South African Journal of Economic and Management Sciences
ISSN: (Online) 2222-3436, (Print) 1015-8812

Stakeholders' engagement in 280 characters: Evidence from JSE-listed companies

Authors:
George F. Nel[1]
Yadah du Toit[1]

Affiliations:
[1]School of Accountancy, Faculty of Economic and Management Sciences, University of Stellenbosch, Stellenbosch, South Africa

Corresponding author:
George Nel,
gfn@sun.ac.za

Dates:
Received: 10 Dec. 2022
Accepted: 18 Apr. 2023
Published: 24 Aug. 2023

How to cite this article:
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* 26(1), a4964. https://doi.org/10.4102/sajems.v26i1.4964

Background: Twitter is revolutionising the way in which companies engage with stakeholders. While prior research examining companies' use of Twitter focused on the capital market consequences thereof, empirical evidence on how companies use Twitter, still remains scant.

Aim: We aim to improve our understanding of the use of Twitter, specifically (1) whether companies use Twitter as a two-way stakeholders' engagement platform, and (2) whether companies change tweeting behaviour around result release dates.

Setting: The sample consists of 70 companies for which 73 018 tweets were downloaded from Twitonomy during the period 2017–2020.

Methods: The data were analysed using the mixed-model analysis of variances (ANOVAs) and generalised estimations equations. The agency, legitimacy, signalling and capital need theories were used to set expectations and interpret results.

Results: Although there was no significant increase in the overall number of tweets, most companies significantly improved their level of engagement from 2017 to 2020. This is especially true of larger companies, the more profitable companies and companies with increased future growth potential. Furthermore, companies tweet significantly more around result release dates. This is most pronounced in primary industries and companies reliant on capital markets.

Contribution: This is the first study that aimed to explore the two-way use of Twitter as a stakeholders' engagement platform, in the context of a developing country, including possible reasons why companies tweeting behaviour changes around result release dates. It is proposed that regulatory bodies should take note of possible risks, and that companies should be aware of what their peers are doing.

Keywords: stakeholders' engagement; social media; Twitter; tweet; annual results; interim results; two-way engagement.

Introduction

Almost 170 years after the Rothschilds became the richest family in the world by using pigeons to carry short and important messages, the world's richest man has obtained control of Twitter, the modern short-message bird, if you like. Several factors revolutionised the use of social media (SM), including Twitter, in company–stakeholders' engagements, with one early milestone being the 2013 expansion of the United States (US) Regulation Fair Disclosure to include SM channels (Best & Caylor 2019).

Social media (SM), defined as 'web-based applications and interactive platforms that facilitate the creation, discussion, modification and exchange of user-generated content' (Aichner & Jacob 2015:258) refers to an array of different and expanding platforms. Twitter is still relatively small in comparison with LinkedIn, YouTube and Facebook, but it has become one of the most important SM outlets used by companies (Jung et al. 2018) and shareholders (Husain, Jain & Varshney 2021). For example 69% of the United Kingdom (UK) FTSE 350-listed companies (Amin, Mohamed & Elragal 2020) and 93% of the US S&P 500-listed companies (Johnston 2022) have active Twitter accounts. Given the nature of SM, these statistics are ever changing, but in early 2023 Twitter remains one of the top ten SM platforms for corporate use (Munson 2022). Many have started to question Twitter's popularity after the tumultuous 2022 period when Elon Musk acquired Twitter, with prediction of a mass exit from users. For example, companies such as General Motors, Audi, Volkswagen, Pfizer and others stopped using Twitter during 2022 (Germain 2022), and it has also been reported that more than half of Twitter's top advertisers halted spending on the platform (Germain 2022). Despite this, Twitter remains popular as it is the fourth most visited site in the

world (Meltwater 2023). Twitter also saw a 2% increase in the number of daily active users since Musk's acquisition of the platform, with a 6.7% increase in time spent on Twitter (Kemp 2023). Twitter also still ranks first as the SM platform used to keep up to date with news and current events, with web traffic referrals in second place (Meltwater 2023).

Ample research examined and confirmed:

- the positive association between Twitter use by companies and liquidity and share price returns (Ganesh & Iyer 2021; Mhanna & Sun 2020; Tan & Tas 2021);
- the ability of Twitter sentiment to forecast liquidity and share price returns (Saleemi 2020); and
- the negative association between Twitter use, and both information asymmetry (Blankespoor, Miller & White 2014; Prokofieva 2015) and the cost of equity (Albarrak et al. 2020; Elnahass, Papaguannidis & Salama 2020).

We know, therefore, how Twitter affects certain variables, but have little understanding of how companies use Twitter, specifically around result release dates and as a stakeholders' engagement tool. Freeman (1984:46) defines stakeholders as 'any group or individual who is affected by or can affect the achievement of an organization's objectives'. So in addition to shareholders, stakeholders also include employees, customers, unions, legislators, service providers, communities, the media, and the environment. In South Africa, companies listed on the Johannesburg Stock Exchange (JSE) are recognised as leaders in stakeholder relationships and integrated reporting because of the well-known King reports. The King IV corporate governance framework specifically advocates a stakeholder-inclusive approach.

While empirical research has indicated the benefits of Twitter as a two-way interaction platform (Chahine & Malhotra 2018), research to date has shown that many companies shy away from the use of technology to engage in stakeholder dialogue (Capriotti, Zeler & Oliveira 2021; Hetze et al. 2019; Nel & Baard 2022; Yue et al. 2019). To investigate stakeholder dialogue, Capriotti et al. studied Facebook, Hetze et al. explored corporate websites, Nel and Baard looked at the email functionality, and Yue et al. researched CEOs' use of Twitter. With the aim of expanding the growing body of knowledge on the corporate use of Twitter, this study examined companies' use of Twitter as a two-way stakeholders' engagement platform (trends and determinants), as well as whether companies change tweeting behaviour around result release dates. This study, therefore, aimed to answer three research questions:

- Question 1: *Has the use of Twitter as a two-way stakeholders' engagement platform increased from 2017 to 2020?*
- Question 2: *What characteristics best explain companies' use of Twitter as a two-way stakeholders' engagement platform?*
- Question 3: *Do companies change their tweeting behaviour around result release dates, and if so, which companies?*

In order to measure stakeholders' engagement, the ratio between the number of tweets a company replied to on per calendar year and the total number of tweets made per company per calendar year were evaluated. For result release dates, both the annual and interim results release dates were examined. To assess companies' tweeting behaviour around result release date, the average daily tweets in a 10-day period (5 days prior to and 5 days after the results release date) was compared to the yearly average daily tweets. The yearly average daily tweets are calculated over 182 days prior to and 182 days after the results release date, excluding the tweets in the 10-day period (also refer to Table 3 in the Methodology section for a detailed discussion of all variables employed in this study).

The South African context also provides a unique opportunity where SM use and stakeholders' engagement are concerned. Firstly, more than 70% of the South African population are internet users that spend an average of more than 9 h online daily (Meltwater 2023). This ranks South Africa as the country who spends the most time online – around 50% more than the global average of daily online time. Of that time, more than a third is spent on SM, where half of South African SM users also indicated that they use SM for work-related activities (Meltwater 2023). Given this uptake of SM (including Twitter), coupled with the stakeholder-inclusive approach, advocated by King IV, and the potential benefits of SM for stakeholder communications, this study aims at contributing to these contexts in a number of ways. More specifically, the results of this study are important for stakeholders, companies, and regulators alike. For stakeholders, the outcome may inform them on whether or not to subscribe to companies' Twitter accounts, based on which companies in South Africa use Twitter and what they use it for. The findings may also assist companies in developing optimal strategies through benchmarking with their peers. Finally, we believe that the findings will offer regulators greater insight into issues relating to corporate use of SM and enhance their assessment of potential risks in the cost-benefit nexus of establishing best practices and standards to regulate companies' use of Twitter. Since financial disclosure on SM is not regulated in South Africa, one such risk could be that companies are tweeting about financial information before announcing it on SENS, which is a requirement in South Africa. In the US, Elon Musk tweeted about taking the company Tesla private in 2018 without following the necessary requirements for such disclosure in the US, causing the company's share price to increase by 11% (Bloomberg 2019). Another possible risk is the spreading of fake news on SM which can also affect share prices in the short term (Wang & Chiang 2019). Consequently, fake news can be used for short-term stock speculation. With the rapid increase in artificial intelligence products, the latest being ChatGPT, regulators must start assessing how to regulate companies' use of SM in order to address these risks.

