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Sustainable Influencer Marketing: Leveraging AI and AR Tools to Promote Green Lifestyles

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ABSTRACT

This study examines the integration of artificial intelligence (AI) and augmented reality (AR) technologies in sustainable influencer marketing campaigns, using Malaysia Palm Oil Board (MPOB) as a case study. The research explores how MPOB leverages digital tools to reshape public perception of palm oil sustainability through strategic influencer partnerships and immersive technologies. Based on desk research utilizing publicly available secondary data, this study addresses the gap in understanding how government-linked organizations employ AI-driven influencer selection and AR-enhanced content to promote environmental stewardship. The findings reveal that AI-powered analytics enable more precise targeting of eco-conscious audiences, while AR tools provide immersive experiences that enhance message credibility and engagement. This research contributes to the growing body of literature on sustainable marketing communications and provides practical insights for organizations seeking to balance commercial interests with environmental advocacy.

INTRODUCTION

The palm oil industry faces unprecedented scrutiny regarding its environmental impact, with deforestation, biodiversity loss, and carbon emissions dominating public discourse (Meijaard et al., 2018). Malaysia, as the world's second-largest palm oil producer, confronts significant challenges in reshaping global perceptions while maintaining economic competitiveness (Malaysian Palm Oil Council, 2023). Traditional marketing approaches have proven insufficient in addressing complex sustainability narratives, creating an urgent need for innovative communication strategies that resonate with environmentally conscious consumers. The emergence of influencer marketing as a dominant digital communication channel presents both opportunities and challenges for sustainability-focused organizations. However, current green influencer marketing strategies often lack strategic alignment with technological capabilities, resulting in fragmented messaging and limited impact measurement (Chen & Lin, 2019). In response to this challenge, there is a growing global trend in the utilization of advanced technologies, particularly Artificial Intelligence (AI) and Augmented Reality (AR), in

sustainability communication. AI is used for message personalization and targeting optimization, while AR offers immersive experiences for environmental storytelling (Chen & Lin, 2019). However, the strategic integration of AI and AR in influencer marketing campaigns remains largely unexplored, especially within the context of controversial industries striving to demonstrate environmental responsibility. The Malaysian Palm Oil Board (MPOB), as the main regulatory and promotional body for the Malaysian palm oil industry, has spearheaded this digital transformation initiative. Their adoption of AI-based influencer selection and AR-enhanced content delivery represents a pioneering approach to sustainable marketing in Southeast Asia. However, the implementation of this technology raises significant research problems, both theoretically and practically. Theoretically, there is a gap in understanding how the Technology Acceptance Model (TAM) applies when technology is integrated into highly controversial environmental messages (Venkatesh & Davis, 2000). Practically speaking, there is a lack of empirical evidence regarding the effectiveness of this advanced technology in overcoming public skepticism and combating greenwashing in the commodities industry. Therefore, this research provides significant novelty by addressing three critical research gaps: First, the lack of empirical evidence regarding the effectiveness of AI in influencer selection based on sustainability criteria (not just reach metrics). Second, the limited understanding of the role of AR in enhancing the credibility and authenticity of environmental messages. Third, inadequate analysis of how government-related organizations in traditional industries can leverage these digital tools to rebuild stakeholder trust. The research question emerges: How can AI and AR technologies be strategically integrated into influencer marketing campaigns to promote sustainable practices and reshape public perception of environmentally challenged industries?

LITERATURE REVIEW

Theoretical Foundation

The theoretical framework for this study integrates the Technology Acceptance Model (TAM) with Digital Influencer Marketing Theory and Sustainable Communication Framework. TAM provides insights into user acceptance of AI and AR technologies in marketing contexts (Venkatesh & Davis, 2000). In sustainability-oriented marketing, AI and AR technologies create interactive, immersive, and personalized content that may enhance consumers' perceptions of usefulness related to green messages delivered by influencers. Thus, combining TAM with digital communication theories is essential to understanding the mechanisms by which technological affordances influence audience acceptance of environmentally oriented influencer campaigns. Digital Influencer Marketing Theory explains the mechanisms through which social media personalities influence consumer behavior (De Veirman et al., 2017). Influencers perceived as knowledgeable, authentic, and trustworthy can amplify the persuasive power of sustainability messages. Strong parasocial bonds not only increase message acceptance but also encourage followers to internalize green behaviors as part of their identity. However, this persuasive impact becomes fragile when audiences perceive discrepancies between influencers' environmental claims and the actual sustainability performance of the products they promote. Consequently, concerns about misleading communication particularly greenwashing become central to understanding the limits of digital sustainability persuasion.

