The dynamics of value propositions through social media engagement in maritime transport networks: Maersk vs Mediterranean Shipping Company

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Abstract

Purpose – This study explores the levels of Facebook engagement of the two largest Europe-based shipping lines, Maersk and Mediterranean Shipping Company (MSC), to discover the marketing orientation of the topics advertised and to ascertain whether they tend to be about brand recognition, new transport services, or value propositions for stakeholders.

Design/methodology/approach – The Facebook posts of Maersk and MSC were analysed using social media text mining and social network analysis (SNA); in- and out-degree centrality analysis was performed to determine the key terms in their posts. NetMiner software was used to collect the respective data on Maersk and MSC. The inquiry period was set between May 2020 and February 2021.

Findings – The results indicated a divergence in their post contents, with higher engagement and a wider, more active follower base for MSC than for Maersk. Maersk primarily posts about logistics services and supply chain solutions. MSC communicates about new and large container vessels. Both companies seek greater brand recognition and information sharing through social media.

Originality/value – These results can be used by the stakeholders to evaluate whether Maersk and MSC truly deliver on their respective value propositions communicated online through their social media engagement. It can also help Maersk and MSC gauge the level of effectiveness of their communication with stakeholders and modify their digital engagement strategy accordingly.

Keywords Maritime logistics, Maersk, Mediterranean shipping company, Social media, Text mining, Social network analysis

Paper type Research paper

1. Introduction

The shipping industry is currently facing a prolonged period of change. Due to the long-lasting conditions of overcapacity and low demand, shipping lines have been struggling to make profits in the past few years. The COVID-19 pandemic has further weakened the market position of shipping companies, accelerating drastic changes in their operational (e.g. blank sailing at several routes to maintain freight rates), marketing and strategic behaviour and financial implications (Notteboom *et al.*, 2021). Under such circumstances, shipping companies must ensure the retention of their current customers through timely and efficient delivery of cargo, wherever required. Moreover, in this new economy, shipping lines must communicate the reliability of their services in a speedy and effective manner. Therefore, the maritime industry is starting to embrace a digital transformation, which is set to create new digital business models and practices across supply chains (Lambrou *et al.*, 2019) and increase the social value of its businesses (Colbert *et al.*, 2016; Fitzgerald *et al.*, 2014). Similarly, the use of social media as a communication tool has increased the speed and reach of transport providers' information channels.

As traditional marketing is primarily focussed on a firm's customer base rather than its products or services, its basic principle is to identify and satisfy customers' needs (Kotler, 2003). Therefore, in the digital era, the shift from offline to online advertising is considered a crucial factor affecting the communication of firms' value proposition to their customers. Digital advertising enables firms to deliver rapid, up-to-date information with effectiveness, which can empower customers, improve business practices and strengthen customer relations (Lam *et al.*, 2016). Within the shipping sector, communication is pivotal to strengthen elements such as brand recognition (new ships, new services, quality of services and popularity), information sharing (larger or newer ships, new services), public relations (environmental initiatives to reduce emissions) or collaborative work and sales support (Kaplan and Haenlein, 2010). The use of social media is considered a key element in firms' marketing communication and must be included in management practices for operational, tactical and strategic improvements (Plowman and Wilson, 2018).

This study explores the levels of Facebook engagement for two ocean carriers—Maersk and Mediterranean Shipping Company (MSC). Social networking websites such as Facebook facilitate interactive communication between the administrator and the users in the form of comments, posts, pictures and online networking (Salloum *et al.*, 2017). Facebook was selected in this study as both shipping lines actively post messages on Facebook and Facebook provides free access to its users to capture data and as per an October 2021 report, it has around 2,895 million active users (Statista, 2021).

Despite the availability of ample opportunities for interaction between the Facebook page administrators and its users, it was decided to apply text mining in this study, focussing the analysis solely on the posts by the two shipping lines and excluding any comments posted by the users. The rationale for examining only the messages delivered by the shipping lines was that including those from the general public and non-experts may bias the research findings.

This study uses text mining and social network analysis (SNA) to investigate the network of posts and determine the key terms required for communicating the firms' value proposition. Maersk and MSC were selected for the analysis in this study for two main reasons. First, Maersk and MSC rank first and second, respectively, in terms of fleet capacity (measured in deadweight tons) and are both competitors in several shipping lanes as well as cooperating players within the same ocean alliance (the 2 M alliance). Therefore, it is worthwhile to investigate whether the value propositions they communicate via social media are divergent or convergent and in line with their respective corporate strategies. Second, both Maersk and MSC have undergone a radical business transformation and are currently aiming for recognition as global logistics operators that offer door-to-door services to their customers (D'agostini *et al.*, 2019). It is important to explore whether their social media content seeks to create brand recognition and value propositions or to maintain relationships with their stakeholders. These research questions can provide a deeper understanding of the evolving communication strategies of Maersk and MSC and unravel the dynamics of the value propositions they intend to convey to their customers and social media followers. Furthermore, the use of text mining and SNA to evaluate their Facebook posts provides a new avenue to draw managerial implications regarding the digital engagement behaviours of the two largest shipping lines worldwide.

This study attempts to answer the following research questions:

(1) What are the main topics advertised on Facebook by the two shipping lines? From a logistics viewpoint, are they oriented towards enhancing brand recognition, marketing new services or strengthening relationships with their stakeholders?

(2) What are the key terms that could emerge from the network of their Facebook posts? Do these terms convey any specific message to their users or followers?

This study is organised as follows. Section 1.1 introduces the theoretical background and the research questions. Sections 2 and 3 address the research design and the results, respectively and Section 4 concludes the paper with a discussion of the study's implications and scope for future research.

