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Engagement Efficiency Evaluation of Social Media Networks in Fast Food Industry

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ABSTRACT

The advent of social media networks has empowered customers to express their sentiments with far reaching consequences for companies. Recent years have seen an implosion in the use of social media networks by companies in the service industry. However, assessing the performance efficiency of customer engagement on their social media networks continues to be a major challenge for most companies. This paper develops a Data Envelopment Analysis (DEA) model to assess the relative engagement efficiency of online social media networks in the fast food industry. It also examines how inefficient forms can improve their performance on social media.

KEYWORDS: Social media networks, Data envelopment analysis, Engagement efficiency, Fast food industry, Web 2.0 networks

INTRODUCTION

The current millennium is facing “information age” as the third wave of change with “Web 2.0” as one of its megatrend (Valacich & Schneider, 2015). During the last few years, the next generation of web has evolved from read-only to a participatory environment (known as Web 2.0). It has enabled users to collaborate and exchange ideas and brought about worldwide popularity of the social media networks (SMNs). From passive readers, consumers now feel empowered to become creators of online content, and thus, impact an organization’s market. As a result, the social media environment has become increasingly consumer, not marketer, controlled.

Kaplan and Haenlein (2010) define social media networks as a set of internet based applications built on the ideological and technological foundations of Web 2.0. It facilitates creation and exchange of user generated content. Belleghem et al. (2011) note that more than 50% of social media users are followers of web pages dedicated to company brands. Organizations, today, not only find it impossible to ignore consumers’ views on social media, but are compelled to engage with them (Verhoef et al., 2010). Thus, to facilitate such engagement, companies are enabling creation of brand communities by developing brand pages on social media networks such as Facebook, Twitter, and Instagram. Companies engage with customers on the brand pages by posting photos, videos, or links and customers, in turn, engage by liking,

commenting, following or sharing them.

Several studies in literature have touted the benefits of customer engagement on social media networks to organizations. The 2016 Nielsen Social Media Study report finds that 39% of the heaviest social media users rely on it to find products and services and 29% of them end up supporting their favorite companies or brands. Bagozzi and Dholakia (2006) state that consumers following the brand fan pages remain loyal and committed to the company by spreading positive messages about the brands. Bughin et al. (2011) and Stelzner (2012) assert that the use of social media networks can provide a range of benefits to companies including increased brand awareness, reduced cost of customer service, improved market research, and better product design due to customer input. As a result, increasing number of companies now accord top priority to investments in social media networks for marketing. According to Williamson (2011), in 2011 worldwide investments in social media networking for marketing stood at around $4.3 billion. With so much investment at stake, it becomes imperative for companies to engage with their customers on social media effectively by providing content that is easy to find, like, share, and support.

However, in spite of significant investments in social media networks, companies continue to face challenges in being able to assess the performance of their engagement with customers. McLaughlin and Coffey (1990) reinforce this view when they mention that measuring the efficiency of customer engagement in service industry is not only important but difficult as well. Loreche et al. (2013) go even further and question companies on the merit of investments in social media if they cannot measure or quantify customer engagement. This provides motivation for our research which focuses on quantifying the engagement efficiency of social media networks in the fast food industry.

In this paper we investigate and analyze the efficiency of brand engagement on social media networks in the fast food industry using data envelopment analysis (DEA) methodology. Specifically, we answer the following research questions:

1. Whether a company is efficient or inefficient in its customer engagement on social media networks?
2. How can a company improve its engagement efficiency on social media networks?

LITERATURE REVIEW

Recent years have witnessed an explosion in the use of social media network by companies and users alike. This phenomenon is explained by the increase in online engagement and digitalized word of mouth communication (Dellarocas, 2003). Word of mouth communication, known as User-Generated Content (UGC), when combined with online social media causes a phenomenon called “Viral” whereby a piece of content spreads like a virus among users on the internet (Subramani & Rajagopalan, 2003). Organizations enable formation of brand communities online to leverage on the effects of going “viral”. Kozinets (2002) states that members joining the online brand community may express their views freely, thus, causing a buzz about the brands. They may spread their emotions or feelings on the brand pages which may get shared along the network to potential consumers through other members of the brand community. This can cause a “viral” effect by increasing the popularity of the brands, and thus, influencing the purchasing behavior of the consumers. As a result, according to Holzner (2008),

companies spend a lot of effort in developing their presence on social media networks for multidirectional communication with the consumers.

