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*Social Media and Company Stock Performance:
A Thematic and Bibliometric Review*

Keywords: thematic analysis; bibliometric analysis; company stock performance; Twitter; social media

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Abstract

Theoretical background: The latent impact of the social media on company stock market performance or equity value has already been empirically studied. It is still in its infancy, although it has received increasing attention over the past few years. No efforts have yet been made to systematically review these studies in order to provide researchers and practitioners with an overview of the state-of-the-art links between social media and stock market performance of companies. This makes our work different from other recently published review papers on social media.

Purpose of the article: The goal of this paper is to review, systematize, and integrate existing research on links between social media releases and stock performance, including research production timeline, global contributions, source analysis, affiliations, author locations, and citations of studies on social media (Twitter especially). A further objective is to comprehend the conceptual and intellectual structure of the relevant literature and to identify the knowledge base of social media use in investor relations and financial communication.

Research methods: This study employs thematic and bibliometric analysis methodology on 135 peer reviewed papers obtained from two databases (Web of Science and Scopus) and provides an analysis of science mapping, including co-citation analysis, bibliometric coupling, word analysis, and trending topics regarding the relationship between social media releases and stock performance.

Main findings: Our results provide three emerging clusters: (1) company stock performance, (2) investor or sentiment analysis, (3) user-generated content and several niche topic clusters: (4) corporate governance and disclosure (5) capabilities and earnings management and (6) economic and social effects. This study indicates that social media have significantly altered the corporate information landscape. Companies and information consumers must incorporate the new channels into their information dissemination or acquisition, and decision-making processes.

Introduction

More than 5 billion of the world's approximately 8.0 billion population use the Internet (Statista, 2022a, 2022b). In 2022, 4.59 billion people were actively using social media. According to Kaplan and Haenlein (2010), "social media is a collection of Internet-based applications that build upon the technological foundations of Web 2.0 and enable the creation and exchange of user-generated content". Since its emergence in the late 1990s, social media applications have moved beyond personal use as direct electronic information exchange to essential marketing tool. Later, companies incorporated them to enhance information flow and knowledge sharing among themselves, strengthen company-customer relationships, and enhance both internal and external cooperation (Lam et al., 2016). Digitalization-driven transformations have a significant impact on strategic management processes, particularly in terms of creating and capturing value for customers. The dynamic nature of social media requires companies to adapt their strategies to effectively leverage their potential (Urbanek, 2022).

By utilizing social media, businesses not only increase brand image and brand awareness but mainly contribute to the company marketing aims and strategy (Alalwan et al., 2017; Nisar & Whitehead, 2016). While research on social media in business-to-consumer (B2C) sectors is abundant (Kanwar & Huang, 2022), the business-to-business (B2B) context it remains relatively infrequent (Cartwright et al., 2021). According to Dwivedi et al. (2015) and Alalwan et al. (2017), the overwhelming majority of social media studies have been within the marketing area. Given the significance of social media to various corporate stakeholders and the numerous outcomes associated with its use, it has attracted the attention of researchers from fields such as accounting and capital markets, with management scholars making the earliest contributions to the corporate communication domain. For example,

Linke and Zerfass (2013) claim that implementing an effective corporate dialogue on social media requires a corporate strategy and internal regulatory frameworks. Furthermore, due to the fact that social media platforms cannot be fully controlled, they also pose some risks to organizations (Wereda, 2021). Twitter is utilized by a wide range of investors and analysts, including both professionals and amateurs. It serves as a platform for posting news articles and opinions, offering a constant flow of information and commentary that often surpasses the frequency of updates from traditional news media sources (Sprenger et al., 2014a).

There are empirical works on the relative impact of social media on company share market performance or equity value, but these are in an early stage of development. Nevertheless, the concept of social media for financial markets has been evolving and gaining increasing attention over the past few years (Bughin & Chui, 2010; Sul et al., 2017; Luo et al., 2013). No efforts have been made to conduct a systematic review of these studies in order to provide both scholars and practitioners with an overview of the relationships between social media links and the stock market performance of companies. Accordingly, the primary objective of this study is to examine and review the most recent studies conducted on the topic of social media and market performance. This circumstance distinguishes our work from other recently published reviews of social media platforms.

The remaining sections are organized as follows. The second section is a literature review. Then, we will discuss the methodology of bibliometric analysis. The results and discussion of the bibliometric analysis are presented in section 4. The last section outlines the concluding remarks and limitations.

Literature review

Accounting literature developed on social media after it was approved by the Security Exchange Commission as a corporate information dissemination channel in 2013. According to Ramassa and Di Fabio (2016), the critical review of papers by accounting scholars addressing questions on the role and function of social media fall into three group of studies: those concentrating on the role and function of social media, those analysing the nexus between social media and financials, and finally those referring to communication with investors across capital markets. Saxton (2012) concentrates on another perspective and organizes his review around the actors using the technology, rather than by accounting subfield, media type, etc., and finds the largest number of studies are on firms and investors.

