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Examining the impact of luxury brand's social media marketing on customer engagement: Using big data analytics and natural language processing

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ABSTRACT

This research utilizes big data in investigating the impact of a luxury brand's social media marketing activities on customer engagement. In particular, applying the dual perspective of customer engagement, this research examines the influence of focusing on the entertainment, interaction, trendiness, and customization dimensions of a luxury brand's social media activities on customer engagement with brand-related social media content. Using big data retrieved from a 60-month period on Twitter (July 2012 to June 2017), this paper analyzes 3.78 million tweets from the top 15 luxury brands with the highest number of Twitter followers. The results indicate that focusing on the entertainment, interaction, and trendiness dimensions of a luxury brand's social media marketing efforts significantly increases customer engagement, while focusing on the customization dimension does not. The findings have important implications for the design, delivery, and management of social media marketing for luxury brands to engage customers with social media content.

1. Introduction

The proliferation of social media has changed the way luxury brands interact with their customers, posing new challenges as well as opportunities to luxury brands (Kim & Ko, 2012). The compatibility between luxury brands and mass-media platforms (e.g., social media) has traditionally been questioned due to the brands' needs to manage uniqueness and exclusivity and to develop one-to-one relationships with selected customers (Heine & Berghaus, 2014; Okonkwo, 2009; Quach & Thaichon, 2017). However, over the last decade, luxury brands have increasingly adopted social media (Kim & Ko, 2010, 2012), realizing its "powerful" potential to connect with consumers (Koivisto and Mattila, 2018, p. 1). Therefore, it is vital to understand how luxury brands can "utilize their social media to engage and influence consumers through targeted use of social media" (Dauriz, Remy, & Sandri, 2014, p. 27). Today, big data is available from both firm and consumer activities, making it possible to investigate firm-consumer interactions in social media (Kunz et al., 2017). Luxury brand managers may benefit from utilizing big data to obtain more accurate understanding of customer engagement on social media and consequently formulate more effective customer engagement strategies.

Previous studies have investigated the relationship between luxury brands' social media marketing efforts and customer engagement. However, these studies suffer from inconsistency between the conceptualization and operationalization of the customer engagement construct. For example, whereas Dhaoui (2014) and Pentina, Guilloux, and Micu (2018) conceptualized customer engagement as a multi-dimensional construct composed of cognitive, emotional, and behavioral aspects, they measured only behavioral engagement due to the limited ability to capture the cognitive and emotional facets of customer engagement in social media. Moreover, most of the studies that focused on the behavioral aspect of customer engagement measured customers' behavioral intentions instead of their actual behaviors (e.g., Jahn, Kunz, & Meyer, 2012; Jin, 2012). Furthermore, extant research investigated only a few luxury brands using a survey, in-depth interview, or case study approach as well as using cross-sectional data (e.g., Hughes, Bendoni, & Pehlivan, 2016; Jin, 2012; Ng, 2014; Phan, Thomas, & Heine, 2011), making it difficult to generalize the findings to a wider set of luxury brands. In this vein, luxury marketing still lacks comprehensive guidance for the effective management of customer engagement using social media.

Increasingly available big data may offer opportunities to address this gap in the luxury brand literature. A main characteristic of big data is the inclusion of unstructured behavioral data, encompassing both

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textual (e.g., posts and text messages) and non-textual data (e.g., images, videos, and voice) captured through social media in which firm and customer interact and share information (Erevelles, Fukawa, & Swayne, 2016). Using this unstructured behavioral big data from social media can extend previous research findings by capturing a firm's social media activities and customers' behavioral engagement and by addressing the issue of limited coverage of luxury brands as well as the lack of longitudinal studies (Barger, Peltier, & Schultz, 2016; Hofacker, Malthouse, & Sultan, 2016; Kunz et al., 2017).

The goal of this study is to utilize big data to investigate the effects of luxury brands' social media marketing on customer engagement. The current study adopts Kunz et al. (2017)'s dual perspective of customer engagement to acknowledge the important role the customer plays in creating value that benefits both the firm and the customer. Furthermore, our study draws upon Kim and Ko's (2012) dimensions of luxury brands' social media marketing efforts as prospective foci of luxury brands' social media marketing activities, and Schivinski, Christodoulides, and Dabrowski's (2016) three types of behavioral customer engagement activities with a brand's social media contents are collectively measured for customer engagement.

To leverage the potential of big data to gain insights on actual customer engagement behavior resulting from a luxury brand's social media marketing activities, we employ a Twitter data set which contains 3.78 million tweets collected from the top 15 luxury brands with the highest number of Twitter followers over a 60-month period (July 2012 to June 2017). To preprocess the big data, we took advantage of cutting-edge natural language processing (NLP) techniques for semantic categorization of large amounts of textual data (Manning & Schütze, 1999). Following this step, a large volume of textual elements of luxury brand tweets were coded to be compatible with other numeric variables so that the big data could be handled in a manageable way (Lee & Bradlow, 2011). Moreover, we used functions provided by the MySQL database to aggregate the 3.78 million tweets into a monthly panel data set in order to integrate them into econometric models (Netzer, Feldman, Goldenberg, & Fresko, 2012). Finally, we ran a fixed-effects (FE) model to address the research question and generate marketing insights.

This study answers marketing scholars' calls for research into understanding the relationship between a firm's engagement activities and the resulting customer engagement using big data (Barger et al., 2016; Kunz et al., 2017). Furthermore, the research findings will help guide luxury managers to make informed decisions about allocating resources among several foci of social media marketing activities to maximize the use of social media to influence customer engagement behaviors, the importance of which was highlighted by Dauriz et al. (2014) and Pentina et al. (2018).

2. Literature review

2.1. Reinforcing customer engagement in social media using big data

Prior literature on the customer-to-firm relationship has mainly focused on measuring purchase behaviors as a performance indicator of the firm. However, such measures fail to capture the active role of consumers in influencing a broader network of entities including potential customers and the general public (Lemon & Verhoef, 2016; Van Doorn et al., 2010; Verhoef, Reinartz, & Krafft, 2010). Thus, the importance of understanding customer engagement stems from the need to understand behaviors of “individuals who interact with brands, without necessarily purchasing” them (Vivek, Beatty, & Morgan, 2012, p. 127). Social media platforms have further empowered customers to engage more with firms by becoming active co-producers or destroyers of value for firms (Van Doorn et al., 2010; Verhoef et al., 2010), making it important for firms to understand customer experiences during customer-brand encounters in social media (Choi, Ko, & Kim, 2016). Kunz et al. (2017) introduced the dual perspective of customer engagement to highlight the idea that the firm's customer engagement activities in social media should be managed from the combined perspective of the customer and the firm to benefit both parties.