It is to be noted that the active participation of users in social media platforms generates large amounts of data, often called, “big” data. One of the major streams of research in literature on social media relates to social media analytics. According to Zeng et al. (2010), social media analytics focuses on studying “big” data to draw some actionable information from it. Drawing actionable information from data is also called social media intelligence. The second stream of research focuses on accrued benefits of customer engagement to companies on social media networks. Barry et. al (2012) show that customer interaction over social media networks can lead to increased customer loyalty and up to 40% increase in spending by the same customers. According to Algesheimer et al. (2005) and Bagozzi & Dholakia (2006), brand engagements can positively affect firm trust and brand purchase behavior. The study by Trusov et al. (2009) examines the effect of user generated content on customer growth using both social media sites and traditional marketing mechanisms. It finds 20-30 times higher elasticity for user generated content than for traditional marketing methods. As mentioned earlier, Bughin et al. (2011) and Stelzner (2012) find that the use of social media networks can provide a range of benefits to companies due to quick customer feedback. Other streams of research on social media networks relate to data mining (Hu and Liu, 2004) and sentiment analysis (Jayashankar et al. 2014).

However, not much work in literature has focused on evaluating the performance and engagement efficiency of social media networks. Companies remain concerned on how to measure the efficiency of their brand engagement with customers on social media networks. This gap poses a challenge to companies on how to measure and improve their brand engagement with customers on social media networks. Zeng et al. (2010) call for a need to define and quantify the performance indicators of activities on social media networks. Along the same lines, Fan and Gordon (2014) highlight a need for research on measuring engagement with customers on social media networks and effective strategies to improve such interactions. This study intends to address the concerns related to measuring efficiency of brand engagement by companies on social media networks.

Bloom (1972) propounds using a simple ratio of input and output to measure efficiency. However, Reynold and Thompson (2002) contend that the mere ratio of output and input for efficiency fails to explicate all the factors responsible for the output. They argue that the traditional efficiency measure requires a direct relationship between inputs and outputs, thus, making inclusion of all reasonable parameters responsible for the output difficult. To overcome the specific challenge of evaluating traditional productive efficiency, Brown and Hoover (1990) suggest using a total-factor productivity analysis. However, Reynolds and Thompson (2002) reject this suggestion on the grounds that total-factor productivity analysis takes into account multiple units with heterogeneous operations and is useful only for intra firm operations. Gronroos and Ojasalo (2004) argue that a major drawback of the traditional efficiency measure is their excessive dependence on resources as input and revenues as output. (Keh et al., 2007) agree by stating that these ratios fail to include other important factors that play a role in

generating the revenues. Farrel (1957) favors using an efficiency measure that can identify the best operating units which can be used as benchmarks for comparison purposes.

Data Envelopment Analysis (DEA) proposed by Charnes et al. (1978) helps in assessing the efficiency of multiple Decision Making Units (DMUs) by considering multiple inputs and outputs. This methodology does not require any relationship between inputs and outputs, which makes it an effective method for efficiency evaluation. Zhu (2014) proposes DEA as the methodology of choice for efficiency analysis in the service industry because of its capability to assess the productivity of a unit irrespective of its operating environment when compared to other competing units. The works by Soteriou and Stavrinides (1997), Murthi et al. (1996), Donthu et al. (2005), Luo and Donthu (2005), and Pergelova et al. (2010) provide several applications of this methodology in the service industry. In this paper, we propose to use DEA methodology for evaluating efficiency of brand engagement by companies on social media networks.

A PRIMER ON DEA

DEA is a powerful benchmarking and performance evaluation technique that assesses the relative efficiency of a homogeneous set of decision-making units (DMUs) while considering multiple inputs and outputs (Charnes, 1978). The definition of a DMU in DEA methodology is very generic and flexible. DMUs can belong to any industry. Sherman and Zhu (2006) describe DEA as a non-parametric technique implying non-dependency between inputs and outputs. They also highlight that DEA methodology can discriminate between technical and scale efficiency from price efficiency. DEA compares all DMUs by optimizing and determining the weighted output to input ratio called an “efficiency score” which ranges between 0 and 1 for each DMU. Any DMU with an efficiency score = 1 is considered efficient, whereas the ones with efficiency scores < 1 are considered inefficient. Efficient DMUs are then used to create an efficiency frontier against which all other DMUs are compared (Sherman and Zhu, 2006). For inefficient DMUs, the DEA technique is able to evaluate not only the degree but also the sources of inefficiency.