Although previous studies have showed interest in social media in the contexts of accounting, investors relations and financial communication, there are very few systematic reviews on the influence of social media on various measures of company financial or market performance and equity value. We have identified six traditional and systematic literature reviews that make reference to links between profitability

and social media. Lal et al. (2020) note that companies find it difficult to calculate the return on investment (ROI) from social media marketing expenditures because most of them focus only on tangible outcomes such as the effect on revenue and purchases, as well as identifying the primary measures for ROI from prior social media studies. In their survey paper, Lei et al. (2019) discuss not only the evolution of Internet-based corporate disclosure and related regulations, but also the motivations for adopting and utilizing social media to communicate with different stakeholders, the features of corporate disclosure in social media, the impact of such disclosures on capital market, and the veracity of corporate information on social media platforms. Finally, they investigate papers on the impact of information generated by non-corporate social media users on the capital market. Lei et al. (2019) distinguish major motifs in latest studies examining the effect of social media on the corporate information environment, but they do not concentrate on company profitability or market performance. They do, however, discuss the importance of social media information on the valuation in the capital markets. According to them, companies with a high information asymmetry are more inclined to employ social media platforms for strategic information disclosure and to increase their company's value. Simultaneously, they imply that information supplied by non-corporate users has a high predictive power for operational outcomes and stock returns of companies. Twitter has become the preeminent social media tool for investor relations management and corporate disclosure, as evidenced by the use of the platform as the research setting in the majority of the 36 papers included in their review from 2011 to 2018. The systematic literature review by Kapoor et al. (2018) integrates and synthesizes the findings of literature on social media from the articles published in the *Information Systems Journal*. This study examines 132 articles published between 1997 and 2017 and focuses primarily on the evolution of social media research from an Information Systems standpoint. Next, they describe the major themes that have emerged from this research. One such relates to value creation seen from the equity value, with seven studies interested in exploring this area in the period 2010–2016. Alalwan et al. (2017) provide an overview of the major literature trends, including the role of social media in advertising, customer relationship management, electronic word of mouth, and company brands and performance, by reviewing approximately 144 empirical articles. In the section devoted to the organizations' perspective, they analysed 15 papers that had found that value can be accelerated by a company's marketing effort conducted through social media platforms. Olanrewaju et al. (2020) systematically reviewed 160 papers, published between 2002 and 2018 on social media from a different perspective and concentrated on factors that drive social media adoption and use by entrepreneurs. Even though company performance has been the primary metric for evaluating the impact of social media on SMEs, the effects of social media use on performance are inconsistent, according to them. Nevertheless, the majority of findings included in Olanrewaju et al. (2020) point to the positive role of social media on business performance (e.g. cost reduction, market

expansion), business process performance (e.g. customer relationship management), crowdfunding performance, and innovation performance. They also looked at social media from the value creation point of view. According to their systematic review, social media may be able to enhance business value by lowering transaction fees, improving information access and transmission via better communication channels, and reinforcing marketing strategies.

At this stage of research, bibliometric analyses are most pertinent for a number of reasons: (1) to provide a transparent process for outlining existing evidence and reducing bias by providing an audit trail of the procedures and decisions taken by various authors (Linnenluecke et al., 2019); (2) to summarize large amounts of bibliometric data, including theoretical and quantitative data (Donthu et al., 2021); (3) to provide an overview of the field and to identify recent achievements and future research opportunities (Donthu et al., 2021). The research questions in our systematic literature review are as follows:

RQ1: Who are the leading authors that contribute to stream research on the links between social media (Twitter especially) and company stock market performance?

RQ2: Evaluate current research in terms of research volume, geographic dispersion of existing studies, number of citations, international cooperation between scholars, analysis of researchers, and social media science mapping.

RQ3: Address the research gaps and the implications of the current study for future research perspectives.

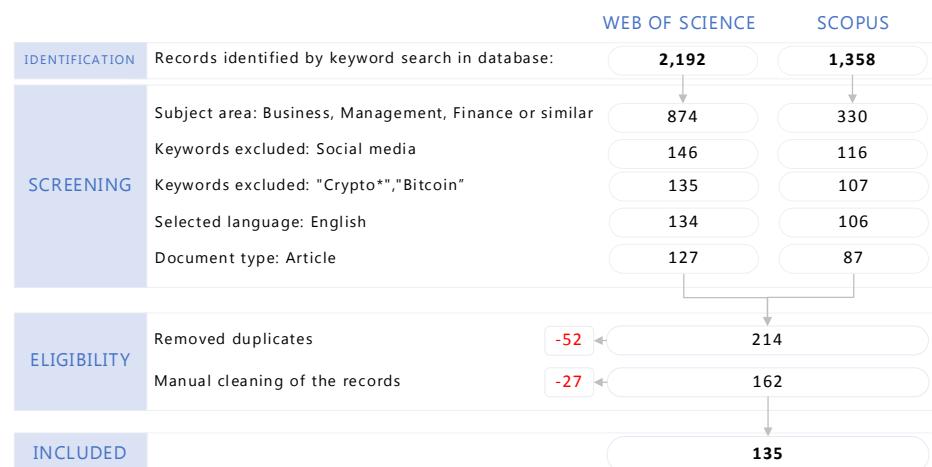
We make multiple contributions to social media and bibliometric research literature. First, we provide an overview of the field's intellectual and conceptual structure by recognizing recent achievements concerning the links between social media and corporate financial performance. Secondly, we add value to the international business literature by discovering niche and emerging research avenues concerning the interactions between social media and financial performance. Thirdly, we expand bibliometric research literature by combining two significant databases, Scopus and WoS, in response to a recent request for the two databases to be used jointly (Echchakoui, 2020). As a result, we provide an up-to-date presentation of the field's knowledge base by analyzing current trends.

Research methods

Sample and data collection

Data collection is split into three sub-stages. The start step is data identification. The process of creating a keyword list was based on analysing most significant works published in established periodicals. These papers served as a reliable basis for further examination, helping to define the initial set of keywords. Through meticulous examination of these articles, we aimed to identify the frequently occurring terms and

