Text analytics approach to examining corporate social responsibility

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Text Analytics Approach to Examining Corporate Social Responsibility

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ABSTRACT

This research article explores a text analytics approach to assess the prominence of corporate social responsibility in 554 Singapore-listed firms through a content analysis of the news. Instead of relying on publications by the firms, third-party news coverage is used to reduce potential biases due to over-reporting. A dataset of news articles on the included firms published during fiscal years 2015 and 2016 is crawled, and the articles' content is parsed to search for information related to corporate social responsibility. Graph theory is subsequently used to create a collaborative network of listed firms' corporate social responsibility activities. The results highlight a more automated and scalable means of assessing the prominence of corporate social responsibility, as well as potential "influencers" within the corporate landscape.

Keywords: Corporate social responsibility, news, content analysis, collaborative network, Singapore Exchange

INTRODUCTION

Corporate social responsibility ("CSR") has become a topic of interest since it was first conceptualised in the 1960s (Freeman, 1984). With its advent came various means of measuring this immeasurable concept through either an index or through content analysis of publications released by the firms, primarily its annual report. These indexes and content analysis for CSR assessment mainly revolve around listed firms in the United States, the United Kingdom, Japan, and Europe, with little focus on the rest of Asia Pacific. The Internet paved the way for the information of firms becoming more accessible across borders and an increase in the comparison of firms' CSR across countries (Chapple & Moon, 2005; Lee & Kim, 2010; Wanderley et al., 2008). Throughout the years, methods of assessing firms' CSR have expanded to the use of content published on firms' websites (Basil & Erlandson, 2008; Chapple & Moon, 2005; Gomez & Chalmeta, 2011), and in the past decade, news articles have been increasingly leveraged to understand how perceptions of firms' CSR have been framed and the attitudes of the public towards CSR (Caroll & McCombs, 2003; Carroll, 2010-a, 2010-b; Caroll, 2011; Cho & Hong, 2009; Hamilton, 2003; Jain & De Moya, 2017; Lee & Carroll, 2011; Lee & Riffe, 2017; Liu et al., 2011; Luo et al., 2012; Tang, 2012; Yang, 2017; Zhang & Swanson, 2006).

The use of news media to assess CSR prominence in the Singaporean context in this research is motivated by a couple of reasons. First, studies of CSR assessment using a reputation index and content analysis have mostly shied away from Asian regions (Chapple & Moon, 2005; Chatterjee & Monir, 2008; Ghazali, 2007; Gunawan, 2007), especially Southeast Asia (Gunawan & Hermawan, 2012). CSR has mostly been deemed a Western concept, and the level of CSR awareness in Asia is relatively low (Roche, 2005). However, CSR's mindshare is growing in Asia, as evidenced, e.g., by the increasing number of Asian firms utilising the Global Reporting Initiative to report on CSR, and mandatory regulatory requirements for CSR reporting that have been implemented in countries such as Singapore. Noting this phenomenon, Chapple and Moon (2005) focused much of their research on the lesser-known CSR activities in Southeast Asian countries, including Singapore, through a content analysis of the corporate websites of the top 50 companies in each country. CSR policies of Singaporean companies, despite the country being considered developed, interestingly lag considerably behind those of companies in Japan and South Korea (Debroux, 2006) and its Southeast Asian neighbours in terms of sustainability reporting (Shah, 2016). Second, the use of news media to examine CSR has mostly been through the perspective of the framing and tone of news articles on firms' CSR activities. However, using content analysis of news media to gauge the prominence of CSR activities of firms has mostly been overlooked. This study provides a different perspective on how content analysis of news media may be utilised for assessing CSR prominence of firms. Furthermore, the use of a global news database may allow this research to be easily expanded to other countries in Southeast Asia. Similar to existing studies, listed firms, instead of non-listed firms, are the subject of this research, as major corporations have more resources for CSR and are more prominent figures in the public eye for wider discussion in the news.

This research aims to evaluate the effectiveness of assessing CSR prominence of firms using news articles and the firms' collaborative networks through text analytics. It explores how content analysis of news, rather than company publications, may be used to assess CSR prominence of firms listed on the main board of the Singapore Exchange (SGX) and the existence of any collaborative networks of engagement in CSR activities. A firm is considered to have high CSR prominence when it is frequently mentioned in favourable news related to CSR, and the frequency of a firm mentioned together with another firm in the same news article on CSR is used to understand the presence of collaborative networks.

CSR activities are distinguished here as (1) community involvement, (2) socially responsible production processes and (3) employee relations (Moon, 2002). CSR activities pertaining to community involvement are considered separately from main business activities, such as those targeting local economic and community development, arts and culture, environment and conservation. Meanwhile, the last two tenets of CSR activities are closely tied to how a company operates rather than the external activities it engages in using excess profits.