One of the most notable conceptualizations of customer engagement focuses on its behavioral aspect. For instance, Van Doorn et al. (2010, p. 253) define customer engagement as “the customers' behavioral manifestation toward a brand or firm, beyond purchase.” Alternatively, some researchers have viewed customer engagement as a multi-dimensional concept composed of cognitive, emotional, and behavioral aspects (e.g., Brodie, Ilić, Jurić, & Hollebeek, 2013; Hollebeek, 2011). With the social media revolution, customers perform a number of company-related behaviors that did not exist before (Hennig-Thurau et al., 2010). In addition, social media makes behavioral metrics such as ratings, comments, and shares readily available (Barger et al., 2016; Kunz et al., 2017; Pentina et al., 2018). The current study, therefore, adopts a conceptualization of customer engagement with a focus on its behavioral aspect in social media (Barger et al., 2016) to investigate the impact of a luxury brand's social media activities on customer engagement using big data.

Several scholars have measured customer engagement with a brand's social media contents. Dhaoui (2014), for example, calculated four customer engagement metrics (endorsement, feedback, conversation, and recommendation) as a function of engagement levels for a post on a brand page (e.g., total number of likes, comments, replies, and shares, respectively) and the size of the brand community on a social media platform. More recently, Schivinski et al. (2016) developed and empirically tested a scale for customer engagement with brand-related social media content based on three types of online customer engagement behavior established by Muntinga, Moorman, and Smit (2011). According to Muntinga et al., there are three different types of online customer engagement behaviors with brands depending on the level of customer activeness: consumption (least active), contribution (moderately active), and creation (most active). Applying these typologies developed in the general online context to social media, Schivinski et al. (2016) viewed passive consumption of brand-related social media content as representing a minimum level of engagement, displayed by behaviors such as reading and watching brand posts and simply following brands on social media. Contribution, on the other hand, captures medium-level customer engagement such as liking, sharing, and commenting on brand posts. Lastly, creation is the strongest level of customer engagement with a brand because customers go beyond the simple consumption of or contribution to the brand posts by creating user-generated content (UGC) such as posts, reviews, or articles related to the brand. Following Schivinski et al.'s perspective, this study measures customer engagement as a holistic concept that incorporates the three types of behavioral engagement activities (i.e., consumption, contribution, and consumption).

Table 1 presents a review of the luxury brand literature on the influence of social media marketing on customer engagement in social media, which in summary reveals some important points. First, few studies have explicitly discussed the conceptualization of customer engagement (e.g., Dhaoui, 2014; Kefi & Maar, 2018; Kim & Lee, 2017; Pentina et al., 2018), and in the few that do so, there is inconsistency between the conceptualization and operationalization of customer engagement. Second, a limited number of studies have investigated a luxury brand's social media strategies as antecedents of customer engagement (e.g., Dhaoui, 2014; Kontu & Vecchi, 2014; Ng, 2014; Phan et al., 2011); instead, the major focus has been on identifying customer-related characteristics (e.g., motivations for engagement or satisfaction with the brands) that influence customer engagement behaviors (e.g., Jahn et al., 2012; Jin, 2012; Pentina et al., 2018; Quach & Thaichon, 2017). Third, most studies measured behavioral intentions instead of actual behaviors for customer engagement, limiting accurate understanding of the customer engagement phenomenon (e.g., Jahn et al., 2012; Jin, 2012; Kefi & Maar, 2018; Kim & Lee, 2017). Fourth, no study so far has included all three types of customer engagement behaviors

Table 1
Marketing research on luxury brand's customer engagement with brand-related social media content.

References (Ordered chrono-logically)	Conceptualization of customer engagement	Measured dimension (s) of customer engagement (cognitive/affective/ behavioral)	Measured customer engagement behavior (behavioral intentions vs. actual behavior)	Measured types of customer engagement (consumption/ contribution/creation)	Research method	Number of brands; length of examination (if known); total number data unit (if known)	Antecedent of customer engagement	Key findings
Phan et al. (2011)	N/A	N/A	N/A	N/A	Case study	1 luxury brand	Social media strategies	Burberry successfully employed social media in various ways to rejuvenate and reposition the brand to engage young consumers.
Jahn et al. (2012)	Interactive and integrative participation in brand page	Behavioral	Behavioral intentions	Unknown	Survey	Various	Consumer motivations for engagement	Consumer motivations for engagement with luxury brands influence usage intensity and the level of customer engagement, which in turn predicts brand loyalty.
Jin (2012)	N/A	Behavioral	Behavioral intentions	N/A	Survey	1 luxury brand	Customer satisfaction with the brand page	Customer satisfaction with the luxury brand page influences attitudes toward the brand, which in turn predicts intention to visit the brand page.
Dhaoui (2014)	Multidimensional concept comprising cognitive, emotional, and behavioral dimensions	Behavioral	Actual behaviors	Contribution	Content analysis	51 luxury brands; 3 months: 2372 posts	Use of the 8 P's of luxury brand marketing (performance, pedigree, paucity, persona, public figures, placement, public relations, pricing) in social media marketing communication	Each element of the 8 P's of luxury brand marketing in social media marketing communication has a different impact on customer engagement.
Kontu and Vecchi (2014)	User activity	Behavioral	Actual behaviors	Consumption and contribution	Case study	3 luxury brands; 4 months; 921 Facebook posts	Brand's social media activity	Customer engagement metrics are important to understand and to further enhance the effectiveness of the luxury brand's social media activity.
Ng (2014)	N/A	N/A	N/A	N/A	Case study	1 luxury brand; 1 year; 1543 Weibo posts	Social media strategies	Burberry successfully employed social media in various ways to engage Chinese consumers.
Hughes et al. (2016)	N/A	N/A	N/A	N/A	Case study	1 luxury brand	Management of a microsite (i.e., brand-owned social networking site)	Tiffany utilized its microsite that allowed co-creation of brand stories between luxury brands and community members to enhance customer engagement.
Chen and Wang (2017)	N/A	N/A	N/A	N/A	Content analysis	8 luxury brands; 1 year; 598 WeChat messages	Social media advertising	Current social media advertising by luxury brands in China is not effective in engaging affluent Chinese consumers.
Kim and Lee (2017)	Participation in brand page (e.g., sharing, advocating, interacting, socializing, participating)	Behavioral	Behavioral intentions	Contribution and creation	Survey	Various	Perceived sense of belongingness to the brand page	Perceived sense of belongingness to the luxury brand page positively affects customer engagement.
Quach and Thaichon (2017)	N/A	N/A	N/A	N/A	In-depth interviews	Various	Consumer motivations to engage with brands	There are four types of consumer motivations (love, status, information, and services) for customer engagement with luxury brands in social media.
Kefi and Maar (2018)	Participation in brand page	Behavioral	Behavioral intentions	Consumption and contribution	Survey	1 luxury brand	Content of the luxury brand page (hedonic, informative)	Both informative and hedonic contents in a luxury brand page influence customer engagement, which in turn predicts brand loyalty.

