



Platforms, multimedia, and AI-mediated engagement in institutional climate communication: Evidence from COP28 digital campaigns

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ABSTRACT

This study examines how institutional climate communication campaigns associated with 2023 United Nations Climate Change Conference (COP28) strategically deploy multimedia and artificial intelligence (AI)-assisted tools across social media platforms to shape public engagement. Adopting a mixed-methods research design, the study combines quantitative analysis of platform engagement metrics using PLS-SEM modeling with a complementary qualitative thematic reading of publicly available audience comments on Facebook, Instagram, YouTube, X (Twitter), and LinkedIn. The quantitative findings indicate that semantic-rich video content is positively associated with higher audience engagement ($\beta = 0.50$, $p = 0.007$), AI-enabled content personalization is associated with improved campaign effectiveness measured through click-through and conversion indicators ($\beta = 0.42$, $p = 0.020$), and interactive multimedia features are associated with stronger user interaction and retention ($\beta = 0.57$, $p = 0.004$). These results are interpreted through media richness and social presence perspectives, alongside platform-based communication logics that emphasize the role of algorithmic visibility, data-driven optimization, and sociotechnical affordances in shaping institutional publics online. The study contributes to social media scholarship by extending empirical evidence on AI-mediated multimedia engagement to the domain of institutional climate communication, while highlighting implications for responsible personalization, transparency, and public trust within platform environments.

Keywords: social media platforms, institutional communication, COP28, climate communication, multimedia, artificial intelligence, personalization, interactivity, public engagement, platform governance

INTRODUCTION

The rapid growth of digital communication in recent decades has resulted in significant changes in the production, distribution, and consumption of information. The incorporation of multimedia features, including audio, video, graphics, and interactive material, has revolutionized digital communication from static text-based messaging to dynamic, immersive experiences that actively engage consumers (Xu, 2025). As social media platforms have emerged as the principal arenas for public conversation and information dissemination, organizations aiming to optimize audience reach and engagement must comprehend the influence of multimedia on the efficacy of digital campaigns. This transformation is particularly salient on social media platforms, where institutional actors increasingly rely on multimedia and algorithmic tools to structure public engagement.

Multimedia refers to the integration of various content forms, such as text, images, audio, video, animations, and interactive elements within a single digital environment to enhance communication and engagement. As highlighted by Scolari (2009), multimedia plays a central role in reshaping the logic of communication, especially in digital platforms where storytelling and interactivity drive audience engagement (Safori et al., 2025). In the context of digital media campaigns, the effective combination of multimedia elements fosters emotional connection, message retention, and active participation from users. Thus, multimedia functions not merely as a vehicle for content delivery, but as a strategic mechanism through which institutions structure attention, participation, and meaning-making on social media platforms (Taha & Abdallah, 2025).

Multimedia is considered one of the most influential tools that has contributed to the evolution of digital communication. It goes beyond presenting content in textual form, integrating various interactive elements such as images, videos, audio, and animations. These components significantly enhance the strength and effectiveness of media messages. In modern media, the use of multimedia has become essential, as it increases message appeal and strengthens its impact on audiences (Safori et al., 2025).

Multimedia has become crucial to the formulation and implementation of media campaigns, as it offers distinctive opportunities to engage consumers in novel and compelling ways. Multimedia, encompassing text, audio, video, and images, enhances audience engagement and response, hence augmenting the efficacy of digital advertising. This is facilitated by technological advancements. It enables users to read, listen to, and view content on a single platform, facilitating the simultaneous consumption of news and information in various formats (Abdallah et al., 2024a).

Multimedia is a crucial element of digital media content through the utilization of various digital tools to improve news creation and narrative. Also, Media convergence, through the integration of text, audio, and visual elements, has generated more dynamic and engaging content that educates audiences in real time (Abokhoza & Abdallah, 2023).

Climate communication campaigns associated with global climate governance events, such as the 2023 United Nations Climate Change Conference (COP28), are primarily institutionally driven initiatives led by international organizations, national governments, and host-country authorities. Unlike commercial or advocacy campaigns, these initiatives aim not only to generate visibility and engagement but also to foster public trust, policy legitimacy, and long-term behavioral change.

Understanding how such institutional actors strategically deploy multimedia and AI-assisted tools on social media is, therefore, critical to evaluating the effectiveness and sustainability of contemporary climate communication. Within platform-governed communication environments, these strategies are further shaped by algorithmic visibility, platform affordances, and data-driven optimization mechanisms.

Moreover, the advent of artificial intelligence (AI) in digital media has further amplified the strategic importance of multimedia. Moreover, AI enhances the production and distribution of multimedia content, fostering a more knowledgeable and involved audience. Media firms can more efficiently engage a broader audience by producing high-quality content across several platforms through the integration of AI in digital marketing (Taha et al., 2024).

Moreover, today's multimedia digital marketing has a greater impact and reach, supported by social media platforms such as Facebook, Instagram, Twitter, and LinkedIn. These platforms help foster direct interaction between journalists, organizations, and readers by targeting diverse demographic groups. Interactive multimedia elements such as polls, videos, and photos enhance journalism's engagement and dynamism by enriching the viewer experience and promoting active participation.

