



From Tweets to Trust

A Theoretical Review on Social Media Sentiment, Corporate Legitimacy, and Financial Outcomes

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Abstract

Introduction/Main Objectives: This paper provides a theoretical review exploring the effect of social media sentiment on corporate legitimacy and financial performance, integrating knowledge from CSR communication, digital reputation, and market response literature. This topic is critical as digital platforms now dominate reputation management.

Background Problems: Although social media heavily influences CSR and reputation, the mechanism by which positive and negative social sentiment affects a firm's legitimacy and financial success remains poorly understood. This study addresses the central question: How do legitimacy processes, governed by digital stakeholder sentiment, operate within the corporate system?

Research Methods: The research employs a narrative and thematic review of 100 peer-reviewed articles indexed in Scopus over the past ten years. This evidence is framed by Stakeholder Theory and Legitimacy Theory and grounded in empirical studies utilizing sentiment analysis, topic modelling, and machine-learning-based text analytics on social media data.

Finding/Results: The review demonstrates that positive CSR/sustainability sentiment significantly enables corporate legitimacy, stakeholder trust, and financial indicators (stock prices/sales). Conversely, negative sentiment (particularly during crises) accelerates legitimacy loss and drops in valuation, an effect often moderated by established corporate reputation and industry context.

Conclusion: We conclude that real-time sentiment observance is crucial for effective CSR communication strategies, ensuring their contribution to corporate legitimacy and financial performance in the digital age. Future research should combine multimodal data and influencer dynamics to build predictive models of legitimacy crises.

Keywords: Social Media Sentiment; Corporate Legitimacy; Financial Performance; Theoretical Review; Stakeholder Theory



Introduction

Rapid pace of the digital age has changed the face of corporate communication, with social media emerging as a strategic tool for attracting stakeholders, improving reputation, and setting long-term organizational direction (Lim, 2022). This shift has led to a significant convergence of social media sentiment, corporate legitimacy, and financial outcome where Twitter (now X) acts as a real-time platform for public evaluation of company actions. The proliferation of digital conversation has further increased sentiment signals and thus their contribution to firms' reputational standing and market value (Zhang, 2025). In this context, corporate social responsibility (CSR) communication over social media plays a key role in shaping stakeholder attitudes. Studies indicate that companies use social media platforms, not only to promote sustainability and ethics, but also to respond to ever-changing social norms (Inversini & Derchi, 2024). The process is further fueled by developments in social opinion mining and sentiment analysis systems: automatic extraction of stakeholder attitudes allows companies to detect concerns that may be increasing, and refine communication strategies accordingly (Leggerini & Bannò, 2025). Through the observation of sentiment patterns, the businesses can gain insight about how legitimacy is constructed or challenged in online space, particularly in sectors where public attention is high and reputational risks are elevated (Acuti *et al.*, 2024).

The beneficial effect of positive sentiment on corporate reputation and financial results may be attributed to enhanced stakeholder trust and a better sustainability positioning (Hanaysha & Alhyasat, 2025). There is also empirical evidence to affirm that positive social media sentiment can jointly improve environmental performance and Corporate Financial Performance (CFP) thus validating the nexus between sustainability promotion and financial results (Islam *et al.*, 2025). Negative sentiment can spread rapidly on digital networks in crises, undermining legitimacy and also modifying investor behavior, consequently generating measurable variability in financial markets (Zhang, 2025).

In this case, using deep learning techniques in financial tweets represents meaningful evolution, enabling researchers and practitioners to conduct sentiment measurement more accurately and provide more accurate prediction of the market (Memiş *et al.*, 2024). In spite of these recent advancements, a theoretical gap remains. The scholarship literature has thus far not sufficiently synthesized how both the supportive and the critical social media sentiment together impact legitimacy construction in digital spaces, let alone how these processes generate financial effects. "From Tweets to Trust: A Theoretical Review on Social Media Sentiment, Corporate Legitimacy, and Financial Outcomes" fills this gap through synthesizing research by synthesizing evidence from 100 peer-reviewed studies to construct a complete framework describing how digital sentiment modulates legitimacy dynamics that ultimately influence corporate financial outcomes.