1.1 Theoretical background

1.1.1 Literature review on social media engagement. Social media has had a profound effect on how people and corporations communicate and receive information (Gottfried and Shearer, 2016). It offers a new and efficient way to reach out to the target customer segments (Nadaraja and Yazdanifard, 2013). A recent study by Foux (2006) revealed that social media is perceived as a more trustworthy source of information compared with traditional marketing. Presently, while the social media presence and engagement of most firms is rather erratic, for some firms, it has become the primary or even the sole platform to connect with customers (Baird and Parasnis, 2011); this trend of adoption is likely to continue as suggested by past studies (Harris and Rae, 2009; Weinberg and Pehlivan, 2011). According to Chi (2011), social media "offers a personal channel and currency for user-centred networking and social interaction". Kaplan and Haenlein (2010) described it as "a group of Internet based applications that build on the ideological and technological foundations of Web 2.0 and allow the creation and exchange of user-generated content". However, Chaffey (2007) suggested a broader definition of social media from the perspective of digital advertising, describing it as "consumers" interactions with a brand to strengthen their emotional, psychological or physical investments'.

The incorporation of social media into a firm's marketing activities has several advantages. Schniederjans *et al.* (2013) suggested that the enhancement of brand recognition via social media could lead to an improvement in the firm's financial performance. Hollebeek *et al.* (2014) found that engagement in social media could increase consumers' brand involvement, connection and their brand usage intent. In terms of brand content, digital advertising is mostly done via social media by creating blogs and posts on platforms such as Twitter, Facebook, YouTube and Instagram.

From a research standpoint, a major challenge in investigating a firm's social media engagement is the large, unstructured data that need to be analysed. Therefore, text mining has been widely utilised by researchers to identify useful models, trends or patterns from unstructured textual data such as text files, messages and emails (Abdous and He, 2011; Lin *et al.*, 2009). Text mining is a powerful tool that can systematically extract, manage and integrate knowledge from texts (Hassani *et al.*, 2020) and is particularly suited for studies using social media data. The technique has been applied to social media data to varied ends and across different disciplines, including marketing (He *et al.*, 2013), risk management (Zielinski *et al.*, 2013), production planning (Isah *et al.*, 2014; Jeong *et al.*, 2019) and digital marketing (Saxena *et al.*, 2018).

Using text mining to analyse an organisation's social media posts is useful for several reasons. First, social media posts are network-rich texts because both the organisation and the user can equally interact and contribute to the text content (Aggarwal and Wang, 2011). The effectiveness of an organisation's engagement on social media can be easily assessed via quantitative tools such as the number of likes, comments and views of the users. Second, social media has become the fastest and the most updated tool for information sharing; therefore, it is a reliable source of fresh data, which can be analysed through text mining.

In this study, after the application of text mining on social media data, SNA was performed to identify the central topics posted by Maersk and MSC. Unlike social media, which represents a "medium to promote and support the communication between users" (Pivec and

Macek, 2019), social networks are a set of "relations (ties) among individuals, units or groups, and progressively used by administrators as a method of understanding the connections between and inside associations" (Monaghan *et al.*, 2017). The term "social network" was introduced by Barnes in 1954. SNA is a growing body of research utilised for analysing complex social networks in the form of a graphic display of nodes and lines (or edges) to represent the relationships amongst them (Jamali and Abolhassani, 2006). The importance of the evolving nature of the network perspective is highlighted within management research for firms that interact with each other in several forms in the business market (Gulati *et al.*, 2011). The application of SNA is found in organisational management (Tichy *et al.*, 1979), knowledge management (Parise, 2007), supply chain management (Borgatti and Li, 2009) and strategic human resources management (Hollenbeck and Jamieson, 2015). SNA has also been performed to analyse the online networks generated in several contexts such as natural disasters (Cheong and Cheong, 2011), social participation (Norman *et al.*, 2015), education (Gruzd *et al.*, 2016) and climate change (Williams *et al.*, 2015).

Overall, an organisation's performance can be improved when its relationship networks can be measured and evaluated. To this end, the advantages of utilising the SNA method include identifying the units playing central roles within an organisation, discerning specific or priority information, raising awareness about the importance of informal networks, and strengthening knowledge and communication across the organisation's channels (Serrat, 2017). Within SNA, graph theory provides an important tool to clearly visualise the structure of a network and understand its characteristics, as defined by the linkages within the network nodes (Martino and Spoto, 2006). Therefore, graph theory allows users to automatically visualise data and focus on the system itself instead of the task of drawing the graph (Pospisil *et al.*, 2015).

1.1.2 Literature review on the use of social media in the shipping industry. The shipping industry has recently started recognising the significance of engaging in social media activities to gain customers' loyalty. In recent years, several studies have explored the social media engagement of maritime companies. For instance, Baruönü and Sanri (2019) investigated the B2B social media interactions in the Turkish maritime industry and found that posts on corporate brands and promotions on special days recorded highly positive reactions from the followers. A comprehensive study by Bitiktas and Tuna (2020) investigated the social media engagement behaviour of the top 30 shipping lines. The findings suggested that the majority of shipping companies do not use social media technology and do not have a clear strategy to implement them successfully. A similar study by Surucu-Balci *et al.* (2020) investigated the characteristics of social media posts that lead to higher user engagement for four large shipping lines. The findings showed that their social media posts varied widely on engagement levels.

Amongst the world's largest shipping lines, Maersk was one of the first to embrace social media. Katona and Sarvary (2014) explored the launch and the engagement levels of Maersk's social media platforms. Specifically, they investigated the challenges in terms of the organisational process and the integration between its social media operations and marketing activities. Agerdal-Hjermind (2014), based on a study on Maersk, contended that social media is driven by people rather than technology, indicating that to successfully implement social media, there is a need for a systematic learning strategy with a well-defined purpose and a primary focus on identifying the relationships that it could create.

Unlike previous studies that focussed on either a single or multiple randomly selected shipping lines, this study compares the social media content and engagement of the two largest shipping lines, which are both fiercely competitive and cooperative in some lanes under the 2 M alliance. Despite several studies that focussed on Maersk, existing literature does not conduct an in-depth comparison between Maersk and MSC and their related digital engagement. Furthermore, the originality of the study is also reflected in the use of a mixed

methodology, which combines text mining and SNA to provide a fresh perspective on social media use by shipping lines.