Comprehending the effective navigation of digital realms is increasingly vital due to the prevailing global tendencies shaping technology and culture (Abdallah et al., 2024b). Social media serves as a significant communication medium, shaping and reflecting many cultural expressions while facilitating the exchange of ideas within society. Also, the proficient application of multimedia to captivate audiences and promote interaction is essential for developing compelling digital marketing (Ramawela & Chukwuere, 2020).

Multimedia elements significantly contribute to enhancing the clarity and appeal of media messages by combining text with visual and auditory components. This integration not only grabs the audience's attention but also improves their understanding and retention of the message content (Abdallah, 2022).

The effectiveness of campaigns significantly increases with personalization, enhancing the persuasiveness and behavioral impact of communications. The transition from passive consumption to interactive participation has transformed organizations' strategies in digital communication, underscoring the significance of multimedia as a vehicle for persuasion and audience involvement.

Within social media platforms, this transformation is particularly visible in institutionally driven climate communication campaigns, where multimedia and AI-assisted strategies are increasingly deployed to mobilize engagement, legitimacy, and public participation around global governance events such as COP28.

Despite the growing adoption of multimedia and AI-assisted tools in social media campaigns, existing research has primarily examined their effects in commercial, political, or advocacy contexts, with limited attention to institutionally driven climate communication campaigns. In particular, there remains insufficient empirical understanding of how multimedia modalities, content tailoring, and interactive features jointly shape audience engagement within global climate governance initiatives such as COP28. This gap is further amplified by the lack of integrative studies that combine quantitative engagement metrics with qualitative insights to assess the effectiveness of digital climate campaigns. Addressing this gap is essential for advancing both theoretical and practical understanding of strategic climate communication in the digital age.

Research Objectives

This study aims to examine how institutionally driven climate communication campaigns associated with COP28 strategically deploy multimedia and AI-assisted tools on social media to enhance audience engagement. Specifically, the study seeks to:

1. Analyze the impact of different multimedia modalities (video, static images, and text-based content) on audience engagement metrics in COP28-related digital campaigns.
2. Examine the role of content personalization and interactive features in shaping user interaction and participation in institutional climate communication campaigns.
3. Assess how AI-assisted tools contribute to the production, distribution, and performance optimization of multimedia content across social media platforms.
4. Integrate quantitative engagement metrics with qualitative thematic observations to provide a comprehensive evaluation of digital climate campaign effectiveness.

THEORETICAL FRAMEWORK

This study is grounded in an integrative theoretical framework that draws on established communication and media theories to explain how multimedia and AI-assisted tools influence audience engagement in institutional climate communication campaigns. First, media richness theory suggests that communication effectiveness increases when media formats are capable of conveying multiple cues, facilitating immediate feedback, and reducing ambiguity. Multimedia content, particularly video and interactive formats, offers higher levels of richness than text-based communication, making it especially suitable for communicating complex and abstract issues such as climate change.

Second, social presence theory explains how multimedia elements enhance users' perceptions of human warmth, immediacy, and involvement in digital communication. Personalized and interactive content increases the sense of social presence, encouraging active participation and sustained engagement rather than passive consumption.

While media richness theory focuses on the capacity of media to convey information effectively, social presence theory complements this perspective by explaining how such formats foster relational closeness and perceived human connection. Together, these theories provide a comprehensive explanation of both the informational and relational dimensions of multimedia communication.

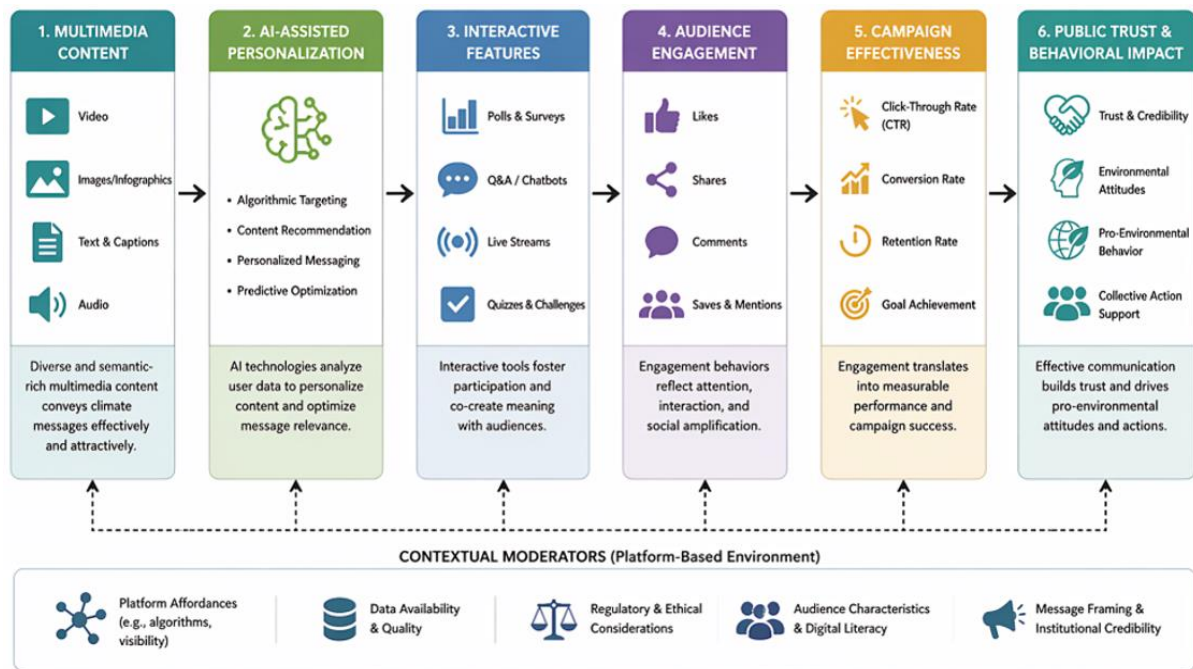


Figure 1. Conceptual framework of AI-driven multimedia, interactivity, and engagement in platform-based climate communication (Source: Authors' own elaboration)