phrases that were significant to the research topic. Based on these findings, we generated more detailed phrases and conducted searches for highly relevant works. Our sample was built by searching Web of Science (WoS at <http://www.webofknowledge.com>) and Scopus (<http://www.scopus.com>). We chose Scopus and WoS databases due to their wide coverage and indexing of important journals. Relying on just one database could result in omitting important journals and articles (Maia et al., 2019). Keyword families offer an efficient way to search for keywords that may have been grouped with other related terms (Guerras-Martín et al., 2020). Our keywords list includes terms related to “stock value” and “social media”. We iteratively combined different keyword combinations to find the most powerful phrases used in articles discussing Twitter. We used the keywords: “stock return*”, “firm* performance*”, “performance*”, “financial performance*”, “attention”, “underreaction” and “return on*” to capture articles related to company stock market performance. Keywords that capture the topic of social media are: “Twitter”, “social media” and “noise”, “*sentiment”, “sentiment”, and “sentiment analysis”. We also used terms related to the financial market, such as “stock market”, “stock return” and “financial market”. By utilizing asterisks, we were able to capture the variants of the keywords (e.g. “Econom*” includes “Economy”, “Economic”, and “Economical”) (Reis et al., 2019). We excluded all articles related to Bitcoin and Cryptocurrencies. We accepted articles published in journals categorized as Business, Management, and Accounting or Economics, Econometrics, and Finance that had undergone peer review. We also limited our finding to papers published in English. As a result, we obtained 127 publications from WoS and 87 publications from Scopus (Figure 1).



Source: Authors' own study.

After gathering the Scopus and WoS articles that fulfilled our criteria, we eliminated duplicates (Linnenluecke et al., 2019) and only retained “Article” as a document type, per Echchakoui (2020). Using the R programming language, we then merged the Scopus and WoS databases into a single file, similar to Echchakoui (2020). There were a total of 52 duplicate articles removed. The merged database provided 162 original papers.

The final sub-stage is data cleaning. Various pre-processing techniques can be utilized, for instance, to identify elements that distort the analysis results. Bibliometric data from two databases may not be consistent; cited references may contain various versions of the same works and different spellings of an author’s name, for instance. In addition, because authors are usually abbreviated by their surname and initials, common names can pose a problem. The names of periodicals may also appear in variant forms. Because citation and co-citation analysis requires references to fit into a single template, as the program might consider them to be two separate articles, we normalized article references. In addition, we normalized manually the authors’ keywords (e.g. CAPM, capital asset pricing model). Author keywords with the same meaning are treated as a single keyword for the sake of visual clarity.

The final bibliometric data were included from 135 articles published between 2011 and 2022. We used no time span restrictions in the query. The first paper meeting our criteria was published in 2011. The maximum number of articles was produced in 2022. We extracted data pertaining to the title, authors, keywords, journal, publication date, and cited sources, among others (Table 1).

Table 1. Main information regarding the collection

Descriptive analysis	
Duration	2011–2022
Documents	135
Annual growth rate (%)	22.11
Document average age	3.02
Average citations per doc	20.68
References	5,802
Document contents	
Keywords plus (ID)	346
Author’s keywords (DE)	393
Authors	
Authors	352
Authors of single-authored docs	15
Authors collaboration	
Single-authored docs	15
Co-authors per doc	2.8
International co-authorships (%)	26.67
Sources (journals, books, etc.)	95

Source: Authors’ own study based on the Bibliometrix R-package.

As a result of the procedure, the number of articles published between 2011 and 2022 increased significantly (annual growth rate: 22.11%) (Figure 2). The papers from our sample had been published in 95 different journals. The average number of

citations per document is 20.68, and the average number of citations per document per year is 3.02. (Table 1).

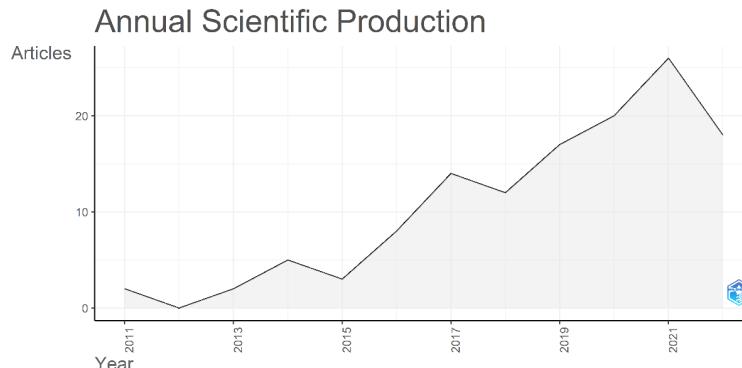


Figure 2. Scientific Production Timeline

Note: annual growth rate – 22.11%.

Source: Authors' own study based on the Bibliometrix R-package.

The *International Journal of Recent Technology and Engineering* (SJR 2019: 0.107) appears to be the most significant source of literature on social media, as indicated in Table 2. (5 articles published during the entire research period). In 2012, the journal began publishing research on social media activity; it is currently in its eleventh volume. In 2019, the *International Journal of Recent Technology and Engineering* no longer appeared in Scopus. *Finance Research Letters* (SJR 2021: 2.007) and *Internet Research* (SJR 2021: 1.62) are *ex aequo* in second place according to the classification of the number of publications (n) and they are widely cited (TC). The most cited is *Decision Support System* (SJR 2021: 1.97) with 398 citations for just 3 articles in the sample.

Table 2. Most relevant scientific actors

#	Authors' countries	n	Average citations	Sources	n	TC
1	USA	63	30.26	<i>International Journal of Recent Technology and Engineering</i>	5	11
2	China	27	28.00	<i>Finance Research Letters</i>	4	93
3	UK	24	10.50	<i>Internet Research</i>	4	141
4	India	14	2.17	<i>Journal of Behavioral Finance</i>	5	38
5	Germany	11	55.67	<i>Journal of Risk and Financial Management</i>	4	3
6	France	12	36.60	<i>Managerial Finance</i>	4	9
7	Italy	11	11.20	<i>Applied Economics Letters</i>	3	35
8	Spain	12	20.88	<i>Decision Support Systems</i>	3	398
9	Australia	9	11.80	<i>European Financial Management</i>	3	202
10	Indonesia	8	2.75	<i>Industrial Marketing Management</i>	3	48

is the position of the scientific actor between the first place to the tenth place; n – the number of times the scientific actor was considered in our sample; TC – total citations.