2. Materials and methods
This study utilises a mix of social media text mining and SNA to explore the characteristics of the digital engagement of Maersk and MSC and to understand the complex intra-network relationships of the two firms' Facebook posts. The proposed research model involves data extraction from Maersk and MSC's respective Facebook pages. Thereafter, text mining was used to derive Facebook posts and they later were ranked according to the highest reaction counts by users. The reason for ranking the posts by reaction counts lies is that a majority of Facebook users engage via reactions rather than comments (which are more time consuming) and sharing of posts. Reactions are considered a form of engagement on Facebook and the importance of reaction counts has been recently highlighted by Facebook itself as the Facebook algorithm considers these reactions as being more important than likes when deciding what posts will be shown to users (Allen, 2017).

Thereafter, the analysis only focused on the posts published by Maersk and MSC and applied a topic modelling analysis to cluster a number of key domains. Words were first filtered and an analysis unit was set for posts with a threshold of 0.5 and a word length of 2; consequently, four main topic clusters were derived. Post networks were created for each firm by calculating the spring and the degree centrality, which were finally used to draw the managerial implications of the study.

2.1 Text mining
Text mining is a technique that involves the utilisation of analytical methods to extract information from a large number of written resources. In particular, it uses algorithms and statistical analysis to reveal the hidden patterns and trends in the text (Tan, 1999). This helps to form new facts or hypotheses from the extracted information, which can be further analysed using different methods. Hence, the main advantage of text mining is to discover unknown information, or "something that no one yet knows" (Hearst, 2003). According to Hotho et al. (2005), text mining can be broadly divided into three main domains: information exchange, data mining and the knowledge discovery in databases (KDD) process. Information exchange simply involves the extraction of information from the text, while text mining requires the application of algorithms and statistical methods to find patterns; finally, KDD is a text mining process with a series of steps, including information extraction and statistical analysis. Amongst the different applications of text mining, techniques such as clustering, information extraction and link analysis have been widely used by researchers (He et al., 2012). In particular, information extraction and clustering have been used to discover hidden trends and correlations in data. For instance, clustering was used to examine e-learning literature and group sources sharing similar words (Hung, 2012). Within the maritime domain, text mining has been applied to the shipping industry. For instance, a mix of SNA, process mining and text mining was applied by Aloini et al. (2020) to assess the coordination of information exchange and, especially, export process efficiency in a mid-sized port.

This study uses an extraction and clustering technique to determine the main themes posted on social media by Maersk and MSC and to cluster them accordingly. Text mining is applied to gather data from the Facebook posts of Maersk and MSC. NetMiner software was used to collect the respective data on Maersk and MSC. The inquiry period was set between 1st May 2020 and 1st February 2021. Maersk and MSC's respective Facebook pages were searched, and a total of 277 posts were extracted (131 for Maersk and 146 for MSC). Users'

comments were not considered, and only the two shipping lines' posts were taken into account for the analysis. In the subsequent step, in order to proceed with the topic cluster analysis and degree centrality measures for SNA, the most frequent words were extracted from the two shipping lines' posts. At this stage, nouns were set as the part of speech to be extracted, whereas adjectives or verbs were discarded from the data collection. For MSC and Maersk, a total of 94 and 87 nouns, respectively, were extracted and considered for the network analysis.

2.2 Network analysis

Within a social network, individuals and organisations interact with each other through a common set of connections. Therefore, a network can be described as a complex structure made of a set of nodes linked with each other through different nodes. In this paradigm, the nodes represent individuals, groups, organisations and firms, while the ties are the different relationships amongst these actors (Giddens, 2009).

The arithmetic computation of a network is expressed as follows:

$N = \{1, 2, \ldots, n\}$ is defined as a finite set of nodes. By $g_{ij} \in \{0, 1\}$, we denote the relationship between the nodes i and j, where

$$g_{ij} = \begin{cases} 1, \text{if there is a link between } i \text{ and } j; \\ 0 \text{ otherwise} \end{cases} \tag{1}$$

Given that $g_{ij} = g_{ji.}$ A network g is defined as a set of nodes N with links between them.

$N_i(g)$ shows the neighbourhood of node i in network g, the set of nodes with which node i has a link:

$$N_j(g) = \{j \in N : g_{ij} = 1\} \tag{2}$$

The degree $d_i(g)$ of a node i in g is the number of i's neighbours in g, that is,

$$d_i(g) = |N_i(g)| \tag{3}$$

A network g is said to be regular if every node has the same number of neighbours, that is, if for some $d = \{0, 1,.., n-1\}$, $d_i(g) = d$ for each $i \in N$.

A complete network is a regular network with $d = n-1$. The empty network is a regular network with $d = 0$.

If there is a path (defined as a trail in which all nodes are distinct) between i and j in g, then the geodesic distance (the shortest path between two points) $d(i; j; g)$ between these two nodes i and j is equal to

$$d(i; j; g) \text{ is the number of links in the shortest path between } i \text{ and } j \tag{4}$$

If there is no path between i and j in g, we set $d(i; j; g) = \infty$

Next, the concept of degree centrality identifies the specific node occupying a critical position in the network. The analysis index of degree centrality was used to explore and evaluate the centrality or a node (or the number of ties directed to it) within the Facebook post contents of Maersk and MSC. The calculation of degree centrality is suitable to highlight the central role played by a specific term within a network and their importance in conveying a value proposition to the firms' social media users and followers. Additionally, the degree centrality keeps track of the degree of a node. It is mathematically expressed as follows:

$$\text{Degree centrality } C_d(j; g) = \frac{d_j(g)}{n-1} = \frac{|N_i(g)|}{n-1} \tag{5}$$

where $N_i(g)$ and $d_i(g)$ are defined in lines (2) and (3), under the condition of $0 \leq C_d(i;g) \leq 1$;

i^* is a node which attains the highest degree centrality $C_d(i^*;g)$ in g.

The degree centrality $C_d(g)$ of the network g is expressed as:

$$C_d(g) = \frac{\sum_{i=1}^{n} \left| \left| C_d(i^*;g) - C_d(i;g) \right| \right|}{max_{g^I \in G} \sum_{i=1}^{n} \left| C_d(i^*;g^I) - C_d(i;g^I) \right|} \qquad (6)$$

As the minimum degree is 1 and the maximum degree $(n-1)$, the denominator of eq. (6) is equal to $\frac{(n-2)(n-1)}{(n-1)}$, and therefore,

$$C_d(g) \frac{\sum_{i=1}^{n} \left| \left| C_d(i^*;g) - C_d(i;g) \right| \right|}{(n-2)}$$

where, $C_d(g) = 1$ if g is a star and $C_d(g) = 0$ if g is a regular network.