Third, platform-based communication perspectives emphasize that social media platforms are not neutral channels but algorithmically governed environments in which visibility, reach, and engagement are shaped by both content characteristics and platform logics. Within these environments, AI-assisted tools play a central role in enabling content optimization, audience segmentation, and personalized message delivery.

By integrating these perspectives, this study conceptualizes multimedia and AI-assisted strategies as context-dependent mechanisms whose effectiveness is shaped by institutional communication goals, platform dynamics, and audience interaction patterns. In this framework, AI-driven personalization acts as an amplifying mechanism that enhances both media richness and social presence within platform-mediated environments.

This integrative approach provides the theoretical foundation for examining how multimedia modalities, personalization practices, and interactive features jointly influence audience engagement in COP28-related climate communication campaigns. It also enables linking empirical findings to broader discussions on institutional communication, algorithmic mediation, and platform governance in contemporary digital environments.

To provide a clearer conceptual representation of the relationships examined in this study, **Figure 1** illustrates the proposed AI-mediated multimedia engagement framework, integrating multimedia content, AI-driven personalization, interactivity, and audience engagement outcomes within platform-based communication environments.

Research Hypotheses

Building on prior research on multimedia effectiveness, personalization, and interactive communication in digital media environments, this study tests the following hypotheses:

- H1.** Campaigns featuring video content achieve significantly higher engagement rates than campaigns relying primarily on text-based or static image content.
- H2.** Tailored digital content targeting specific audience segments is positively associated with higher campaign effectiveness, as reflected in click-through and conversion rates.
- H3.** The integration of interactive elements such as polls, quizzes, and surveys is positively associated with user engagement and retention in digital campaigns.

LITERATURE REVIEW

The Function of Multimedia in Digital Media Campaigns

Multimedia plays a critical role in enhancing digital advertising by making content more memorable, interactive, and visually engaging. Existing literature demonstrates that interactive infographics, multimedia-rich content, and machine-readable personalized messages consistently outperform static media campaigns in terms of engagement and retention (Liu et al., 2025).

From a human-computer interaction (HCI) perspective, digital media design that incorporates interactive multimedia techniques generates substantial engagement benefits, as such features encourage prolonged attention and active participation (Xu, 2025). These affordances are particularly relevant in social media environments, where users are exposed to high information density and rapid content turnover.

Advances in digital advertising analytics have further amplified the role of multimedia by enabling real-time campaign evaluation and strategic adjustment. Media planning processes increasingly rely on AI-based analytics, big data intelligence, and machine learning models to optimize content performance and maximize campaign effectiveness (Iankovets, 2023).

Within social media platforms such as Facebook, Instagram, X (Twitter), and YouTube, content must capture audience attention within seconds due to the highly visual and interactive nature of these environments. Empirical research confirms that promotional video content outperforms text-based or static image formats in generating audience engagement and click-through rates (Arbi & Juhana, 2024). Additionally, interactive elements, including polls, live videos, and gamified experiences, have been shown to significantly enhance audience engagement and information recall within digital campaigns (Juhana et al., 2024).

COP28 Digital Campaign Context

This study focuses on digital media campaigns associated with COP28, examining how multimedia components contribute to audience engagement, interaction, and content visibility across social media platforms. Key performance indicators such as click-through rates, interaction levels, and user retention are used to assess the effectiveness of multimedia strategies in institutional climate communication.

The COP28 conference, held at Expo City Dubai in the United Arab Emirates (UAE) from November 30 to December 12, 2023, represented a pivotal moment in global climate governance, marking a shift from negotiation-centered discourse toward action-oriented climate solutions. In this context, digital campaigns have become essential tools for mobilizing global audiences and communicating environmental priorities.

Recent studies indicate that the integration of multimedia elements, particularly video, interactivity, and tailored messaging, enhances behavioral impact and audience engagement in development and advocacy communication (Udoudom et al., 2024). Moreover, climate advocacy campaigns associated with global events such as COP28 reflect broader transformations in digital journalism, adopting multimedia storytelling and audience-centered strategies that align with emerging journalistic practices in platform-based media environments.

METHODOLOGY

This study adopts a mixed-methods research design that integrates quantitative analysis of social media engagement metrics with complementary qualitative observations. The quantitative component serves as the primary analytical approach, examining the relationships between multimedia content types, personalization, interactivity, and campaign performance indicators across COP28 digital campaigns. The qualitative component plays an illustrative role by contextualizing quantitative findings through selected examples of audience interaction.

In this study, AI-assisted tools are operationalized as platform-based mechanisms that enable algorithmic content optimization, audience segmentation, and personalized content delivery. These mechanisms are inferred through observable campaign characteristics, including tailored messaging, adaptive content formats, and interactive features.