Source: Authors' own study based on the Bibliometrix R-package.

With 63, 27, and 24 authors, respectively, the United States, China, and the United Kingdom have the most significant contributions to scientific production, as shown in Table 2. The remaining 44 nations contribute less than the authors from the USA, China, and the UK combined. This may be explained by the fact that the authorities regulating and supervising North American capital markets allow companies to choose their channels of communication with investors (including social media), while it is not permitted in Europe. In fact, the SEC issued a report in April 2013 that made it clear that companies can use social media platforms such as Facebook and Twitter to disclose fundamental information in accordance with Regulation Fair Disclosure (Regulation FD) so long as investors are informed of which social media platforms will be used.

Procedures

Bibliometrix is a highly relevant tool for science mapping (Aria & Cuccurullo, 2017). According to Linnenluecke et al. (2019), the popularity of this tool is increasing. Taking advantage of this trend, we conducted a systematic literature review using the Bibliometrix package from R software. Bibliometric analysis uses statistical and mathematical techniques to examine research findings in a scientific field (Aparicio et al., 2019), which results in identifying recent developments and exploring the intellectual structure of research on a particular topic (Verma & Gustafsson, 2020; Donthu et al., 2021). The statistical tools are applied to author statistics, journal statistics, and keyword statistics (Pinto et al., 2020; Donthu et al., 2021), and the resulting data is separated into two sections. The first section focuses on performance analysis, while the second examines the mapping of current scientific literature. In this paper, a bibliometric analysis is conducted to examine recent studies on the effect of social media on company stock performance.

Citation, co-citation analysis and keyword co-occurrence network

A citation analysis is the identification of previously published works (Ferreira et al., 2014) and helps to portray the knowledge base by identifying works that had a major impact, delivering the most important approaches and theories (Ferreira et al., 2014; Reis et al., 2019; Ferreira et al., 2020).

Co-citation analysis provides insights into the intellectual structure of a field by exploring how works and theories interconnect (Reis et al., 2019; Ferreira et al., 2014). Co-citation analysis inspects the reference list of articles in the sample to identify and count the frequency of simultaneously use of two given papers (Ferreira et al., 2014; Reis et al., 2019; Ferreira et al., 2020), thus, identifying their interrelationships (Ferreira et al., 2014). The more often two works are cited together, the stronger their association (Reis et al., 2019). Each work is represented by a node in the co-citation network, with the lines representing the strength of the connections

between the nodes (Reis, 2019). The diameters of the circles indicate relevance: a larger circle indicates that a source is cited more frequently (Ferreira et al., 2014). This analysis is, therefore, predicated on the premise that co-cited articles share a connection or conceptual similarity (Ferreira et al., 2020). Using the list of references for the 5,802 articles cited in our sample, we determined the 25 most-cited works. This list was compiled using the local citation score (LCS), i.e. the frequency with which a reference was cited in works included in our sample (Linnenluecke et al., 2019).

The keyword co-occurrence network explores how keywords are interrelated. This determines the conceptual structure used in the discipline. Two keywords are considered to co-occur if they are both appearing in the authors keyword list (Bornmann et al., 2018). A stronger relationship can be expected between any keywords representing core issues (Su & Lee, 2010). This type of the analysis is founded on the idea that co-occurring keywords share a connection or relationship.

Thematic map

The thematic map gives some insight into research topic patterns, trends, outliers, and seasonality by illustrating the evolution of topics over time (Aria & Cuccurullo, 2017). Because topics are separated into four quadrants based on their centrality (plotted on the X-axis) and density (plotted on the Y-axis), thematic maps are intuitive (Forliano et al., 2021). As measured by centrality, the degree of interconnectedness between topics is discernible in a specific domain (Forliano et al., 2021). In contrast, density quantifies the level of development in terms of intra-cluster cohesion (Forliano et al., 2021). In the Motor Topics quadrant, the topics can influence the research field and are well developed (Forliano et al., 2021). Basic Subjects are those that span multiple disciplines (Bretas & Alon, 2021). Niche Topics are those that are specialized amongst academics (Forliano et al., 2021) and are therefore relatively hermetic, not influencing and not influenced by other topics – in contrast to Basic Topics, which are intertwined with existing research. Emerging Topics are those that are underdeveloped or undergoing rapid expansion (Bretas & Alon, 2021).

Results

Author analysis illustrates that authors conducted more research on a specific topic, thus, driving that field (Figure 3) (Ferreira et al., 2020). We observed that the USA, China, and the UK are the most productive countries (Table 2). The results indicate that Yudhvir Seetharam and Kingstone Nyakurukwa are both the most relevant researchers in the topic of social media or stock performance. Authors' production over time differs due to the fact that some authors had many publications in the early stages while others have few publications over the entire period (Figure 4). Therefore, Kingstone Nyakurukwa and Yudhvir Seetharam contributed in 2022,

while Timm O. Sprenger and Isabell M. Welpe produced the most articles during the recent years. In spite of this, Sprenger and Welpe are the most prolific authors, as their output has been crucial over the years. In addition, they had the highest scores for total citations (189.0) and total citations by year (21.0).

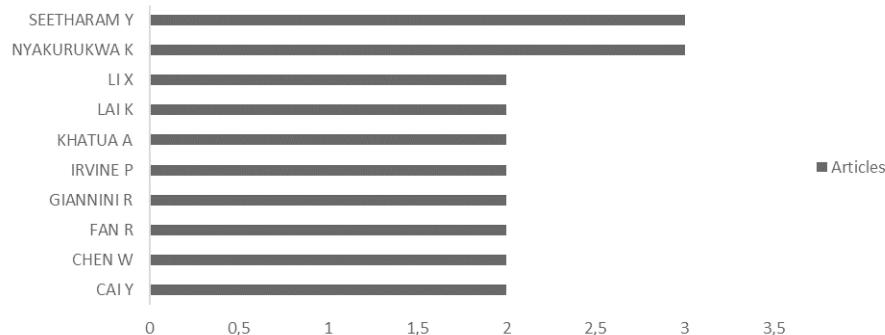


Figure 3. Most relevant authors, 2011–2022

Note: Number of authored articles in our sample.