(*continued on next page*)

Table 1 (*continued*)

References (Ordered chronologically)	Conceptualization of customer engagement	Measured dimension (s) of customer engagement (cognitive/affective/ behavioral)	Measured customer engagement behavior (behavioral intentions vs. actual behavior)	Measured types of customer engagement (consumption/ contribution/creation)	Research method	Number of brands; length of examination (if known); total number data unit (if known)	Antecedent of customer engagement	Key findings
Pentina et al. (2018)	An expression of consumers' cognitive and emotional attitudes in brand page	Behavioral	Actual behaviors	Contribution	In-depth interviews	Various	Consumer motivations to engage with brands	Luxury consumers' social media engagement behaviors can be categorized into 10 activities based on the intended engagement counterpart (brand vs. other social media users) and the level of consumer effort/creativity (low vs. high).
Current study	The customers' behavioral manifestation toward brand-related social media content	Behavioral	Actual behaviors	Consumption, contribution, and creation	Big data analysis	15 luxury brands; 5 years; 3.78 million tweets	Four foci of luxury brands' social media marketing activities (entertainment, interaction, trendiness, and customization)	Focusing on the entertainment, interaction, and trendiness dimensions of a luxury brand's social media marketing efforts increases customer engagement, while focusing on the customization dimension does not significantly enhance customer engagement.

(i.e., consumption, contribution, creation) in measuring customer engagement with social media content. Lastly, most studies examined only a few luxury brands using a case study, survey, or in-depth interview approach (e.g., Hughes et al., 2016; Kontu & Vecchi, 2014; Ng, 2014; Phan et al., 2011). Furthermore, the longest period of examination to date was only one year (e.g., Chen & Wang, 2017; Ng, 2014).

With advances in technology that allow researchers and practitioners to capture data with greater volume, velocity, and variety, marketers have started to recognize the power of big data as a new capital (Erevelles et al., 2016). However, not all firms take advantage of big data despite its potential benefits (Hofacker et al., 2016; Liu, 2019b). Although big data may provide an enormous amount of customer intelligence, several challenges exist to derive sustainable competitive advantage. These include the difficulty of obtaining data on unobserved behaviors (e.g., motivation or attitude), the complicated process of untangling unstructured data, and an inability to use conventional data-management tools to handle huge sets of data (Erevelles et al., 2016; Liu, 2019a). Nevertheless, more interactions between firms and customers are taking place in social media, and all actions are automatically stored in real-time through various customer touchpoints in multiple channels and media that firms can use to generate data-driven insights (Barger et al., 2016; Kunz et al., 2017). These data can be analyzed on an individual or aggregated level to inform brand managers of how to optimize engagement activities and to reinforce the positive cycle of value generation (Barger et al., 2016; Hofacker et al., 2016; Kunz et al., 2017). Therefore, big data is a fitting source of data to address the above-mentioned gaps in the luxury brand literature in the current investigation. In the last row of Table 1, we outline the contribution to the luxury brand literature of the present paper that examines customer engagement on social media.

2.2. *Luxury brand's social media marketing activities*

According to Kim and Ko (2012), luxury brands' social media marketing efforts are comprised of five dimensions: entertainment, interaction, trendiness, customization, and WOM (word-of-mouth). Entertainment is related to the luxury brand's attempts to provide fun and interesting contents to its consumers via social media. In the social media setting, entertainment is a key motivator for consumers to create and share user-generated content (Phelps, Lewis, Mobilio, Perry, & Raman, 2004) and to participate in the social media brand community (Gummerus, Liljander, Weman, & Pihlström, 2012). Furthermore, information considered entertaining, exciting, amusing, interesting, or fun is more likely to be virally spread (Dobele, Lindgreen, Beverland, Vanhamme, & Van Wijk, 2007; Golan & Zaidner, 2008).

Interaction is a luxury brand's ability to allow the sharing and exchanging of information with others on social media. The participatory nature of social media readily enables collaboration and sharing of content, including information, video, and pictures (Hennig-Thurau et al., 2010). The interactivity of a firm's social media posts is important because it promotes customer reactions, such as liking and commenting on the firm's post (De Vries, Gensler, & Leeflang, 2012).

Trendiness refers to the extent to which the luxury brand disseminates the latest and trendiest information about the brand. With the increasing popularity of social media, customers demand immediate access to brand information and frequently utilize information available on various social media to make purchase decisions (Dauriz et al., 2014; Vollmer & Precourt, 2008). More importantly, customers consider social media to be a more trustworthy source of information than traditional instruments of marketing communications such as press releases or advertising (Foux, 2006). Likewise, social media is an important source of up-to-date brand information.

Customization involves the extent to which a luxury brand's social media provides customized information or service. Social media makes it possible to reach a target audience through customization in a more cost-effective way compared to other traditional media (Chu & Kim, 2011). Customization or personalization is important for firms because it enhances customers' overall commitment to a company (Lacey, Suh, & Morgan, 2007). Moreover, a personalized social media strategy focused on responding to individual customers is known to be more effective than a mass-directed social media strategy (Hewett, Rand, Rust, & van Heerde, 2016).

Lastly, WOM reflects the customer's willingness to pass along information from a luxury brand's social media to others. Unlike the aforementioned four dimensions, which are considered potential foci of a luxury brand's social media activities, WOM is a behavioral manifestation of customer engagement in response to the brand's activities (Kunz et al., 2017; Van Doorn et al., 2010). Schivinski et al. (2016) proposed that customer engagement behaviors encompass three broader categories of customer activities in social media (i.e., consumption, contribution, and creation). Upon examining two items used to measure WOM in Kim and Ko's (2012) empirical study, we found that the first item ("I would like to pass along information on brand, product, or services from LV (Louis Vuitton)'s social media to my friends") corresponds to Schivinski et al.'s "consumption" activities of customer engagement, while the second item ("I would like to upload contents from LV's social media on my blog or micro blog") corresponds to Schivinski et al.'s "contribution" activities. Thus, Kim and Ko's WOM dimension is integrated into Schivinski et al.'s customer engagement construct which we used as a performance outcome variable of a luxury brand's entertainment, interaction, trendiness, and customization-focused social media activities.