Twitter as a social media stakeholders' engagement platform

From a theoretical stance, Nuseir and Quasim (2021) claim that legitimacy theory (Deegan 2006), signalling theory (Connelly et al. 2011) and capital need theory (Shehata 2014) best explain companies' use of a voluntary disclosure channel, such as Twitter, to communicate with stakeholders. Additionally,

Esterhuyse and Wingard (2016) advocates that agency theory (Jensen & Meckling, 1976) also provides rational for companies' engaging in any voluntary disclosures.

Legitimacy theory proposes that to gain legitimacy, companies need to operate within an unwritten social contract containing implicit and explicit expectations (Deegan 2006). Consequently, by engaging in activities contrary to society's expectation, companies may face losing their legitimacy status, and with that, access to critical resources (Haji 2013). Companies therefore undertake various strategies to either protect or restore their legitimacy (Suchman 1995). One such strategy could be to use Twitter to interact with stakeholders to positively influence society's perception of the company. Another could be to use Twitter to keep up with societal norms and technological changes, such as updating stakeholders continually throughout the day.

Furthermore, due to a separation in ownership, information asymmetry exists between management and stakeholders. Agency theory suggests that companies will try to decrease this asymmetry in order to decrease the associated agency costs. Likewise, signalling theory suggests that companies will take action in order to signal inside information, such as increased profitability, to stakeholders to try to shake up this asymmetry. One way then, for companies to decrease information asymmetry, is to engage with stakeholders via Twitter.

Finally, capital need theory asserts that voluntary disclosure, including the optimal use of Twitter to engage with stakeholders, will positively influence capital providers' views of companies and thereby decrease financing costs (Shehata 2014).

In the remainder of this section Twitter is positioned first in the SM realm by exploring the advantages and disadvantages thereof, followed by a brief discussion of related literature, and finally, variables are elaborated on that may explain variations in companies' use of Twitter.

Advantages and disadvantages of Twitter in company–stakeholders' engagements

Table 1 presents SM platforms in six categories, based on two characteristics: self-presentation or self-disclosure and social presence or media richness. Self-presentation refers to the desire by companies to control the impression stakeholders form of them by the self-disclosure of information, while social presence is influenced by the intimacy and immediacy of the medium. Intimacy ranges from mediated (e.g., telephone conversations) to interpersonal (e.g., face-to-face discussions), and extends immediacy from asynchronous to synchronous. Twitter, regarded as a microblog (Aichner & Jacob 2015), is depicted under Blogs.

TABLE 1: Classification of social media.

Self-presentation or self-disclosure	Social presence or media richness		
	Low	Medium	High
High	Blogs	Social networking sites (e.g., Facebook)	Virtual social worlds (e.g., Second Life)
Low	Collaborative projects (e.g., Wikipedia)	Content communities (e.g., YouTube)	Virtual game worlds (e.g., World of Warcraft)

Source: Kaplan, A.M. & Haenlein, M., 2010, 'Users of the world, unite! The challenges and opportunities of Social Media', *Business Horizons* 53(1), 59–68, https://doi.org/10.2308/accr-51906

One disadvantage of Twitter and a possible reason why companies do not adopt Twitter is the fear of losing control, given the retweet Twitter functionality. Cade (2018) reports results showing that the influence of negative news strongly depends on the number of retweets. Furthermore, negative sentiment is empirically linked to decreasing liquidity and share returns. Alternatively, Twitter can be used to manage negative news. Following an experiment that entailed a hypothetical company, best practice for companies in dealing with negative news is to address the issue directly or redirect investors to positive news (Cade 2018). The worst outcome would be to abstain from the conversation. Several studies have, however, concluded that companies are less likely to use Twitter when they have negative news (Johnston 2022; Jung et al. 2018; Xiong et al. 2019).

The use of Twitter has also been linked to earnings management (Ruangprapun 2022), and impression management using visuals to accentuate positive news (Nekrasov, Teoh & Wu 2021). Overall, Hong and Huang (2005) found that companies purposively participate in stakeholders' engagement to manage liquidity. Twitter therefore provides companies with the opportunity to actively manage earnings and impressions by emphasising positive news. Another possible advantage is the replies Twitter functionality which provides companies with access to two-way synchronous stakeholders' engagement.

Finally, two further disadvantages may be Twitter's limited character count and 'noise' from a shareholder perspective. Nuseir and Qasim (2021) argue that given the unique characteristics of different SM platforms, each is best suited for a specific use by companies. They claim that Twitter is best fit for the fast sharing of up-to-date information, and for directing followers to other platforms. The 280-character count may therefore not really matter to companies, given their use thereof. In support, a report published by Twitter indicated that only 5% of tweets are longer than 190 characters, following the allowed increase from 140 to 280 characters in November 2017 (Perez 2018). It is noteworthy that the results of the current study reported no significant increase in the number of tweets made by companies between 2017 and 2018.

Turning to possible Twitter 'noise', Zhou et al. (2015) reported that only 3.45% of tweets made by US companies are related to corporate disclosures. This points towards substantial 'noise' for users concerned with related investment decision information only. Using UK data, Amin et al. (2020) categorised company tweets in 12 categories in which financial disclosures and corporate sustainability disclosures represented only 7% and 8.8% of the total tweets respectively.

Despite this possible 'noise', the widespread use of Twitter indicates its usefulness in decision-making scenarios that range from share selection to product sales prediction, crime prevention, epidemic tracking, COVID-19 and traffic monitoring (Zhang et al. 2022).

The Twitter body of knowledge

Although some studies investigated a 'package' of four or more SM platforms (Aichner & Jacob 2015; Husain et al. 2021; Khlifi 2021; Rautianen & Jokinen 2022), the majority investigated only a single SM platform, with Twitter being the most popular.

Empirical research that examined the use of Twitter can be categorised as descriptive, determinant or effect studies. Although there is no shortage in variety of research designs such as event studies (Boylan & Boylan 2017; Chahine & Malhotra 2018; Dinh, Kopf & Seitz 2017), true and quasi-experimental studies (Cade 2018; Kelton & Pennington 2020; Rakowski, Shirley & Stark 2019; Snow 2015), surveys (Husain et al. 2021) and systematic literature reviews (Nuseir & Qasim 2021; Zhang et al. 2022), the majority of studies in this domain depended on quantitative research methods such as multivariate regressions using archival data.

Furthermore, these studies can be categorised according to the proxy used to measure Twitter. A substantial number of studies measured Twitter use by assigning a binary variable if companies had adopted Twitter (Balasubramanian, Fang & Yang 2021; Boylan & Boylan 2017; Ghardallou 2021; Jung et al. 2018; Khlifi 2021), while others used a combination of the number of tweets, replies, likes and followers (Ganesh & Iyer 2021; Mhanna & Sun 2020; Ruangprapun 2022). A few studies measured the sentiment of company tweets (Hamraoui & Boubaker 2022; Nyakurukwa & Seetharam 2022), whereas others went even further and categorised the tweets using automated methods such as supervised or unsupervised machine learning and advanced textual analysis techniques (Albarrak et al. 2020; Araujo & Kollat 2018; Majumdar & Bose 2019; Nekrasov et al. 2021).

For several possible reasons (e.g., the availability of data), most published studies to date used data from developed countries for example US, UK, Australia and Europe (Lombardi & Secundo 2020). Furthermore, Twitter adoption (by investors and companies) in developing countries is often lower compared to developed countries. In Poland only 64% of financial market professionals use SM, with 50% of them using SM only once a month or less frequently (Cwynar et al. 2019). In Thailand, only 24 out of 50 SET50 companies had a Twitter account in 2019 (Ruangprapun 2022). Looking at South Africa, the results of a survey completed by 48 C-suite respondents ranked Facebook and Twitter as respectively the lowest and second lowest out of 20 tasks or tools available to investor relation professionals (Nel & Van der Spuy 2021). The results of current studies may therefore not translate to developing countries, creating a gap in the body of knowledge.

Possible explanatory variables in explaining variations between companies

Although empirical research on the determinants of companies' use of Twitter appears to be scant, with the exception of Amin et al. (2020) and Ruangprapun (2022), a substantial body of empirical evidence is available on the determinants of companies' use of corporate websites (Mokhtar 2017). Drawing from these studies, the following six variables were examined in the current study as variables that could explain companies' use of Twitter: size, future growth opportunity, profitability, dependency on capital markets, industry membership and shareholder dispersion.

Size, measured as market capitalisation, is the variable most often used in the literature to explain variations in disclosure levels. Larger companies are more visible with presumably higher reputational risk, and they have more resources, creating an expectation for them not only to tweet more frequently, but also to have increased two-way stakeholders' engagement.