Configuration of the Measurement Model

Latent variables definition

- **Content type:** Classified as video, textual/static picture, interactive, and customized content.
- **Performance indicators:** Engagement rate, click-through rate, and conversion rate.
- **Data coding:** Each campaign is classified according to its principal content components. COP28: Climate Vision is designated as video-driven with interactive elements, whilst Global Green COP28 is defined as predominantly textual and static in nature.

Hypothesis Testing

1. **H1.** Video-based content in COP28-related digital campaigns is associated with higher audience engagement compared to text-based or static image content.
2. **H2.** Personalized multimedia content is positively associated with click-through rates and conversion rates in institutional climate communication campaigns.
3. **H3.** The presence of interactive elements in multimedia content is positively associated with user interaction and retention.

Model Details

The proposed model illustrates the relationships between COP28 digital campaigns on social media and three key dimensions of campaign performance: audience engagement, campaign effectiveness, and user interaction. The model examines the associations between video-based content, tailored multimedia content, and interactive elements with their respective performance indicators, as specified in the study hypothesis.

Measurement Scale

Although **Table 1** presents the constructs in a Likert-type analytical format, these indicators were not used as self-reported survey items. Rather, they were employed as structured coding dimensions derived from prior literature to classify campaign characteristics and support the analytical modeling of engagement patterns.

These items were used as analytical indicators to classify and interpret campaign characteristics rather than as self-reported measures collected from respondents.

Data Sample and Collection

Sample selection

Brandwatch was utilized to identify and evaluate digital media campaigns related to COP28, ensuring accuracy in the selection of relevant samples. The system gathered campaign data from platforms, including YouTube, Instagram, Twitter, Facebook, and LinkedIn, by formulating keyword queries that incorporated hashtags such as #COP28, #ClimateAction, and #SustainableFuture.

The platform provided insights into audience interaction, sentiment analysis, and content efficacy via its real-time social listening and analytics features, enabling a methodical evaluation of campaign performance. Filters were employed to refine findings based on temporal intervals, geographic locations, and information formats, aligning with the selected case studies. Furthermore, Brandwatch's access to historical data and competition benchmarking facilitated a comparative analysis of COP28's strategies across several sectors, thereby offering a data-driven approach for the selection and validation of campaign samples.

Five recognized digital projects about COP28 were selected for examination based on the revised search criteria. These campaigns span many geographic locations and digital platforms, ensuring a dataset that captures distinct multimedia strategies, audience engagement metrics, and platform-specific content effectiveness. The selected campaigns are outlined in **Table 2**.

Table 1. Coding framework based on prior literature

Construct	Measurement Items	Scale	Reference
Video content	1. The campaign uses high-quality video content to engage the audience.	5-point Likert scale	Han et al. (2022)
	2. Video elements in the campaign effectively capture attention and increase retention.	5-point Likert scale	Prihatiningsih et al. (2024)
Tailored content	3. The campaign provides content that is relevant to specific audience segments.	5-point Likert scale	Kaplan and Haenlein (2010)
	4. The campaign customizes messages based on audience demographics and interests.	5-point Likert scale	Qian et al. (2023)
	5. Personalized content improves audience engagement with the campaign.	5-point Likert scale	John & Khajavali (2023)
Interactive elements	6. The campaign includes interactive features such as polls, quizzes, or surveys.	5-point Likert scale	John & Khajavali (2023)
	7. Interactive elements encourage audience participation and prolong engagement.	5-point Likert scale	John & Khajavali (2023)
	8. The presence of interactive content enhances the user experience.	5-point Likert scale	Udoudom et al. (2024)
Engagement rate	9. The campaign's multimedia elements lead to increased likes, shares, and comments.	5-point Likert scale	Han et al. (2022)
	10. The campaign's engagement rate is significantly higher due to multimedia content.	5-point Likert scale	Prihatiningsih et al. (2024)
Campaign effectiveness	11. The campaign drives higher click-through and conversion rates.	5-point Likert scale	Kaplan & Haenlein, 2010)
	12. The audience responds positively to the multimedia elements in the campaign.	5-point Likert scale	Qian et al. (2023)
User interaction & retention	13. Users spend more time interacting with multimedia campaigns than static content.	5-point Likert scale	John & Khajavali (2024)
	14. The campaign encourages repeated interactions from the audience.	5-point Likert scale	John & Khajavali (2024)

Table 2. Selected COP28 digital campaigns: Platforms, strategies, and engagement insights

No	Campaign name	Time Period	Country	Primary digital platforms	Multimedia features	TP	AP/W
1	COP28: Climate Vision	Nov 25-Dec 15, 2023	UAE	YouTube, Instagram, Official Site	Explanatory videos, interactive elements (polls & live comments)	30	10
2	Global Green COP28	Dec 1-Dec 12, 2023	UK	Twitter, Instagram	Textual content, static images, and infographics	24	14
3	COP28: Action for Change	Nov 28-Dec 10, 2023	Canada	Facebook, Official Site	Awareness videos, interactive surveys	20	12
4	Sustainable Future COP28	Nov 30-Dec 12, 2023	Germany	LinkedIn, YouTube	Tailored video content for business/tech audiences, interactive tools	18	10
5	COP28: Global Impact	Nov 29-Dec 12, 2023	USA	Facebook, Twitter	A mix of videos and interactive content (quizzes & contests)	25	14

Note. No: Campaign number; TP: Total posts; & AP/W: Average posts/week

Justification for selecting COP28 as the research sample

COP28 was selected as the research sample because of its comprehensive and strategic application of multimedia in digital media campaigns, rendering it an exemplary case for examining the impact of multimedia on social media participation. COP28, as a global climate summit, executed an extensive digital communication plan utilizing many multimedia components, such as high-definition video footage, interactive infographics, live-streamed dialogues, and AI-enhanced tailored messaging. These factors enhanced audience participation, knowledge retention, and real-time interaction across many platforms, including Twitter (X), Instagram, YouTube, Facebook, and LinkedIn.