Text analytics are leveraged to explore a more automated and scalable methodology for content analysis of firms' prominence in CSR activities. Using a different source for content analysis – news media from the Global Data on Events, Location and Tone ("GDELT") – is proposed to reduce reporting bias by the respective firms. The GDELT database holds news articles reported by media worldwide in many languages, and each article is supplemented with data on the relevant persons, organisations, locations, themes and tone. Each record in the GDELT database is a news article from national and international media sources that include BBC Monitoring, United Press International, the

Washington Post, Agence France Presse, Associated Press Worldstream, Facts on File, the New York Times, Google news (except for entertainment, sports and strictly economic news) and Africa News (Leetaru & Schrodt, 2013). This database has been leveraged by various types of research that include academic studies, published books, talks and news analysis of insights on topics such as CSR (Odziemkowska & Henisz, 2016), the United States policy on gun control (Bump, 2018), the palm oil industry (Leetaru & Thoumi, 2017) and the civil unrest in the Arab Spring (Wu & Gerber, 2017).

Content analysis is performed in three steps: first, it is determined using text analytics whether the content of a news article is related to CSR; next, results from the first step are validated through content analysis of annual reports according to the definition of CSR activities; and finally, it is determined whether any SGX-listed firms are mentioned together in the same article to deduce connections between listed firms in their CSR activities. The results of this research spanning two fiscal years ("FY") of 2015 and 2016 indicate that online news media, supplemented with content analysis of the firm's annual report, is a viable source of data for assessment of a firm's prominence in CSR activities. The network graph (Albert & Barabasi, 2002; Brandes & Erlebach, 2005; Wasserman & Faust, 1994) highlights key firm(s) that are central to the web of CSR activities and can also display the potential interactions between firms during such CSR activities or potential avenues for future collaboration (Cortado et al., 2016).

This paper consists of six sections. This introduction is followed by a discussion of the existing literature related to this study; the methodology used; the presentation of the results; a discussion of the findings with an analysis of the previous research and including the implications, limitations and future research opportunities; and finally, the conclusion.

LITERATURE REVIEW

There are generally two methods of assessing CSR (Cochran & Wood, 1984), namely, through a reputation index in which firms are appraised according to one or more criteria of CSR or through content analysis that qualitatively or quantitatively apprises the degree to which CSR activities are reported in a firm's publications.

REPUTATION INDEX

The former method of the reputation index summarises the key components of firms' CSR activities and is internally uniform, as the same criteria are used to assess each firm by an observer. However, the subjective nature of the ranking may result in significant variation when a firm is appraised by a different observer (Cochran & Wood, 1984, p.43). The Council of Economic Priorities ("CEP") developed the first reputation index in the late 1960s to early 1970s, in which 24 firms in the pulp and paper industry were ranked according to their pollution control performance (Council of Economic Priorities, 1971). Currently, prominent reputation indexes include the Dow Jones Sustainability Index, the FTSE4Good Index and the MSCI ESG ("Environmental, Social and Governance") rating. Even so, these indexes mostly focus on stock markets of the United States, Europe, the United Kingdom and Japan, and little is known about the CSR rankings for the Southeast Asian market, including Singapore. Thus, content analysis has to be relied on in assessing the CSR activities of SGX-listed firms.

CONTENT ANALYSIS OF SELF-REPORTED SOURCES

The latter method of content analysis depends on a subjective selection of variables, and compared to using the reputation index, it is a more mechanical technique. The analysis may entail observing whether a variable was discussed in the publication, either qualitatively or quantitatively, or counting a few items. Bowman and Haire (1975) published the first study that applied content analysis to the food processing industry, whereby an index was established according to the number of lines dedicated to CSR in the firm's annual report. Numerous other studies

followed suit (Abbott & Monsen, 1979; Anderson & Frankle, 1980; Bosetti, 2018; Gering, 2015; Hsieh & Shannon, 2005; Ingram, 1978; Preston, 1978), relying on the studies by Beresford (1973, 1975, 1976). However, in addition to the subjective nature of variable selection, the analysis of CSR content merely indicates what the firm professes to do rather than actual practice.

In addition to analysing firms' annual reports or sustainability reports, studies have also leveraged content published on firms' websites to assess their CSR activities. This channel is becoming increasingly popular for CSR information disclosure, as firms can publish comprehensive updated information quickly at reduced cost, and the information is readily available around the clock to diverse stakeholders (Beattie & Pratt, 2003; Khan & Ismail, 2012; Oyelere & Kuruppu, 2016). The corporate website is increasingly becoming the medium of choice for self-representation (Bosetti, 2018; Vilar & Simão, 2015; Wanderley et al., 2008), and, except for the annual report, is replacing the conventional corporate communication media (Oyelere & Kuruppu, 2016; Pollach, 2003). Websites may even supersede annual reports due to the less timely provision of information by the latter according to the fiscal year reporting cycle (Aly et al., 2010; Hunter and Bansal, 2007; Lambin, 2014; Xiao et al., 2004). From a researcher's perspective, the communication medium provides a company-approved viewpoint on CSR (Bondy et al., 2004) and allows analysis of CSR remotely for firms in several countries (Chapple & Moon, 2005).

De Grosbois (2012) assessed the CSR practices of the top 150 hotel companies using content and reports published on their websites in the summer of 2010. Wanderley et al. (2008) examined the website features used by the top 50 profitable American businesses from the Fortune 500 as of 2009 in conveying their CSR programmes to various stakeholders. Chapple and Moon (2005) analysed CSR reporting on websites of 50 firms in seven Asian countries, regarding as CSR any company initiatives, policies, and codes with positive impact or stakeholder interaction.