Companies with future growth opportunities and intangibles, proxied by market-to-book ratio, are expected to increase stakeholders' engagement in order to decrease information asymmetries regarding these opportunities and intangibles (Ohlson 2005; Orens, Aerts & Cormier 2010). It is therefore likely that these companies will use Twitter as a two-way stakeholders's engagement platform.

Signalling theory and capital need theory explain why profitable companies and companies that are more dependent on capital markets are anticipated to tweet more often. Profitable companies, measured as return on equity, may have an added incentive to increase tweets and engagement with stakeholders to distinguish themselves from less profitable companies in 'spreading the news'. Likewise, companies more reliant on capital markets experience higher pressure to engage with stakeholders (Cormier, Ledoux & Magnan 2009). As in Nel, Smit and Brummer (2017), we used a categorical variable for companies that have issued shares in the preceding 12-month period as proxy for capital market reliance.

While some industries, such as consumer industries, may be more accustomed to increased disclosure and stakeholders' engagements (De Vries, Erasmus & Gerber 2017), others, such as basic materials and industrials, could have increased pressure to increase tweets and stakeholders' engagement to legitimise their operation. The current study grouped the industries into two categories, consumer industries and primary industries.

Finally, a more dispersed shareholder base may result in higher agency costs and information asymmetry. Both of these are factors that may motivate companies to develop their Twitter presence and engagement. Following Celik, Ecer and Karabacak (2006), our proxy for shareholder dispersion was free float.

Methodology

In terms of research methodology, this study relied on a positivist research philosophy, with a deductive approach – using archival longitudinal secondary data collected over four years. This section discusses the compilation of the study sample, followed by a brief overview of the data sources used to collect the required data. Finally, research methods are discussed in turn for each of the three research questions.

Sample

The population was defined as all companies listed (and not suspended) on the JSE as on 01 January 2017. To ensure data availability to answer the research questions, 229 companies were excluded for several reasons (summarised in Table 2), with the main reason being that 114 of the 299 companies were found to have no active Twitter account (i.e., 38%), resulting in a final study sample of 70 companies. This compares favourably with the 53% of Saudi Arabian (Ghardallou 2021), 52% of Thailand (Ruangprapun 2022), and 31% of UK-listed companies (Amin et al. 2020) that were reported to not have an active Twitter account, but unfavourably with only 7% of US S&P companies found to not have an active Twitter account (Johnston 2022).

TABLE 2: Study sample.

Variable	*n*
All companies listed on the JSE on 01 January 2017	299
Companies not listed on the JSE for all four years (2017–2020)	5
Companies with no active Twitter account	114
Companies that did not have a central company Twitter account	26
Companies with protected Twitter accounts (only accessible to employees)	1
Companies who do not have at least one tweet in all four years	61
Companies with missing data points	22
Final sample	**70**

JSE, Johannesburg Stock Exchange.

Data sources, variables used and statistical analysis

Twitonomy, a database extending beyond the tweets currently accessible via Twitter's Application Programming Interface, was used to obtain company-initiated tweets and replies for 2017–2020. This time period includes one COVID-19 year (2020) which could possibly skew the results. For robustness, the 2020-year was removed and similar results were obtained. To limit the possible effect that a further COVID-19 year could have on the data, the 2021-year was not included. Furthermore, given the unpredictable 2022 when Musk acquired Twitter, this year was also excluded. All other variables used in this study were captured from either IRESS or obtained directly from the JSE. Table 3 provides a brief description of each variable used in this study, as well as which research question(s) each was used for. All variables were measured daily, except for the following variables that were measured on an annual basis for practical reasons; Market-to-book (MTB), Return on equity (ROE), Free float (F.FLT), Engagement (ENG) 2, Industry membership., johannesburg stock exchange (IND.JSE.).

Various mixed-model analysis of variance (ANOVA) models were used to address the research questions. In all mixed-model ANOVAs, the companies were entered into the model as random effect. The statistical analysis is discussed in more detail in the remainder of the section.

Research question one: Twitter as a two-way stakeholders' engagement platform

To ascertain whether the use of Twitter as a two-way stakeholders' engagement tool increased from 2017 to 2020, the various years were entered as fixed effects, while NO. TWEETS and ENG 1 were employed as dependent variables. Following Chahine and Malhotra (2018), ENG 2 dichotomised ENG 1 to distinguish between companies that engage with stakeholders and those that do not. Since ENG 2 is a categorical

TABLE 3: Variables used to answer the research questions.

Acronym	Variable	Description	Research question(s) used
Continuous variables			
NO. TWEETS	Number of tweets	Sum of the total number of tweets made per company per calendar year	Question 1
ENG 1	Engagement	Ratio between the number of tweets a company replied to per calendar year, and the total number of tweets made per company per calendar year	Questions 1 and 2
FYE Results	Annual result release tweets	Average daily tweets in a 10-day period – 5 days prior to and 5 days after the annual results release date	Question 3
FI Results	Interim result release tweets	Average daily tweets in a 10-day period – 5 days prior to and 5 days after the interim results release date	Question 3
FYE Year	Average daily tweets	Average daily tweets, 182 days prior to and 182 days after the annual results release date, excluding the tweets in the 10-day period (FYE Results)	Question 3
FI Year	Average daily tweets	Average daily tweets, 182 days prior to and 182 days after the interim results release date, excluding the tweets in the 10-day period (FI Results)	Question 3
SIZE	Market capitalisation	Natural logarithm of the average daily market capitalisation of all trading days	Questions 2 and 3
MTB	Future growth opportunity	Ratio between the market value and the book value of equity	Question 2
ROE	Profitability	Ratio between profit to ordinary shareholders' interest	Questions 2 and 3
F.FLT	Share dispersion	Ratio between the total issued shares minus restricted shares to the total issued shares	Question 2
Categorical variables			
ENG 2	Engagement	Dummy variable representing one if the company replied to at least one tweet in a calendar year	Questions 1 and 2
NET.ISS	Dependency on capital markets	Dummy variable representing one if the company has issued shares in the preceding 12-month period	Questions 2 and 3
IND.JSE	Industry membership	Dummy variable representing one if the company is a member of one of the five consumer industries (financials, healthcare, telecommunications, consumer goods and consumer services)	Questions 2 and 3

NO. TWEETS, Number of tweets; ENG 1, Engagement 1; FYE, Financial year-end; FI, Financial interim; MTB, Market-to-book; ROE, Return on equity, F.FLT, Free float, NET.ISS, New shares issued; IND.JSE, Industry membership Johannesburg Stock Exchange.

variable, a generalised estimating equation (GEE) was used to examine whether the use of Twitter as a two-way stakeholders' engagement tool increased from 2017 to 2020. In all cases, Fisher's least significant difference (LSD) was used for post-hoc testing.

Research question two: Determinants of companies that use Twitter as a two-way stakeholders' engagement platform

To answer this research question, six company characteristics, namely size (SIZE), future growth opportunity (MTB), profitability (ROE), dependency on capital markets (NET. ISS), industry membership (IND.ISS) and share dispersion (F.FLT) where entered as fixed effects. These characteristics were regressed on ENG 1 in a mixed-model ANOVA and ENG 2 in a GEE model. In both regression models we have only analysed the contemporaneous association between the independent and dependent variables.

Research question three: Tweeting behaviour around result release dates

To examine whether companies tweet more around result release dates, a period fixed effect was entered into the mixed-model ANOVA. The period fixed-effect tests whether there is a significant difference between Financial year-end (FYE) Results and FYE Year in respect of the release of annual results, and between financial interim (FI) Results and FI Year in respect of the release of interim results. Refer to Table 3 for a brief description on how these variables were calculated.

Following this, SIZE, ROE, NET.ISS and IND.JSE were entered as fixed effects into mixed-model ANOVA's in order to determine which companies, if any, increase their tweets around result release dates.

Ethical considerations

Ethical clearance to conduct this study was obtained from the Stellenbosch University Social Behavioural and Education Research. (No. 23572).

Results

Selected descriptive statistics

The descriptive statistics are set out in Table 4. For one variable, SIZE, the natural logarithm was used to reduce the skewness in distribution. Descriptive statistics for SIZE are presented prior to the natural logarithmic transformation, which was used in all further analysis. Appendix 1 shows relevant correlation coefficients for 2017–2020.