Moreover, COP28's digital initiatives were aimed at many audiences, including policymakers, environmental organizations, the general populace, and youth activists, illustrating the adaptability of multimedia for distinct demographic segments. The incorporation of big data analytics and AI-driven content recommendations significantly enhanced campaign efficacy. This research utilizes COP28 as a research

sample to elucidate best practices for multimedia-driven digital campaigns, presenting a data-driven analysis of how multimedia strategies augment audience engagement, message dissemination, and advocacy results in prominent global events.

The countries listed in **Table 2** represent the geographical focus or origin of the COP28-related digital campaigns. Each campaign was either launched from or targeted a specific country, reflecting variations in digital media strategies, audience engagement, and platform preferences across different regions.

In addition to campaign names, platforms, and multimedia features, two additional columns, Total Posts and Average Posts/Week, were included to capture the scale and frequency of content dissemination. Total Posts reflects the cumulative number of digital items (e.g., videos, infographics, and interactive posts) published during each campaign's duration. Average Posts/Week provides insight into the campaign's publishing rhythm and consistency. These indicators are essential in digital media analysis, as they influence visibility, audience retention, and the overall impact of multimedia strategies. High-frequency posting is often correlated with higher engagement rates, while consistent pacing can support user retention and algorithmic reach on social platforms.

Justification for including countries in the sample

- The COP28: Climate Vision initiative, initiated by the UAE, employs YouTube and Instagram for educational videos and interactive participation through the digital outreach strategy of the event's host country.
- The "Global Green COP28" campaign in the United Kingdom (UK) concentrated on Twitter and Instagram, highlighting textual material, infographics, and static photography, consistent with digital awareness techniques typically employed in UK environmental initiatives.
- Canada → The "COP28: Action for Change" campaign utilized Facebook and an official website to disseminate awareness videos and interactive polls, emphasizing Canada's inclination towards public engagement via organized, policy-oriented digital communication.
- Germany's "Sustainable Future COP28" campaign aimed at business and technology audiences, utilizing LinkedIn and YouTube to provide customized video content and interactive tools, exemplifying Germany's emphasis on industry-oriented sustainability dialogue.
- The "COP28: Global Impact" campaign in the United States (USA) utilized a combination of Facebook and Twitter, incorporating videos, quizzes, and contests to foster user involvement, consistent with prevailing USA digital marketing trends that prioritize interactivity.

Data Collection Methods

- Quantitative data: Rated engagement, click-through, and conversion assessed utilizing technologies.
- Qualitative data: It was used to evaluate campaign messaging and user interactions, correlating them with multimedia tactics identified in contemporary research.
- Data were collected through real-time social listening tools, focusing on engagement metrics (likes, shares, and comments) and content type (video, interactive, and personalized). No survey instrument was administered in this study. The items included in **Table 3** serve as coding indicators derived from validated literature to ensure conceptual rigor in content classification.
- A supplementary qualitative review of audience comments was also performed to enhance the interpretation of engagement trends.

Constructing Reliability and Validity

Table 3 presents the reliability and validity metrics for the constructions utilized in this research. The assessment includes composite reliability (CR), average variance extracted (AVE), and Cronbach's alpha (CA) to determine the reliability and validity of the measurement scales.

Data Analysis of the Key Performance Indicators

1. $CA \geq 0.70$ for reliability: In most common use, CA scale is used to measure the Internal consistency, reliability of the construct, where values greater than 0.70 are considered evidence of strong reliability.

Table 3. Construct reliability and validity

Construct	CA	CR	AVE
Video content	0.87	0.90	0.75
Tailored content	0.85	0.88	0.72
Interactive elements	0.88	0.91	0.78
Engagement rate	0.86	0.89	0.74
Campaign effectiveness	0.84	0.87	0.71
User interaction & retention	0.89	0.92	0.79



Figure 2. Construct reliability and validity (Source: Authors' own analysis based on Table 3)

To put it differently, the measurement items within each construct are very closely related to each other and consistent with each other.