To measure the variability of individual centrality scores, the degree centralisation index was also calculated for Maersk and MSC. A high degree centralisation index reflects a highly centralised network; therefore, it is important to compare the relative centrality in the Facebook post network between Maersk and MSC. The degree centralisation index is computed using the following equation:

$$\text{Degree centralisation index} = \frac{\sum_{every\ node}(\max degree\ centrality - node's degree\ centrality)}{(\#nodes - 2)(\#nodes - 1)}$$

3. Results

The first research question aimed at finding the main topics advertised by Maersk and MSC and the messages conveyed to their social media followers. For this, a text mining method was first deployed and 277 posts were extracted for the period from May 2020 to February 2021. The text mining analysis for Maersk and MSC revealed that the content of the messages posted is fundamentally divergent for the two companies. Each message was summarised and categorised according to its nature (e.g. product for ship models and supply chain network/intermodal service for a new logistics service offered or advertised). Subsequent analysis revealed that Maersk's posts are mainly service-oriented and mostly focus on the supply chain network/intermodal services (container depots, distribution centres, cold chain services, new maritime connections, end-to-end logistics solutions and inland transportation). Most of the posts fell under the proposed category "Supply chain network/intermodal services" as for instance "The first ever inland container depot in Japan" (reaction counts: 1,299), "Train connectivity between the East Coast and West Coast of India" (reaction counts: 596), "An urgent cold chain requirement by a customer solved by air and intermodal transport" (reaction counts: 519), "Customer needs on end-to-end logistics solutions" (reaction counts: 420), "An Investment in a distribution centre in Duisburg, Germany"(reaction counts: 390). To a lesser extent, Maersk also had posts about its products (e.g. "Elisabeth Maersk built in 1979–1980", reaction counts 1,652) and the sustainability of its supply chain such as "An increase in sustainable rail transport services available in Germany" (reaction counts: 382).

In contrast, the content posted by MSC appears to be much more asset-oriented; a majority of posts were about vessel advertisement (Ocean brand), with particular emphasis on the recently delivered container vessels, their size and information on large container ships calling at ports. For instance, some of the post related to product advertisement (vessels) include "A video of the latest class of vessel" (reaction counts: 5,431), "MSC Sixin: The largest

ever ship to call at the port of Gioia Tauro, Italy" (reaction counts: 2,577), "An aerial tour of MSC Oscar" (reaction counts: 1,197), "MSC Sixin: The largest ever ship to call at the port of Gioia Tauro, Italy" (reaction counts: 1,003), "A record-time arrival of two record-setting container vessels, MSC Tina and Oscar, in the port of Asyaport in Turkey" (reaction counts: 710), "Ultra-large container vessel MSC Mina" (reaction counts: 686).

A post "MSC fleet of 560 vessels covering 200 routes and 500 ports of call" (reaction counts: 2,577) referred to the overall container fleet and its maritime network connectivity and was therefore categorised under "ocean network". Generally, there were not a significant number of posts referring to logistics services or supply chain solutions amongst the considered ones.

Therefore, the method above reveals divergence in the post content of Maersk and MSC. Although both lines are similar in terms of market share (Maersk 17.1%; MSC 16.0%) and fleet capacity (Maersk 4,122.511 TEU; MSC 3,855,926 TEU [TEU: twenty-foot equivalent unit]) as of December 2020 (Alphaliner, 2021), and both aim to become logistics operators offering door-to-door solutions to their customers, the content of their Facebook posts are fundamentally different. Maersk tends to communicate about its wide range of logistics services, and its posts are in line with the company's dominant market strategy of vertical integration with terminal and inland transport management. MSC almost solely focusses on its ocean leg and the size of its new fleet, and although its posts do not fully mirror its full range of logistics services, they do reflect the company's recent competitive strategy of ordering new ultra-large container ships.

Figure 1 (a) and (b) illustrate the four main topics derived from all the posts by Maersk and MSC, respectively. Out of the four topics identified for Maersk, Topic 2 (container, vessel, world and Maersk moments), mainly represented the general maritime activities of the company. Topics 1, 3 and 4 were closely interrelated with "customer" and "logistics" as the linking nodes. Topic 3 (logistics, distribution, cost and automotive supply chain) showed the importance of logistics solutions and supply chain services and was closely connected to Topic 1 (cargo, need, transport, service, time and customer) with respect to "logistics". In turn, Topic 1 showed a strong link between customer service and human resources of the corporation, represented by Topic 4 (team, manager, CEO and career).

In contrast, the topic modelling analysis for MSC depicted more connected, yet unvaried, topics. Topic 2 (ship and port/place of call) was linked by the term "TEU" to Topic 1 (photo, collection, port and view). The term "Vessel" strongly bridged Topics 1 and 3 (technology, Israel, award and UAE) and Topic 4 (container, Valencia port, Asyaport, MSC Oscar, MSC Sixin). This analysis further strengthens the orientation of MSC's social media engagement towards vessels and vessel size, and more generally, towards recognition of the Ocean brand.

The second research question was centred on the overall post networks for Maersk and MSC, and the centrality of specific terms within it. A 2D spring of the post networks was created and visualised based on the algorithm of Kamada and Kawai (1989), which interprets a graph as a system of pairs of nodes connected by edges and springs.

After generating the post networks, a degree centrality analysis was applied to gain insights on the key terms posted by Maersk and the MSC in their Facebook posts. The statistical results of the distribution of degree centrality scores are shown in Table 1. Furthermore, the networks' centralised index results revealed that MSC's index was more centralised (in-degree: 16.788%; out-degree: 13.528%) than Maersk's (in-degree: 6.463%; out-degree: 7.639%).