3. Conceptual framework

Fig. 1 illustrates the conceptual framework of this study. This framework examines the relationship between the luxury brand's social media marketing activities and customer engagement with brand-related social media content. This conceptual framework relies on Kunz et al.'s (2017) dual perspective of customer engagement.

According to Kunz et al. (2017), customer engagement should be viewed and managed from a combined approach that merges the customer's and firm's view. While previous research on customer engagement lacks a customer focus and relies heavily upon a firm-centric perspective to induce firm-beneficial engagement from customers (e.g., Algesheimer, Dholakia, & Herrmann, 2005), it is critical to integrate customers as value co-creators because "customer engagement will increase if managers execute engagement activities that meet or exceed the customers' expectations" (Kunz et al., 2017, p. 168). This dual perspective is in line with the concept of value fusion developed by Larivière et al. (2013), who argued that the joint focus on the value derived by both the firm and the customer can produce an interaction from which both parties benefit. The dual perspective on customer engagement also acknowledges the varying degrees of resource investment in the engagement activities (e.g., time, money, effort) by both firm and customer, emphasizing the need to understand the customer and the firm jointly as co-creators in engagement initiatives. Applying the dual perspective of customer engagement, the current study examines how a luxury brand's respective focus on the entertainment, interaction, trendiness, and customization dimensions of social media activities (Kim & Ko, 2012) influences the aggregated concept of customer engagement combining consumption, contribution, and creation activities with social media content (Schivinski et al., 2016). Moreover, the present study seeks to understand which of the luxury brand's social media activities the customer values and to help firms make informed decisions about allocating resources to maximize their use of social media.

In the luxury brand literature, a plethora of articles have documented examples of luxury brands that engaged in entertainment, interaction, trendiness, and customization-focused activities in social media (Heine & Berhaus, 2014; Hughes et al., 2016; Kontu & Vecchi, 2014; Phan et al., 2011). For instance, Chanel assembled a collection of photos of iconic people wearing the Chanel jacket in the "Little Black Jacket" art exhibition and placed them in the virtual museum on its microsite. Visitors to the site could go from one "room" to another and hear other people walking around as if in a real museum (Heine and Berghaus, 2014). Tiffany (Hughes et al., 2016) and Burberry (Phan et al., 2011l Straker & Wrigley, 2016) each encouraged their consumers to share personal experiences through stories or pictures on the brand-owned social networking sites. Several luxury brands including Burberry and Calvin Klein also live-stream runway shows (Kontu & Vecchi, 2014) and disseminate the latest fashion trends utilizing social media (Chen & Wang, 2017). In addition, WeChat, a popular social mobile application in China, allowed Coach to send personalized communications to its customers (Ng, 2014).

Research also shows that a luxury brand's social media activities focusing on the entertainment, interaction, trendiness, and customization dimensions allow the co-creation of brand stories between luxury brands and community members (Hughes et al., 2016; Phan et al., 2011) and evoke emotional connections (Kim & Ko, 2010, 2012; Straker & Wrigley). Furthermore, a luxury brand's social media activities enhance customer trust (Kim & Ko, 2010), customer equity (sum of customer lifetime value; Kim & Ko, 2012), and brand equity (Godey et al., 2016), which will ultimately stimulate customer engagement.

In summary, the conceptual framework of this study is designed to understand a better way for a luxury brand to facilitate an engagement co-creation process that benefits both the firm and the customer.

4. Methods

4.1. Sample data collection from Twitter

We chose Twitter as a source of big data to study the impact of luxury brands' social media marketing activities on customer engagement for three reasons. First, as one of the most popular social media platforms (Hennig-Thurau, Wiertz, & Feldhaus, 2015), Twitter has attracted a large number of luxury brands to use it as an integrated marketing communication channel (Dauriz et al., 2014; PMX Agency, 2017). Second, previous research has primarily used Facebook (Dhaoui, 2014; Jahn et al., 2012; Jin, 2012; Kim & Ko, 2010, 2012; Kontu &

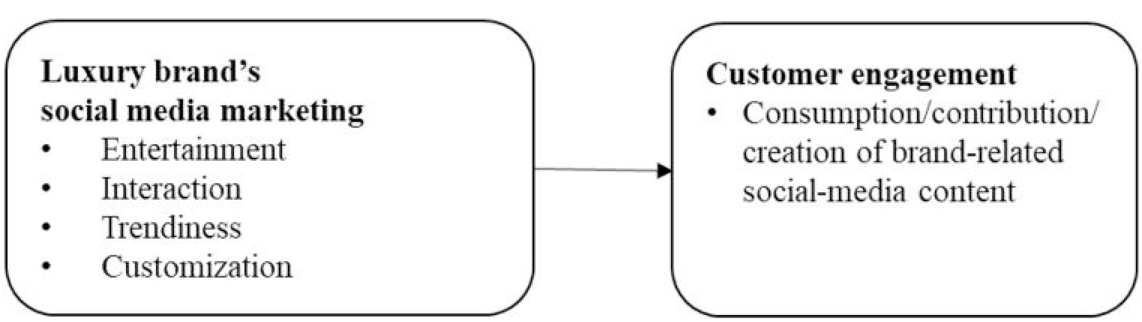

Fig. 1. The conceptual framework for the impact of luxury brand's social media marketing on customer engagement.

Vecchi, 2014) or brand-owned communities (Hughes et al., 2016; Phan et al., 2011; Straker & Wrigley, 2016) as the context of investigation into luxury brands' social media marketing activities. Using big data from Twitter can broaden the understanding of a luxury brand's social media marketing activities. Last but not least, the interactive features of Twitter offer real-time data on firm-customer interaction (Kwon & Sung, 2011). Thus, Twitter is an appropriate social media platform to study the dual perspective of customer engagement for luxury brands.

The top 15 luxury brands with the highest number of Twitter followers, identified from PMX Agency's (2017) list of luxury brands per Twitter follower counts, were used as a research sample. Previous research has successfully utilized valid lists of brands/companies from secondary data sources to represent various theoretical constructs (e.g., Butler, Armstrong, Ellinger, & Franke, 2016; Shin & Ellinger, 2013; Shin, Ellinger, Nolan, DeCoster, & Lane, 2018). A total of 3.78 million tweets posted by the 15 luxury brands or their customers over the period of July 2012 to June 2017 were collected, using a combination of specialized web crawling techniques and registered access to Twitter's API[1] (Application Programing Interface), following the steps taken by Liu, Burns, and Hou (2017). To collect tweets related to luxury brands, we took advantage of Twitter's "mention" (@) mechanism and only downloaded tweets that specifically mention the brands in our research sample. This approach makes the data collection process manageable. For example, our crawling algorithm used "@Dior" to get tweets posted about Dior by the brand or by consumers. Table 2 contains summary information about the 15 luxury brands' Twitter accounts including account creation date, the number of followers, the number of Twitter accounts the brand follows, the number of firm tweets, as well as the number of consumer tweets directly mentioning the brand.