2. $CR \geq 0.70$ for construct reliability: The assessment of CR includes considering the loadings for individual indicators as well as measurement errors. Values greater than 0.80 are considered an indicator of high reliability. In this research, CR values for all constructs range from 0.87 to 0.92, indicating that the construct measurements are stable and have high reliability, considering both the effects of indicators and potential errors.
3. $AVE \geq 0.50$ for convergent validity: Convergent validity ($AVE \geq 0.50$): Construct is defined independently from its indicators; AVE is an average of an indicator variance / (indicator variance + error variance). Any value above 0.50 indicates that the construct is sufficiently explaining the variances in its indicators, thus confirming a solid convergent validity. In this research, all constructs show AVE values ranging from 0.71 to 0.79, confirming their ability to capture a large proportion of variance from their measurement items and indicating that they are accurate and effective assessments of the phenomena studied.
4. Strong convergent validity: This implies that the measurement items are effective in explaining the constructs (all outer loadings > 0.70), thus demonstrating strong convergent validity.
5. Statistical validity of the model: High CR and AVE values are supportive of the validity as well as reliability of the research model, which indicates that this model is statistically valid in terms of cutoff CR, which assures the validity of the model in terms of well-defined constructs, as shown in **Figure 2**.

The reliability and convergent validity results of the measurement model are summarized visually in **Figure 2**. **Figure 2** visually represents the CA, CR, and AVE for each construct in the research.

Analytical overview of the information in **Figure 2**:

Table 4. Discriminant validity–HTMT matrix

Construct	Video content	Tailored content	Interactive elements	Engagement rate	Campaign effectiveness	User interaction & retention
Video content	1	0.68	0.72	0.64	0.59	0.66
Tailored content	0.68	1	0.70	0.65	0.62	0.67
Interactive elements	0.72	0.70	1	0.69	0.61	0.71
Engagement rate	0.64	0.65	0.69	1	0.73	0.68
Campaign effectiveness	0.59	0.62	0.61	0.73	1	0.75
User interaction & retention	0.66	0.67	0.71	0.68	0.75	1

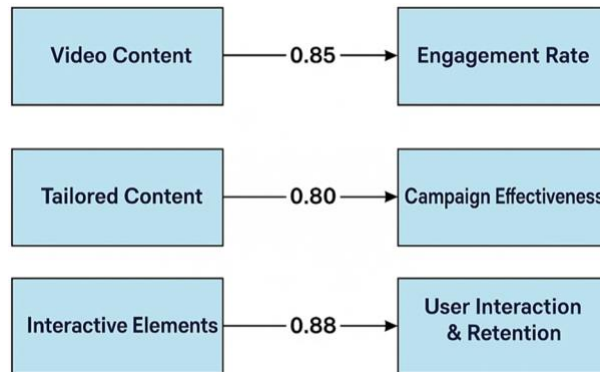


Figure 3. Structural measurement model (Source: Authors’ own analysis using PLS-SEM)

- Blue bars (CA) measure internal consistency of the construct, and values above 0.70 indicate strong reliability.
- Red bars (CR) evaluate overall construct reliability, and values above 0.80 confirm strong consistency.
- Green bars (AVE) measure convergent validity, and values above 0.50 confirm that constructs effectively explain variance.

RESULTS

Quantitative Results

Table 4 presents the discriminant validity results of the measurement model using the heterotrait-monotrait (HTMT) criterion. **Table 4** reports the HTMT values among the six constructs examined in the study: video content, tailored content, interactive elements, engagement rate, campaign effectiveness, and user interaction & retention.

The results presented in **Table 4** confirm that all HTMT values fall below the recommended threshold of 0.85, indicating satisfactory discriminant validity among the constructs. This suggests that each construct is empirically distinct and captures a unique dimension within the conceptual model.

Building on these findings, the structural relationships among the constructs are further illustrated in **Figure 3**, which presents the proposed measurement model linking multimedia components, AI-assisted personalization, and campaign performance indicators. **Figure 3** illustrates the structural measurement model showing the proposed relationships between multimedia components and campaign performance indicators as specified in the research hypotheses.

Table 5 reports engagement and conversion indicators across selected COP28 digital campaigns. To provide a clearer visual representation of engagement and conversion performance across the selected COP28 digital campaigns, **Figure 4** presents a comparative overview of engagement rates and click-through rates.

Table 5. Engagement and conversion indicators for COP28 case study campaigns

Campaign name	Platform(s)	Views	Likes	Shares	Comments	Click-through rate (%)	Engagement rate (%)
Climate Vision	YouTube, Instagram	2.1M	45,300	12,500	3,600	4.7	7.2
Global Green COP28	Twitter, Instagram	870K	14,800	2,200	1,000	2.3	5.5
Action for Change	Facebook	1.3M	28,900	9,000	2,400	3.9	6.8
Sustainable Future	LinkedIn, YouTube	950K	18,400	3,500	900	3.5	5.9
Global Impact	Facebook, Twitter	1.7M	32,100	7,800	2,000	4.1	6.4