While some companies made only one tweet in an entire year and had not responded to a single stakeholder tweet, other companies tweeted daily and were extremely active in replying to stakeholder tweets. As nearly 50% (ENG 2, not tabulated) of companies had not replied to at least one stakeholder tweet, our results suggest that companies may have a low interest in using Twitter to engage with stakeholders. Similar results were reported for companies' use of Facebook (Capriotti et al. 2021) and CEOs' use of Twitter (Yue et al. 2019).

TABLE 4: Selected descriptive statistics.

Variables	2017	2018	2019	2020
Number of Tweets (NO. TWEETS)				
Total number of tweets	17 784	19 866	17 433	17 935
Minimum	5	4	1	1
Maximum	1160	1218	911	1009
Average	254.06	283.80	249.04	256.21
Median	160	198	175	137.50
Engagement (ENG 1) (%)				
Minimum	0	0	0	0
Maximum	0.72	0.84	0.89	0.93
Average	0.09	0.14	0.16	0.19
Median	0.03	0.04	0.05	0.11
Market capitalisation (SIZE) (ZAR million)				
Minimum	90	44	32	31
Maximum	2 574 609	2 139 622	2 087 583	1 590 722
Average	117 783	112 852	104 980	94 285
Median	10 406	9765	9123	7067
Profitability (ROE) (%)				
Minimum	-63.64	-62.77	-280.53	-128.38
Maximum	214.91	50.85	42.35	38.73
Average	13.14	6.98	0.35	-4.62
Median	11.30	10.20	9.02	2.31

ROE, Return on equity.

Furthermore, Table 4 provides evidence of the cross-sectional variation in both SIZE and ROE. Although not tabulated, similar variation was evident in MTB and F.FLT. Just over 50% of the companies included in the study sample had issued at least one new share in at least one of the years examined. Regarding industry membership, 44 companies were categorised as consumer industries and 26 as primary industries.

It is noteworthy from Appendix 1 that positive and significant correlation coefficients exist between NO. TWEETS and our proxy for stakeholders' engagement, ENG 1 and ENG 2, in all years. Additionally, NO. TWEETS, ENG 1 and ENG 2 are positively and significantly correlated with SIZE and MTB in all years, and with ROE in all years, except 2017.

Research question one: Twitter as a two-way stakeholders' engagement platform

Table 5 Section A reports the results from the mixed-model ANOVAs used to examine the use of Twitter. As is evident from Table 5 Section A, NO. TWEETS had not increased significantly from 2017 to 2020. This was confirmed by the results of a Fisher LSD post-hoc test (not reported), which showed no statistically significant difference between any of the years.

Although the total number of tweets had not increased over the study period, both variables used to measure stakeholders' engagement increased significantly from 2017 to 2020: ENG 1 at the 1% level (Table 5 Section A) and ENG 2 at the 10% level (Table 5 Section C). The results of a Fisher LSD post-hoc test, reported in Table 5 Section B, shows that, while ENG 1 did not increase significantly year-on-year from 2018 to 2020, it

TABLE 5: Results for Twitter as a two-way stakeholders' engagement platform (N = 70).

Variables	Panel A NO. TWEETS		Panel B ENG1		2017	2018	2019	2020	*Wald*	*p-value*
	F	*p*-value	*F*	*p*-value						
Section A: Mixed model ANOVA results	0.91	0.44	4.13	< 0.01***	-	-	-	-	-	-
Section B: Fisher LSD post-hoc test for ENG1										
2017	-	-	-	-	-	0.02**	< 0.01***	< 0.01***	-	-
2018	-	-	-	-	0.02**	-	0.36	0.04**	-	-
2019	-	-	-	-	< 0.01***	0.36	-	0.16	-	-
2020	-	-	-	-	< 0.01***	0.04**	0.16	-	-	-
Section C: GEE model effects using ENG2 to examine the use of Twitter	-	-	-	-	-	-	-	-	6.34	0.10*

ANOVA, analysis of variance; LSD, least significant difference; GEE, generalised estimating equation.
***, significant at the 1% level; **, significant at the 5% level and *, significant at the 10% level.

did increase significantly from 2017 to 2018 and the cumulative increase over two or more years between 2017 and 2020 is also significant.

Even though 29 out of 70 companies had not replied to a single stakeholder tweet in 2020, companies appear to have used Twitter increasingly to legitimise stakeholder relationships. More specifically, as depicted in Table 4, the average of ENG 1 increased from 0.09 in 2017 to 0.19 in 2020. Russo et al. (2022) report results that suggests that the mere existence of a Twitter account, as opposed to the actual communication activity thereon, could potentially play a superior role in maintaining stakeholder relationships.

Research question two: Determinants of companies who use Twitter as a two-way stakeholders' engagement platform

Table 6 shows the results of the two models that regressed the independent variables mentioned earlier on both ENG 1 (Panel A) and ENG 2 (Panel B). As previously discussed, a mixed-model ANOVA was used for the continuous variable, ENG 1, and a GEE model for the dichotomous variable, ENG 2. The unavailability of F.FLT for some company observations explains the decrease in company observations from 280 used in research question one to the 260 as depicted by Table 6.

Overall, also considering the robustness tests discussed below, SIZE, MTB, and ROE appear to be the variables that best explain variations in companies' use of Twitter for two-way stakeholders' engagement. More specifically, larger companies (SIZE), companies with more future growth opportunities (MTB), and more profitable companies (ROE), exert more effort to engage with their stakeholders. The agency theory may explain the positive associations with SIZE and MTB, and signalling theory with ROE. Similar results were reported by Hoffmann and Aeschlimann (2017), Amin et al. (2020) and Ruangprapun (2022) for size, by Ruangprapun (2022) for market-to-book ratio, and by Amin et al. (2020) for profitability.

Additional tests

To test the robustness of the results reported in Table 6, three additional regressions (not tabulated) were performed for

TABLE 6: Regression results for determinants of companies that use Twitter as a two-way engagement platform (N = 260).

Variables	Panel A ANOVA ENG1		Panel B GEE ENG2	
	Value	*p*-value	Value	*p*-value
(Intercept)	-0.4496	-0.03**	-6.54	< 0.01***
Year | 2018	0.0437	-0.05**	0.18	0.48
Year | 2019	0.0829	< 0.01***	0.56	0.12
Year | 2020	0.1220	< 0.01***	1.04	< 0.01***
NET.ISS	-0.0012	-0.96	0.09	0.75
IND.JSE	0.0357	-0.39	0.47	0.29
SIZE	0.0205	-0.02**	0.22	0.02**
MTB	0.0185	-0.05**	0.32	0.05**
ROE	0.0004	-0.19	0.01	0.05**
F.FLT	0.0126	-0.84	0.08	0.90
Conditional R^2	0.4900	-	-	-

ANOVA, analysis of variance; GEE, generalized estimating equation; ENG 1, Engagement 1; ENG 2, Engagement 2; NET.ISS, New shares issued; IND.JSE, Industry membership Johannesburg Stock Exchange; MTB, Market-to-book; ROE, Return on equity; F.FLT, Free float.
***, significant at the 1% level; **, significant at the 5% level and *, significant at the 10% level.

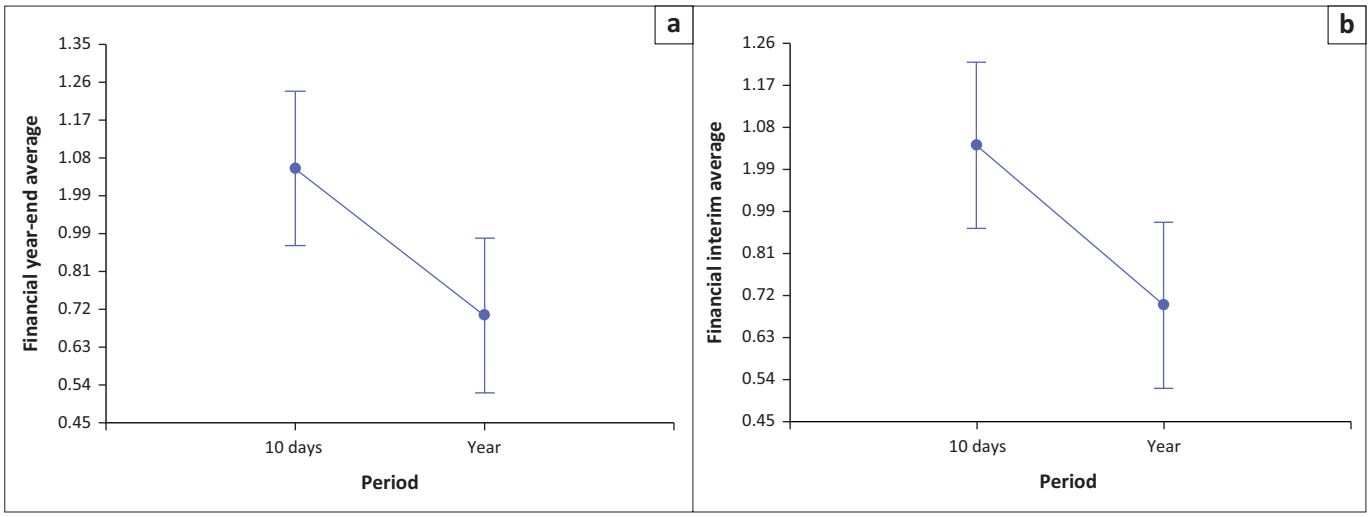
ENG 1 and ENG 2. In the first thereof, the two regressions mentioned, were repeated but excluding 2017, due to the increase in character count allowed in November 2017. While the results did not change significantly for ENG 1 (except SIZE which was now significant at the 10% level only), MTB was no longer statistically significant at the 10% level for ENG 2, and ROE was only significant at the 10% level.