Research Methods

This study adopts a systematic theoretical review to integrate the fragmented literature on the relationships among social media sentiment, corporate legitimacy, CSR, and financial performance. The methodology follows a rigorous multistage protocol designed to ensure transparency, comprehensiveness, and replicability, and is aligned with the structure illustrated in the methodological flowchart (figure 1).

Figure 1. Systematic Theoretical Review Methodology: From Literature Collection and Screening to Framework Development

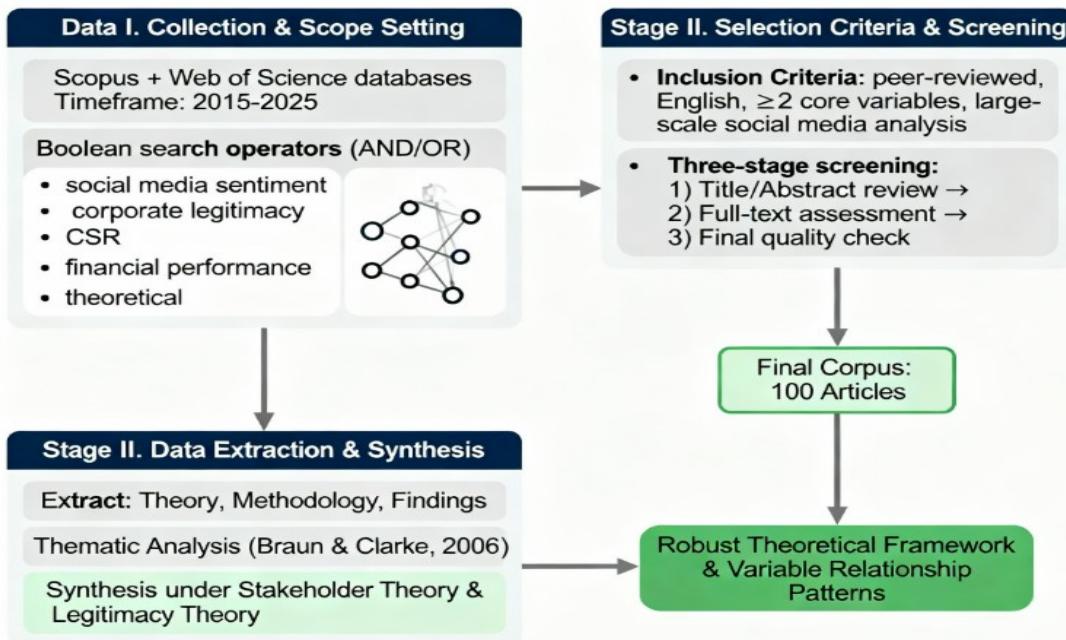


Figure 1 Systematic Theoretical Review Methodology

Data Collection and Scope Setting

The review began with the identification of relevant literature through the Scopus database as the primary source, supplemented by Web of Science to ensure full coverage across high-impact journals. Consistent with the accelerated development of digital analytics and corporate communication research, the timeframe was restricted to 2015–2025.

A structured keyword strategy using Boolean operators (AND/OR) was applied. Core search terms included:

- “social media sentiment”
- “corporate legitimacy”
- “CSR”
- “financial performance”
- “theoretical”

This search protocol ensured the identification of empirical and conceptual studies directly addressing the interplay between digital sentiment, legitimacy dynamics, and firm outcomes.

Selection Criteria and Screening

The initial search results were subjected to a three-layered screening procedure, as depicted in the methodological schematic:

Inclusion Criteria

To ensure relevance and methodological rigor, studies were included only if they met the following conditions:

1. Peer-reviewed journal articles
2. Published in English

3. Addressed at least two core variables (e.g., sentiment–legitimacy, CSR–performance)
4. Employed large-scale social media analysis, including sentiment analysis, machine learning, or computational text analytics

Three-Stage Screening Process

1. Title and Abstract Review

Articles that were conceptually irrelevant or outside the scope of digital sentiment, legitimacy, or performance research were excluded.