THE PROPOSED MODEL

Industries like fast food remain very competitive and often face increasing customer demand for higher levels of performance on quality of service and on-time delivery. Strategies designed to address the needs of such demanding customers effectively can help fast food companies to gain loyal customers. Fast food industry has realized the power of customers and has made a smart move to make them a member of their brand community. Social media is playing a major role in helping form online brand communities where customers can connect with a company’s brands and vice-versa. Furthermore, it helps customers to not only share their views on a particular brand, but also to follow the latest updates from fast food companies on their brands.

According to Jaydee (2016), there are currently 1.6 billion users of Facebook and 325 million users of Twitter. Social media networks are becoming a valuable resource for companies to connect and engage with such a large audience. It becomes imperative for companies to value the engagement opportunity with customers on their social media networks. Else, it may take

just a few seconds for customers to unfollow a brand and start following another brand. The success of a company's engagement with customers on its social media network lies in being able to quantify its engagement efficiency.

We propose to use an input oriented DEA model with variable returns to scale (also known as BCC model) to evaluate the relative engagement efficiency of social media networks for companies within the fast food industry. Input oriented DEA model is used since, unlike outputs, adjusting the input resources to increase efficiency may be easier to manage and typically remains within the control of the companies.

Even though every company follows a different tactic of engaging with their customers, our paper includes a common set of input and output parameters across all the fast food companies for a fair assessment of engagement efficiency measure for each company. We use Facebook and Twitter, the two most popular social media networks, to assess the engagement of fast food companies with their customers in this paper. We researched these two social media platforms to identify the most relevant parameters to use for efficiency assessment. DEA methodology classifies these parameters into inputs and outputs (Zhu, 2014). Within the social media context, inputs parameters are considered to be the investments of time and efforts made by companies to engage with their customers. On the other hand, output parameters are considered to be the responses generated by the customers to a company's input. Inputs by companies can be in the form of posts like photos, videos, and links on their social media web sites, whereas, comments, likes, shares, and replies by customers can represent the outputs.

We tracked the Facebook and Twitter pages of the fast food companies to learn about their range of activities undertaken for marketing and engagement purposes. Facebook is a widely used social media platform by companies to host web pages for their own brands. These pages in turn have followers who may increase as the popularity of a company's social media pages increases. These followers can be active or passive. Active followers are the ones who not only follow the pages but also comment, like, and/or share. However, passive followers are the ones who just follow an organization's pages without engaging in comment, share or like. Since the company posts affect both kinds of followers, a company is able to engage with its customers irrespective of their participation. It is to be noted that visitors to a company's pages on social media networks may include both the current and potential customers. The latter may visit a company's brand pages occasionally to look for updates and react to the postings.

Posts by the companies typically include photos, videos and links. For instance, a fast food company may decide to post a promotional photo of their new dish offering, a video of their advertising offers or a URL link on their social media site. Each of the posts by the company has the potential to receive "likes" from the customers who may even "share" these posts with their friends (potential customers).

On the Twitter platform, the companies may post Tweets in the form of Photos, Videos and Links. The Tweets may generate Likes, Replies, and Retweets from the active followers. Retweets are similar to Shares in the Facebook environment. Consider a situation where a company posts a Tweet in the form of a Photo, a Video, or a Link. This Tweet may receive

Likes from the customers. Furthermore, the customers may Retweet the company's Tweet to share it with their own followers, or they may simply Reply to the company's tweet. Twitter platform uses another term called "user mention" which is akin to directing a message publicly to one's own account. For example, customers may post a comment on their timelines about the company by writing their account names following '@'. Note User Mention similar to tagging someone in Facebook platform. So Tagging and User Mentions are like calling someone by name, literally, to get their attention.

Understanding all the terms used in social media pages is important to effectively distinguish between input and output parameters. Categorizing activities on social media pages into input and output parameters also depends on distinguishing the ones originated by companies and the ones generated by customers in response. For example, Likes are responses to Posts; hence, Likes are categorized as output. Table 1 shows the input and output parameters used in our DEA model.