Even so, a crucial limitation of self-reporting of CSR initiatives by the respective companies is that it may not be reflective of actual CSR policies and practice (Cochran & Wood, 1984, p.44). The firm may either exaggerate the CSR practice and performance or underreport it. Increasingly, CSR may be leveraged on as a marketing and reputational branding strategy (Adams et al., 1998; Hooghiemstra, 2000), which may result in embellishment of the firm's actual practices. On the other hand, companies may underreport their CSR efforts if these have been part of their daily operations or if components of CSR are reported inconspicuously.

CONTENT ANALYSIS OF NEWS SOURCES

Cochran and Wood (1984, p.44) posit that self-reporting by companies has lower credibility than that of media coverage. The news media is perceived as a nonpartisan watchdog of firms' activities with the public's interests at heart; thus, it plays a major role in shaping public discussions on CSR (Wang, 2007; Zhang & Swanson, 2006). Studies have largely focused on how the tone and framing of CSR activities by the media have influenced the public's perceptions of firms' CSR activities. The evolution of Chinese firms' rationale in engaging in CSR was explored by Liu et al. (2011) based on content analysis of 19 major Chinese newspapers published in the mainland China. Jain and De Moya (2017) examined the approach of Indian firms through content analysis of two major local newspapers and the respective corporate websites. However, research that utilises content analysis of news instead of examining the tone and framing of articles on CSR to gauge the CSR prominence of firms has been sparse.

COLLABORATIVE NETWORKS

Literature on network ties has examined the benefits of social networks and their means of exerting indirect influence. A firm's connections and standing within a network (Albert & Barabasi, 2002; Brandes & Erlebach, 2005; Wasserman & Faust, 1994) hint at the firm's ability to influence others (Cortado et al., 2016; Henisz, 2013), as demonstrated by the analysis of NGOs by Murdie (2014), in which the more central NGOs (i.e., those with a high betweenness centrality) in the international human rights NGO network are involved in more advocacy. Furthermore, a party outside of a social network may influence a firm in the said network by building cooperative relationships with a party that can influence that firm's behaviour (Gargiulo, 1993; Keck & Sikkink, 1999). Hence, understanding networks and

standing of firms in the network is beneficial in the CSR context for identifying potential "influencer" firms. Odziemkowska and Henisz (2016) leveraged the GDELT dataset to show how larger networks of organisations, individuals, and environmental and social stakeholders positively affected CSR activities of firms across 42 countries. In this research, GDELT data will be used to identify any collaborative networks in relation to CSR activities for firms listed on the SGX and the "influencers" in the network.

This study uses a keyword search (Liu et al., 2011; Jain & De Moya, 2017) and supplements it with text analytics to address the gap in the literature on content analysis of news to assess CSR prominence and collaborative networks of Singapore-listed firms. The content analysis of five top newspapers in China by Tang (2012) concluded that CSR reporting of firms in China was predominantly steered by the government and corporations. To limit potential promotion of agendas by local news media, the GDELT dataset is used instead of relying on a database restricted to local newspapers, as the former also contains international newspapers, resulting in a more diverse perspective.

METHODOLOGY

This study analyses CSR coverage from GDELT dataset news articles on 554 SGX-listed firms using text analytics. No distinction is made as to whether the listed firm is the initiator or the main entity of a CSR activity or a mere mention with regards to CSR in general. Hence, the scope of this research is limited to only associations of firms with CSR. The research focuses on only favourable associations with CSR activities, determined primarily using the sentiment scores indicated for each article in the GDELT database, which are stated according to a list of six core emotional dimensions (Leetaru, & Schrodt, 2013). One of these is the average sentiment of the document, ranging from -100 (extremely negative) to 0 (neutral) and +100 (extremely positive). Hence, a firm is considered to be favourably associated with CSR if it is mentioned in an article regarding CSR with a positive sentiment of greater than 0. The frequency of a firm being positively associated with CSR in online news becomes the proxy for evaluating firms' CSR prominence; a firm is considered to have high CSR prominence if it is frequently mentioned favourably in the news related to CSR. The frequency of a firm mentioned, together with another firm in the same news article on CSR, is used to understand any collaborative networks amongst firms with respect to engaging in CSR activities. Figure 1 shows the conceptual framework of this study.

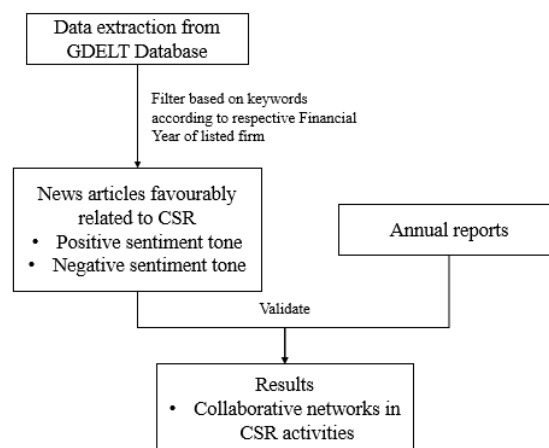FIGURE 1. Conceptual Framework of this Study

The content for each firm will be analysed over two fiscal years: 2015 and 2016. The 554 SGX-listed firms that form part of this research exclude newly listed firms that do not have full fiscal year reports, firms that have secondary listings on the SGX, firms that comply with codes set by other exchange regulators, funds, real estate investment trusts

(REITS), business trusts, firms suspended from trading, and firms that did not release any annual reports for the past three years.