2. Full-Text Assessment

Each article was thoroughly evaluated to ensure theoretical relevance, methodological quality, and clear reporting of constructs.

3. Final Quality Check

A final round of scrutiny assessed the robustness of the research design, transparency of methods, and contribution to the field.

This screening protocol yielded a final corpus of 100 high-quality articles, which served as the analytical foundation of the review.

Data Extraction and Synthesis

Following the selection process, each retained article underwent structured data extraction. Key information gathered included:

- **Theoretical frameworks** (e.g., Signaling Theory, Stakeholder Theory, Legitimacy Theory)
- **Methodological designs**, including sentiment analytics, computational modeling, and statistical approaches
- **Core findings**, especially variable linkages
- **Patterns of mediation and moderation** between sentiment, legitimacy, and firm outcomes

Data synthesis followed the Thematic Analysis procedure proposed by Braun and Clarke (2006). This iterative coding approach enabled progression from descriptive summaries to a structured theoretical integration. Codes were grouped into broader thematic categories such as:

Thematic Analysis

The extracted material was synthesized using Thematic Analysis following Braun and Clarke (2006). The process consisted of:

1. Initial coding of recurring concepts, variables, and analytical procedures
2. Refinement of code clusters to identify broader conceptual patterns
3. Construction of thematic categories, such as:
 - The mediating role of corporate legitimacy
 - The moderating effect of corporate reputation
 - The influence of CSR narratives on sentiment dynamics
 - The link between digital legitimacy signals and financial performance

Theoretical Integration

These themes were further interpreted through Stakeholder Theory and Legitimacy Theory, enabling the development of an integrated conceptual framework. The synthesis reveals consistent patterns in how digital sentiment influences legitimacy judgments and how legitimacy subsequently shapes corporate financial outcomes, forming a robust evidence-based theoretical model.

Result

This review, theoretical in nature, compiles the evidence of 100 Scopus-indexed papers published primarily between 2015 and 2025. The overall aim is to develop a coherent theory explaining the mechanism associating stakeholder reactions to a platform such as Twitter with corporate legitimacy, CSR communication quality, and financial performance. The theoretical framework integrates traditional theories namely Stakeholder Theory (Freeman, 1984) and Legitimacy Theory (Etter et al., 2018) with emerging methodologies such as sentiment analysis, topic modelling, and machine learning. In the empirical context Twitter (X) is a predominant source of real-time sentiment data, and it demonstrates how such data transforms corporate messaging, legitimacy-building and market action in a fundamental way.

Table 1: Integration of Theoretical Frameworks, Empirical Operationalization, and Key Findings

Focus Area	Theoretical Lens	Key Construct & Social Media Proxies	Main Findings & Consequences (Legitimacy & Financial)	Supporting Literature (Examples)
Corporate Legitimacy	Legitimacy Theory	Perceived Corporate Legitimacy (Pragmatic, Moral, Cognitive); Stakeholder trust and sentiment tone; Defense mechanisms against negative spread.	Positive CSR sentiment significantly enables legitimacy and trust. Negative sentiment accelerates legitimacy loss. Legitimacy acts as a mediator (40–60% of sentiment impact on returns).	Etter et al. (2018); Xu et al. (2024); Gómez & Vargas-Preciado (2016)
CSR Communication & Engagement	Stakeholder Theory	Stakeholder Engagement Quality (Likes, Replies, Retweets, Dialogic interactions); CSR Communication Intensity (Number of CSR tweets, share of total posts); Digital CSR Quality (Interactivity, responsiveness, emotional framing).	High-quality digital CSR (interactivity, tone) is associated with increased firm performance and value. Symbolic/inauthentic communication can trigger legitimacy challenges.	Freeman (1984); Aichner et al. (2021); Han et al. (2023)
Financial Market Impact	Signaling Theory / Behavioral Finance	Social Media Sentiment Index (SMSI) (Aggregate or firm-specific sentiment from Twitter); Comparison of Social Media vs. News Sentiment.	Direct Price Impact: SMSI is a proxy for investor attention and significantly affects S&P 500 returns and volatility. Social media sentiment outperforms traditional news sentiment in predicting returns.	Antweiler & Frank (2004); Islam et al. (2025); Gordilo Martinez (2024)