Table 1: DEA Model Inputs and Outputs

Parameters	Facebook	Twitter
Input	Photos	Photos
	Videos	Videos
	Links	Links
Output	Followers	Followers
	Likes	Likes
	Comments	Retweets
	Shares	User Mentions
		Replies

DATA COLLECTION

The data on the input and the output parameters for our proposed DEA model was collected using the Facebook and Twitter social media sites of 20 fast food companies over a 3-month period between February-April, 2017. Each fast food company is considered a DMU in our DEA model. The collection of publicly available data on the 20 DMUs posed a challenge due to the absence of any particular data source point, as well as, the availability of sheer volume of piecemeal data. We eventually tracked the Facebook and Twitter social media pages of the 20 DMUs using analytical tools like Web Crawlers, Tweet Catcher, and Tweet Viz. We also performed manual compilation of the acquired data. To the best of our knowledge this paper is the first to consider Photos, Videos and Links as separate input parameters for the Twitter platform. In literature, the limited prior research measuring business efficiency of social media networks uses Tweets as one single input parameter due to unavailability of the Twitter analytics API.

RESULTS AND DISCUSSION

We used DEA Frontier software by Zhu (2003) to solve the proposed DEA model for Facebook and Twitter social media platforms. DEA Frontier is an Add-In to Microsoft Excel and uses Excel solver. Table 2 shows the relative efficiency scores and slack values for the 20 fast food DMUs.

Results show that DMUs 2, 7, 11, and 20 have efficiency score of less than 1 and are considered inefficient in their engagement with customers on the Facebook platform. All other DMUs with an efficiency score of 1 are considered efficient or best practice set. Thus, 25% of fast food companies in our sample are considered inefficient ranging from Papa John's being most inefficient (efficiency score=0.22) to Texas Roadhouse being the least inefficient (efficiency score=0.98).

The efficiency scores and slack values further identify the degree and source of inefficiencies with significant implications for the managers. For example, to improve performance efficiency of Papa John's, managers should reduce "Photo", "Video", and "Links" inputs to 22% of their current levels while increase its current output levels in "Likes" and "Share" engagement categories by amounts indicated under output slack.

Table 2: DEA Model Efficiency and Slack Results for Facebook

DMU No.	DMU Name	Efficiency	Input Slacks			Output Slacks			
			Photos	Videos	Links	Followers	Likes	Comments	Shares
1	Wendy's	1	0	0	0	0	0	0	0
2	Texas Road-house	0.98	0	0	0	180272	807172	0	166111
3	Sonic Drive in	1	0	0	0	0	0	0	0
4	Shake Shack	1	0	0	0	0	0	0	0
5	Red Robbin Gourmet	1	0	0	0	0	0	0	0
6	Popeye's Louisiana Kitchen	1	0	0	0	0	0	0	0
7	Papa John's	0.22	0	0	0	0	94879	0	4282
8	McDonalds	1	0	0	0	0	0	0	0
9	KFC	1	0	0	0	0	0	0	0
10	Taco Bell	1	0	0	0	0			
11	Pizza Hut	0.43	0	0	0	0	0	20257	180470
12	Jollibee	1	0	0	0	0	0	0	0
13	Jack in the box	1	0	0	0	0	0	0	0
14	iHOP	1	0	0	0	0	0	0	0
15	Habit Burger	1	0	0	0	0	0	0	0
16	Domino's	1	0	0	0	0	0	0	0
17	Chipotle	1	0	0	0	0	0	0	0
18	Burger King	1	0	0	0	0	0	0	0
19	Buffalo Wild Wings	1	0	0	0	0	0	0	0
20	Bojangles	0.36	0	0	0	73809	38061	8614	8599

Similarly, Bojangles needs to reduce all three inputs to 36% of their current quantities while ensuring to increase all four engagement outputs. Similar interpretations can be made about the social media sites of Texas Roadhouse and Pizza Hut.

It is interesting to note that, both, Bojangles and Texas Roadhouse have slacks in most of the engagement output categories. It implies that the fans of these two companies find their input media ("Photo", "Video", and "Link) on social media networks to lack enough appeal for meaningful engagement. An important implication for managers at both these companies is to focus on improving the quality of their input media by making them more interesting.