Source: Authors' own study based on the Bibliometrix R-package with data retrieved from Scopus and WoS.

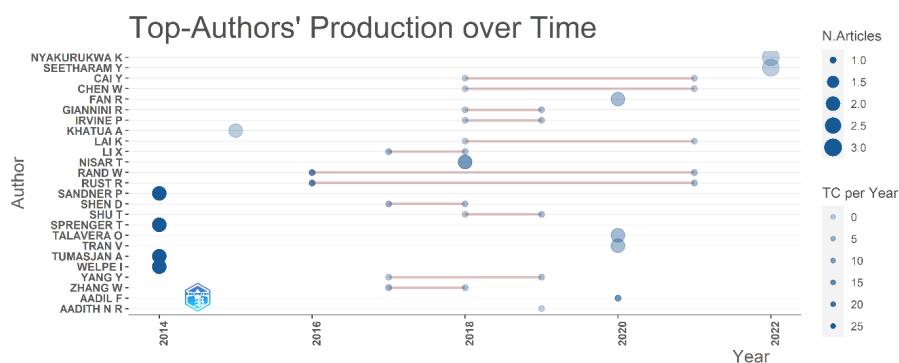


Figure 4. Authors' production over time

Note: The size of the circles represents the annual frequency of articles published; the intensity of the color represents the relevancy (e.g. Sprenger, 2014b).

Source: Authors' own study based on the Bibliometrix R-package with data retrieved from Scopus and WoS.

Citation, co-citation analysis and keyword co-occurrence network

The most frequently cited papers in a field of study are likely to be considered the most significant (Ferreira et al., 2014). The 135 articles contained a total of 5,802 references. It is not possible to analyze such a large list (Ferreira et al., 2014), so

Table 3 presents the results of the 10 most cited works from the reference list of 135 papers in our sample.

These citations had the most significant impact on the field (Table 3). The top ten cited references, i.e. top ten, were categorized into two distinct groups: brand communications and company stock performance. Hewett et al. (2016), Schweidel and Moe (2014), Kaplan and Haenlein, (2011), as well as Jung et al. (2018) were the most influential papers on brand communications (primarily sociology-based approach and economics-based approach), and the most influential works on firm or stock performance were Yu et al. (2013), Bartov et al. (2018), Sprenger et al. (2014b), Maqsood et al. (2020), and Paniagua and Sapena (2014).

Table 3. Characteristics of the articles included in the citation network

Document	DOI	Subject	Total citations (TC)	TC per year	Normalized global citations
Yu et al. (2013)	10.1016/j.dss.2012.12.028	Short-term stock performances	302	30.20	1.525
Bartov et al. (2018)	10.2308/accr-51865	Company stock performances	114	22.80	3.851
Sprenger et al. (2014b)	10.1111/j.1468-036X.2013.12007.x	Short-term stock performances	189	21.00	2.177
Hewett et al. (2016)	10.1509/jm.15.0033	Brand communications	134	19.14	3.481
Vrontis et al. (2021)	10.1108/JIC-11-2019-0258	Equity crowdfunding	35	17.50	7.45
Maqsood et al. (2020)	10.1016/j.ijinfomgt.2019.07.011	Stock prediction	51	17.00	4.46
Schweidel and Moe (2014)	10.1509/jmr.12.0424	Brand communications	144	16.00	1.658
Kaplan and Haenlein (2011)	10.1016/j.bushor.2010.09.004	Brand communications	162	13.50	1.688
Oliveira et al. (2016)	10.1016/j.dss.2016.02.013	Sentiment analysis	93	13.29	2.416
Paniagua and Sapena (2014)	10.1016/j.bushor.2014.07.005	Company performances	103	11.44	1.186
Jung et al. (2018)	10.2308/accr-51906	Brand communications	65	13.00	2.05

Source: Authors' own study based on the Bibliometrix R-package with data retrieved from Scopus and WoS.

The networks in Figure 5 were illustrated using the Kamada–Kawai method. The Kamada–Kawai design is based on the theoretical distance between vertices, which corresponds to the geometric distance between the drawing's vertices (Kamada & Kawai, 1989). Relevant papers are presented as nodes (Linnenluecke et al., 2019). The co-citations are represented by arrows, which correspond to the relationships between the works (Linnenluecke et al., 2019; Ferreira et al., 2014). Moreover, the width of the line connecting two papers indicates the strength of the connection (Ferreira et al., 2014). The diameters of the circles represent relevance; a larger circle

indicates that a source is cited more frequently (Ferreira et al., 2014). Therefore, the analysis of the results should concentrate on revealing the nodes that are close to one another, as well as the width of the connection between them.

In line with Linnenluecke et al. (2019), we decided to concentrate on the 25 most relevant papers to enhance the visual appeal and brevity in order to pinpoint the connections between the works (Figure 5 and detailed in Table 3). There were three main clusters in the co-citation network, (1) brand communications-based approach cluster (blue), (2) company performance approach cluster (red), and (3) sentiment analysis (green).

On the blue cluster, we noticed the strongest relationship between Antweiler and Frank (2004) and Tetlock et al. (2008), as both are fundamental papers on the sentiment-based conceptualization of social media. Also, Antweiler and Frank (2004) and Tetlock et al. (2008) showed a strong connection with Hou et al. (2015), as firms can acquire legitimacy by acting in a socially acceptable manner. In addition, Antweiler and Frank (2004) is connected to Sprenger et al. (2014b) regarding the relationship between stock-related news published by individual investors and stock returns. Sprenger et al. (2014b) is a seminal paper for many others (Figure 5).