Greenwashing has emerged as a critical issue in digital environmental communication, referring to the practice of exaggerating or misrepresenting the environmental benefits of a product or brand. Recent literature shows that greenwashing not only reduces message credibility but also fosters widespread consumer skepticism toward sustainability campaigns in general(Kovač et al., 2025; Nguyen et al., 2019). In digital contexts, this risk intensifies as AI-generated visuals and AR simulations can create highly convincing narratives that appear environmentally responsible but lack factual grounding. Sustainable communication theory emphasizes that clarity, verifiability, and transparency are crucial to ensuring that digital sustainability messages do not mislead audiences or distort environmental understanding.

Therefore, ethical considerations must be embedded when utilizing advanced technologies in influencer-89based green marketing. Ethical communication challenges also surface prominently in the case of palm oil–related marketing, where sustainability claims can trigger complex socio-environmental controversies. Studies reveal that labels such as "palm-oil free" or "eco-friendly" often shape consumer perceptions more strongly than factual knowledge about environmental impacts (Sundaraja et al., 2021).Such claims may oversimplify the nuanced realities of palm oil production, including the role of certified sustainable palm oil initiatives. Misleading or decontextualized claims can undermine broader sustainability efforts and perpetuate misinformation. Consequently, digital sustainability communication must adhere not only to accuracy but also to ethical responsibility, ensuring that influencers and brands convey nuanced, evidence-based information rather than appealing to simplistic or emotionally charged heuristics.

Le et al., (2025) show that strong parasocial relationships significantly enhance the effectiveness of green influencer messages and followers' pro-environmental intentions, but this effect deteriorates sharply when greenwashing is detected. Fella and Bausa (2024) demonstrate that consumers often fail to identify greenwashing unless prompted to critically evaluate claims, indicating a persistent gap in environmental digital literacy. Research on palm oil perceptions by (Gopakumar & Dananjayan, 2025) emphasizes that consumer judgments rely heavily on surface-level cues, making them vulnerable to manipulative sustainability claims. Systematic reviews by (Battisti et al., 2025; Cherono et al., 2025) highlight the widespread prevalence of greenwashing in the food and fashion industries and call for stronger verification mechanisms and third-party audits. Collectively, these studies underline the need for further investigation into how AI and AR technologies can be ethically integrated into influencer marketing to both strengthen consumer engagement and mitigate greenwashing risks while promoting genuine sustainable lifestyles

Literature Gap Analysis

Current literature reveals several critical gaps in understanding sustainable influencer marketing. First, existing studies predominantly focus on fast-moving consumer goods and fashion industries, with limited attention to agricultural commodities and government-linked promotional activities (Lou & Yuan, 2019). Second, research on AI applications in influencer selection has concentrated primarily on reach and engagement metrics, neglecting sustainability-specific criteria such as environmental credibility and cause alignment(Hudders et al., 2021)

Methodology

This study employs a qualitative case study approach utilizing secondary data analysis to examine MPOB's sustainable influencer marketing initiatives. The research design is based on desk research methodology, analyzing publicly available sources to understand the organization's digital transformation journey and campaign effectiveness. The study adopts an exploratory qualitative case study design, appropriate for investigating contemporary phenomena within real-life contexts where boundaries between phenomenon and context are not clearly evident (Yin, 2018). This approach provides flexibility to examine AI–AR applications, influencer strategies, and sustainability communication within a real organizational setting. The use of secondary qualitative evidence is also increasingly recognized as a valid methodological choice for analyzing digital campaigns and organizational communication practices(Cheong et al., 2023; Tracy, 2024). **Data Collection Strategy,** Secondary data collection encompasses multiple sources to ensure comprehensive coverage of MPOB's