The degree centrality vectors for Maersk and MSC were calculated to determine the centrality of nodes in each network. A directed network was selected and in-degree and out-degree centrality were derived; in-degree centrality represents the portion of nodes adjacent to each node, whereas out-degree centrality refers to the portion of nodes opposite each node. Figure 2(a) and 2(b) illustrate the concentric degree centrality.
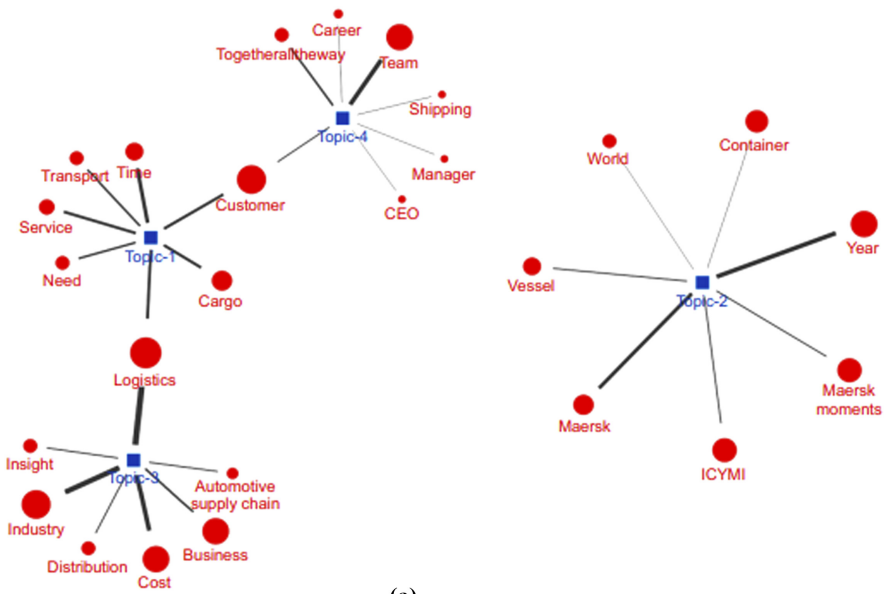
(a)
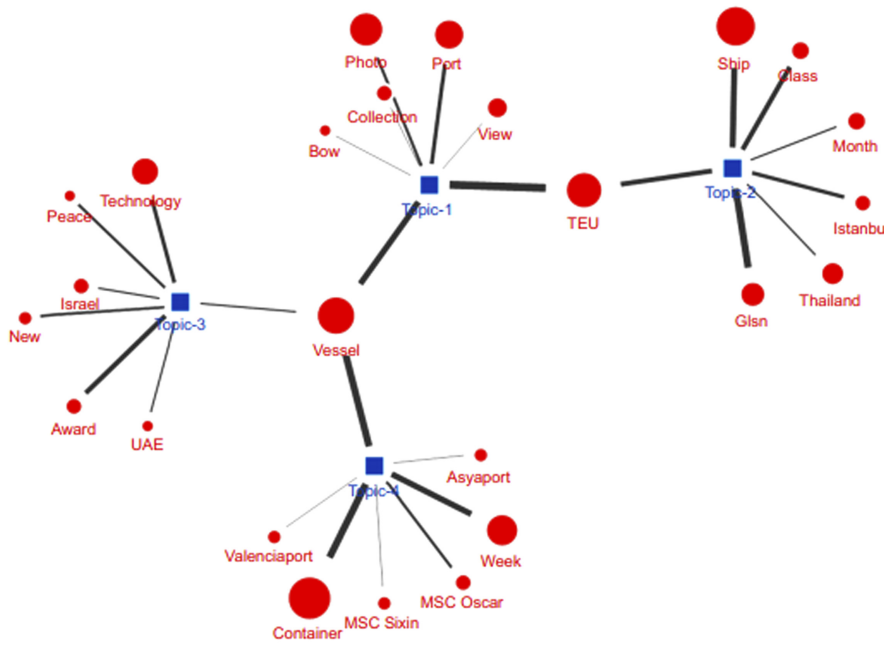
(b)

Figure 1.
The four main topics
posted by Maersk (a)
and MSC (b)

For Maersk, the highest score for in-degree centrality were reflected primarily by the terms "India" (0.081), "need" (0.069), "service" (0.058), "transport" (0.058), "customer" (0.046), and "deport" (0.046). These were the most important nodes found in the network because they play a central role in posts published by Maersk, thereby the value proposition of the company in terms of customer needs and logistics services.

The analysis for MSC determined that its overall post network is more centralised compared to that of Maersk. The terms with the highest in-degree centrality for MSC were "TEU" (0.182), "vessel" (0.150), "GLSN (0.064), "MSC Oscar" (0.043), "ship" (0.043), "Aysaport" (0.0322), "Istanbul" (0.0322), "port" (0.0322), "Thailand" (0.322), and "container" (0.0322). The two most central nodes for this company were clearly "TEU" and "Vessel", which represent the themes found in its posts. As demonstrated in the previous analysis, MSC's social media engagement is primarily vessel-centric and the content posted by it is monothematic.

4. Discussion

This study proposed a mixed methods research model, combining text mining of social media posts and SNA, to determine the content and the centrality of the terms used by Maersk and MSC to convey their value propositions to their digital followers. With an increase in firms' digital engagement, the speed with which information is exchanged has also transformed. Therefore, the aim of this study was to understand the dynamics of digital communication within the sphere of maritime logistics and to determine the online stakeholder engagement of Maersk and MSC, the largest shipping lines globally.

The first stage involved applying text mining to extract Maersk and MSC's recently published Facebook posts. In the second stage, a network analysis was used to evaluate the in-degree centrality of terms within the network. Specifically, these terms were considered as nodes within the network of posts. This analysis resulted in three main findings.

First, the study revealed that MSC showed a higher level of user engagement than Maersk for all the three categories for the top ten posts published. Considering the differences in the reaction count (Average: Maersk = 7786.1; MSC = 1,497.6), comment count (Average: Maersk = 12.9; MSC = 32.5), and share count (Average: Maersk = 61.4; MSC = 359.9), MSC has a wider and more active user base than Maersk.

