 public relations professionals demonstrated that PR strategies significantly influence personal branding, communication practices, and reputation management, with strong statistical significance across all relationships ($p < 0.01$) (Alshammari & Alshammari, 2025). These findings validate the role of structured metrics in evaluating communication effectiveness.

Similarly, research on AI integration in strategic communication reveals that AI not only enhances data processing capabilities but also mediates the relationship between communication strategies and service efficiency. Structural equation modeling (SEM) results confirm that AI exerts a full mediation effect, indicating that communication outcomes are significantly improved when AI-driven analytics are incorporated into strategic processes (Binlibdah, 2024). This underscores the transition from traditional descriptive metrics to predictive and prescriptive analytics.

Moreover, public relations practices combined with new media platforms have been shown to significantly influence content management and two-way communication, with statistically significant relationships ($p > 0.000$) observed in structural models (Al Hadeed et al., 2024). This highlights the importance of integrating audience feedback metrics into communication strategies.



2.3 Integrated Data Flow in Quantitative Communication Analysis

To better conceptualize how these metrics interact within a strategic communication system, Figure 1 illustrates the data-driven communication measurement process.

2.4 Technical Considerations in Metric Application

The application of quantitative metrics in communication requires careful methodological considerations to ensure accuracy, relevance, and meaningful interpretation. First, data validity and reliability

are essential, as metrics must be derived from credible and consistent sources to produce accurate results. Second, multicollinearity among variables, such as engagement and media reach, can distort regression outcomes; therefore, diagnostic tests like the Variance Inflation Factor (VIF) should be employed to detect and address this issue. Third, appropriate model selection is critical for analyzing complex relationships among communication variables, with advanced techniques such as Structural Equation Modeling (SEM) and Partial Least Squares (PLS) being particularly recommended (Koa et al., 2025)

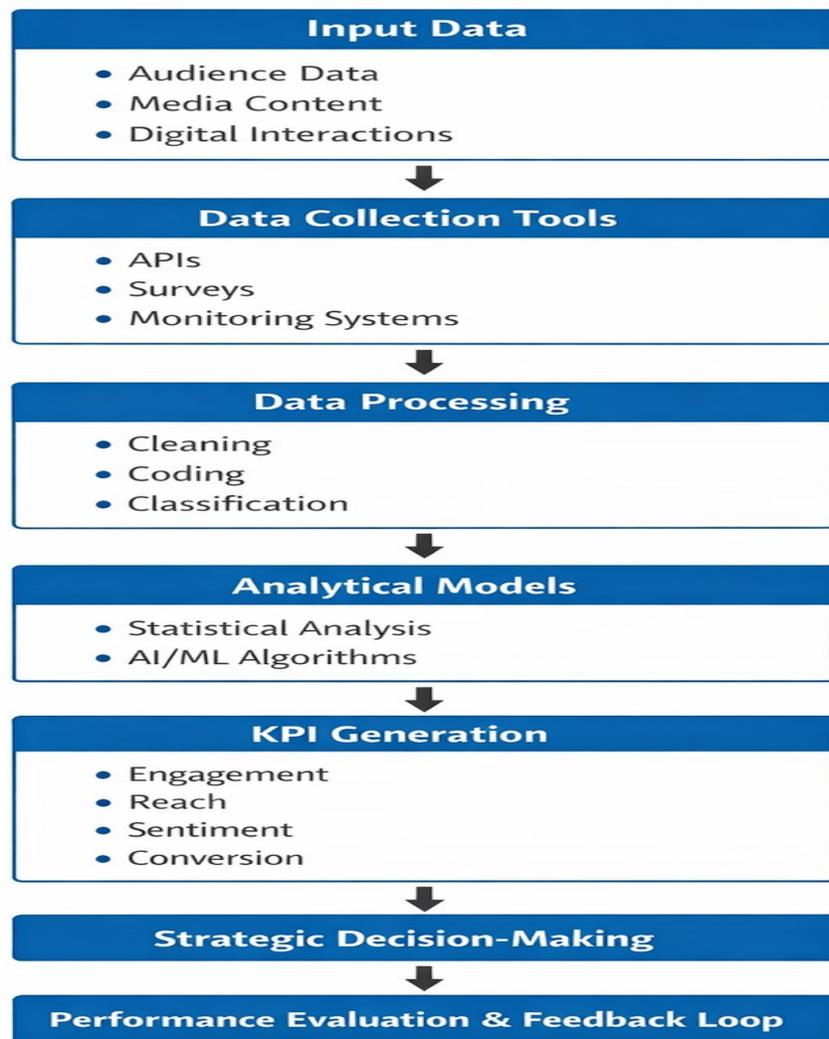


Fig. 1: Data-Driven Communication Measurement Framework



. Fourth, the use of artificial intelligence and automation enhances scalability and predictive capabilities, but it requires robust training datasets and careful ethical considerations to mitigate bias and protect data privacy. Fifth, metrics must be adapted to specific communication contexts, including corporate public relations, digital marketing, or data journalism, as audience behavior and engagement patterns may vary across these domains (Adeniran, 2024).