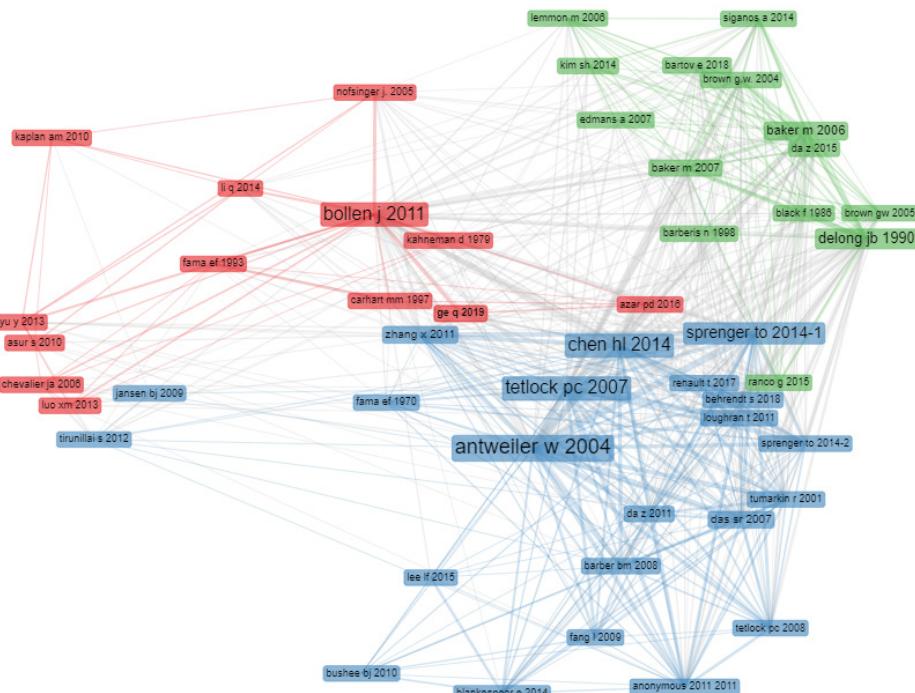


Figure 5. Co-citation network: Papers

Source: Authors' own study based on the Bibliometrix R-package with data retrieved from Scopus and WoS.

Figure 6 illustrates the direct citation network and a timeline analysis of the most pertinent citations from the selected papers on social media and company stock performance. The histogram focuses on two sub-samples: based on brand communications (blue) and the company stock performance approach cluster (red).

Historical Direct Citation Network

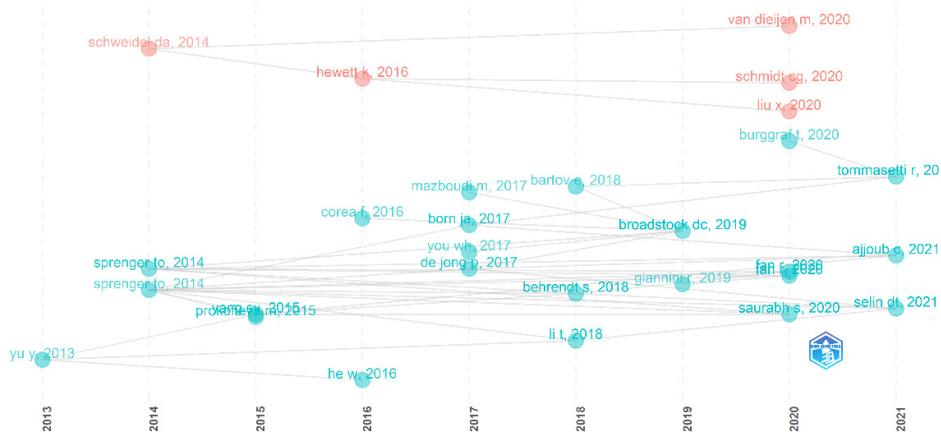


Figure 6. Intellectual Structure – Historiography: Papers

Source: Authors' own study based on the Bibliometrix R-package with data retrieved from Scopus and WoS.

The keyword co-occurrence network monitors the co-occurrence of keywords in a particular research field. The results are interpreted similarly to co-citation analysis. The Kamada–Kawai layout was applied to Figure 7 (Kamada & Kawai, 1989). The relationship between two keywords is indicated by an arrow. The width of the line indicates the connection's strength. Co-located and arrow-connected keywords share a relationship and a similar conceptual meaning. The sizes of the boxes represent frequency, with a larger box representing a topic that is studied more frequently (Ferreira et al., 2014). Figure 7 presents the co-occurrence network which has five clusters. The three largest clusters in the network, company stock performance (green), corporate social responsibility (red), and sentiment analysis (blue), highlight the centrality of the three main research topics: company stock performance (green), sentiment analysis (blue), and corporate social responsibility (red). These are the main keywords because we are investigating the relationship between social media and the performance of a company's stock. Notably, sentiment analysis also revealed a strong connection with the core concepts. With regard to the company stock performance cluster, we identified issues such as disclosure, information and text analysis. On the sentiment analysis cluster, we identified various issues such as volatility, return, volume being applied, to measure the impact of sentiment of

social media. Concerns such as the strategic application of knowledge, responsibility, user-generated content, and word-of-mouth were discovered in the corporate social responsibility cluster.