GDELT DATA EXTRACTION

The GDELT database contains media-reported news articles from all over the globe in many languages and spans the period from 1979 to present. The database is updated daily using national and international media sources. Every record in the database is a news article with supplementary information that is algorithmically coded and represents persons, organisations and locations involved in the article, the URL, the source, themes and the sentiment of the news that can be negative, positive or neutral (Leetaru & Schrodt, 2013). The GDELT 2.0 and 1.0 databases are used to extract newspaper articles from 1 May 2014 to 31 May 2016. The GDELT 2.0 database contains newspaper articles from 20 February 2015 onwards and is queried using Google Big Query by specifying the date range and listed firms of interest. Articles prior to that are stored in GDELT 1.0 and are queried using Python's gdelt package (Creekmore, 2016). Only the date range may be specified, and the results return all articles within that timeframe. Articles that are tagged with SGX-listed firms are extracted based on the variable stating all organisations mentioned in the article. Data extracted from the GDELT 2.0 and 1.0 databases yield more than a million news articles.

DETERMINING CSR-RELATED ARTICLES

For each news record, the GDELT database provides all possible themes from an algorithmic content analysis of the article based on a list of over 300 different themes. The themes include various categories of economics, and environmental, social, political, crime-, health- and government-related ones. The themes could have been used to determine articles that were CSR related; however, sample checks of records in the dataset showed that using theme categories related to the environment, health and society did not accurately identify articles related to CSR. Hence, text analytics is leveraged, whereby the URLs of articles are utilised instead for content analysis of each news article.

Using the Beautiful Soup package (Richardson, 2014), the URLs of each article are crawled, and the HTML sources are parsed to read the content. Similar to content analysis of news articles by Liu et al. (2011) and Jain and De Moya (2017), news related to CSR are identified using a keyword search. The cited studies used keywords that were variations of the term CSR, such as "corporate social responsibility," "social responsibility," and "enterprise and social responsibility". In addition to the term "corporate social responsibility", this study also considered actions related to CSR based on the definition by Moon (2002) and any local CSR movements. This approach resulted in six sets of keywords − "corporate giving", "corporate social responsibility", "company of good", "volunteer", "donate" and "sustainability" – in which the Company of Good is a programme that encourages corporate giving in Singapore that was established by the National Volunteer and Philanthropy Centre (Companyofgood.sg, 2017). There are 2,360 URLs that have content with any of the six keywords specified.

Next, the URLs are matched to each of 554 firms based on

(a) the variable stating all organisations mentioned in the article,

(b) the one-year period preceding both FY2015 and FY2016 of each firm based on the date of the newspaper article, and

(c) a positive or negative sentiment of the article.

VALIDATION OF CSR-RELATED ARTICLES

Based on both positive and negative sentiments of articles, 242 URLs that can be matched to SGX-listed firms according to the timeframe of interest are then validated manually, as the keywords may have been extracted from advertisements or links in the HTML source rather than the article content. Next, duplicate URLs in this validated dataset were removed, resulting in 31 articles on favourable CSR associations for FY2015 and 34 articles for FY2016. The results for favourable CSR associations in news are further validated with content analysis of the respective firm's annual reports according to the three tenets of CSR defined by Moon (2002) of community involvement, socially responsible production processes and employee relations.

BUILDING THE NETWORK GRAPH

Using the validated articles' dataset, listed firms that are mentioned in the same article are determined. Hence, the nodes (i.e., listed firms), edges (i.e., mentions of firms together) and weights (i.e., counts of the mention) are established to build the network graph. The NetworkX package (Hagberg et al., 2008) written in Python (Python Software Foundation, 2001) is used to build the network graph (Albert & Barabasi, 2002; Brandes & Erlebach, 2005; Wasserman & Faust, 1994) and calculate the centrality matrices of degree, betweenness centrality, harmonic centrality, and degree centrality, while the visNetwork package (Almende et al., 2017) written in R (R Core team, 2013) is used to visualise the collaborative network.

RESULTS

LISTED FIRMS POSITIVELY ASSOCIATED WITH CSR IN ONLINE NEWS ARTICLES

There are 13 firms for FY2015 and nine firms for FY2016 that have favourable associations with CSR in news articles using both positive and negative sentiments. The annual reports were next searched for any CSR goals developed and the means utilised to attain those goals according to the three defined CSR tenets. According to the annual report content analysis, all firms with favourable CSR associations in news articles in FY2015 and FY2016 provide in their annual reports the details on CSR goals and the relevant CSR activities they were engaged in.

Table 1 provides the details of the annual report content analysis for listed firms favourably associated with CSR activities in FY2015 and FY2016.

NETWORK GRAPH AND CENTRALITY MATRICES

In building the network graph, firms are represented as nodes of the graph, and an edge represent a co-mention of one firm with another firm. The weight of an edge is the number of times that the firms are co-mentioned in the same article on CSR.