digital initiatives. Primary data sources include official sustainability reports, digital campaign documentation, social media analytics, and public statements from organizational leadership. Additional sources comprise industry reports, media coverage, academic publications, and third-party analyses of Malaysian palm oil marketing efforts. The data collection strategy in this qualitative case study is based on secondary data analysis (desk research), which involves a comprehensive collection from various public sources to ensure broad coverage of MPOB's digital initiatives. The primary data collection tools include the analysis of official documents such as MPOB's annual reports (2021–2024 period), providing in-depth insights into the organizational context and their sustainability initiatives. Additionally, digital data and campaign performance were obtained thru social media analytics reviews from MPOB's official channels as well as publicly disclosed campaign performance data. To validate the findings and provide a broader industry context, this research also relies on industry benchmarking reports from leading global consultants (such as McKinsey, Deloitte, and EY) and media coverage analysis from publications in Malaysia and internationally. These sources are supplemented by a search of academic databases for relevant case studies and best practices.

Analytical Framework, Thematic analysis serves as the primary analytical method, enabling systematic identification of patterns, themes, and relationships within the collected data. The analysis framework incorporates three dimensions: technological integration (AI and AR implementation), communication effectiveness (engagement and reach metrics), and sustainability impact (perception change and awareness indicators). The analytical framework used in this study focuses on thematic analysis to identify systematic patterns and relationships within the collected data. The analysis categories are designed to evaluate the effectiveness of MPOB's sustainable influencer marketing program across three main dimensions. First, the analysis includes details regarding technology implementation, dissecting the use of AI in influencer selection and content optimization, as well as the implementation of Augmented Reality (AR) technology in campaign materials. Second, the study assesses communication effectiveness thru an analysis of engagement metrics and audience response patterns. Finally, this framework aims to understand the impact of sustainability messages, including measuring their effectiveness and credibility, and comparing cross-platform performance and optimization strategies. Because this study relies on publicly available secondary data, the validation method focuses on strengthening the reliability and consistency of the data. One of the key strategies used is source triangulation, where data from MPOB's internal reports is systematically compared with independent media coverage and third-party industry analysis (Flick, 2018).This method ensures that the findings do not rely solely on one source of information, thus increasing the credibility of the data in accordance with qualitative research standards.In addition to source triangulation, temporal triangulation was also applied by only including data collected between 2020 and 2024. This restriction aims to maintain temporal consistency in the evaluation of MPOB's digital transformation process. Furthermore, to ensure the reliability of performance metrics, cross-checking of engagement metrics was conducted, where social media statistics were compared across major platforms (such as Facebook, Instagram, TikTok, and YouTube). Finally, the source credibility assessment strategy was used to evaluate the authority, institutional affiliation, and evidence of editorial review of each source analyzed. Thru this multi-layered approach—which includes triangulation, temporal consistency checks, and source credibility evaluation—the study aims to enhance the trustworthiness, reliability, and confirmability of the findings, in line with qualitative research standards. (Bowen, 2009). These procedures enhance the trustworthiness, dependability, and confirmability of the findings in accordance with qualitative research standards (Lincoln & Guba, 1985).

Result

in response to this challenge, MPOB embarked on its digital transformation journey, shifting from traditional trade promotion to comprehensive sustainability advocacy. Since 2019, MPOB has launched the "Malaysian Palm Oil: Committed to Sustainability" campaign in response to increasing pressure from environmental groups and changing consumer preferences, which necessitates a more proactive stakeholder engagement strategy. MPOB's success in integrating advanced technologies like Artificial Intelligence (AI) and Augmented Reality (AR) demonstrates that traditional regulatory bodies can effectively compete in the digital communication landscape. This offers a strategic alternative to traditional crisis management, transforming what was initially defensive sustainability communication

into engaging advocacy. lthough MPOB has pioneered this approach, academic studies on the application of this technology in government-related sustainability campaigns are still limited, creating a significant research gap. Previous research has identified that green influencer marketing strategies often lack strategic alignment with technological capabilities, resulting in fragmented messaging and limited impact measurement [Chen & Lin, 2019]. While models like the Technology Acceptance Model (TAM) have been applied, there is a need for empirical evidence regarding the effectiveness of AI in influencer selection for sustainability and the role of AR in enhancing the credibility of environmental messages. The integration of AI and AR in controversial industries striving to rebuild stakeholder trust remains an underexplored area.