Second, the analysis revealed a fundamental divergence between the content shared by Maersk and MSC. The four main topics extracted for Maersk were highly focussed on logistics services and supply chain solutions for its customers. Three of these topics were linked by the terms "Logistics" and "Customer". Unlike Maersk, MSC tended to place a higher focus on communicating about its new and large fleet container vessels. Therefore, it is argued that these findings are in line with the shipping lines' dominant marketing strategies discussed earlier. Additionally, Maersk has shifted from a diversification strategy to a

Shipping line	Measure	Value	
		In-degree centrality	Out-degree centrality
Maersk	Mean	0.018	0.018
	Standard deviation	0.016	0.017
	Min.	0	0
	Max.	0.081	0.093
MSC	Mean	0.017	0.017
	Standard deviation	0.025	0.02
	Min.	0	0
	Max.	0.183	0.151

Table 1.
Distribution of degree centrality scores for Maersk and MSC

(a)

(b)

Figure 2.
Concentric degree
centrality of Maersk (a)
and MSC (b)

differentiation strategy (D'agostini *et al.*, 2019) with the aim of becoming an integrated logistics operator. In contrast, Maersk has recently aimed to narrow its capacity gap with MSC and has started to purchase large-sized second-hand ships aggressively, which has been dubbed as a "massive buying spree" in the market (Vineyard, 2020). Wackett (2020) claimed that MSC buys "anything that floats", which is deeply reflected in their social media engagements.

Third, despite the major differences in their Facebook post content, both Maersk and MSC convey value proposition messages on social media to enhance their brand recognition and information sharing. Although their priority domains substantially differ (logistics services for Maersk and vessels for MSC), they both aim to strengthen their brand value in their key sectors in line with their respective marketing strategies.

4.1 Theoretical and managerial implications

These findings provide the following managerial and academic implications. The results can be utilised by a wide range of stakeholders to evaluate whether Maersk and MSC truly deliver on their respective value propositions communicated online through social media, or whether social media is just a means to maintain their online presence. Similarly, these firms should monitor their posts to evaluate whether their audiences are absorbing their intended messages or if they should change the focus of their posts in a different direction. Particularly, by knowing the centrality of terms in the post networks, these shipping lines can gauge the level of effectiveness of their communication with the stakeholders and modify their digital engagement strategy accordingly.

From an academic viewpoint, the findings were able to bridge an existing gap by comparing Maersk and MSC in a comprehensive manner, through the application of text mining and SNA. The two shipping lines were investigated in depth in terms of online engagement through Facebook posts, empirically examining the strategic centrality of some terms within the network of Facebook messages considered. Furthermore, there are several implications beyond digital advertising that can be extended and generalised because firms across various industries have embraced en masse the use of social media. Although the messages delivered may be different, the participation of firms in digital advertising highlights the concept of value co-creation. Customers and, more generally, stakeholders are integrated with the firm through a single platform, which allows the creation of a buyer-seller relationship. This is important for enhancing firm performance as it ensures customers' trust, network opportunities, transactional relationships and collaborative problem solving, as shown by Quinton and Wilson (2016). Similarly, the customer-centric management of social media contributes to a firm's capability of establishing efficient customer relationship management by integrating the information obtained via customer interactions. Further, social media can enhance business performance by affecting sales. Although shipping is a service-based industry, the use of social media can strongly influence the strategic sales process and information communication behaviour, which influence customer satisfaction levels. Therefore, social media strategies and their strategic deployment can help build relationships, enhance firm performance, increase sales and influence customer base at multiple levels.

4.2 Limitations and further research

Finally, several avenues for future research exist in the area of social media engagement by shipping lines. First, as this study focussed on a limited number of posts and on a single social media platform, an apparent scope for future research is to compare the change in these companies' value propositions over time and their convergence and divergence on different platforms. Second, this study involved a limited application of degree centrality directional analysis and therefore, future studies could attempt to use other methods to provide a more robust SNA. Finally, based on the findings of this study, more investigation is needed to

evaluate whether shipping lines convey a different value proposition depending upon the social media platform and related level of user engagement.

References

Abdous, M. and He, W. (2011), "Using text mining to uncover students' technology-related problems in live video streaming", *British Journal of Educational Technology*, Vol. 40 No. 5, pp. 40-49.

Agerdal-Hjermind, A. (2014), "When a shipping company creates transparency, empowerment and engagement through social media: the case of Maersk Line", in *Port-city Governance*, Editions, EMS, pp. 261-277.

Aggarwal, C. and Wang, H. (2011), "Text mining in social networks", in Aggarwal, C. (Ed.), *Social Network Data Analytics*, Springer, Boston, MA, pp. 353-378.

Allen, R. (2017), "Facebook algorithm counting reaction as more important than likes", *SmartInsights*, available at: https://www.smartinsights.com/social-media-marketing/facebook-marketing/facebook-algorithm-counting-reactions-important-likes-smartinsights-alert (accessed 3 February 2022).

Aloini, D., Benevento, E., Stefanini, A. and Zerbino, P. (2020), "Process fragmentation and port performance: merging SNA and text mining", *International Journal of Information Management*, Vol. 51, 101925.

Alphaliner (2021), "Alphaliner TOP 100", available at: https://alphaliner.axsmarine.com/PublicTop100/ (accessed 3 January 2021).

Baird, C.H. and Parasnis, G. (2011), "From social media to social customer relationship management", *Strategy and Leadership*, Vol. 39 No. 5, pp. 30-37.

Barnes, J.A. (1954), "Class and committees in a Norwegian island parish", *Human Relations*, Vol. 7 No. 1, pp. 39-58, doi: 10.1177/001872675400700102.

Baruönü, F.A. and Sanri, Ö. (2019), "Social media usage patterns of Turkish maritime businesses: a study on Facebook", *Journal of ETA Maritime Science*, Vol. 7 No. 2, pp. 165-177, doi: 10.5505/jems.2019.18189.

Bitiktas, F. and Tuna, O. (2020), "Social media usage in container shipping companies: analysis of Facebook messages", *Research in Transportation Business and Management*, Vol. 34, 100454, doi: 10.1016/j.rtbm.2020.100454.

Borgatti, S.P. and Li, X. (2009), "On social network analysis in a supply chain context", *Journal of Supply Chain Management*, Vol. 45 No. 2, pp. 5-22.