Out of the 13 firms with favourable CSR associations for FY2015, only 10 of them are mentioned in the same article along with one or more other listed firms (Figure 2). Furthermore, all nine firms are mentioned in the same article along with one or more other listed firms in FY2016 (Figure 3). The centrality matrices of degree[1], degree centrality[1], harmonic centrality[2] and betweenness centrality[3] for each of the firms in the network graph (Albert & Barabasi, 2002; Brandes & Erlebach, 2005; Wasserman & Faust, 1994) for FY2015 and FY2016 are summarised in Table 2 and 3, respectively.

TABLE 1. Annual report content analysis for listed firms favourably associated with CSR activities in news

Firm	FY2015		FY2016	
	Has a CSR goal in the annual report	Has three tenets of CSR activities in the annual report	Has a CSR goal in the annual report	Has three tenets of CSR activities in the annual report
Banyan Tree Holdings	Yes	Yes		
Capitaland	Yes	Yes		
City Developments	Yes	Yes	Yes	Yes
DBS Group Holdings	Yes	Yes		
Global Logistic Properties			Yes	Yes
Keppel Corp	Yes	Yes	Yes	Yes
Libra Group	Yes	Yes		
Olam International	Yes	Yes		
Sembcorp Industries	Yes	Yes		
Singapore Airlines			Yes	Yes
Singapore Exchange	Yes	Yes	Yes	Yes
Singapore Press Holdings	Yes	Yes	Yes	Yes
Singapore Telecommunications	Yes	Yes	Yes	Yes
Starhub	Yes	Yes	Yes	Yes
United Overseas Bank	Yes	Yes		
Wilmar International			Yes	Yes

Note: This firm was negatively associated with social giving in an article dated 2 May 2014.

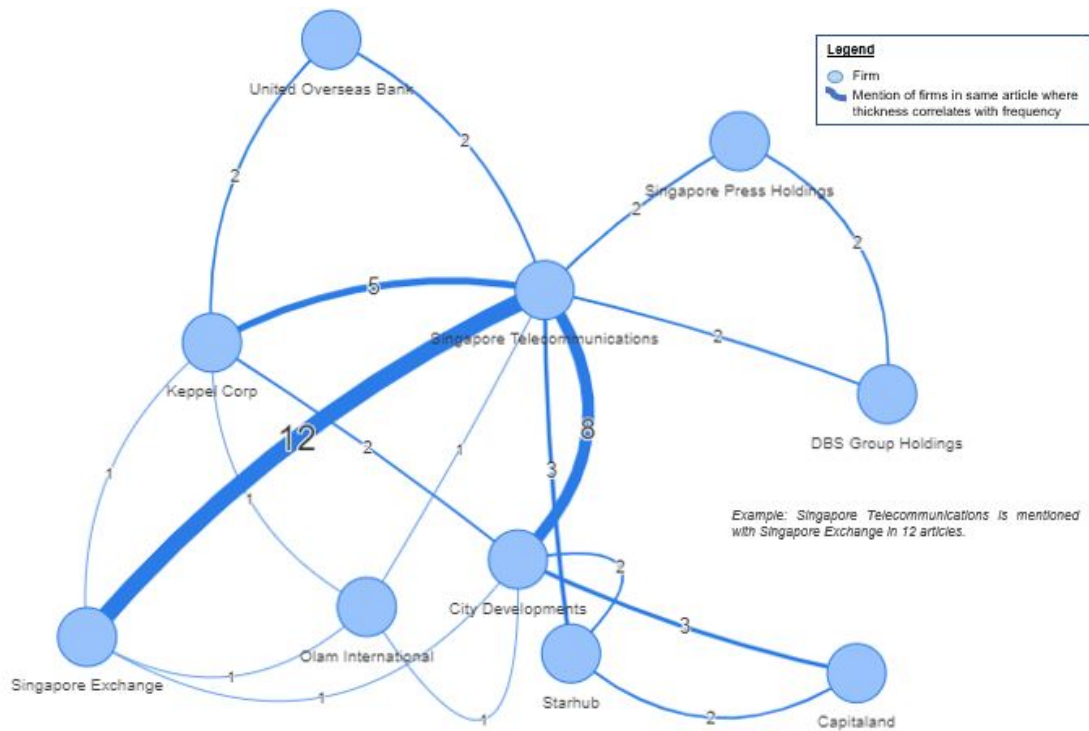FIGURE 2. Network graph of listed firms co-mentioned in news on CSR in FY2015