Next, 2020 was removed to control for the potential skewing of results given the impact of the COVID-19 pandemic. In explaining ENG 1, both SIZE and MTB remained significant at the 5% level, while only MTB remained significant at the 10% level for ENG 2.

Finally, both 2017 and 2020 were removed, and the regressions therefore repeated only for 2018 and 2019. Regarding ENG 1, SIZE was no longer found significant, but MTB and ROE were significant at the 1% and 10% levels, respectively. Somewhat similar, SIZE was also no longer significant in explaining ENG 2, while both MTB and ROE remained significant at the 10% and 5% levels respectively.

Research question three: Twitter behaviour around results release dates

Both Figure 1a and 1b depict statistically significant differences at the 1% level between the average daily tweets around



Note: Vertical bars denote 0.95 confidence intervals.

FIGURE 1: (a) Average daily tweets 10 days around the financial year-end result release dates (FYE Results) and average daily tweets for the year (FYE Year). (b) Average daily tweets 10 days around the financial interim result release dates (FI Results) and average daily tweets for the year (FI Year).

TABLE 7: Mixed model analysis of variance results for Tweeting behaviour around result release dates (N = 70).

Variables	Panel A Financial year-end results release dates		Panel B Financial interim results release dates	
	F	*p*-value	*F*	*p*-value
Year	1.53	0.20	0.31	0.82
Period	23.85	< 0.01***	22.75	< 0.01***
Year x Period	0.91	0.43	0.41	0.74

***, significant at the 1% level; **, significant at the 5% level and *, significant at the 10% level.

results release dates in comparison with the average daily tweets for the rest of the year.

In support of the results shown in Figure 1a and 1b, the results of the two mixed-model ANOVAs reported in Table 7 for the period fixed effect (PERIOD) show a statistically significant difference at the 1% level between results release date tweets and tweets during the rest of the year for both annual and interim results release dates. Although no similar evidence is available for the use of Twitter around results release dates, these results support evidence provided by Hasan and Cready (2019) that shows an increase in Facebook activity around earnings announcements.

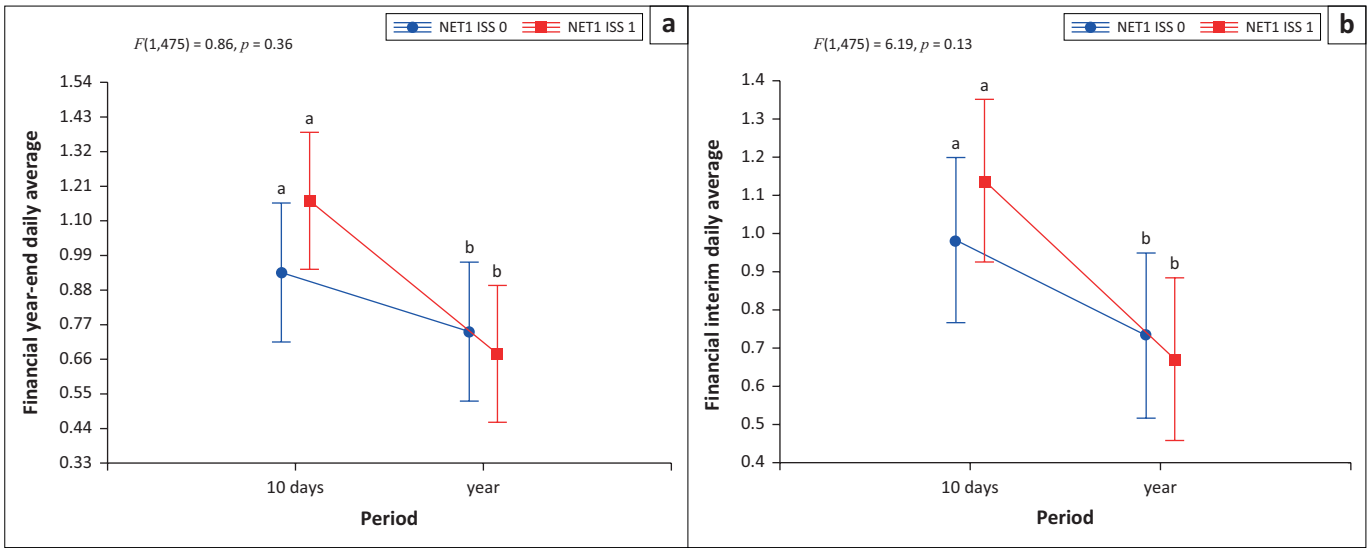
Interestingly, but not surprising, given the results reported in Table 5 Section A, no statistically significant difference was found for the year fixed effects (YEAR) in both Panels A and B in Table 7. This implies that the average daily number of tweets made by companies did not increase significantly over time. Finally, Table 7 shows that the interaction variable (YEAR x PERIOD) was not statistically significant for both tweets related to the annual (Panel A) and interim (Panel B) results release dates. This means that although companies tweeted significantly more around results release dates compared to the rest of the year, the ratio between the average daily tweets around results release dates to the rest of the year did not change significantly over the -year study period. The statistical difference between the average daily tweets around results release dates in comparison with the rest of the year is therefore not dependent on the year.

Additional tests

As shown in Figure 2a and 1b, tweet volume increased significantly around result release dates, irrespective of whether new shares were issued (NET.ISS = 1) or not (NET. ISS = 0), for both annual and interim result release dates. In respect of annual result release dates (Figure 2a), companies that issued shares during the year reported statistically significant more tweets at the 10% level in comparison with companies that had not issued new shares during the year. In Figure 2b, the same pattern, although not statistically significant, is shown for interim result release dates. These results provide support for the capital need theory where companies that are more reliant on capital markets exert more effort in engaging with stakeholders.

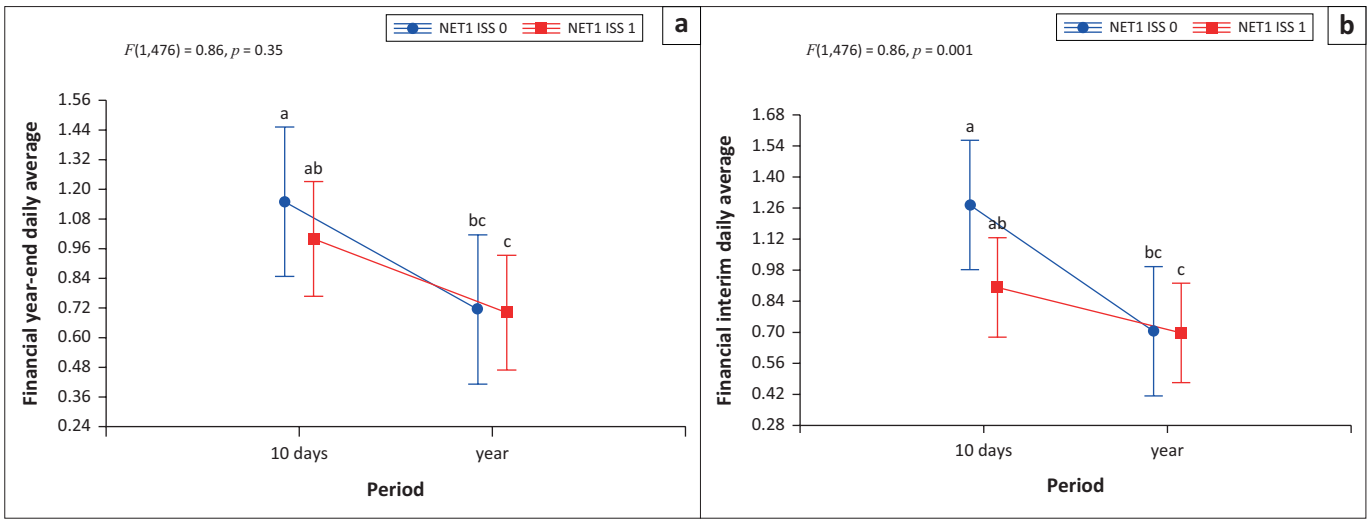
Similar to the mentioned results, all companies had higher tweet volumes around result release dates, irrespective of industry membership, with consumer industries depicted by IND.JSE = 1 and primary industries by IND.JSE = 0. Figure 3b shows a statistically significant higher tweet volume at the 5% level in the 10-day period for companies that are members of the primary industries groups. Although it was expected that consumer industry companies would tweet more, the increased tweets by primary industry companies may be explained by pressure to legitimise their results as a result of environmental and social concerns.