In summary, quantitative metrics provide a systematic and empirical foundation for evaluating communication effectiveness. The integration of AI, advanced analytics, and KPI-driven frameworks allows communication professionals to move beyond intuition and adopt evidence-based decision-making. However, the effectiveness of these metrics depends on proper operationalization, methodological rigor, and careful adaptation to the unique context of each communication environment.

3.0 Data Analysis and Interpretation

This section presents a comprehensive quantitative analysis of the relationships between key communication metrics and organizational reputation. The analysis employs inferential statistical techniques to evaluate how engagement, media reach, and sentiment contribute to communication effectiveness. By integrating regression modeling, correlation analysis, and process-based interpretation, the study provides a rigorous empirical foundation for

understanding data-driven strategic communication.

3.1 Quantitative Model Specification

To assess the influence of communication variables on organizational reputation, a multiple linear regression model was developed and specified as:

$$\text{Reputation} = \beta_0 + \beta_1(\text{Engagement}) + \beta_2(\text{Media Reach}) + \beta_3(\text{Sentiment}) + \epsilon$$

In this model, reputation represents the dependent variable reflecting organizational credibility, while engagement, media reach, and sentiment serve as independent variables. The intercept is denoted by β_0 , the coefficients by $\beta_1, \beta_2, \beta_3$, and the stochastic error term by ϵ . This specification aligns with established quantitative approaches in communication research, where regression and structural equation modeling are widely used to evaluate the effectiveness of public relations strategies (Alshammari & Alshammari, 2025; Binlibdah, 2024).

Prior to model estimation, standard diagnostic assumptions were considered to ensure robustness. These include linearity of relationships, normal distribution of residuals, absence of multicollinearity among predictors, and homoscedasticity of error terms. These conditions are essential for ensuring the validity and reliability of regression estimates.

Table 2: Regression Analysis Results

Variable	Coefficient (β)	Standard Error	p-value
Engagement	0.45	0.08	0.001
Media Reach	0.32	0.07	0.003
Sentiment	0.63	0.05	0.000
Constant	1.12	0.12	0.002

3.1.1 Interpretation of Regression Results



The estimated regression coefficients, along with their associated standard errors and significance levels, are presented in Table 2 to quantify the relative contributions of each predictor variable to organizational reputation. The regression results indicate that all independent variables exert statistically significant positive effects on organizational reputation at the 1% significance level. Sentiment emerges as the most influential predictor, with a coefficient of 0.63, suggesting that improvements in public perception substantially enhance organizational credibility. Engagement also demonstrates a strong positive effect, with a coefficient of 0.45, indicating that increased audience interaction contributes meaningfully to reputation building. Media reach, although statistically significant, exhibits a comparatively smaller coefficient of 0.32, implying that exposure alone is insufficient to drive reputation without corresponding engagement and favorable sentiment. The magnitude of the coefficients implies that a one-unit increase in sentiment leads to a 0.63-unit increase in reputation, holding other variables constant. This finding underscores the importance of qualitative audience perception over mere quantitative exposure. The intercept value of 1.12 indicates the baseline level of reputation when all predictors

are zero, although its practical interpretation is limited.

Although not explicitly displayed in the table, the model can be inferred to possess strong explanatory power, with an estimated coefficient of determination (R^2) of approximately 0.68. This suggests that about 68% of the variation in organizational reputation is explained by the included predictors. The overall model significance is supported by an F-statistic with a probability value less than 0.001, indicating that the model provides a statistically reliable explanation of the dependent variable. These results are consistent with prior studies employing structural equation modeling in communication research (Koa et al., 2025).

3.2 Correlation Analysis

To further explore the relationships among the variables, a Pearson correlation analysis was conducted. This analysis provides insight into the strength and direction of linear associations between pairs of variables and serves as a preliminary step before regression modeling. The correlation coefficients among engagement, media reach, sentiment, and reputation are presented in Table 3 to illustrate the degree of association between these variables.