FIGURE 3. Network graph of listed firms co-mentioned in news on CSR in FY2016
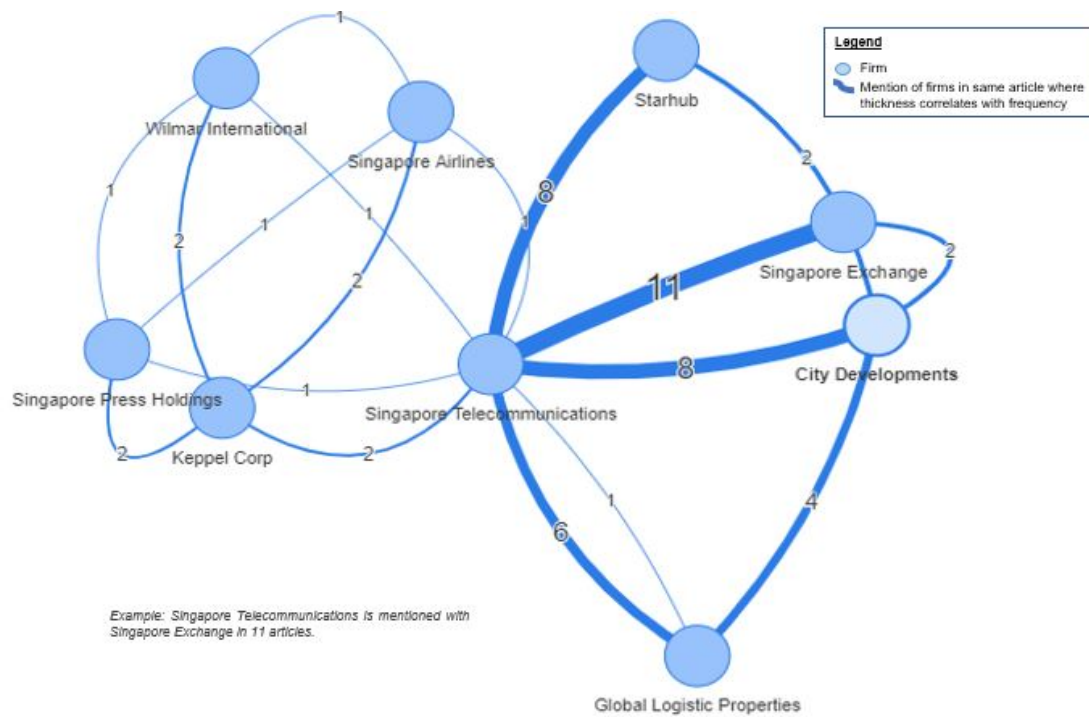
TABLE 2. Centrality matrices for the network graph of listed firms co-mentioned in articles on CSR in FY2015

Firm	Degree[1]	Degree centrality[1]	Harmonic centrality[2]	Betweenness centrality[3]
Singapore Press Hldgs	2	0.222	5.333	0
Capitaland	2	0.222	5	0
United Overseas Bank	2	0.222	5.333	0
DBS Group Hldgs	2	0.222	5.333	0
Starhub	3	0.333	6	0.051
Olam International	4	0.444	6.5	0
Singapore Exchange	4	0.444	6.5	0
Keppel Corp	5	0.556	7	0.051
City Developments	6	0.667	7.5	0.185
Singapore Telecommunications	8	0.889	8.5	0.519

TABLE 3. Centrality matrices for the network graph of listed firms co-mentioned in articles on CSR in FY2016

Firm	Degree[1]	Degree centrality[1]	Harmonic centrality[2]	Betweenness centrality[3]
Global Logistic Properties	2	0.25	5	0
Singapore Exchange	2	0.25	5	0
Starhub	2	0.25	5	0
Wilmar International	4	0.5	6	0
Keppel Corp	4	0.5	6	0
Singapore Airlines	4	0.5	6	0
Singapore Press Holdings	4	0.5	6	0
City Developments	4	0.5	6	0.054
Singapore Telecommunications	8	1	8	0.625

DISCUSSION

This research provides a viable alternative method for assessing the CSR prominence of firms using the frequency of mentions in CSR-related news articles. As in the case of earlier research, CSR-related news articles can be identified using keyword searches of news content (Liu et al., 2011; Jain & De Moya, 2017). Selecting firms mentioned in CSR-related news and validating the selection using content analysis of annual reports did not identify any firms in which the CSR associations could not be verified against self-reported practices. All SGX-listed firms favourably associated with CSR activities in the news have CSR goals and are characterised by all three tenets of CSR activities designed to achieve such goals. Hence, the favourable news association of firms with CSR activities may be a reasonable indicator of a firm's engagement and prominence in CSR.

Nevertheless, the lack of firms' news associations with CSR should not indicate firms' lack of engagement in CSR, as news coverage is generally influenced by the principles of newsworthiness that includes the prominence of a particular firm, event or scenario (Itule & Anderson, 1994; Shoemaker & Reese, 1996; Yopp et al., 2010). Accordingly, firms may get more coverage if they are known for their CSR activities, especially when they deviate from their CSR goals (Morsing & Schultz, 2006). Conversely, a lack of CSR media coverage of a firm may be due to the lack of prominence.

There were 47 news articles characterised by favourable associations with CSR in FY2015 and 48 articles in FY2016 for SGX-listed firms. This small volume of CSR-related news may impede the use of news articles as a tool for assessing CSR prominence; reviewing the newsworthiness of CSR may hint at whether this alternative method may become increasingly viable in the future. The literature on CSR news coverage in Europe and the United States shows a burgeoning increase over the past century (Hamilton, 2003; Lee & Carroll, 2011) – with more coverage in Europe than in the United States – and suggests CSR's increasing newsworthiness. Similar literature in the Asian context, especially that of Singapore, is lacking. However, if the trend of CSR newsworthiness in Singapore was to follow that of Europe and the United States, albeit at a different pace, news articles on CSR may be a progressively useful tool.