Chaffey, D. (2007), "Customer Engagement Interview with Richard Sedley of cScape", *SmartInsights*, available at: https://www.smartinsights.com/customer-engagement/customer-engagement-strategy/customer-engagement-interview-with-richard-sedley-of-cscape/ (accessed 2 October 2020).

Cheong, F. and Cheong, C. (2011), "Social media data mining: a social network analysis of tweets during the Australian 2010-2011 Australian floods", *PACIS 2011-15th Pacific Asia Conference on Information Systems: Quality Research in Pacific*, RMIT University, pp. 1-16.

Chi, H.-H. (2011), "Interactive digital advertising vs. virtual brand community: exploratory study of user motivation and social media marketing responses in Taiwan", *Journal of Interactive Advertising*, Vol. 12 No. 1, pp. 44-61, doi: 10.1080/15252019.2011.10722190.

Colbert, A., Yee, N. and George, G. (2016), "The digital workforce and the workplace of the future", *Academy of Management Journal*, Vol. 59 No. 3, pp. 731-739, doi: 10.5465/amj.2016.4003.

D'agostini, E., Nam, H.S. and Kang, S.H. (2019), "Gaining competitive advantage at sea: an overview of shipping lines' strategic decisions", *International Journal of Transportation Engineering and Technology*, Vol. 5 No. 4, pp. 74-81, doi: 10.11648/j.ijtet.20190504.12.

Fitzgerald, M., Kruschwitz, N., Bonnet, D. and Welch, M. (2014), "Embracing digital technology: a new strategic imperative", *MIT Sloan Management Review*, Vol. 55 No. 2, pp. 1-12.

Foux, G. (2006), "Consumer-generated media: get your customers involved", *Brand Strategy*, Vol. 8, pp. 38-39.

Giddens, A. (2009), *Anthony Giddens Sociology*, 6th ed., Polity Press, Cambridge.

Gottfried, J. and Shearer, E. (2016), *News Use across Social Media Platforms 2016*, Pew Research Center, available at: https://www.journalism.org/2016/05/26/news-use-across-social-media-platforms-2016/ (accessed 10 October 2020).

Gruzd, A., Paulin, D. and Haythornthwaite, C. (2016), "Analyzing social media and learning through content and social network analysis: a faceted methodological approach", *Journal of Learning Analytics*, Vol. 3 No. 3, pp. 46-71.

Gulati, R., Lavie, D. and Madhavan, R. (2011), "How do networks matter? The performance effects of interorganizational networks", *Research in Organizational Behavior*, Vol. 31, pp. 207-224.

Harris, L. and Rae, A. (2009), "Social networks: the future of marketing for small business", *Journal of Business Strategy*, Vol. 30 No. 5, pp. 24-31.

Hassani, H., Beneki, C., Unger, S., Mazinani, M.T. and Yeganegi, M.R. (2020), "Text mining in big data analytics", *Big Data and Cognitive Computing*, Vol. 4 No. 1, pp. 1-34.

He, W., Chee, T., Chong, D. and Rasnick, E. (2012), "Using bibliometrics and text mining to explore the trends of e-marketing literature from 2001 to 2010", *International Journal of Online Marketing*, Vol. 2 No. 1, pp. 16-24.

He, W., Zha, S. and Li, L. (2013), "Social media competitive analysis and text mining: a case study in the pizza industry", *International Journal of Information Management*, Vol. 33 No. 3, pp. 464-472.

Hearst, M. (2003), "What is text mining?", available at: https://www.jaist.ac.jp/~bao/MOT-Ishikawa/FurtherReadingNo1.pdf (accessed 24 September 2020).

Hollebeek, L.D., Glynn, M.S. and Brodie, R.J. (2014), "Consumer brand engagement in social media: conceptualization, scale development and validation", *Journal of Interactive Marketing*, Vol. 28 No. 2, pp. 149-165.

Hollenbeck, J.R. and Jamieson, B.B. (2015), "Human capital, social capital, and social network analysis: implications for strategic human resource management", *Academy of Management Perspectives*, Vol. 29 No. 3, pp. 370-385.

Hotho, A., Nürnberger, A. and Paaß, G. (2005), "A brief survey of text mining", *LDV Forum - GLDV Journal for Computational Linguistics and Language Technology*, Vol. 20 No. 1, pp. 19-62.

Hung, J.L. (2012), "Trends of e-learning research from 2000 to 2008: use of text mining and bibliometrics", *British Journal of Educational Technology*, Vol. 43 No. 1, pp. 5-16.

Isah, H., Trundle, P. and Neagu, D. (2014), "Social media analysis for product safety using text mining and sentiment analysis", *2014 14th UK Workshop on Computational Intelligence (UKCI)*, IEEE, pp. 1-7.

Jamali, M. and Abolhassani, H. (2006), "Different aspects of social network analysis", *2006 IEEE/WIC/ACM International Conference on Web Intelligence (WI 2006 Main Conference Proceedings)*, pp. 66-72, doi: 10.1109/WI.2006.61.

Jeong, B., Yoon, J. and Lee, J.M. (2019), "Social media mining for product planning: a product opportunity mining approach based on topic modelling and sentiment analysis", *International Journal of Information Management*, Vol. 48, pp. 280-290.

Kamada, T. and Kawai, S. (1989), "An algorithm for drawing general undirected graphs", *Information Processing Letters*, Vol. 31 No. 1, pp. 7-15.

Kaplan, A.M. and Haenlein, M. (2010), "Users of the world, unite! The challenges and opportunities of social media", *Business Horizons*, Vol. 53 No. 1, pp. 59-68, doi: 10.1016/j.bushor.2009.09.003.

Katona, Z. and Sarvary, M. (2014), "Maersk Line: B2B social media—it's communication, not marketing", *California Management Review*, Vol. 56 No. 3, pp. 142-156, doi: 10.1525/cmr.2014.56.3.142.

Kotler, P. (2003), *Marketing Insights from A to Z: 80 Concepts Every Manager Needs to Know*, John Wiley & Sons, Hoboken, NJ.

Lam, H.K., Yeung, A.C. and Cheng, T.E. (2016), "The impact of firms' social media initiatives on operational efficiency and innovativeness", *Journal of Operations Management*, Vol. 47, pp. 28-43, doi: 10.1016/j.jom.2016.06.001.