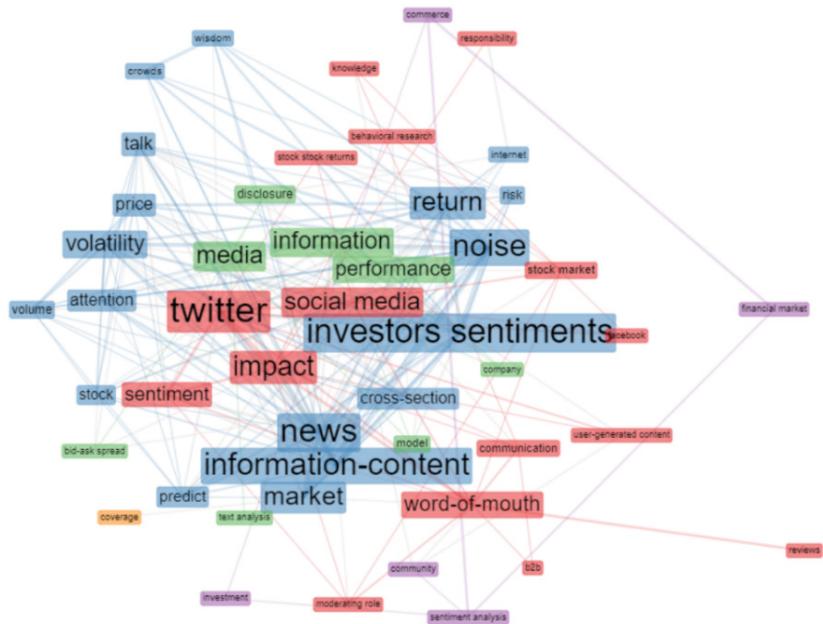


Figure 7. Keyword co-occurrences as a network plot: Keywords Plus

Source: Authors' own study based on the Bibliometrix R-package with data retrieved from Scopus and WoS.

Thematic map

Even though the keyword co-occurrence network is useful for recognizing connections and relevancy, it involves extra information to capture evolving trends and prospective study directions. The thematic map may offer an impartial method for clustering keywords according to the strength of their internal (density) and external (centrality) connections (Bretas & Alon, 2021). In light of this, the Motor Topics quadrant contains mainstream topics (Bretas & Alon, 2021) that can affect the research field and are well-established (Forliano et al., 2021). The Basic Topics quadrant contains topics that can impact other topics but are not well internally developed (Bretas & Alon, 2021; Forliano et al., 2021). The Emerging Topics quadrant spots emerging or underdeveloped topics (Bretas & Alon, 2021). The Niche Topics quadrant contains specialized topics (Forliano et al., 2021) (Figure 8).

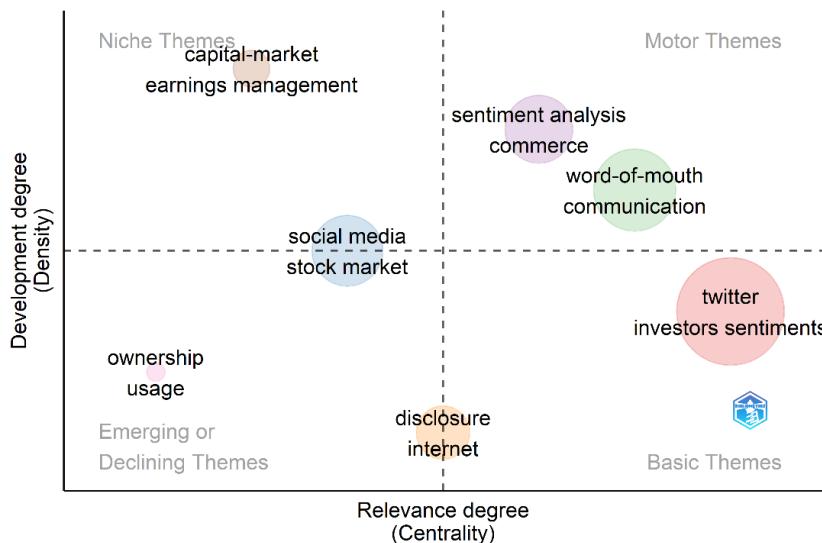


Figure 8. Thematic Map – Keyword Plus

Source: Authors' own study based on the Bibliometrix R-package with data retrieved from Scopus and WoS.

The same analysis was performed for the keywords used by the research authors (Figure 9). In Motor Themes, we identified the cluster of Twitter or investor sentiment and event study. In Niche Themes, we identified corporate governance and spillover effects. We also classified text-mining and financial performance as Emerging or Declining research settings. In Basic Themes, we identified the cluster of social media and Trump.



Figure 9. Thematic Map – Authors' Keywords

Source: Authors' own study based on the Bibliometrix R-package with data retrieved from Scopus and WoS.

Discussions

Based on a bibliometric sample of articles published between 2011 and 2022, we conduct a systematic review in this article of existing research on the relationship between social media and company stock performance. In order to answer the research questions, we ran citation and co-citation analyses, a keyword co-occurrence network, and a thematic map analysis. Our findings summarize the data in order to present both the intellectual and conceptual structure of the field, allowing for multiple ways of visualizing literature's big picture. We add value to the finance literature by advancing the understanding of the contribution and current achievements on links between social media and company stock performance. Earlier reviews and meta-analyses primarily viewed social media as a moderating effect on concepts related to corporate disclosure and capital market regulations (Lei et al., 2019) or focused on the developments in social media research from an Information Systems viewpoint (Kapoor et al., 2018). Alalwan et al. (2017) provide an overview of the most significant literature trends, including the influence of social media on electronic word of mouth, advertising, customer relationship management, and company brands and performance. Given that understanding the relationship between social media and company stock performance remains a contentious issue and that research on this topic is still in its infancy, we assert that there is a knowledge gap regarding social media's effect on company stock performance. Consequently, our bibliometric analysis contributes to previous research by advancing our understanding of the relationship between social media and company stock performance. In addition, we contribute to the finance literature by suggesting avenues for future research on the relationship between social media and stock performance. We advocate that the presented thematic maps provide an objective method for identifying future research opportunities. As a result of their low centrality, Niche Themes may have theoretical contributions, while Emerging Themes may offer underdeveloped subject matters. Our findings indicate three Emerging clusters: (1) company stock performance, (2) investor or sentiment analysis, (3) user-generated content and several Niche topic clusters: (4) corporate governance and disclosure (5) capabilities and earnings management and (6) economic and social effects. To sum up, our findings indicate that analysing different media sources alone may not provide the ability to explain stock returns. However, our results emphasize the importance of focusing on understanding the impact of information derived from social media.