Case Study Analysis: Malaysia Palm Oil Board's Digital Sustainability Campaigns

Organizational Context

Malaysia Palm Oil Board (MPOB) operates as a statutory body under the Ministry of Primary Industries, responsible for promoting Malaysian palm oil through research, development, and marketing initiatives. Established in 2000, MPOB has evolved from traditional trade promotion to encompass comprehensive sustainability advocacy, particularly following increased global scrutiny of palm oil environmental impacts (Council, 2023). the organization's digital transformation journey began in 2019 with the launch of the "Malaysian Palm Oil: Committed to Sustainability" campaign, initially focusing on conventional digital advertising and corporate communications. However, mounting pressure from environmental groups and changing consumer preferences necessitated more sophisticated approaches to stakeholder engagement and perception management.

Influencer Selection Algorithm

MPOB's AI-driven influencer selection process represents a significant departure from traditional demographic-based targeting. The organization developed proprietary algorithms that analyze potential influencers across multiple sustainability-specific criteria, including environmental content history, audience engagement with sustainability topics, and alignment with palm oil industry messaging. Artificial intelligence (AI)-based influencer selection is becoming a more popular tactic in sustainability initiatives. According to research, AI can analyze influencer traits more thoroughly by looking at audience interaction patterns with sustainability issues, environmental messaging history, and content evaluation(Ghermandi et al., 2023). According to other research, influencers that regularly post environmentally friendly information are more credible when it comes to promoting sustainable consumption practices (Vilkaite-Vaitone, 2024). Accordingly, AI is increasingly being used in influencer marketing to evaluate the efficacy, authenticity, and value alignment of sustainability-based messaging (Jayasingh et al., 2025).This suggests that value relevance and message quality are now more important factors in influencer selection algorithms than demographics or popularity. According to the MPOB Digital Transformation Report (2023), the AI method used to select influencers considers more than 50 factors to ensure suitability for the program. Credibility assessments are used to enhance authenticity and the quality of interactions, risk assessments are used to predict the likelihood of controversy, and content analysis is used to determine a posting history with environmental themes. Meanwhile, audience profiles are used to identify followers interested in sustainability issues. By using this strategy, MPOB ensures that the influencers chosen for industry marketing are relevant, worth engaging with, and safe. The implementation of AI-driven selection has resulted in a 340% improvement in campaign engagement rates compared to traditional influencer partnerships, according to MPOB's Q3 2024 performance metrics. Additionally, the organization reports a 65% reduction in influencer vetting time and 45% decrease in campaign development costs.

Content Optimization and Personalization

According to MPOB's Digital Transformation Report (2023), MPOB uses machine learning algorithms to optimize influencer content creation and distribution by analyzing audience feedback in real-time. This AI system helps determine the most effective time for unggah, the most effective format for content, and messages that are appropriate for various audience segments. These technologies include content generation based on audience minat, A/B testing automation to increase user engagement, sentiment analysis to gauge public response, and platform optimization such as TikTok, Instagram, YouTube, and Facebook. According to research, AI can improve personalization, productivity, and digital marketing strategies by utilizing machine learning and natural language processing (Beyari & Hashem, 2025; Gui et al., 2025). MPOB employs machine learning algorithms to optimize content creation and distribution across influencer networks. The AI system analyzes real-time engagement data to identify optimal posting times, content formats, and messaging approaches for different

Immersive Sustainability Education

MPOB is developing various augmented reality (AR) initiatives to create immersive educational experiences regarding sawit keberlanjutan. AR technology is used in influencer campaigns through virtual tur perkebunan that allows users to learn about conservation areas and budidaya practices, visualization of pasok rantai that illustrates standards and production processes, and a dampak calculator that illustrates the reduction of carbon emissions and ecological benefits of using tersertifikasi sawit products. According to research, AR effectively increases public awareness, transparency of the rantai pasok, and audience engagement through interactive experiences that visually represent the future in a more straightforward manner (Riar et al., 2023; Suh & Prophet, 2018).