Table 1 synthesizes the theoretical mechanisms, social media proxies, and main findings regarding legitimacy, CSR communication, and financial impact, as identified across the review of Scopus-indexed articles.

Theoretical Integration: Sentiment and Legitimacy

This has been widely reflected in the literature, viewing social media sentiment as a critical and emotion-driven signifier of organisational legitimacy, serving as a complement (or rival) to conventional performance measures (Etter et al., 2018). Research has found this "legitimacy

pressure" to be largely induced by criticism or negative comments on social media that encourages firms to modify their disclosures and CSR activity. This is particularly true in sensitive areas like carbon reporting (Shao, 2022) and general sustainability practices (Rahmansyah, Mulyani dan Geumpana, 2023). It is illustrated by the fact that positive sentiment regarding CSR is the most powerful enabler for the legitimacy of a corporation and the trust of stakeholders in the company (Leggerini & Bannò, 2025; Islam et al., 2025), so also sentiment analysis is still important in business decision and perception evaluation (Aguilar-Moreno et al., 2024).

CSR Communication Processes and Stakeholder Engagement on Twitter

Global analyses (2017–2022) confirm that firms, especially larger and high-growth companies, are increasingly using Twitter (X) for digital CSR communication, primarily focusing on environmental and community themes (Kvasničková, 2023). While the platform is ideal for real-time storytelling and dialogue, two-way engagement remains uneven (Gómez & Vargas-Preciado, 2016; Nel & du Toit, 2023). Crucially, high-quality digital CSR—defined by factors like interactivity, tone, and timeliness—is associated with improved firm performance and value when it successfully elicits positive stakeholder signals (Han et al., 2023). However, this proximity poses a risk: inauthentic or "symbolic" CSR can instantly trigger critical sentiment and legitimacy challenges (Ruehl & Ingenhoff, 2015). Ultimately, the effectiveness of digital CSR hinges on driving meaningful engagement and avoiding the perception of mere window dressing (Erokhin, 2025)..

Financial Market Consequences of Social Media Sentiment

The comprehensive review confirms social media sentiment is a powerful, robust market indicator influencing financial outcomes through a rapid, iterative loop (Antweiler & Frank, 2004). Sentiment acts as a direct proxy for investor attention (Rakowski et al., 2021) and offers significant predictive power over market volatility, trading volume, and Direct Price Impact on returns, often exceeding traditional news indicators (Lachana & Schroder, 2025; Nyakurukwa & Seetharam, 2024). This effect drives a self-reinforcing cycle—particularly among retail investors (Huynh, De Mello & Li, 2025)—where sentiment shifts trigger price changes, which then fuel further discussion. The predictive strength of sentiment is consistent across markets (Byrka et al., 2025), underscoring its necessity as a material variable for real-time market risk assessment (Verma, 2022) and the basis for machine learning-driven predictive models (Sina, 2023).

Discussion

This discussion synthesizes the findings of the systematic theoretical review to establish a comprehensive framework detailing the mechanism by which social media sentiment—particularly on platforms like Twitter (X)—governs corporate legitimacy and ultimately influences financial performance. This section integrates the insights from the CSR communication, digital reputation, and market response literature under the umbrella of Stakeholder Theory and Legitimacy Theory

1. Social Media Sentiment as a Signifier of Legitimacy Pressure

The review definitively establishes social media sentiment as a critical and emotion-driven signifier of organizational legitimacy, often functioning as a complement or rival to conventional performance measures. Legitimacy Theory posits that firms must continuously prove their alignment with societal expectations. Our synthesis shows that the online discourse, particularly its real-time, emotional tone, is now a material factor driving this social license to operate.