While larger and more profitable companies tweeted significantly more than their smaller counterparts based on the correlation coefficients reported in Appendix 1, no similar evidence was found to corroborate that these companies change their tweeting behaviour around result release dates. This therefore suggests that JSE-listed companies do not



Note: Vertical bars denote 0.95 confidence intervals.

FIGURE 2: (a) Average daily tweets 10 days around the financial year-end result release dates (FYE Results) and average daily tweets for the year (FYE Year) – issue of shares. (b) Average daily tweets 10 days around the financial interim result release dates (FI Results) and average daily tweets for the year (FI Year) – issue of shares.



Note: Vertical bars denote 0.95 confidence intervals.

FIGURE 3: (a) Average daily tweets 10 days around the financial year-end result release dates (FYE Results) and average daily tweets for the year (FYE Year) – Industry membership. (b) Average daily tweets 10 days around the financial interim result release dates (FI Results) and average daily tweets for the year (FI Year) – Industry membership.

appear to use Twitter to only accentuate good news, which validates their use thereof.

Conclusion

Social media is revolutionising the way in which companies share information with stakeholders. While there are various SM channels, this study chose to focus on Twitter. Prior research examining Twitter focused on the capital market consequences of companies' use of Twitter; however, empirical evidence of companies' use of Twitter as a stakeholders' engagement tool, as well as their use thereof around result release dates, appears to be scant. The extant literature further predominantly reports data from developed countries.

Against this backdrop, the study employed data from JSE-listed companies to explore how companies use Twitter to engage with their stakeholders, and whether companies' tweeting behaviour changes around result release dates.

The findings that emerged from the study can inform:

- stakeholders on whether to subscribe to company Twitter accounts,
- companies of what their peers are doing and;
- regulators about possible risks which need managing, such as financial disclosure on SM and the sharing of fake news on SM to manipulate share prices.

The results suggest that, specifically for smaller and less profitable companies, stakeholders should not expect companies to engage with them in two-way communication via Twitter. Nevertheless, JSE-listed companies were found to have progressed significantly in using Twitter as a means of

engaging with stakeholders over the four years considered for the study. Larger companies and companies with higher future growth prospects (and intangibles) are therefore starting to conform to the added pressure caused by higher agency costs and information asymmetry over the years. Even though the signalling theory explains why more profitable companies have increased engagement with stakeholders via Twitter, they (more profitable companies) do not appear to change their Twitter behaviour around result release dates.

The results further show that, in general, companies tend to be significantly more active on Twitter around result release dates. This is even more prevalent in companies that are reliant on capital markets, in line with the capital need theory. Additionally, companies that have added pressure to legitimise their results due to possible environmental and social concerns also show an above-average increase in tweets around result release dates.

Possible limitations that warrant future research are the inclusion of only one COVID affect year, not including the period in which Musk acquired Twitter, not categorising company tweets based on the content thereof, not analysing lagged and lead associations, and finally, not considering empirical evidence that companies use different SM platforms purposively and distinctly.

Acknowledgements

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

G.F.N. and Y.D.T. were equally involved in all parts of the research.

Funding information

This research received no specific grant from any funding agency in public, commercial or not-for-profit sectors.

Data availability

The data that support the findings of this study are available from the corresponding author, G.F.N. upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

References

Aichner, T. & Jacob, F., 2015, 'Measuring the degree of corporate social media use', *International Journal of Market Research* 57(2), 257–275, https://doi.org/10.2501/IJMR-2015-018

Albarrak, M.S., Elnahass, M., Papaguannidis, S. & Salama, A., 2020, 'The effect of twitter dissemination on cost of equity: A big data approach', *International Journal of Information Management*, 50, 1–16, https://doi.org/10.1016/j.ijinfomgt.2019.04.014

Amin, M.H., Mohamed, E.K.A. & Elragal, A., 2020, 'Corporate disclosure via social media: A data science approach', *Online Information Review* 44(1), 278–298, https://doi.org/10.1108/OIR-03-2019-0084

Araujo, T. & Kollat, J., 2018, 'Communicating effectively about CSR on Twitter', *Internet Research* 28(2), 419–431, https://doi.org/10.1108/IntR-04-2017-0172

Balasubramanian, S.K., Fang, Y., & Yang, Z., 2021, 'Twitter presence and experience improve corporate social responsibility outcomes', *Journal of Business Ethics* 173(4), 737–757. https://doi.org/10.1007/s10551-020-04537-x

Best, E. & Caylor, M.L., 2019, 'Risks and rewards of financial disclosure on Twitter', *The CPA Journal* 89(6), 42–47.

Blankespoor, E., Miller, G. & White, H.D., 2014, 'The role of dissemination in market liquidity: Evidence from firms' use of Twitter', *The Accounting Review* 89(1), 79–112, https://doi.org/10.2308/accr-50576

Bloomberg, 2019, *Tesla stock drops, wiping out Elon Musk's Twitter-fueled 'going private' rally*, viewed 12 April 2023, from https://fortune.com/2018/08/09/tesla-stock-drop-musk-twitter-private-sec/.

Boylan, D.H. & Boylan, C.L., 2017, 'Technology in accounting: Social Media as effective platform for financial disclosures', *The International Journal of Digital Accounting Research* 17, 93–109. https://doi.org/10.4192/1577-8517-v17_4

Cade, N.L., 2018, 'Corporate social media: How two-way disclosure channels influence', *Accounting, Organizations and Society* 68, 63–79, https://doi.org/10.1016/j.aos.2018.03.004

Capriotti, P., Zeler, I. & Oliveira, A., 2021, 'Assessing dialogic features of corporate pages on Facebook in Latin American companies', *Corporate Communications: An International Journal* 26(5), 16–30. https://doi.org/10.1016/j.aos.2018.03.004

Celik, O., Ecer, A. & Karabacak, H., 2006, 'Impact of firm specific characteristics on the Web based business reporting: Evidence from the companies listed in Turkey', *Problems and Perspectives in Management* 4(3), 100–133.

Chahine, S. & Malhotra, N.K., 2018, 'Impact of social media strategies on stock price: the case of Twitter', *European Journal of Marketing* 52(7), 1526–1549. https://doi.org/10.1108/EJM-10-2017-0718

Connelly, B.L., Certo, S.T., Ireland, R.D. & Reutzel, C.R., 2011, 'Signaling theory: A review and assessment', *Journal of Management* 37(1), 39–67, https://doi.org/10.1177/0149206310388419

Cormier, D., Ledoux, M. & Magnan, M., 2009, 'The use of web sites as a disclosure platform for corporate performance', *International Journal of Accounting Information Systems* 10(1), 1–24, https://doi.org/10.1016/j.accinf.2008.04.002

Cwynar, A., Cwynar, W., Pater, R. & Filipek, K., 2019, 'Social media as an information source in finance: Evidence from the community of financial market professionals in Poland', *The International Journal of Digital Accounting Research* 19(1), 29–58, https://doi.org/10.4192/1577-8517-v19_2

Deegan, C., 2006, 'Legitimacy theory', in Z. Hoque (ed.), *Methodological issues in accounting research: Theories and methods*, pp. 161–181, Spiramus Press Limited, London.

De Vries, A., Erasmus, P.D. & Gerber, C., 2017, 'The familiar versus the unfamiliar: Familiarity bias amongst individual investors', *Acta Commercii* 17(1), 1–10, https://doi.org/10.4192/1577-8517-v19_2

Dinh, T., Kopf, K. & Seitz, B., 2017, 'The power of social media – Shareholder activism via Twitter and a firm's market value', *Swiss Journal of Business Research and Practice* 71, 50–73, https://doi.org/10.5771/0042-059X-2017-1-50

Esterhuyse, L. & Wingard, C., 2016, 'An exploration of the online investor relations (IR) practices of companies listed on the Johannesburg Stock Exchange (JSE)', *South African Journal of Economic and Management Sciences* 19(2), 215–231, https://doi.org/10.4102/sajems.v19i2.1261

Freeman, R.E., 1984, *Strategic management: A stakeholder approach*, Pittman, Boston, MA.