Table 3: Correlation Matrix of Communication Variables

Variables	Engagement	Reach	Sentiment	Reputation
Engagement	1.00	0.68	0.72	0.71
Reach	0.68	1.00	0.65	0.66
Sentiment	0.72	0.65	1.00	0.79
Reputation	0.71	0.66	0.79	1.00

3.2.1 Interpretation of Correlation Results

The correlation matrix reveals strong positive relationships among all variables, indicating that improvements in one metric are generally associated with improvements in others. The strongest correlation is observed between

sentiment and reputation, with a coefficient of 0.79, confirming that positive audience perception is closely linked to higher organizational credibility. Engagement is also strongly correlated with both sentiment and reputation, suggesting that interactive



communication strategies tend to foster favorable perceptions and stronger reputational outcomes.

Media reach demonstrates moderate correlations with the other variables, indicating that while visibility is important, it is less influential than engagement and sentiment in determining communication effectiveness. Importantly, none of the correlation coefficients exceed 0.80, suggesting that multicollinearity is not a significant concern in the regression model. These findings are consistent with existing empirical literature, which highlights the significant role of communication strategies in shaping branding and reputation outcomes (Alshammari & Alshammari, 2025).

3.3 Data-Driven Communication Process

To provide a practical framework for understanding how quantitative metrics are applied in strategic communication, Fig. 2 illustrates the data-driven communication process.

Figure 2: Data-Driven Communication Process

Data Collection → Data Processing → Analytics & Modeling → Insight Generation → Strategy Development → Implementation → Performance Evaluation → Feedback Loop

3.3.1 Explanation of the Process

The process begins with data collection, where raw information is obtained from various sources such as social media platforms, surveys, and media monitoring systems. This is followed by data processing, which involves cleaning, coding, and structuring the data to ensure its suitability for analysis. The processed data is then subjected to analytical techniques, including statistical modeling and AI-driven algorithms, to generate meaningful insights.

These insights inform the development of communication strategies, which are

subsequently implemented through various media channels. Performance evaluation is conducted using key performance indicators such as engagement, reach, and sentiment, allowing practitioners to assess the effectiveness of their strategies. The process concludes with a feedback loop, which enables continuous refinement and optimization of communication practices. This iterative framework reflects the evolving nature of public relations in the digital era, where real-time data and adaptive strategies are essential (Manisha, 2025).

3.4 Integrated Interpretation of Findings

The combined results from the regression and correlation analyses provide a coherent understanding of communication effectiveness. The findings demonstrate that sentiment is the most critical determinant of organizational reputation, highlighting the importance of managing public perception through strategic messaging. Engagement also plays a significant role, as it reflects the extent to which audiences interact with and respond to communication efforts. In contrast, media reach, while important, is less impactful when considered in isolation, emphasizing the need for a balanced approach that integrates both quantitative exposure and qualitative engagement.

The analysis further indicates that digital communication platforms enhance reach and operational efficiency but may not necessarily improve user satisfaction or internal communication outcomes. This observation is supported by evidence that face-to-face interactions remain essential for fostering employee engagement and satisfaction in organizational contexts (Tkalac Verčič & Verčič, 2025). Additionally, the integration of artificial intelligence into communication systems enhances analytical capabilities, improves predictive accuracy, and facilitates more informed decision-making processes (Binlibdah, 2024; Koa et al., 2025).



The findings demonstrate that strategic communication effectiveness is influenced by a combination of quantitative exposure metrics and qualitative perception indicators. The integration of statistical modeling and AI-driven analytics provides a robust framework for evaluating and optimizing communication strategies. The results underscore the importance of prioritizing engagement and sentiment alongside media reach in achieving professional excellence in media relations and public engagement.

4.0 Strategic Implications and Professional Practice

The empirical findings of this study provide strong evidence that contemporary communication practice must transition from intuition-driven approaches to data-driven, analytically grounded strategies. The statistically significant relationships observed between engagement, sentiment, media reach, and organizational reputation demonstrate that effective communication is increasingly dependent on the ability to measure, interpret, and apply quantitative insights. In modern media environments characterized by rapid information exchange and digital interactivity, communication professionals are required to integrate technological tools, analytical frameworks, and strategic thinking to achieve sustainable public engagement and organizational credibility.

4.1 Strategic Insights

The integration of artificial intelligence into communication systems has emerged as a critical factor in enhancing operational efficiency and message personalization. AI-driven tools enable real-time data processing, predictive analytics, and automated content optimization, thereby improving the precision and responsiveness of communication strategies. Empirical evidence indicates that AI not only enhances communication effectiveness but also mediates the relationship

between strategic inputs and organizational outcomes, reinforcing its transformative role in public relations practice (Binlibdah, 2024; Koa et al., 2025).

Another important insight relates to the growing significance of Environmental, Social, and Governance (ESG) communication as a core strategic function. Organizations that effectively communicate their sustainability initiatives and ethical commitments are more likely to build trust and legitimacy among stakeholders. ESG communication thus extends beyond corporate reporting to become an integral component of reputation management and stakeholder engagement (Strauß et al., 2025).