4.2. Data transformation

Big data that includes unstructured behavioral data, encompassing both textual (e.g., posts and text messages) and non-textual (e.g., images, videos, and voice) data (Erevelles et al., 2016), is regarded as "unstructured", in contrast to the "structured" numerical values which can be easily stored in databases and processed by traditional marketing software packages. To handle unstructured data in the same way as structured data, the 3.78 million tweets were subjected to three stages of data transformation.

First, we downloaded the raw tweets via Twitter API in a special data format called JavaScript Object Notation (JSON) and used Java programming language and JSON parsers to extract field information from them (Twitter, 2018). JSON stores data in key/value pairs (Colditz et al., 2018). After being extracted from the raw tweets, the variables were saved in a csv (comma-separated values) file format. At this stage, each observation/row in the csv file contained TweetText, TweetID, TimeOfCreation, ScreenName, ScreenID, PictureOrVideo, and IsReplyTo (see Fig. 2). The values of these variables do not change once a tweet is posted. The numbers of Retweets, Favorites, and Replies were also obtained from the original JSON data, but the values for these three variables were dynamic at first. However, the values of retweets, favorites, and replies do not change much after a month from the initial posting of the tweet. Therefore, all tweets were downloaded at least one month after the original posting date.

Second, we quantified the unstructured data by performing a series of NLP procedures (Manning & Schütze, 1999). Once quantified by NLP, unstructured textual big data can be used along with the other quantitative variables. The textual variables related to hashtags (i.e., Hashtags, and NumOfHashtags), mentions (i.e., Mentions, NumOfMentions), and URLs (i.e., URLs and NumerofURLs) were first extracted from the TweetText field with regular expressions in Java (Campesato, 2018).

It is important to note that the accuracy and usefulness of unstructured textual data depend heavily on proper NLP processes such as tokenization and tagging. Tokenization splits a sentence or paragraph into words and punctuation; tagging is the process of finding the part of speech of a word (Pustejovsky & Stubbs, 2012). In NLP terms, the 3.78 million tweets in our sample form a corpus (Bird, Klein, & Loper, 2009) which consists of 50 million tokens, including words and punctuation marks. We removed stop words such as "the", "to", and "in", which appear frequently in the corpus but do not provide much insight regarding our research. After removing the stop words, we used a Java-based NLP package called Stanford CoreNLP (Manning et al., 2014) to tokenize and tag all the words of the luxury brands' tweets in the corpus. Of particular interest are the top nouns, adjectives, verbs, and adverbs, which will be used to identify the presence of the entertainment and trendiness dimensions in the textual component of the tweets. Further details are provided in the Section 4.3.1. *Entertainment and trendiness*.

Third, we integrated the quantitative data (e.g., Retweets, Favorites, and Replies) and qualitative data which had been transformed into quantitative data through the stage described above. As seen in Fig. 2, each observation for the 3.78 million data points was composed of 22 variables (elements). We loaded these data points into a table in a relational database called MySQL (Schwartz, Zaitsev, & Tkachenko, 2012). We aggregated the 3.78 million rows of observations into a monthly panel data set using the "group by" SQL statement and combining it with SQL's data aggregation functions, such as "count" (counting the number of observations), "sum" (summing up a variable), and "avg" (calculating the average of a variable) (Schwartz et al., 2012). During the aggregation process, we took advantage of three critical variables: TweetType, CompanySN, and TimeOfCreation. TweetType was used to identify whether a tweet was created by a brand or a consumer. CompanySN identified the name of the luxury brand the tweet was related to and was an effective panel ID for the final data. The TimeOfCreation variable helped categorize tweets into monthly intervals.

The final monthly panel comprised a group of 15 luxury brands. The panel data set contained 900 observations spanning 60 months. Econometric analysis was performed on this aggregated panel data set. Each observation in this panel data was composed of 8 variables (elements): companySN, year, month, entertainment, interaction, trendiness, customization, and customer engagement. We note that year and month are derived from TimeOfCreation with the year and month functions in MySQL. The operationalizations of the rest of the variables are described in the following section on measures.

4.3. Measures

As described in Sections 1 and 2, the goal of this research was to investigate the effect of luxury brands' social media marketing on customer engagement with brand-related social media content. The four dimensions of Kim and Ko's (2012) social media marketing efforts (entertainment, interaction, trendiness, and customization) were used to measure the respective focus of the luxury brand's social media marketing activities. For customer engagement with brand-related social media content, one composite variable was created from each measure to represent Schivinski et al.'s (2016) three types of customer engagement behaviors (consumption, contribution, creation). See Table 3 for descriptive statistics of the measures. The total number of observations (N = 900) includes a monthly-basis observation over the 60 months of the examination period across the 15 luxury brands.

4.3.1. Entertainment and trendiness

The entertainment and trendiness dimensions of Kim and Ko's (2012) luxury brand social media marketing efforts were identified from the textual elements of Twitter data because there were no readily

[1] More specifically, we used Twitter's REST API (https://developer.twitter.com/en/docs/tweets/post-and-engage/overview).

Table 2
15 top luxury brands' Twitter accounts and their summary Twitter activities.

Luxury brands	Twitter account	Account creation date	Number of followers	Number of following accounts	Number of firm tweets	Number of consumer tweets mentioning the firm
Chanel	@CHANEL	6/29/2011	13,364,534	0	1415	404,384
Marc Jacobs	@marcjacobs	1/29/2010	9,156,597	1549	18,121	109,781
Burberry	@Burberry	6/15/2009	8,426,097	238	11,266	387,240
Dior	@Dior	8/4/2011	8,065,825	141	2081	244,741
Louis Vuitton	@LouisVuitton[a]	6/2/2009	7,040,535	14	2864	461,855
Dolce & Gabbana	@dolcegabbana	10/28/2009	5,126,419	414	11,171	249,584
Gucci	@Gucci	10/22/2008	5,148,860	349	5346	267,822
Saint Laurent	@YSL	7/25/2009	4,024,197	140	787	124,640
Versace	@Versace	9/8/2009	4,185,557	464	4389	226,645
Michael Kors	@MichaelKors	6/8/2010	3,621,773	591	10,449	415,992
Armani	@giorgioarmani[b]	9/28/2009	3,379,247	389	5488	166,321
Christian Louboutin	@LouboutinWorld	8/28/2009	2,945,545	693	9662	329,067
Ralph Lauren	@RalphLauren	4/22/2009	2,224,550	356	3341	186,762
Valentino	@MaisonValentino	9/11/2009	1,973,291	1059	4543	112,052
Alexander McQueen	@McQueen	11/30/2010	1,836,250	293	2554	6616

Note. Information updated as of December 6, 2017.