Ganesh, A. & Iyer, S., 2021, 'Impact of firm-initiated tweets on stock return and trading volume', *Journal of Behavioral Finance* 24(2), 171–182, https://doi.org/10.1080/15427560.2021.1949717

Germain, T., 2022, *General motors, Pfizer, United Airlines: Here are all the big advertisers that have left Twitter since Elon took over*, viewed 12 April 2023, from https://gizmodo.com/elon-musk-twitter-list-of-advertisers-leaving-1849751644.

Ghardallou, W., 2021, 'The impact of firms' and CEOs' social media usage on corporate performance', *Investment Management and Financial Innovations* 18(4), 21–35. https://doi.org/10.21511/imfi.18(4).2021.03

Haji, A.A., 2013, 'Corporate social responsibility disclosures over time: Evidence from Malaysia', *Managerial Auditing Journal* 28(7), 647–676, https://doi.org/10.1108/MAJ-07-2012-0729

Hamraoui, I. & Boubaker, A., 2022, 'Impact of Twitter sentiment on stock price returns', *Social Network Analysis and Mining* 12, 28, https://doi.org/10.1007/s13278-021-00856-7

Hasan, R. & Cready, W.M., 2019, 'Facebook posting activity and the selective amplification of earnings disclosures', *China Journal of Accounting Research* 12(1), 135–155, https://doi.org/10.1016/j.cjar.2019.02.001

Hetze, K., Bögel, P.M., Emde, A., Bekmeier-Feuerhahn, S. & Glock, Y., 2019, 'Online stakeholder dialogue: *quo vadis?* – An empirical analysis in German-speaking countries', *Corporate Communications: An International Journal* 24(2), 248–268. https://doi.org/10.1108/CCIJ-01-2018-0012

Hoffmann, C.P. & Aeschlimann, L., 2017, 'Shielding or engaging: The use of online shareholder platforms in investor relations', *Corporate Communications: An International Journal* 22(1), 133–148, https://doi.org/10.1108/CCIJ-05-2016-0037

Hong, H. & Huang, M., 2005, 'Talking up liquidity: Insider trading and investor relations', *Journal of Financial Intermediation* 14(1), 1–31, https://doi.org/10.1016/j.jfi.2003.08.004

Husain, A., Jain, R. & Varshney, T., 2021, 'Ranking investor's perception towards social media technologies in financial decisions', *Shodh Sanchar* 11(41), 118–124.

Jensen, M.C. & Meckling, W.H., 1976, 'Theory of the firm: Managerial behavior, agency costs and ownership structure', *Journal of Financial Economics* 3(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Johnston, J., 2022, *The information content and audience response of earnings disclosures on Twitter*, viewed 10 June 2022, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4059877

Jung, M.J., Naughton, J.P., Tahoun, A. & Wang, C., 2018, 'Do firms strategically disseminate? Evidence from corporate use of social media', *The Accounting Review* 93(4), 225–252. https://doi.org/10.2308/accr-51906

Kaplan, A.M. & Haenlein, M., 2010, 'Users of the world, unite! The challenges and opportunities of Social Media', *Business Horizons* 53(1), 59–68, https://doi.org/10.2308/accr-51906

Khlifi, F., 2021, 'Web-based financial reporting, social media and information asymmetry: The case of Saudi Arabia', *Journal of Financial Reporting and Accounting 20(5), 994-1020.* https://doi.org/10.1108/JFRA-01-2021-0008

Kelton, A.S. & Pennington, R.R., 2020, 'If you tweet, they will follow: CEO Tweets, social capital, and investor say-on-pay judgments', *Journal of Information Systems* 34(1), 105–122, https://doi.org/10.2308/isys-52449

Kemp, S., 2023, *Digital 2023 deep-dive: Twitter use jumps after Elon Musk's acquisition*, viewed 12 April 2023, from https://datareportal.com/reports/digital-2023-deep-dive-the-potential-outlook-for-twitter?utm_ source=Global_Digital_Reports&utm_medium=Partner_Article&utm_campaign=Digital_2023

Lombardi, R. & Secundo, G., 2020, 'The digital transformation of corporate reporting – A systematic literature review and avenues for future research', *Meditari Accountancy Research* 29(6), 1179–1208. https://doi.org/10.1108/MEDAR-04-2020-0870

Majumdar, A. & Bose, I., 2019, 'To tweets create value? A multi-period analysis of Twitter use and content of tweets for manufacturing firms', *International Journal of Production Economics* 216(1), 1–11. https://doi.org/10.1016/j.ijpe.2019.04.008

Meltwater, 2023, *Digital 2023 global overview report – The essential guide to the world's connected behaviours*, viewed 11 April 2023, from https://www.meltwater.com/en/blog/changing-world-of-digital.

Mhanna, Y.G. & Sun, L., 2020, 'The effect of social media on stock market evidence from Twitter', *Asia Pacific Journal of Advanced Business and Social Studies* 6(2), 13–24.

Mokhtar, E.S., 2017, 'Internet financial reporting determinants: A meta-analytic review', *Journal of Financial Reporting and Accounting* 15(1), 116–154, https://doi.org/10.1108/JFRA-07-2016-0061

Munson, T., 2022, *Top 10 social media platforms for businesses in 2023*, viewed 11 April 2023, from https://www.tributemedia.com/blog/top-10-social-platforms-for-business.

Nekrasov, A., Teoh, S.H. & Wu, S., 2021, 'Visuals and attention to earnings news on twitter', *Review of Accounting Studies* 27, 1233–1275, https://doi.org/10.1007/s11142-021-09630-8

Nel, G.F. & Baard, R., 2022, 'Investor communication channels: The case of e-mail and corporate websites – Mutually exclusive or complementary?', *Corporate Communications: An International Journal* 27(5), 56–73, https://doi.org/10.1108/CCIJ-08-2021-0086

Nel, G.F. & Van der Spuy, P., 2021, 'Strategic stakeholder management: Investor relations in South Africa', *Journal of Accounting in Emerging Economies* 11(3), 431–448, https://doi.org/10.1108/JAEE-12-2019-0233

Nel, G.F., Smit, E., & Brummer, L.M., 2017, 'Determinants of the quality of internet investor relations – A study of companies listed on the JSE', *South African Journal of Business Management* 48(1), 55–65.

Nuseir, M. & Qasim, A., 2021, 'Investor relations in the era of social media: Systematic literature review of social media as a strategic corporate disclosure tool', *Journal of Financial Reporting and Accounting* 19(5), 819–838, https://doi.org/10.1108/JFRA-06-2020-0160

Nyakurukwa, K. & Seetharam, Y, 2022, 'Can a 280-character message explain stock returns? Evidence from South Africa', *Managerial Finance* 48(4), 663–686, https://doi.org/10.1108/MF-12-2021-0598

Ohlson, J.A., 2005, 'On accounting-based valuation formulae', *Review of Accounting Studies* 10(23), 323–347, https://doi.org/10.1007/s11142-005-1534-4

Orens, R., Aerts, W. & Cormier, D., 2010, 'Web-based non-financial disclosure and cost of finance', *Journal of Business Finance and Accounting* 37(9), 1057–1093, https://doi.org/10.1111/j.1468-5957.2010.02212.x

Perez, S., 2018, *Twitter's doubling of character count from 140 to 280 had little impact on length of tweets*, viewed 23 June 2022, from https://techcrunch.com/2018/10/30/twitters-doubling-of-character-count-from-140-to-280-had-little-impact-on-length-of-tweets/#:~:text=According%20to%20new%20data%20released,people%20aren%27t%20using%20it.

Prokofieva, M., 2015, 'Twitter-based dissemination of corporate disclosure and the intervening effects of firms' visibility: Evidence from Australian-listed companies', *Journal of Information Systems* 29(2), 107–136, https://doi.org/10.2308/isys-50994

Rakowski, D., Shirley, S.E. & Stark, J.R., 2019, 'Twitter activity, investor attention, and the diffusion of information', *Financial Management* 50, 3–46, https://doi.org/10.2308/isys-50994

Rautianen, A. & Jokinen, J., 2022, 'The value-relevance of social media activity of Finnish listed companies', *International Journal of Accounting & Information Management* 30(2), 301–323, https://doi.org/10.2308/isys-50994

Ruangprapun, J., 2022, 'Corporate use of social media and earnings management of Thai listed companies: Evidence from Twitter platform', *Journal of Accounting Profession* 18(57), 25–56.