We contribute to the bibliometric research by integrating data from two significant databases, Scopus and WoS. We followed Echchakoui's recommendation for combining the two databases (2020). Few studies use both (Liedong et al., 2020; López-Duarte et al., 2016). The majority of studies make assessments using one or the other (Reis, 2019; Ferreira, 2014, 2020), while a few use both (Liedong et al., 2020; López-Duarte et al., 2016). Scopus has a greater publication scope (Echchakoui, 2020) in terms of languages, sources (e.g. books and confer-

ence papers), and journals than WoS (Echchakoui, 2020). WoS provides extensive coverage over the years with a broad range of information. However, there are cases when very prominent journals are included only in one of the repositories (Maia et al., 2019). Consequently, a search in a single database could have omitted relevant journals and, as a result, numerous important papers and academics (Maia et al., 2019).

Conclusions

Our critical review of literature revealed a few future research opportunities. First, we identified many papers relating to social media activity and capital markets, but in the context of politics (Born et al., 2017; Paul & Sui, 2022; Nisar & Yeung, 2018) and macroeconomics (Özdurak & Ulusoy, 2020; Kwakye & Haw, 2021). There are very few empirical analyses concentrating on the financial perspective, which is our interest. Although finance-based approaches are still in their infancy, the concept of social media for financial markets has been developing steadily and gaining increasing attention over the past few years (Bughin & Chui, 2010; Sul et al., 2017; Luo et al., 2013). On the one hand, the finance-based approach emphasizes how various types of social media activity can affect capital markets (Da et al., 2011; Blankespoor et al., 2014; Baker & Wurgler, 2007). Consequently, future research may find it pertinent to investigate how social media (Ranco et al., 2015; Brown & Cliff, 2004) can assist businesses in overcoming problems caused by information asymmetry. Furthermore, Olanrewaju et al. (2020) point to the positive role of social media on business performance (e.g. cost reduction, market expansion), business process performance (e.g. customer relationship management), crowdfunding performance and innovation performance. They also examine social media from the perspective of value creation. According to their systematic review, social media can create value by decreasing the cost of transactions, improving data access and transmission through better communication channels, and enhancing marketing strategies. Chodziński and Laskowska-Solarz (2022) observe, using sports industry as an example, that virtually all top football clubs in the UEFA ranking use social media to report on environmental, social, and governance (ESG) issues. Because of its unique nature, promoting ESG values in sports is just as important as financial performance, especially given their local reach. Consequently, future research could also look into the relationship between social media and ESG reporting.

Second, following the analyses of the thematic maps, we suggest several future research directions. Recent scholarship examines corporate social responsibility (Kassem et al., 2022). However, social entrepreneurship, economic and social effects, and earnings management are three phenomena that face particular challenges in social media's diverse systems. The current discussion may inspire researchers and legislators to identify the mechanisms underlying the impact of social media on these

issues. Future research may look at examining social conditions at the national level that can affect corporate sustainability and international entrepreneurship.

Third, there has been a considerable focus on the USA, Australia and the UK as far as research samples are concerned (Bilinski, 2022; Schmidt et al., 2020; Filip et al., 2021; Prokofieva, 2015). Due to the fact that neither Twitter nor Facebook are permitted as officially appointed investor relationship channels in Europe and the traditional media is still considered a powerful player (Bartov et al., 2018), social media does exist there and is actively used by public companies. And thus, future research may find it beneficial to comprehend how social media influences the company stock performance in other regions, such as Europe. It is even more interesting how it influences markets when they are permitted, leaving the question of whether company stock values will grow as communication environments improve (Fang & Peress, 2009). Future research may help to understand how the social media and company stock performance relationship is shaped by the institutional environment, or how traditional media ties lose value over time. So far, the effect of US market reforms regarding investor communication on the performance of company stocks has been mixed, which may be a result of (1) the rate of institutional change and (2) the type of company holdings. Future studies could test how the quality of social media affects the profitability of various types of businesses, as firm profitability might not be homogeneous.

This study is not free from limitations as we concentrated only on a bibliometric analysis of existing literature on links between social media and company stock performance. We did not apply other literature mapping tools, such as page rank analysis.

Furthermore, we collected only peer-reviewed articles from journals classified in business, management or finance. However, other journals such as disciplinary journals in computer science or decision science also publish works on social media, yet such research is typically quite narrow in scope and, arguably, receives little interest from those outside the core discipline. In addition, we did not include the so-called “grey literature”, i.e. publications such as books, chapters in monographs, conference proceedings or press articles.¹ We also did not take into consideration discrepancies between British and American English in the list of keywords. Future research may include in a sample a larger number of journals.

According to Linnenluecke et al. (2019), citation and co-citation network mapping make it necessary for the scholar to set a minimum citation threshold for papers to be included in a network, which may eliminate more recent publications that have not attained the minimum number of citations. By analyzing various time periods, we believe we have discovered the most current topics. To further empirical and conceptual development in this field, future research may examine more recently published papers.

¹ According to Hensel (2020, p. 32), 77% of systematic literature reviews conducted by scientists exclude “grey literature”.

Although bibliometric analysis appears appropriate, we should concur with Ferreira et al. (2014) that it is merely a proxy and that a thorough reading of the papers is necessary to comprehend the conceptual and intellectual structure of the field. Therefore, future research is best advised to use different research techniques to gain understanding and detect additional knowledge gaps and future research opportunities.

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