[a] Originally, PMX Agency stated US-specific account @LouisVuitton_US instead of @LouisVuitton. However, our examination indicates that PMX Agency made a mistake in listing the correct account as the number of followers for @Louisvuitton_US does not correspond to the number of followers stated in the reports (PMX Agency, 2017).

[b] Originally, PMX Agency stated @armani instead of @giorgioarmani. However, Armani consolidated its @armani Twitter account to @giorgioarmani as of December 31, 2016 and as a result, all tweets at @Armani were transferred by the Twitter mechanism to @giorgioarmani automatically.

available Twitter metrics to be used as proxies. Therefore, the results of transforming the qualitative textual data in tweets into quantitative data had to be integrated into the panel data for the entertainment and trendiness dimensions, unlike the interaction and customization dimensions which were measured using existing Twitter metrics. Automated text analytical approaches specified by Humphreys and Wang (2017) and Berger and Milkman (2012) were utilized to code a large number of firm tweets within a reasonable time frame.

To code whether or not the tweet contains textual components that represent an entertainment dimension, identifying a group of words that adequately portray the entertainment dimension was critical. We started with the two words “fun” and “interesting”, which are salient in Kim and Ko's (2012) two scale items for the entertainment dimension. We then searched for other words related to the perceptions of entertainment from the tagged corpus of tweets. We asked four coders to select all the words that denote “entertainment” from the 800 words. They were also encouraged to come up with words that were not on the list. In the end, 57 words, including nouns, adjectives, verbs, and adverbs, were selected to identify tweets that represent the entertainment dimension (see Table 4A). Similarly, to code whether or not the tweet contains textual elements that represent the trendiness dimension, we began with the key words “newest” and “trendy”, which were prominent in Kim and Ko's (2012) two scale items for the trendiness dimension. Using the same procedures as for the entertainment dimension counterpart, we came up with a list of 53 words, including nouns, adjectives, verbs, and adverbs that illustrate the trendiness dimension (see Table 4B).

To check inter-rater reliability, we asked another pair of coders to evaluate how highly each word gives the perception of entertainment for the entertainment dimension, using a scale of 1 to 5, with 1 being the lowest and 5 being the highest. The average rating for the 57 words that denote an entertainment dimension was 4.23, confirming that these words reliably portray the entertainment dimension. Krippendorff's alpha (Hayes & Krippendorff, 2007) for entertainment is 0.82 (a value above 0.70 indicates adequate reliability). Similarly, we asked two coders to evaluate the perception of trendiness for the 53 words identified for the trendiness dimension. The average rating for trendiness was 4.36, with a Krippendorff's alpha value of 0.84.

Finally, we counted the total number of tweets created by the luxury brands that contain elements representing the entertainment dimension and trendiness dimension respectively as proxies for the entertainment and trendiness dimensions.

4.3.2. Interaction

Interaction is the degree to which a luxury brand's social media account is interactive. Twitter provides several mechanisms by which firms are able to interact with audiences (Araujo, Neijens, & Vliegenthart, 2015). In this study, the interaction dimension we measured as the sum of the total number of tweets created by the firm and the numbers of hashtags, mentions, and URLs included in tweets from the firm.

4.3.3. Customization

On Twitter, firms may offer customized services by replying to individual customers or by direct messaging to them. Replies are publicly shared, but direct messaging is private. Thus, we were only able to use the number of a luxury brand's tweets sent as a reply to a specific customer as a proxy for the customization dimension.

4.3.4. Customer engagement

In this paper, customer engagement is measured as a reflection of the three types of customer engagement behaviors (i.e., consumption, contribution, and creation behaviors) with brand-related social media content (Schivinski et al., 2016). More specifically, proxies representing consumption, contribution, and creation behaviors according to Schivinski et al.'s (2016) operationalization were identified from the Twitter data and collapsed into one composite variable of customer engagement by calculating the mean score. In numerous instances, composite measures are often effective in capturing broad constructs (Dearden et al., 2013) and meaningfully summarizing a complex phenomenon (Sharpe, 1999), which is the case with the integrated construct of customer engagement the present study adopts. While multiple methods are available for calculating the composite measures (Nardo, Saisana, Saltelli, & Tarantola, 2008), we chose a commonly used additive aggregation method in which the average of multiple indicator variables is calculated (Janzen, 2003).

As noted by Hofacker et al. (2016), accommodating an existing scale to big data sets is a very difficult task. In evaluating Schivinski et al.'s (2016) operationalization (i.e., scale items) of the consumption, contribution, and creation behaviors to identify proxy measures from Twitter data, it became apparent that the items in this scale cover a variety of customer engagement activities that may occur across

Data Source URL: https://twitter.com/gucci/status/280725918685745152

TweetText: Stylish entertaining courtesy of this month's GUCCI MUSEO BOOK CLUB #cheers http://on.gucci.com/books pic.twitter.com/poPZBdSk

TweetID: 280725918685745152

TimeofCreation: 2012-12-17 12:27:29

ScreenName: gucci

ScreenID: 16913418

PictureOrVideo: true

IsReplyTo: false

Retweets: 37

Favorites: 32

Replies: 11

Hashtags: #cheers

NumOfHashtags: 1

Mentions: null

NumOfMentions: 0

URLs: http://on.gucci.com/books ; pic.twitter.com/popzbdsk

NumOfURLs: 2

Entertainment: 1

Trendiness: 1

Customization: 0

TweetType: firm-created

CompanySN: gucci

Fig. 2. A single observation example of Twitter data.
Note. The tweet can be retrieved by following the data source URL. All the tweets were downloaded at least one month after they had been posted.

Table 3
Descriptive statistics for the measures.

Measures	Observations	Mean	Std. Dev.	Min	Max
Entertainment	900	5.11	10.27	0	195
Interaction	900	5231.95	4134.91	41	57,629
Trendiness	900	19.09	16.52	0	102
Customization	900	35.38	77.66	0	1848
Customer Engagement	900	9800.06	10,091.3	179.49	104,307.7

multiple social media platforms. Since we rely on Twitter as a sole source of big data for analysis, it was crucial to acquire reasonable proxies for each type of engagement behavior that take into consideration the unique characteristics of Twitter as a social media platform. First, for the consumption type of customer engagement, no Twitter metric was readily available as a proxy.[2] Hence, we turned to predictive techniques to derive a model. We set up 30 hypothetical Twitter accounts and regularly posted tweets during a one-month

[2] For instance, the "impression" metric only records the number of times Twitter has delivered one's tweet to someone else's timeline.