Negative discourse triggers intense "legitimacy pressure" , especially in sensitive areas like carbon reporting and sustainability practices. This pressure forces firms to modify their disclosures and CSR activity. Conversely, positive CSR sentiment is identified as the most powerful enabler for corporate legitimacy and stakeholder trust. This dynamic confirms the role of social media as the key arena for legitimacy construction across its three dimensions: pragmatic, moral, and cognitive

2. CSR Communication: The Imperative of Authentic Engagement

Global trends show firms increasingly using Twitter (X) to highlight environmental and community themes , with larger firms demonstrating greater interaction. However, the transition from symbolic presence to effective communication hinges on authenticity and engagement quality. The findings highlight a critical risk: while social media is ideal for real-time storytelling , inauthentic or "symbolic" CSR can instantly trigger critical sentiment, leading to serious legitimacy challenges. Conversely, high-quality digital CSR, defined by interactivity, tone, and timeliness , significantly strengthens engagement and is associated with improved firm performance and value. This supports Signaling Theory, where engagement quality (likes, replies, retweets) acts as a preliminary legitimacy signal , demonstrating responsiveness to dialogue across stakeholder groups. The effectiveness of digital CSR is thus measured by its ability to drive meaningful engagement and avoid the perception of mere window dressing.

3. Financial Market Consequences: Sentiment as a Predictor

The review clearly establishes social media sentiment as a powerful, robust market indicator influencing financial outcomes through a rapid and iterative reaction loop.

- **Direct Impact:** Sentiment acts as a direct proxy for investor attention and possesses significant predictive power over market volatility and trading volume. Social media-based sentiment indices are consistently found to affect S&P 500 returns and even outperform traditional news sentiment in predicting returns.
- **Behavioral Mechanism:** Sentiment directly influences Investor Behavior, particularly among retail investors , driving a self-reinforcing cycle where sentiment shifts trigger price changes which fuel further discussion. Negative sentiment, particularly during crises, accelerates legitimacy loss and can lead to large drops in stock markets.
- **Predictive Value:** The predictive strength is consistent across different markets , underscoring the necessity for real-time sentiment observance as a material variable in assessing corporate market risk and opportunity. Advancements in machine learning have further enhanced the creation of predictive models for abnormal returns based on this data

Conclusion

The integrated framework confirms that positive CSR/sustainability sentiment significantly enables corporate legitimacy, stakeholder trust, and financial indicators. This mechanism, summarized conceptually in Figure 1 , demonstrates that the firm's social license to operate is dynamically managed through digital stakeholder regimes. We conclude that real-time sentiment observance is crucial for effective CSR communication strategies. Future research must continue to explore this domain, specifically by combining multimodal data and influencer dynamics to build more accurate predictive models of legitimacy crises. Further analysis should also target the specific structural conditions and firm characteristics that moderate the conversion of short-term sentiment into long-term financial value, particularly focusing on the role of authenticity.

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References

Aichner, T., Grünfelder, M., Maurer, O., & Jegeni, D. (2021). *Twenty-five years of social media marketing: A review of the literature*. Journal of Business Research, 126, 73–87. <https://doi.org/10.1016/j.jbusres.2020.12.050>

Aguilar-Moreno, E., Hernández-Gress, N., & García-Alcaraz, J. L. (2024). *Sentiment analysis in business decision-making: A systematic mapping study*. Expert Systems with Applications, 234, 120911. <https://doi.org/10.1016/j.eswa.2023.120911>

Aguilar-Moreno, J. A., Palos-Sánchez, P. R., & Pozo-Barajas, R. (2024). *Sentiment analysis to support business decision-making: A bibliometric study*. AIMS Mathematics, 9(2), 4337–4375. <https://doi.org/10.3934/math.2024215>