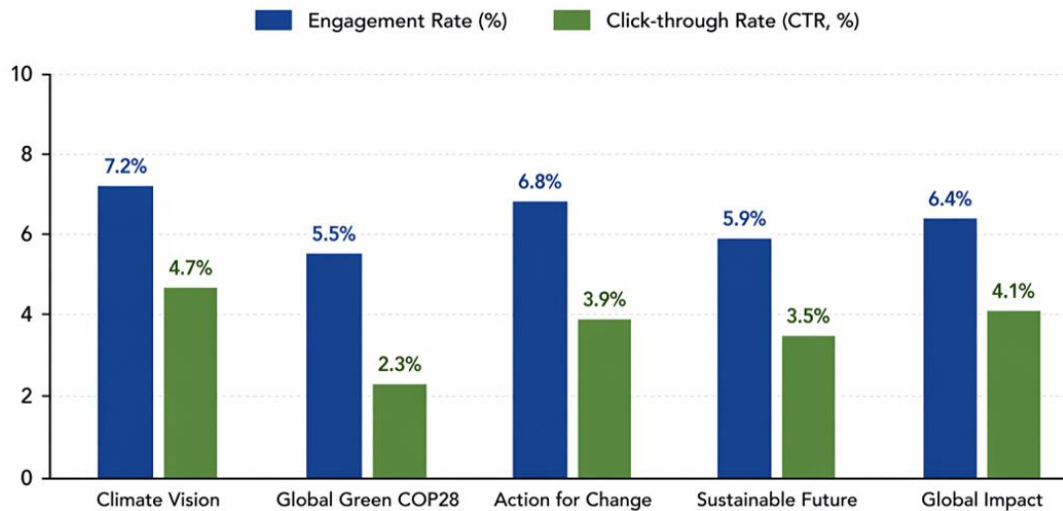


Figure 4. Engagement and conversion performance across COP28 digital campaigns (Source: Authors' own analysis based on the engagement and conversion indicators presented in Table 5)

Campaigns incorporating video content and interactive multimedia features demonstrate higher engagement and click-through rates compared to campaigns relying primarily on static or textual content.

As illustrated in **Figure 4**, campaigns such as climate vision and action for change achieved higher engagement and click-through rates, highlighting the effectiveness of multimedia-rich and interactive strategies. Notably, campaigns such as climate vision achieved the highest engagement rate (7.2%), indicating the effectiveness of combining video content with interactive elements, while campaigns relying on more static or text-based content demonstrated comparatively lower performance.

Qualitative Results

To provide a more in-depth understanding of audience interaction with multimedia content, a qualitative content analysis was conducted using selected public comments from platforms such as YouTube, Twitter, Instagram, and Facebook. The goal was to assess emotional tone, perceptions, and responses to multimedia and AI-enhanced content.

Findings revealed recurring themes of authenticity, urgency, and optimism, especially in response to personalized video narratives powered by AI. Comments reflected heightened emotional engagement and a sense of connection with the campaign messages. These reactions highlight how semantic-rich content and AI-driven personalization do not merely inform but resonate with users. Emotional cues, interactive features, and storytelling enabled by AI tools were instrumental in enhancing user trust and encouraging content sharing. These qualitative insights complement the quantitative findings by illustrating audience perceptions and interaction patterns associated with multimedia and AI-driven strategies, as summarized in **Table 6**. **Table 6** summarizes selected audience comments illustrating user engagement patterns across COP28-related digital campaigns.

DISCUSSION

This study explored how multimedia and AI-assisted strategies shape audience engagement in institutionally driven climate communication campaigns associated with COP28. This section interprets the

Table 6. Audience feedback table: Qualitative insights

Audience comment	Type of engagement	Associated multimedia element	Related campaign
"This video really opened my eyes to the urgency of climate change."	Positive-Emotional	Awareness video	COP28: Climate Vision
"The live Q&A was great. I wish more campaigns allowed us to interact like this."	Positive-Interactive	Live interactive session	COP28: Global Impact
"Too much talking, not enough real data. I wanted charts or facts."	Critical-Informational	Lack of visual data support	COP28: Global Green
"Loved the personalized message, it felt like this campaign really 'spoke' to me."	Positive-Personal	Personalized content	COP28: Sustainable Future
"I shared this video with my students. Simple, powerful, and informative."	Positive-Educational/sharing	Educational video	COP28: Climate Vision
"Polls and quizzes made me think more about my carbon footprint."	Positive-Interactive educational	Interactive elements	COP28: Global Impact
"It's hard to engage with long videos on mobile; short clips would be better."	Critical-Technical	Video length/user experience	COP28: Action for Change
"This infographic really helped me understand the impact of ocean pollution."	Positive-Visual/informational	Infographic	COP28: Global Green

empirical findings in light of established communication theories, with particular attention to media richness, social presence, and platform-based dynamics shaping institutional climate communication.

These findings may be further contextualized by prior empirical research on digital trust and platform-specific engagement. Previous studies indicate that audience interaction and content-sharing behaviors vary across social media platforms based on perceived credibility, privacy concerns, and verification practices. Such trust-related dynamics have been shown to influence not only the intensity of engagement but also users' willingness to interact with institutional content, highlighting the importance of transparency and trust-building strategies in AI-mediated communication environments.

The observed effectiveness of video-based content can be interpreted through media richness theory, which posits that richer media formats are better suited for conveying complex, ambiguous, and emotionally charged information. Climate communication inherently involves scientific complexity and value-laden narratives, making video a particularly effective medium for enhancing message clarity, emotional resonance, and audience involvement. The findings suggest that COP28 campaigns benefited from employing rich multimedia formats capable of reducing cognitive ambiguity and increasing interpretive depth.

The effectiveness of tailored content aligns with social presence theory, which emphasizes the importance of perceived immediacy, relevance, and relational closeness in digital communication. Personalized multimedia content enhances users' sense of being directly addressed, fostering stronger engagement and increasing the likelihood of interaction. In the context of COP28, personalization strategies appear to have strengthened the relevance of campaign messages for diverse audience segments, thereby supporting more meaningful engagement with climate-related content.