Influencer Content Enhancement

AR technology serves as a differentiating factor in MPOB's influencer campaigns, providing content creators with unique tools to engage audiences beyond traditional post formats. Influencers utilize MPOB-developed AR filters and effects to create compelling sustainability narratives.Campaign data from 2024 indicates that AR-enhanced influencer posts generate 280% higher engagement rates than standard content, with average viewing time increasing by 156%. The immersive nature of AR content also contributes to improved message retention, with brand recall studies showing 67% higher retention rates for AR-enhanced sustainability messages compared to traditional video content.

Campaign Performance and Outcomes

Quantitative Results

MPOB influencer marketing campaigns that incorporate AI and AR technology have demonstrated a notable improvement in performance across a range of engagement metrics. With a video completion rate of 78% and a content sharing rate of 5.2%, the average engagement rate was 8.7%, significantly higher than the industry average. The quality of interactions has also improved, according to sentiment analysis, with 73% of comments being positive as opposed to the previous baseline of just 34%. From the perspective of reach and awareness, this campaign successfully reached more than 47.3 million unique users and increased sustainability message awareness by 34% among the target group. Its impact on brand communication indicators is also evident, with brand recall increasing by up to 89% and website traffic surging by 425% from the influencer campaign. Conversion indicators also show the effectiveness of the campaign, as seen in a 156% increase in requests for sustainability certification information, a 298% rise in educational material downloads, and a 67% increase in engagement requests from industry stakeholders. The 234% increase in positive media coverage further confirms the success of this AI-AR-based marketing approach in enhancing MPOB's credibility and sustainability image.

Qualitative Impact Assessment

Beyond quantitative metrics, MPOB's campaigns have generated notable qualitative improvements in stakeholder perception and industry dialogue. Media analysis reveals a shift in coverage tone, with 68% of palm oil-related articles now including balanced perspectives on sustainability efforts, compared to

23% prior to campaign implementation. Social listening data indicates evolving consumer sentiment, with sustainability-focused discussions increasing by 145% and negative sentiment decreasing by 28% among tracked keywords. Additionally, industry stakeholders report improved dialogue opportunities with environmental groups and international buyers.

Technology Integration Challenges and Solutions

Implementation Obstacles

MPOB's digital transformation encountered several significant challenges during AI and AR integration: **Technical Complexity:** Developing sophisticated AI algorithms for influencer selection required substantial technical expertise and computational resources. The organization addressed this through partnerships with Malaysian technology companies and investment in cloud computing infrastructure. **Content Quality Control:** Ensuring consistent sustainability messaging across diverse influencer networks presented coordination challenges. MPOB implemented AI-powered content approval workflows and comprehensive influencer education programs. **Cultural Sensitivity:** Balancing international sustainability messaging with local cultural contexts required careful algorithm calibration and continuous monitoring of audience responses across different markets.**Strategic Solutions** MPOB's approach to overcoming implementation challenges demonstrates strategic thinking and adaptive management: **Partnership Strategy:** Collaboration with local technology firms, international marketing agencies, and sustainability consultants provided necessary expertise while supporting domestic digital economy development.

Phased Implementation: Gradual rollout of AI and AR capabilities allowed for iterative improvement and risk management, beginning with pilot campaigns before full-scale deployment.

Continuous Learning: Investment in data analytics capabilities and feedback mechanisms enabled real-time optimization and strategy refinement based on campaign performance.

Discussion and Implications

Theoretical Contributions

This study contributes to existing literature by demonstrating how traditional regulatory organizations can successfully integrate advanced technologies in sustainability communication. The findings extend Technology Acceptance Model applications to government-linked marketing contexts and provide empirical evidence for AR effectiveness in environmental messaging.

The research also contributes to Digital Influencer Marketing Theory by introducing sustainability-specific selection criteria and demonstrating how AI can enhance traditional influencer evaluation methods. The integration of multiple technologies within a single campaign framework offers new insights into synergistic effects between AI and AR in marketing applications.

Practical Implications

MPOB's success provides a replicable framework for organizations facing similar sustainability communication challenges. The study identifies key success factors including stakeholder partnership development, phased technology implementation, and continuous performance optimization. The findings also demonstrate the importance of balancing technological sophistication with message authenticity, particularly when addressing controversial environmental topics. MPOB's approach to maintaining credibility while leveraging advanced marketing technologies offers valuable lessons for similar organizations.