Table 4
Words used to identify luxury brands' tweets that represent the entertainment and trendiness dimensions

A. Entertainment dimension (total 57 words)
amuse, amuses, amused, amusing, amusement, anticipated, anticipation, anticipating, captivate, captivating, captivated, captivation, captivates, clever, enjoying, enjoyment, enjoyable, compelling, entertain, entertainment, entertaining, feast, festival, festive, film, fun, funny, funnier, funniest, good time, hilarious, humor, humorous, hysterical, hysterically, interesting, interested, laugh, laughter, laughing, mesmerizing, mesmerized, pageantry, performance, performer, pleasure, recreation, red carpet, relaxing, relaxation, ridiculously, screaming, theatre, thrill, thrilling, thrilled, witty

B. Trendiness dimension (total 53words)
best, catwalk, chic, classy, contemporary, cool, creative, dressy, elegant, elegantly, fabulous, fabulously, famous, fashion, fashionable, first class, glamor, glamourous, gorgeous, gorgeously, icon, iconic, in vogue, influential, innovative, innovator, innovating, inspiring, inspiration, latest, leading, leader, luxurious, luxury, modish, modern, newest, on-trend, pioneering, popular, renowned, styles, stylish, supermodel, superstar, top, trend, trends, trendy, trend-setter, trendsetter, unique, vogue

period. We included texts, pictures, videos, and URL links in our tweets. After one month, we downloaded the Twitter analytics data. Our data show that the number of views of the pictures or videos and the number of clicks on the URLs of both firm and consumer tweets, as well as the unique number of users who had posted tweets using "@brand", are adequate proxies for the consumption dimension. For the contribution type of customer engagement, we used the sum of the numbers of "retweets" (share) and "likes" on tweets posted by the brand or by fellow users using "@brand". Lastly, for the creation type of customer engagement, the total number of customer-generated tweets that mention a brand (i.e., "@brand") was counted as a proxy.

4.4. The econometric model

We used a fixed-effects (FE) model to analyze panel data consisting of 900 monthly observations for 15 luxury brands. We used the xtreg function in Stata 14 (Cameron & Trivedi, 2010). A FE model assumes that individual heterogeneity between brands is captured by the unknown intercept and therefore gives researchers the ability to control for all time-invariant unobserved variables (Allison, 2009).

4.4.1. Unit root test

Before we conducted the final analysis of the panel data, we first ran unit root tests to check whether any of the variables of interest showed non-stationarity, which can cause spurious regression results if not handled correctly. We ran the Fisher-type unit root tests on the entertainment, interaction, trendiness, customization, and customer engagement variables respectively and found that all the *p*-values were < 0.001, rejecting the null hypothesis that the panels contain unit roots. This confirms that all the panels are stationary.

4.4.2. Fixed-effect model

We ran the Hausman test (Hausman, 1978; Wooldridge, 2010) to decide whether a fixed-or random-effects model would be the right choice. The *p*-value of the Hausman test was 0.013. At a 5% significance level, the null hypothesis that differences in coefficients are not systematic was rejected, meaning that a fixed-effects model is preferable. We express the basic model as follows:

$$Engagement_{it} = \beta_1 Entertain_{it} + \beta_2 Interact_{it} + \beta_3 Trendi_{it} + \beta_4 Custom_{it} + \alpha_i + \epsilon_{it}$$

where $i = 1, \ldots, N$ (=15) luxury brands and $t = 1, \ldots, T$ (=60) time periods, spanning from July 2012 to June 2017 and producing 900 observations; $Engagement_{it}$ represents customer engagement with luxury brand i at time period t; $Entertain_{it}$, $Interact_{it}$, $Trendi_{it}$, and $Custom_{it}$ represent brand i's entertainment, interaction, trendiness, and customization at time period t, respectively; α_i is the unknown intercept (i.e., the fixed-effects); ε_{it} is the random error.

5. Results

The effects of luxury brand's social media marketing efforts on customer engagement are presented in Table 5. The results from the fixed-effects model show that the first three foci of the social media marketing activities have significantly positive effects on customer engagement: entertainment ($b = 72.32$, $p = 0.01$), interaction ($b = 1.18$, $p < 0.001$), and trendiness ($b = 88.93$, $p < 0.001$). We can also compare the relative impacts of the independent variables on customer engagement. For example, the effect of trendiness ($b = 88.93$, $p < 0.001$) is bigger than that of entertainment ($b = 72.32$, $p = 0.01$). The effect of customization, on the other hand, is not significant on customer engagement, with $b = -6.82$ and $p = 0.08$. This unexpected finding and a plausible explanation behind this effect will be presented in the discussion section below.

Table 5
The impact of luxury brand's social media marketing on customer engagement.

Luxury brand's social media marketing	Customer engagement	
	b	p
Entertainment	72.32	0.010
Interaction	1.18	0.000
Trendiness	88.93	0.000
Customization	−6.82	0.075
Constant	1791.63	0.002

Number of observations = 900.
Number of brands = 15.
$R^2 = 0.33$.
F-Statistic (4, 861) = 71.21.

6. Discussion

6.1. Discussion and implications

Luxury brands have significantly increased their use of social media in the last 10 years in recognition of the important role social media plays in customer engagement and luxury consumers' purchasing decisions (Dauriz et al., 2014; Kim & Ko, 2012; Scott, 2015). While previous research findings indicated that luxury brands manage social media to increase customer engagement (e.g., Hughes et al., 2016; Phan et al., 2011), most research so far has remained qualitative in nature and has rarely employed actual customer engagement behaviors resulting from luxury brand's social media marketing. This study was conducted with the aim of examining the roles of the entertainment, interaction, trendiness, and customization dimensions of luxury brands' social media marketing on customer engagement with social media content. Employing a Twitter data set as a source of big data that allows the capture, measurement, and analysis of both firm and customer engagement activities in social media, the current research investigated the "symbiotic relationship" between the luxury firm's social media engagement activities and consumer engagement with the brand's social media content (Barger et al., 2016, p. 279).

Kim and Ko (2012) initially proposed the five aspects (entertainment, interaction, trendiness, customization, and WOM) of a luxury brand's social media marketing efforts as a holistic concept. Although this conceptualization has been well-received in previous empirical studies (e.g., Godey et al., 2016), the current study further categorized Kim and Ko's five dimensions into firm's engagement (entertainment, interaction, trendiness, customization) and customer's engagement (WOM) activities based on which party is investing in the engagement activities according to Kunz et al.'s (2017) dual perspective of customer engagement. This way, further managerial insights could be generated through identifying the differential roles each dimension plays in leading to customer engagement. The current study also expands the existing operationalization of customer engagement behavior with social media content in the luxury brand literature by measuring consumption, contribution, and creation activities collectively. This allowed a more inclusive understanding of the customer engagement possible on social media and addressed the gap in the research on customer engagement behavior in the luxury domain, the importance of which was raised by Pentina et al. (2018).