Interestingly, there are firms that have favourable associations with CSR activities, but the sentiment of the news articles is negative. There was one such firm in FY2015 and six firms in FY2016, with two of these firms having other CSR-related articles with positive sentiment as well (Figure 4). The literature on sentiments of CSR-related news articles shows that favourable CSR associations of firms mostly correspond to news articles' positive sentiment in the United States (Zhang & Swanson, 2006) and in Europe (Buhr & Grafström, 2007). Again, the literature for the Asian region is lacking and does not explain the sentiment of news articles on the SGX-listed firms. From the outset, the stance of the media seems to mirror that of the United States and Europe, in which most of the CSR articles express positive sentiment (98% in FY2015 and 88% in FY2016). Hence, the sentiment of news appears not to be a good indicator of whether the CSR news association of a firm is favourable, as the sentiment only expresses the attitude of the reporter or the public towards CSR. A firm may be favourably associated with CSR in a news article that nonetheless may have a negative sentiment.
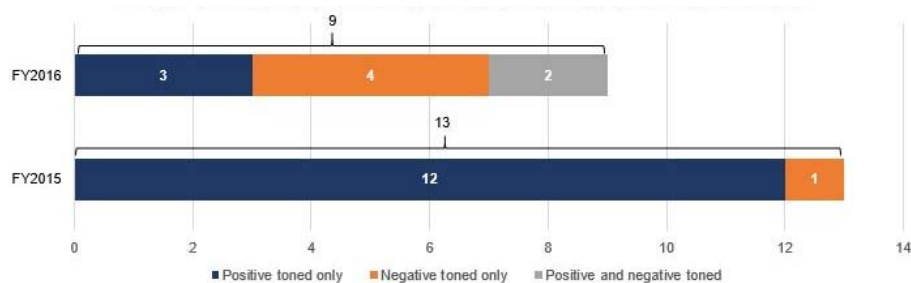

FIGURE 4. Number of Firms Favourably Associated with CSR in the News

In the results for both FY2015 and FY2016, the top two firms, according to all measures of degree[1], degree centrality[1], harmonic centrality[2] and betweenness centrality[3] (Albert & Barabasi, 2002; Brandes and Erlebach, 2005; Wasserman & Faust, 1994), are Singapore Telecommunications and City Developments. Hence, these firms may be regarded as highly connected to and influential on other firms with respect to CSR, as they may be involved in similar types of CSR activities, have similar objectives for CSR or be co-partners in the same CSR event since they were co-mentioned in the same news article on CSR. It may be helpful for nonprofit organisations that are engaged in CSR activities to understand how firms are connected and the extent of such connections. By understanding such connections better, nonprofit organisations may focus their fundraising efforts on high-centrality firms, as they may influence other listed firms to participate in the same or similar CSR activities (Henisz, 2013; Murdie, 2014).

IMPLICATIONS

In addition to the content analysis of news articles in terms of framing and tone regarding firms' CSR activities, news articles are also a reasonable indicator of firms' CSR prominence based on the frequency of favourable associations in news articles. Such an approach towards examining CSR in media coverage may provide useful implications for public relations practitioners, reputation indexes, nonprofit organisations and researchers.

Studies have frequently connected CSR with favourable corporate reputation and possible ability to play a pivotal role in managing stakeholders (Brammer & Millington, 2005; Dincer Atli, 2016; Hsu, 2012; Melo & Garrido-Morgado, 2012). The results of this research allow firms to compare their frequency of mentions in favourable news coverage related to CSR against their CSR efforts. Wartick (1992, p.44-45) posited that the amount of media coverage was significantly associated with a firm's reputation for firms with good or average reputation, whilst the sentiment of media coverage was significantly associated with a firm's reputation for firms with poor reputation. Hence, using this research method, firms may assess if any change in their CSR efforts has increased their favourable media coverage regarding CSR or media coverage of CSR with a positive sentiment and, in tandem, improved their corporate reputations.

Next, current reputation indexes, such as the Dow Jones Sustainability Index, the FTSE4Good Index and MSCI ESG ratings, similarly to the content analysis method of CSR assessment, rely on self-reporting by the respective firms. Cochran and Wood (1984, p.44) postulated that a crucial limitation of self-reporting of CSR initiatives by the respective company is that it may not be reflective of actual CSR policies and practice, whilst Carroll (2011, p.424) posited that media coverage was more credible than self-reporting. Hence, the above indexes may consider incorporating this study's method of assessing a firm's CSR prominence through favourable associations in news coverage to account for a third-party perspective on the firm's CSR practices.

Furthermore, nonprofit organisations may use this research method and its by-product of collaborative networks when firms engage in CSR activities to understand high "influencer" firms. Nonprofit organisations may extend the use of media coverage as a data source complementary to their own internal data on donors, in addition to including information on the type of CSR activities in the network graph. The results may allow such organisations to understand their donors better and improve their fundraising efforts with donors.

Lastly, this research expands on previous studies that examined CSR news in the Singapore context and the utilisation of news media as a tool for assessing CSR prominence of firms. Research has mostly focused on the framing and tone of news coverage of a firm's CSR activities rather than evaluation of firms' CSR prominence. This research warrants further investigation, as it offers a more automated and scalable methodology by leveraging text analytics of news articles rather than manual perusal of corporate publications and an alternative perspective on how news coverage can be used to assess CSR of firms.