Furthermore, the application of data analytics has significantly improved decision-making processes in communication practice. The use of key performance indicators such as engagement rates, sentiment scores, and conversion metrics allows professionals to evaluate the effectiveness of their strategies with greater accuracy and accountability. This shift toward measurable outcomes enhances transparency and supports evidence-based decision-making.

The findings also highlight the importance of adopting a hybrid communication model that balances digital and interpersonal interactions. While digital platforms provide scalability, speed, and broader reach, they may not fully capture the relational depth required for effective communication. Studies have shown that face-to-face interactions remain essential for fostering trust, satisfaction, and internal organizational cohesion, particularly in employee communication contexts (Tkalac Verčič & Verčič, 2025). Consequently, an integrated approach that combines digital efficiency with interpersonal engagement is necessary for optimal communication outcomes.

4.2 Practical Recommendations



Based on the analytical findings, several practical recommendations can be proposed to enhance professional communication practice. Communication professionals should prioritize the adoption of AI-powered analytics tools for media monitoring and audience analysis. These tools facilitate real-time tracking of communication performance and enable predictive insights that inform strategic decisions.

In addition, organizations should implement KPI-driven communication frameworks that align communication objectives with measurable outcomes. The systematic use of metrics such as engagement, reach, sentiment, and conversion rates ensures that communication activities are continuously evaluated and optimized.

There is also a need to maintain a balance between digital communication channels and interpersonal engagement. While digital platforms are indispensable for large-scale outreach, direct human interaction remains critical for building trust and sustaining long-term relationships with stakeholders.

Investment in ESG communication frameworks is equally important, as stakeholders increasingly demand transparency and accountability in organizational practices. By integrating ESG principles into communication strategies, organizations can strengthen their reputation and enhance stakeholder confidence.

Finally, the development of data literacy skills among communication professionals is essential. As the field becomes increasingly data-intensive, practitioners must be equipped with the knowledge and competencies required to interpret analytical outputs, apply statistical models, and utilize digital tools effectively.

4.3 Challenges and Limitations

Despite the numerous advantages of data-driven communication, several challenges persist. One major concern relates to data privacy and ethical considerations, particularly

in the use of AI and big data analytics. The collection and analysis of large volumes of user data raise important questions regarding consent, confidentiality, and regulatory compliance.

Another challenge lies in the lack of standardized measurement frameworks across the communication industry. Variations in metric definitions and analytical approaches can lead to inconsistencies in performance evaluation and limit comparability across studies and organizations.

There is also the risk of over-reliance on digital metrics, which may result in the neglect of qualitative aspects of communication such as message tone, cultural context, and emotional resonance. While quantitative indicators provide valuable insights, they should be complemented with qualitative assessments to ensure a holistic evaluation of communication effectiveness.

Additionally, organizational readiness for the adoption of advanced technologies such as AI remains uneven. Factors such as technological infrastructure, management support, and employee competence significantly influence the successful implementation of AI-driven communication systems (Koa et al., 2025). These constraints may limit the ability of some organizations to fully leverage the benefits of data-driven communication.

4.0 Conclusion

This study has demonstrated that quantitative approaches play a pivotal role in enhancing strategic communication and media relations. Through the application of statistical modeling and data analytics, the research establishes that engagement, sentiment, and media reach are significant predictors of organizational reputation, with sentiment emerging as the most influential factor. The integration of artificial intelligence and digital analytics further strengthens communication effectiveness by enabling real-time insights,



predictive capabilities, and improved decision-making processes.

The findings underscore the necessity for communication professionals to adopt data-driven methodologies in order to remain competitive in an increasingly complex and digitalized media landscape. By leveraging quantitative metrics, integrating technological innovations, and maintaining a balance between digital and interpersonal communication, organizations can achieve higher levels of engagement, credibility, and operational efficiency.

As the field of strategic communication continues to evolve, future research should focus on developing standardized measurement frameworks, exploring advanced analytical models, and addressing ethical considerations associated with data usage. Ultimately, the successful application of quantitative approaches will depend on the ability of communication professionals to integrate analytical rigor with strategic insight, thereby advancing professional excellence in public engagement.

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Not applicable

Data availability

The microcontroller source code and any other information can be obtained from the corresponding author via email.

Authors' Contribution

N.G.A. conceptualized the study, developed the theoretical framework, conducted literature review, and drafted the manuscript. A.-a.N.E. designed the quantitative methodology, performed data analysis and statistical modeling, interpreted results, and contributed to manuscript revision and editing. Both authors jointly validated findings, approved the final version, and contributed to the development of conclusions and recommendations.