Lambrou, M., Watanabe, D. and Iida, J. (2019), "Shipping digitalization management: conceptualization, typology and antecedents", *Journal of Shipping and Trade*, Vol. 4 No. 1, pp. 1-17, doi: 10.1186/s41072-019-0052-7.

Lin, F.R., Hsieh, L.S. and Chuang, F.T. (2009), "Discovering genres of online discussion threads via text mining", *Computers and Education*, Vol. 52 No. 2, pp. 481-495.

Martino, F. and Spoto, A. (2006), "Social network analysis: a brief theoretical review and further perspectives in the study of information technology", *PsychNology Journal*, Vol. 4 No. 1, pp. 53-86.

Monaghan, S., Lavelle, J. and Gunnigle, P. (2017), "Mapping networks: exploring the utility of social network analysis in management research and practice", *Journal of Business Research*, Vol. 76, pp. 136-144.

Nadaraja, R. and Yazdanifard, R. (2013), *Social Media Marketing: Advantages and Disadvantages*, Center of Southern New Hampshire University, pp. 1-10.

Norman, H., Nordin, N., Din, R., Ally, M. and Dogan, H. (2015), "Exploring the roles of social participation in mobile social media learning: a social network analysis", *International Review of Research in Open and Distributed Learning*, Vol. 16 No. 4, pp. 205-224.

Notteboom, T., Pallis, T. and Rodrigue, J.P. (2021), "Disruptions and resilience in global container shipping and ports: the COVID-19 pandemic versus the 2008-2009 financial crisis", *Maritime Economics and Logistics*, Vol. 23 No. 2, pp. 1-32.

Parise, S. (2007), "Knowledge management and human resource development: an application in social network analysis methods", *Advances in Developing Human Resources*, Vol. 9 No. 3, pp. 359-383.

Pivec, M. and Maček, A. (2019), "Employment background influence on social media usage in the field of European project management and communication", *Journal of Business Research*, Vol. 94, pp. 280-289.

Plowman, K.D. and Wilson, C. (2018), "Strategy and tactics in strategic communication: examining their intersection with social media use", *International Journal of Strategic Communication*, Vol. 12 No. 2, pp. 125-144.

Pospisil, L., Hasal, M., Nowakova, J. and Platos, J. (2015), "Computation of Kamada–Kawai algorithm using Barzilai–Borwein method", *2015 International Conference on Intelligent Networking and Collaborative Systems*, pp. 327-333, doi: 10.1109/INCoS.2015.66.

Quinton, S. and Wilson, D. (2016), "Tensions and ties in social media networks: towards a model of understanding business relationship development and business performance enhancement through the use of LinkedIn", *Industrial Marketing Management*, Vol. 54, pp. 15-24.

Salloum, S.A., Al-Emran, M., Monem, A.A. and Shaalan, K. (2017), "A survey of text mining in social media: Facebook and twitter perspectives", *Advances in Science, Technology and Engineering Systems Journal*, Vol. 2 No. 1, pp. 127-133.

Saxena, A., Chaturvedi, K.R. and Rakesh, S. (2018), "Analysing customers reactions on social media promotional campaigns: a text-mining approach", *Paradigm*, Vol. 22 No. 1, pp. 80-99.

Schniederjans, D., Cao, E.S. and Schniederjans, M. (2013), "Enhancing financial performance with social media: an impression management perspective", *Decision Support Systems*, Vol. 55 No. 4, pp. 911-918.

Serrat, O. (2017), "Social network analysis", in *Knowledge Solutions*, Springer, Singapore, pp. 39-43, doi: 10.1007/978-981-10-0983-9_9.

Statista (2021), "Most popular social networks worldwide as of October 2021, ranked by number of active users", available at: www.statista.com/statistics/ (accessed 27 January 2022).

Surucu-Balci, E., Balci, G. and Yuen, K.F. (2020), "Social media engagement of stakeholders: a decision tree approach in container shipping", *Computers in Industry*, Vol. 115, 103152, doi: 10.1016/j.compind.2019.103152.

Tan, A.H. (1999), "Text mining: the state of the art and the challenges", *Proceedings of the PAKKD 1999 Workshop on Knowledge Discovery from Advanced Databases*, Vol. 8, pp. 65-70.

Tichy, N.M., Tushman, M.L. and Fombrun, C. (1979), "Social network analysis for organizations", *Academy of Management Review*, Vol. 4 No. 4, pp. 507-519.

Vineyard, J. (2020), "MSC, buying 'anything that floats', likely to surpass Maersk", available at: https://www.universalcargo.com/msc-buying-anything-that-floats-in-order-to-surpass/#:~:text=The%20Mediterranean%20Shipping%20Company%2C%20better,in%20the%20world%20by%20capacity.&text=Right%20now%2C%20MSC%20is%20aggressively,up%20ships%2C%20increasing%20its%20capacity (accessed 29 November 2021).

Wackett, M. (2020), "MSC on 'massive buying spree of second-hand tonnage' to build capacity", available at: https://theloadstar.com/msc-on-massive-buying-spree-of-second-hand-tonnage-to-build-capacity/#:~:text=News%20%2F%20MSC%20on%20'massive%20buying,hand%20tonnage'%20to%20build%20capacity&text=With%20the%20containership%20charter%20market,on%20its%202M%20partner%2C%20Maersk (accessed 17 November 2020).

Weinberg, B.D. and Pehlivan, E. (2011), "Social spending: managing the social mix", *Business Horizons*, Vol. 54, pp. 275-282.

Williams, H.T., McMurray, J.R., Kurz, T. and Lambert, F.H. (2015), "Network analysis reveals open forums and echo chambers in social media discussions of climate change", *Global Environmental Change*, Vol. 32, pp. 126-138.

Zielinski, A., Middleton, S.E., Tokarchuk, L.N. and Wang, X. (2013), "Social media text mining and network analysis for decision support in natural crisis management", in Comes, T., Fiedrich, F., Fortier, S., Geldermann, J. and Miller, T. (Eds), *Proceedings of the 10th International ISCRAM Conference*, Germany, May 2013, pp. 840-845.

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