Our results suggest that a luxury firm's social media engagement to enhance entertainment, interaction, and trendiness pays off in terms of increasing customer engagement with brand-related social media content. Therefore, the most important implications of this study for practice are associated with the significance of investing in the entertainment, interaction, and trendiness aspects of a luxury brand's social media activities.

First, entertainment activities can be highlighted by delivering fun and interesting contents that build excitement about the luxury brand among consumers so that even non-owners can become involved enough to be motivated to share brand-related social media content with their friends and acquaintances. For example, luxury brands often collaborate with celebrities or online influencers and use product placement to provoke excitement and build recognition of the brand (Dauriz et al., 2014; Kapferer, 2012; Scott, 2015). This way, luxury brands can "strike a balance between exclusivity and inclusiveness" (Scott, 2015) and "spread brand and worth awareness far beyond the target group" (Kapferer & Bastien, 2009, p. 319).

Next, to increase interaction activities with luxury customers, luxury brands may offer various opportunities for luxury customers to partake in their social media. For instance, Tiffany and Burberry invited customers to create content and participate in social media campaigns (Hughes et al., 2016; Phan et al., 2011; Straker & Wrigley, 2016), while the British luxury brand Karen Millen crowdsourced photos from social media for its online store (Scott, 2015). Likewise, firms are encouraged to utilize the interactive nature of social media that allows co-creation of value with customers (Kunz et al., 2017).

Luxury brands should also promote the trendiness dimension by keeping customers up-to-date on the latest products or events (Dauriz et al., 2014; Phan et al., 2011). For instance, luxury brands can stream live runway shows and give behind-the-scenes glimpses at fashion shows and photo shoots (Phan et al., 2011; Scott, 2015; Straker & Wrigley, 2016). By sharing up-to-date information on social media, luxury brands solidify their positioning as fashionable and aspirational and enhance customer engagement with social media content (Phan et al., 2011; Straker & Wrigley, 2016).

An unexpected finding of our analysis is that customization efforts as part of luxury brands' social media activities did not increase customer engagement with the brands' social media content. One plausible explanation for this effect is the innate characteristics of Twitter as the social media platform where the data for the existing analysis was obtained. While Twitter allows customization for firms in the form of replies and direct messages, we only had access to the replies for analysis because direct messages are exchanged privately between the brand and the individual consumer only. Therefore, Twitter may not be the ideal social media platform in which to investigate luxury brands' customization efforts.

Nevertheless, we do not suggest that firms should ignore the conventional practice of personalized interactions with customers, which is commonly emphasized in the luxury brand communication (Okonkwo, 2009). Rather, our findings suggest that luxury brands may not do enough customized communication in social media to meet or exceed customers' expectations. The effort it takes for luxury brands to execute customization in social media is qualitatively different from that to deliver entertainment, interaction, and trendiness to customers. While entertainment, interaction, and trendiness can be delivered through mass communication, customization is by definition on a one-to-one individual level. Cailleux, Mignot, and Kapferer (2009) recommend that luxury brands develop differential communication strategies based on the profitability of the customer segments so that high-spending segments are managed through a personalized contact method (e.g., personalized phone calls, handwritten notes, and invitations to VIP events), while low-to-middle segments are managed through a mass contact method (e.g., newsletters and brand catalogs). Social media for luxury brands is a "cost-effective image building tool" (Godey et al., 2016, p. 5840). Because actual purchase history and the level of previous interactions are not revealed on social media, luxury brands are advised to exercise caution in investing in customization or personalization through social media.

6.2. Limitations and future research

The current research has limitations that imply directions for future research. First, the current study focused on Twitter as a communication medium for luxury brands' social media activities. Although Twitter is most often used by luxury brands as a means of social media marketing along with Facebook and Instagram (Dauriz et al., 2014; Kim & Ko, 2012; PMX Agency, 2017), luxury consumers use different social media for different reasons (Dauriz et al., 2014). For example, consumers consider Twitter useful to learn about or comment on live events in real-time, whereas Facebook is mostly informative about promotions. Online communities, blogs, and forums, on the other hand, allow luxury customers to exchange reviews on products and share in-store experiences. Therefore, future researchers may investigate how luxury brands' engagement needs to vary and which dimensions of luxury brands' social media marketing activities need to be highlighted across the different social media platforms.

Second, while this is the first study to examine luxury brands' social media strategies using big data over a five-year period (60 months), using big data is not without limitations. With the help of big data, it is possible to observe, record, and understand customer engagement behavior more systematically. However, the level of customer engagement is also a function of the characteristics of the brand (e.g., brand equity and firm reputation) and customer (e.g., motivations for engagement, involvement with a brand, and relationship history with the brand) (Hofacker et al., 2016; Kunz et al., 2017), which were omitted in the current analysis. Therefore, future researchers need to combine big data with traditional consumer information collected through behavioral experiments, surveys, or a firm's customer relationship management (CRM) system to gain a more holistic understanding of customer engagement (Erevelles et al., 2016).

Third, although we adopted Kim and Ko's (2012) established dimensions of luxury brands' social media marketing activities in our investigation, luxury brands are equipped with characteristics that are unique in comparison to non-luxury brands. For example, Christodoulides, Michaelidou, and Li (2009) identified six dimensions that are not captured by Kim and Ko's (2012) framework, including excellent quality, very high price, scarcity and uniqueness, aesthetics, heritage, and superfluousness. Thus, future researchers should examine the role of social media in enhancing consumers' perception of the traditional dimensions of luxury brands and how the unique characteristics of luxury brands are communicated in social media.

Fourth, as a measure for customer engagement, the current study created a composite measure as a reflection of the three types of customer engagement behaviors (i.e., consumption, contribution, and creation behaviors) with brand-related social media content (Schivinski et al., 2016). However, future studies can examine which dimensions of a luxury brand's social media marketing efforts may result in the most active (creation), moderately active (contribution), and least active (consumption) customer engagement behaviors by investigating the three types of customer engagement behaviors as separate theoretical constructs.

Lastly, this study examined the social media practices of the top 15 luxury brands with the highest number of Twitter followers as compiled by PMX Agency (2017). Although the big data analytics allowed the investigation of a large volume (3.78 million) of tweets collected over a 5-year period, further study is required to examine a more comprehensive and diverse sample of luxury brands to enhance the application of the findings.

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