LIMITATIONS

The limitations of this research should be considered when interpreting the results. First, the GDELT database is coded using the Textual Analysis by Augmented Replacement Instructions (TABARI) system, and some errors or inaccuracies may arise due to this coding system. For instance, an online news article known for its CSR content and mentions of SGX-listed firms were checked against the GDELT data. However, three SGX-listed firms mentioned in the article were not listed in the GDELT data variable that listed all organisations mentioned in the article. Hence, there may be other such instances of GDELT data being inaccurately coded, and the results for the volume of articles on firms favourably associated with CSR and the collaborative network could potentially be wider.

Second, news articles on community events sponsored by a firm as part of its CSR may only cover details of the event and exclude details of the sponsorship. Thus, such articles would not be identified using the keyword search. Accordingly, the six keywords used to extract relevant articles on CSR may not be all-encompassing. More knowledge and research on articles regarding CSR are required to increase the robustness of this technique. Furthermore, the keywords detected in the article may have appeared in the advertisements or links in the online article page. Hence, human validation is required to ensure that the articles highlighted indeed contain CSR-related content.

Finally, some of the HTML content could not be assessed, as there were errors such as connection timeouts and connection errors (Reitz, 2018). There were 4,876 such URLs for which Python's Beautiful Soup package (Richardson, 2014) was unable to retrieve the HTML content and parse the content to check for the six keywords.

FUTURE RESEARCH

This study's limitations may be overcome, and the results may be extended in future studies. First, the accuracy of determining articles with favourable CSR associations and the automation of this process may be improved using text classification. This is a supervised learning method for text analytics whereby a model is trained to classify favourable CSR associations in news articles and non-CSR news using two different datasets on the two types of news articles. There are now specialised sources that report on CSR, such as CSRwire (www.csrwire.com) and Ethical Performance (www.ethicalperformance.com), that can be used as the training dataset for CSR-related news. Hence, the resulting method for identifying CSR-related news would require less human validation.

Next, this research only focuses on listed firms in Singapore and can be extended to non-listed firms. The study can also be extended to other firms in the Southeast Asia, and a comparison may be made across borders. Similar to Chapple and Moon (2005) who analysed website reporting on CSR of 50 firms in seven Asian countries, future studies may explore the differences in CSR media coverage of firms within Southeast Asia. Since news in most Southeast Asian countries are reported in the respective native tongues, the local languages would have to be accounted for when parsing local news media.

Lastly, with an alternative source for firm's CSR performance measurement in Singapore, the results can be refined and subsequently used to study relationships with other factors interwoven with CSR, such as corporate governance. Khan (2010) concluded that private commercial banks' CSR disclosures in Bangladesh were significantly related with corporate governance elements of presence of non-executive directors and individuals with foreign nationalities on the Board of Directors. Similarly, the relationship between corporate governance elements and positive CSR associations of firms in CSR news coverage may be explored further in the Singaporean context. Elements of corporate governance and the corporate governance index established for SGX-listed firms (the Singapore Governance Transparency Index) can be analysed against the CSR performance measure to understand any significant relationships that exist between them.

CONCLUSIONS

This study examines whether the content analysis of news articles using text analytics is a viable method for assessing the CSR prominence of Singapore-listed firms. The results, validated against the annual reports of the respective firms, demonstrate how news media can be a proxy for assessing firms' CSR prominence, and the text analytics obtained for GDELT data leveraged in this research offer a more automated and scalable alternative. There were few news articles with favourable associations with CSR for SGX-listed firms in both FY2015 and FY2016; however, this method of determining CSR-related news could be further refined to yield more results. As exemplified by trends over the past century, CSR is becoming increasingly newsworthy, and there may potentially be increased news coverage in the future for more meaningful assessment of firms' CSR prominence using this approach. The results of this research provide a glimpse into how the news can be used to assess CSR prominence and how collaborative networks can lead to a better understanding of the relationship between firms in the context of engaging in CSR. The implications of this research to further refine and expand CSR assessment to other geographical areas and organisation types apply similarly to both practitioners and those in academia.

NOTES

1   Degree and degree centrality measure the connectedness of a firm to others. A higher degree and degree centrality (ranging from 0 to 1) measure a firm's centrality and power potential. Firms that have more ties to other firms may be at an advantage in that, through the many ties, they may have alternative ways of satisfying their needs, and, hence, are less dependent on others. Given their many ties, these firms may also act as third parties and dealmakers in transactions among others.
2   Harmonic centrality measures a firm's closeness to others and accounts for the indirect ties of a firm to other firms instead of merely its direct neighbours (i.e., how connected a firm is to the social network as a whole). A higher harmonic centrality indicates an increased closeness of the firm to all other firms in the business network.
3   Betweenness centrality measures the importance of the firm as a middleman. A higher betweenness centrality (ranging from 0 to 1) reflects the increased influence of the firm within the business network, as it has control over information passed between others. A removal of such firms from the network will disrupt communications between other vertices the most because such firms belong to the largest number of paths followed by messages.

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