Interactive elements further reinforce these dynamics by transforming audiences from passive recipients into active participants. Consistent with interactive communication and HCI perspectives, interactive features such as polls, live discussions, and participatory storytelling enhance cognitive involvement and retention. The COP28 campaigns' use of interactive mechanisms facilitated sustained engagement by encouraging user contribution, feedback, and co-creation of meaning within digital spaces.

The role of AI emerges as a critical enabling factor within these processes. AI-assisted tools supported content personalization, real-time sentiment analysis, audience segmentation, and adaptive message delivery, allowing institutional actors to align multimedia strategies with platform-specific logics. From a platform-based communication perspective, such algorithmic alignment enhances content visibility and reach within social media environments governed by engagement-driven metrics.

The findings also highlight the role of platform governance and algorithmic visibility in shaping engagement outcomes, suggesting that multimedia effectiveness cannot be fully understood without considering platform-mediated dynamics.

The findings suggest that the integration of AI and multimedia is not merely additive but structurally transformative, particularly in public climate communication, where emotional resonance, trust, and behavioral engagement are central objectives.

Recent research highlights that AI-driven marketing strategies significantly enhance user engagement and operational efficiency by enabling personalized communication, real-time interaction, and data-driven optimization of content delivery (Saboune, 2024).

Recent research suggests that virtual reality technologies enhance audience engagement by creating immersive and interactive communication environments, where users actively experience content rather than passively consume it] (Saboune, 2022).

Overall, the discussion demonstrates that multimedia and AI-assisted strategies function as context-dependent mechanisms whose effectiveness is shaped by institutional goals, platform infrastructures, and audience interaction patterns. By grounding these interpretations in established communication theories, the study contributes to a more nuanced understanding of strategic climate communication in the digital age.

Importantly, the findings further emphasize the role of institutional trust as a key outcome of effective multimedia and AI-driven communication strategies within platform-based environments.

Theoretical Contribution and Model Advancement

This study offers a theoretical advancement by integrating media richness theory and social presence theory within a platform-based communication framework to explain AI-mediated multimedia engagement in institutional climate communication. While prior studies have examined these theories independently in digital media contexts, this research contributes by conceptualizing their combined application within algorithmically governed environments.

Specifically, the study proposes that multimedia richness, perceived social presence, and AI-driven personalization operate as interconnected mechanisms that jointly influence audience engagement outcomes. This integrative perspective extends traditional communication theories by embedding them within platform logics characterized by algorithmic visibility, data-driven optimization, and interactive affordances.

Importantly, the findings highlight the role of platform governance and algorithmic visibility as critical factors shaping engagement outcomes, suggesting that multimedia effectiveness cannot be fully understood without considering platform-mediated dynamics.

Furthermore, the study introduces a context-specific application of these theoretical constructs to institutional climate communication, an area that remains underexplored in existing literature. By doing so, it provides a conceptual model that can guide future research examining the intersection of AI, multimedia, and public communication within platform ecosystems.

LIMITATIONS AND FUTURE RESEARCH

This study is subject to several limitations that should be acknowledged when interpreting the findings. First, the analysis focuses on a limited number of institutionally driven digital campaigns associated with COP28. While this purposive selection enabled in-depth examination of multimedia and AI-assisted strategies within a global climate governance context, it may limit the generalizability of the findings to other types of campaigns or communication domains.

Second, the study relies on engagement metrics and publicly available audience interactions collected through social media analytics tools. Although these indicators provide valuable insights into user behavior, they may not fully capture offline behavioral change or long-term attitudinal shifts resulting from climate communication efforts. Additionally, the qualitative component of the study was intentionally illustrative rather than exhaustive, aiming to contextualize quantitative patterns rather than provide a comprehensive discourse analysis.

Future research could expand this work by examining a broader range of climate communication initiatives across different cultural, political, and institutional contexts. Comparative studies across multiple climate conferences or national campaigns may offer deeper insights into how multimedia and AI strategies

operate under varying governance frameworks. Further research may also explore emerging technologies such as immersive media, virtual reality, and advanced AI-driven conversational agents to assess their potential impact on sustained engagement and behavioral change in digital climate communication.

Finally, future studies should consider the ethical implications of AI-assisted personalization in public communication, particularly regarding data privacy, transparency, and algorithmic bias. Addressing these dimensions would contribute to the development of more responsible and trustworthy digital climate communication practices.

CONCLUSION

This study examined the strategic role of multimedia and AI-assisted tools in shaping audience engagement within institutionally driven climate communication campaigns associated with COP28. By integrating quantitative engagement metrics with illustrative qualitative insights, the study provides evidence that multimedia modalities, personalization practices, and interactive features play a critical role in enhancing digital campaign effectiveness in global climate governance contexts.

The findings contribute to communication and media scholarship by extending established theoretical perspectives, particularly media richness theory, social presence theory, and platform-based communication, into the context of institutional climate communication.

From a practical perspective, the study offers insights for policymakers, communication practitioners, and institutional actors involved in climate advocacy. Strategic investment in rich multimedia formats, interactive engagement mechanisms, and responsible AI-driven personalization can enhance public trust, participation, and sustained engagement in climate-related initiatives. Overall, the study underscores the importance of theoretically informed and ethically grounded digital communication strategies in advancing effective and sustainable climate governance in the digital age.

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