Russo, S., Schimperna, F., Lombardi, R. & Ruggiero, P., 2021, 'Sustainability performance and social media: An explorative analysis', *Meditari Accountancy Research* 30(4), 1118–1140, https://doi.org/10.2308/isys-50994

Saleemi, J., 2020, 'In Covid-19 outbreak, correlating the cost-based market liquidity risk to microblogging sentiment indicators', *National Accounting Review* 2(3), 249–262, https://doi.org/10.2308/isys-50994

Shehata, N.F., 2014, 'Theories and determinants of voluntary disclosure', *Accounting and Finance Research* 3(1), 18–26, https://doi.org/10.5430/afr.v3n1p18

Snow, N.M., 2015, 'Retail investors' perceptions of financial disclosures on social media: An experimental investigation using Twitter', unpublished DPhil dissertation, University of South Florida.

Suchman, M.C., 1995, 'Managerial legitimacy: Strategic and institutional approaches', *The Academy of Management Review* 20(7), 571–610, https://doi.org/10.5430/afr.v3n1p18

Tan, S.D. & Tas, O., 2021, 'Social media sentiment in international stock returns and trading activity', *Journal of Behavioral Finance* 22(2), 221–234, https://doi.org/10.1080/15427560.2020.1772261

Wang, C.C. & Chiang, C.Y., 2019, 'Analyzing online fake business news communication and the influence on stock price: A real case in Taiwan', J*ournal of Information Technology Applications & Management* 26(6), 1–12.

Xiong, F., Chapple, L., Xu, S. & Wenwei, L., 2019, 'Adoption and use of technology with low litigation risk – The case of financial reporting on Twitter by ASX companies', *Technology analysis & Strategic management* 31(10), 1152–1167. https://doi.org/10.1080/15427560.2020.1772261

Yue, C.A., Thelen, P., Robinson, K. & Men, L.R., 2019, 'How do CEOs communicate on Twitter? A comparative study between Fortune 200 companies and top startup companies', *Corporate Communications: An International Journal* 24(3), 532–552. https://doi.org/10.1108/CCIJ-03-2019-0031

Zhang, Y., Shirakawa, M., Wang, Y., Li, Z. & Hara, T., 2022, 'Twitter-aided decision making: A review of recent developments', *Applied Intelligence* 52, 13839–13854. https://doi.org/10.1108/CCIJ-03-2019-0031

Zhou, M., Lei, L., Wang, J., Fan, W. & Wang, A.G., 2015, 'Social media adoption and corporate disclosure', *Journal of Information Systems* 29(2), 23–50, https://doi.org/10.2308/isys-50961

Appendix starts on the next page →

Appendix 1

Correlation matrixes

TABLE 1-A1: 2017.

Variables	NO. TWEETS	ENG 1	ENG 2	SIZE	MTB	ROE	F. FLT	NET.ISS	INDE.JSE
NO. TWEETS	1.00	-	-	-	-	-	-	-	-
ENG 1	0.21*	1.00	-	-	-	-	-	-	-
ENG 2	0.32**	0.65***	1.00	-	-	-	-	-	-
SIZE	0.26**	0.22*	0.36***	1.00	-	-	-	-	-
MTB	(0.07)	0.17	0.28**	(0.00)	1.00	-	-	-	-
ROE	0.05	0.04	0.12	(0.03)	0.13	1.00	-	-	-
F.FLT	(0.06)	0.12	0.04	0.06	(0.23) *	0.01	1.00	-	-
NET.ISS	(0.16)	(0.02)	(0.17)	0.05	(0.17)	(0.24) *	(0.01)	1.00	-
INDE.JSE	0.04	0.05	0.10	0.04	(0.02)	0.02	0.01	0.13	1.00

NO. TWEETS, Number of tweets;

ENG 1, Engagement 1; ENG 2, Engagement 2;

MTB, Market-to-book; ROE, Return on equity, F.FLT, Free float, NET.ISS, New shares issued; INDE.JSE, Industry membership Johannesburg Stock Exchange.

***, significant at the 1% level; **, significant at the 5% level; *, significant at the 10% level.

TABLE 2-A1: 2018.

Variables	NO. TWEETS	ENG 1	ENG 2	SIZE	MTB	ROE	F. FLT	NET.ISS	INDE.JSE
NO. TWEETS	1.00	-	-	-	-	-	-	-	-
ENG 1	0.43***	1.00	-	-	-	-	-	-	-
ENG 2	0.41***	0.63***	1.00	-	-	-	-	-	-
SIZE	0.42***	0.24*	0.22*	1.00	-	-	-	-	-
MTB	0.27**	0.30**	0.36***	0.08	1.00	-	-	-	-
ROE	0.21*	0.27**	0.36***	0.27**	0.19	1.00	-	-	-
F.FLT	(0.06)	(0.14)	(0.11)	0.04	(0.03)	0.02	1.00	-	-
NET.ISS	(0.25) **	(0.14)	(0.09)	(0.10)	(0.01)	(0.07)	0.22*	1.00	-
INDE.JSE	0.03	0.19	0.13	0.09	0.06	0.28**	(0.02)	0.15	1.00

NO. TWEETS, Number of tweets; ENG 1, Engagement 1; ENG 2, Engagement 2; MTB, Market-to-book; ROE, Return on equity; F.FLT, Free float; NET.ISS, New shares issued; INDE.JSE, Industry membership Johannesburg Stock Exchange.

***, significant at the 1% level; **, significant at the 5% level; *, significant at the 10% level.

TABLE 3-A1: 2019.

Variables	NO. TWEETS	ENG 1	ENG 2	SIZE	MTB	ROE	F. FLT	NET.ISS	INDE.JSE
NO. TWEETS	1.00	-	-	-	-	-	-	-	-
ENG 1	0.50***	1.00	-	-	-	-	-	-	-
ENG 2	0.22*	0.64***	1.00	-	-	-	-	-	-
SIZE	0.42***	0.27**	0.26**	1.00	-	-	-	-	-
MTB	0.40***	0.46***	0.24*	0.22*	1.00	-	-	-	-
ROE	0.28**	0.24*	0.27**	0.23*	0.21*	1.00	-	-	-
F.FLT	(0.06)	(0.08)	(0.03)	0.12	(0.15)	0.19	1.00	-	-
NET.ISS	(0.01)	(0.06)	0.00	(0.08)	0.06	0.04	0.08	1.00	-
INDE.JSE	(0.13)	0.06	0.06	0.09	(0.01)	0.04	(0.06)	(0.09)	1.00

NO. TWEETS, Number of tweets; ENG 1, Engagement 1; ENG 2, Engagement 2; MTB, Market-to-book; ROE, Return on equity; F.FLT, Free float; NET.ISS, New shares issued; INDE.JSE, Industry membership Johannesburg Stock Exchange.

***, significant at the 1% level; **, significant at the 5% level; *, significant at the 10% level.

TABLE 4-A1: 2020.

Variables	NO. TWEETS	ENG 1	ENG 2	SIZE	MTB	ROE	F. FLT	NET.ISS	INDE.JSE
NO. TWEETS	1.00	-	-	-	-	-	-	-	-
ENG 1	0.40***	1.00	-	-	-	-	-	-	-
ENG 2	0.31**	0.62***	1.00	-	-	-	-	-	-
SIZE	0.42***	0.25**	0.46***	1.00	-	-	-	-	-
MTB	0.34***	0.29**	0.15	0.27**	1.00	-	-	-	-
ROE	0.25**	0.19	0.11	0.22*	0.30**	1.00	-	-	-
F.FLT	(0.07)	0.01	0.15	0.13	(0.15)	0.13	1.00	-	-
NET.ISS	(0.20)	(0.16)	0.04	0.10	(0.01)	(0.19)	(0.01)	1.00	-
INDE.JSE	0.02	0.08	0.04	0.06	(0.04)	(0.05)	(0.11)	(0.09)	1.00

NO. TWEETS, Number of tweets; ENG 1, Engagement 1; ENG 2, Engagement 2; MTB, Market-to-book; ROE, Return on equity; F.FLT, Free float; NET.ISS, New shares issued; INDE.JSE, Industry membership Johannesburg Stock Exchange.

***, significant at the 1% level; **, significant at the 5% level; *, significant at the 10% level.