Antweiler, W., & Frank, M. Z. (2004). *Is all that talk just noise? The information content of internet stock message boards*. Journal of Finance, 59(3), 1259–1294. <https://doi.org/10.1111/j.1540-6261.2004.00662.x>

Acuti, D., Bellucci, M., & Manetti, G. (2024). *Preventive and remedial actions in corporate reporting among “addiction industries”: Legitimacy, effectiveness and hypocrisy perception*. Journal of Business Ethics, 189, 603–623. <https://doi.org/10.1007/s10551-023-05375-3>

Braun, V., & Clarke, V. (2006). *Using thematic analysis in psychology*. Qualitative Research in Psychology, 3(2), 77–101. <https://doi.org/10.1111/1478088706qp063oa>

Caviggioli, F., et al. (2020). *Social media, innovation and stock market performance*. Journal of Product & Brand Management. <https://doi.org/10.1108/JPBM-03-2018-1774>

Chung, W., & Zeng, D. (2020). *Dissecting emotions in social media for public opinion analysis*. Information & Management, 57(6), 103250. <https://doi.org/10.1016/j.im.2018.09.008>

Dai, X., et al. (2013). *Sentiment analysis of online texts in corporate crises*. International Journal of Applied Management and Computing, 5(1), 63–76. <https://doi.org/10.1504/IJAMC.2013.053672>

Dwivedi, Y. K., et al. (2021). *Setting the future of digital and social media marketing research: Perspectives and research propositions*. Journal of Business Research, 125, 436–446. <https://doi.org/10.1016/j.jbusres.2021.01.001>

Erokhin, D. (2025). *ESG reporting in the digital era: Unveiling public sentiment and engagement on YouTube*. *Sustainability*, 17(15), 7039. <https://doi.org/10.3390/su17157039>

Etter, M., Colleoni, E., Illia, L., Meggiorin, K., & D'Eugenio, A. (2018). *Measuring organizational legitimacy in social media: Assessing citizens' judgments with sentiment analysis*. *Business & Society*, 57(1), 60–97. <https://doi.org/10.1177/0007650316683926>

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139192675>

Gómez-Carrasco, P., Guillamón-Saorín, E., & García Osma, B. (2021). *Stakeholders versus firm communication in social media: The case of Twitter and corporate social responsibility information*. *European Accounting Review*, 30(1), 31–62. <https://doi.org/10.1080/09638180.2019.1708428>

Gordillo Martínez, L. (2024). *The impact of the social media sentiment index on S&P 500 returns*. *The Anáhuac Journal*, 24(1), 1–20. <https://doi.org/10.36105/theanahuacjour.2024v24n1.08>

Hanaysha, J. R., & Alhyasat, K. M. K. (2025). *Leveraging technological innovation, social media, and green marketing for corporate reputation: The mediating role of business sustainability*. *Cogent Business & Management*, 12, 2518249. <https://doi.org/10.1080/23311975.2025.2518249>

Huynh, N., De Mello, L., & Li, K. (2025). *Evolution of investor sentiment: A systematic literature review and bibliometric analysis*. *International Review of Economics & Finance*, 100, 104115. <https://doi.org/10.1016/j.iref.2025.104115>

Inversini, A., & Derchi, G. B. (2024). *Corporate social responsibility on social media: A scoping review of the literature*. *Journal of Information, Communication and Ethics in Society*, 22(4), 434–452. <https://doi.org/10.1108/JICES-04-2023-0046>

Islam, T., et al. (2025). *Corporate environmental performance leading financial performance: Impacts of social media sentiment and corporate reputation*. *Business Strategy and the Environment*. <https://doi.org/10.1002/bse.4201>

Kwanjai, M., & Nettayanun, S. (2025). *Sentiment and tone analysis of corporate communication in different market conditions*. *Sage Open*, 15(3). <https://doi.org/10.1177/21582440251363860>