Table 3 shows the efficiency scores and slack values for each DMU on Twitter platform.

Table 3: DEA Model Efficiency and Slack Results for Twitter

DMU No.	DMU Name	Efficiency	Input Slacks			Output Slacks				
			Photos	Videos	Links	Followers	Likes	Retweets	User Mentions	Replies
1	Wendy's	1	0	0	0	0	0	0	0	0
2	Texas Roadhouse	1	0	0	0	0	0	0	0	0
3	Sonic Drive in	1	0	0	0	0	0	0	0	0
4	Shake Shack	0.13	0	0	2	9330	3326	1187	1694	46
5	Red Robbin Gourmet	1	0	0	0	0	0	0	0	0
6	Popeye's Louisiana Kitchen	0.92	0	0	13	6546	3436	885	280	201
7	Papa John's	0.29	0	0	50	85547	85800	23945	5360	0
8	Mc Donald's	1	0	0	0	0	0	0	0	0
9	KFC	0.98	0	0	18	35143	23199	10194	2847	0
10	Taco Bell	1	0	0	0	0	0	0	0	0
11	Pizza Hut	0.46	0	22	0	217758	96181	0	13758	557
12	Jollibee	1	0	0	0	0	0	0	0	0
13	Jack in the box	0.81	0	0	0	8660	2999	0	2929	108
14	iHOP	0.45	0	0	0	51856	29939	0	0	1585
15	Habit Burger	0.19	0	0	0	11290	8661	3139	2897	327
16	Domino's	1	0	0	0	0	0	0	0	0
17	Chipotle	1	0	0	0	0	0	0	0	0
18	Burger King	0.86	0	0	16	0	77924	28336	15873	0
19	Buffalo Wild Wings	0.47	0	22	0	222163	95860	0	18213	161
20	Bojangles	0.30	0	0	0	71806	29823	487	7970	0

Results show that out of 20 DMUs, 11 or 55% of DMUs are found to be inefficient in our sample with efficiency scores below 1. Shake Shack, Bojangles, and Papa John's seem to be poorly engaged with their customers on their Twitter platforms due to very low efficiency scores. These results suggest that managers at the inefficient companies should reduce each of their current input media levels to a multiple of their efficiency score with a further reduction as indicated by the respective input slack values. For example, Pizza Hut should reduce its entire input media to 46.2% of current levels with "Videos" by an additional 22 units. Furthermore, Pizza Hut should increase "Followers", "Likes", "User Mentions", and "Replies" Twitter output categories by their respective output slack values while maintaining the same "Retweets" level. This would make Pizza Hut as efficient as the best performing fast food companies on Twitter platform.

CONCLUSION AND LIMITATIONS

This paper develops a DEA based model to evaluate the engagement efficiency of activities performed by organizations on social media platforms to stay connected with their customers and gain popularity. It examines how extensively organizations in the fast food industry leverage their customer attention and the extent to which they exploit their social media platforms. This study proposes all the relevant input and output parameters to consider while evaluating the effectiveness of social media networks. It further suggests an approach to identify the firms that run their operations efficiently on social media as well as an action plan for the inefficient firms. With the help of results generated through this study, organizations can strategically and optimally plan their operations on Facebook and Twitter. This can help companies reduce their investments in social media and yet achieve the required output efficiency.

We faced a few challenges in selecting the set of DMUs for our study. We had to first understand the importance of social media in the service industry. Fast food industry being a popular sector of service industry drew our attention. Service industry entails significant amount of customer engagement to run a successful business. Social media being the most convenient platform to connect with a large number of audiences has become the default choice for major players in the fast food industry to engage with customers. Deciding on the input and output parameters to consider was another hurdle in this study. We had to first understand all the operational activities that can be performed by companies on social media platforms and the output those engendered. Then we had to narrow down our search to only those parameters with the publicly available data.

Next we would like to enumerate the limitations of this study. This paper does not include the impact of customer sentiments and content type of the posts on outputs like comments, shares and likes. In addition, we did not have a way to incorporate hash tags in our study due to vagueness of its definition. Hash tags could not be defined as either input or output. Future extensions of this study may include customer sentiments, content type, and hash tags and other industry sectors for a comprehensive analysis of engagement efficiency on social media networks.

REFERENCES

References available upon request.