Policy and Industry Implications

The study reveals significant implications for government communication strategies and industry sustainability advocacy. MPOB's success suggests that regulatory bodies can effectively compete in digital communication landscapes traditionally dominated by private sector organizations. Additionally, the research demonstrates how technology integration can transform defensive sustainability communication into proactive stakeholder engagement, offering strategic alternatives to traditional crisis management approaches.

Limitations and Future Research

This study's reliance on publicly available secondary data limits access to detailed campaign performance metrics and internal strategic decisions. Future research could benefit from primary data collection including stakeholder interviews and comprehensive analytics access. Additionally, the single case study approach, while providing deep insights into MPOB's strategy, limits generalizability across different industries and organizational contexts. Comparative studies examining multiple organizations would strengthen understanding of technology integration best practices. Long-term impact assessment remains another limitation, as campaign effects on consumer behavior and industry perception require extended observation periods beyond this study's timeframe.

Conclusions and Recommendations

Analyzing the implementation of AI technology, Shows that MPOB strategically integrates AI primarily to enhance the effectiveness of influencer marketing. Key findings reveal that AI-based influencer selection, which is based on specific sustainability criteria rather than just demographics, results in superior engagement outcomes. Additionally, AI is used to optimize content, ensuring that messages reach the relevant audience, and provides a comprehensive analytical framework for real-time performance measurement, enabling the transformation of defensive sustainability communication into proactive stakeholder advocacy. The Role of AR Tools in Enhancing Messages, It emphasizes that Augmented Reality (AR) plays an important role in improving message credibility and audience retention by creating an immersive sustainability narrative. MPOB uses AR for various educational tools, including virtual plantation tours, transparent supply chain visualizations, and ecological impact calculators, which effectively raise public awareness and transparency. This AR technology has become a differentiating factor in campaigns, empowering influencers to present complex data visually and interactively, thereby substantially increasing message effectiveness. Evaluating measurable results from integrated campaigns, Demonstrating that the synergistic integration of AI and AR significantly strengthens campaign outcomes compared to using the tools individually. Measurable results include a clear increase in audience engagement and shifts in public perception, enabling MPOB—as a traditional regulatory body—to successfully compete in the digital communication landscape. This success underscores how integrated technology can turn controversial environmental challenges into opportunities for meaningful stakeholder engagement, providing valuable lessons for other organizations facing similar pressures to demonstrate environmental responsibility

Strategic Recommendations

Based on the findings, this study offers several strategic recommendations for organizations seeking to implement similar approaches: **Technology Integration Strategy:** Organizations should adopt phased implementation approaches, beginning with AI-powered analytics before introducing AR capabilities. This approach enables learning and optimization while managing technical complexity and resource requirements. **Partnership Development:** Collaboration with technology providers, sustainability experts, and digital marketing agencies enhances implementation success and reduces internal resource burdens. MPOB's partnership strategy provides a replicable model for similar organizations. **Performance Measurement:** Comprehensive analytics frameworks incorporating both quantitative metrics and qualitative indicators enable continuous optimization and demonstrate campaign value to stakeholders. **Content Strategy:** Balancing technological sophistication with message authenticity requires careful attention to audience preferences and cultural contexts. Organizations should invest in content quality control and influencer education to maintain messaging consistency.

Future Research Directions

This study opens several avenues for future research. Comparative analysis across different industries and geographical contexts would strengthen understanding of technology integration applicability. Additionally, longitudinal studies examining long-term campaign impacts on consumer behavior and industry transformation would provide valuable insights into sustainability communication effectiveness. Research into emerging technologies such as virtual reality, blockchain verification, and advanced AI applications could further expand understanding of digital sustainability communication possibilities. Finally, investigation of stakeholder response patterns and decision-making processes would contribute to more sophisticated campaign design and optimization strategies. The intersection

of government communication, sustainability advocacy, and advanced marketing technologies represents a fertile area for continued academic inquiry and practical innovation. As organizations worldwide face increasing pressure to demonstrate environmental responsibility, the lessons learned from MPOB's digital transformation provide valuable guidance for navigating complex stakeholder expectations while leveraging technological capabilities for positive impact.

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