Kvasničková Stanislavská, L., Pilař, L., Vogli, X., Hlavsa, T., Kuralová, K., Feenstra, A., Pilařová, L., & Hartman, R. (2023). *Global analysis of Twitter communication in corporate social responsibility area: Sustainability, climate change, and waste management*. *PeerJ Computer Science*, 9, e1390. <https://doi.org/10.7717/peerj-cs.1390>

Lachana, I., & Schröder, D. (2025). *Investor sentiment and stock returns: Wisdom of crowds or power of words?* *Journal of Financial Markets*, 74, 100970. <https://doi.org/10.1016/j.finmar.2025.100970>

Leggerini, C., & Bannò, M. (2025). *Tweets to insights: Social opinion mining on corporate social responsibility*. Corporate Social Responsibility and Environmental Management. <https://doi.org/10.1002/csr.70016>

Lim, W. M. (2022). *Customer engagement and social media: Revisiting the past to inform the future*. Journal of Business Research, 148, 325–342. <https://doi.org/10.1016/j.jbusres.2022.04.068>

Manetti, G., & Bellucci, M. (2023). (already cited through Acuti et al., keep if needed separately — not provided as full source)

Memiş, E., Akarkamçı (Kaya), H., Yeniad, M., Rahebi, J., & Lopez-Gude, J. M. (2024). *Comparative study for sentiment analysis of financial tweets with deep learning methods*. Applied Sciences, 14(2), 588. <https://doi.org/10.3390/app14020588>

Meyer, K. E., & Tse, C. H. (2025). *Organizational legitimacy as a core concept for theorizing on business in emerging economies*. International Business Review, 34(4), 102447. <https://doi.org/10.1016/j.ibusrev.2025.102447>

Nazareth, N., & Reddy, Y. V. R. (2023). *Financial applications of machine learning: A literature review*. Expert Systems with Applications, 228, 119640. <https://doi.org/10.1016/j.eswa.2023.119640>

Nel, G. F., & du Toit, Y. (2023). *Stakeholders' engagement in 280 characters: Evidence from JSE-listed companies*. South African Journal of Economic and Management Sciences. (No DOI provided)

Nyakurukwa, K., & Seetharam, Y. (2024). *Sentimental showdown: News media vs. social media in stock markets*. Heliyon, 10(9), e30211. <https://doi.org/10.1016/j.heliyon.2024.e30211>

Pilgrim, K., & Bohnet-Joschko, S. (2022). *Corporate social responsibility on Twitter: A review of topics and digital communication strategies' success factors*. Sustainability, 14(24), 16769. <https://doi.org/10.3390/su142416769>

Rahmansyah, A., Mulyany, R., & Geumpana, T. A. (2023). *Using social media as a legitimization tool in sustainability reporting: Evidence from SOEs listed on the Indonesia Stock Exchange*. Jurnal Dinamika Akuntansi dan Bisnis, 10(2), 339–352. <https://doi.org/10.24815/jdab.v10i2.33905>

Shao, J., & He, Z. (2022). *How does social media drive corporate carbon disclosure? Evidence from China*. Frontiers in Ecology and Evolution, 10, 971077. <https://doi.org/10.3389/fevo.2022.971077>

Schwinges, A., & Lock, I. (2025). *Constructing corporate media legitimacy through the public interest: A framing analysis of Big Tech in the news*. Corporate Communications: An International Journal, 30(7), 156–171. <https://doi.org/10.1108/CCIJ-11-2024-0211>

Taherdoost, H., & Madanchian, M. (2023). *Artificial intelligence and sentiment analysis: A review in competitive research*. Computers, 12(2), 37. <https://doi.org/10.3390/computers12020037>

Zhang, H. (2025). *The impact of social media users' sentiment on financial markets*. SHS Web of Conferences, 225, 03005. <https://doi.org/10.1051/shsconf/202522503005>