RESEARCH PAPER

Understanding reviewer characteristics in online reviews via network structural positions

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Abstract

With the prevalence of online review websites, understanding online reviewer characteristics has become important, as such an understanding provides brand managers with opportunities to segment their markets, target influencers, and develop effective marketing strategies. Nonetheless, past studies have overlooked the role of network structural positions in the characteristics of online reviewers. Accordingly, using data from Yelp websites as samples, this study attempted to explore the differences in reviewer characteristics by network structural positions. The study used multiple data collection and analysis approaches, including web scraping, network analysis, and statistical analysis. The results of this study showed that compared to peripheral reviewers, core reviewers exhibited significantly more photos and brands reviewed and included a higher proportion of early reviewers. The study has significant theoretical and practical implications for researchers and brand managers who are interested in understanding online review markets.

Keywords Reviewer characteristics · Online reviews · Network structural positions

Introduction

Websites that offer online reviews, such as Yelp, TripAdvisor, Amazon, and Netflix, have been prevalent in recent years. Online reviews provide rich information sources regarding product or service purchase experiences (Ahani et al., 2019; Gao et al., 2018; Li et al., 2017), affecting nearly half of all buying decisions among consumers (Mathwick & Mosteller, 2017). Online reviews have been a significant topic that has drawn attention from not only business managers but also academic researchers over the past several years.

Previous studies on online reviews have paid much attention to social influence issues, and most of these studies revealed the significant impacts of various online review characteristics, including images (Zinko et al., 2020), emotional content (Guo et al., 2020), inconsistent reviews (Steur et al., 2022), review

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quality (Lee & Shin, 2014), information overload (Furner & Zinko, 2017), and information helpfulness (Filieri et al., 2018) on consumer purchase intentions. Additionally, several studies have shown concern about the social influence of prior reviews/ratings on subsequent reviews/ratings (e.g., Lee et al., 2015; Li et al., 2020; Ma et al., 2013). Among these studies, reviewer characteristics (e.g., gender, experience, and geographic mobility) have been a significant topic of researcher focus, given that these characteristics not only serve as essential bases of market segmentation in marketing strategies (Kotler & Keller, 2006) but also play an important role in moderating the effects of prior reviews/ratings on subsequent reviews/ratings (Li et al., 2020; Ma et al., 2013). Nonetheless, past research has been limited to the examination of reviewers' demographic or psychographic features (e.g., Ma et al., 2013; Zhang et al., 2016) and has overlooked reviewer characteristics from the perspective of network structure.

Relationships between network structural positions and individual characteristics have been explored in previous studies (Kratzer & Lettl, 2009; Lee et al., 2010; Litterio et al., 2017; Risselada et al., 2016; Van Eck et al., 2011; Zhu et al., 2014). In these investigations, individuals' centrality in a social network has been found to positively correlate with both opinion leadership and susceptibility to interpersonal influence (Lee et al., 2010). Particularly, several researchers suggest that being an opinion leader or

influencer is a significant characteristic that distinguishes individuals in central positions in the network from the rest of the individuals in the network (e.g., Kratzer & Lettl 2009; Litterio et al., 2017; Risselada et al., 2016). Although network structural positions and individual characteristics are not independent of each other (Muller & Peres, 2019), no prior studies have been devoted to integrating the two in the context of online reviews.

An increasing number of online review websites have incorporated social networking functions (Li et al., 2017). For example, reviewers on Yelp can interact with brands via reviews and replies or link with other reviewers by adding friends or peer evaluation votes. In these ways, a reviewer–brand network or a reviewer–reviewer network is formed within online review websites, offering brand managers an opportunity to understand the characteristics of online reviewers through network structural positions, given that the features of individuals' influences can be inferred from their locations in the network (e.g., Lee et al., 2010; Risselada et al., 2016). Accordingly, given the networked nature of social interactions on online review websites, it is essential to explore how network structural positions relate to reviewer characteristics in online reviews, as this can help business managers precisely segment online reviewers and devise efficient marketing strategies for targeted segments. Nevertheless, prior studies on online reviews have not explored this issue.

To address the existing research gap, this study aimed to understand online reviewer characteristics via network structural positions. Considering that being an opinion leader is an individual feature reflected by central network positions (e.g., Kratzer & Lettl 2009; Lee et al., 2010; Risselada et al., 2016), this study examined the differences in online reviewer characteristics by core and peripheral network positions based on a three-dimensional framework of opinion leader characteristics. The framework integrated the relevant and appropriate variables for explaining opinion leaders' characteristics identified in prior research, including reviews, photos, early reviewers, words in reviews, expert labels, brands reviewed, and friends. This study utilized multiple approaches to collect and analyze data from Yelp, including web scraping, network analysis, and statistical analysis.

This study makes the following contributions. First, the study is the first to explore reviewer characteristics via network structural positions in the context of online reviews. Second, the study collected online user-generated content from Yelp via web parsing technology and used various data analysis methods including network analysis and statistical analysis, which have not been applied in previous studies of online reviewer characteristics. Accordingly, this study benefits both marketing managers and researchers by providing an alternative approach to traditional methods for understanding the characteristics of online reviewers and

conducting market segmentation. Finally, the study used data from delivery restaurants in Yelp as a sample case. The results of this study provide brand managers in the food and restaurant services industry with useful market information for developing effective marketing strategies.

Literature review

Reviewer characteristics in online reviews

Reviewer characteristics have been a topic discussed in previous studies related to online reviews. Researchers have explored various reviewer characteristics that affect the social influence of prior reviews or ratings on subsequent reviews or ratings, including experience, social relationships, gender, geographic mobility, etc. (e.g., Li et al., 2020; Ma et al., 2013; Wang et al., 2018).

Li et al. (2020) attempt to investigate critical reviewer characteristics and reviews that may exert impacts on the process of social influence. Using restaurant review data from Yelp, they find that prior average review ratings positively affect subsequent review ratings of the same restaurant; however, variance in existing review ratings attenuates this impact. Additionally, reviewers with the feature of experience—classified as elite by Yelp—are less susceptible to the social influence of prior average review ratings than nonelite reviewers.

Features of experience among reviewers are also the focus of Zhang et al. (2016). Zhang et al. (2016) attempt to investigate how online user-generated expert reviews influence travelers' behavior. They find that the number of expert reviews of a hotel has a positive impact on future traveler ratings of the hotel. Nonetheless, the marginal impact of a greater number of expert reviews decreases. Additionally, when travelers increase their reviewing expertise, they post more negative ratings, while the marginal effect of the level of reviewing expertise lessens. The results also reveal that reviewing expertise can strengthen the positive impacts of expert hotel reviews on rating behavior among travelers.

In addition to experience, social relationships have been suggested to be a critical reviewer characteristic. For instance, Wang et al. (2018) explore the social influence of online friends in the context of online book ratings. Using experimental methods, they show that after online friend relationships are formed, the similarity of ratings among friends becomes significantly higher. In addition, they also find that social influence is stronger for users with smaller networks and for older books.

Multiple reviewer characteristics have been simultaneously considered by researchers. For example, Ma et al. (2013) analyze the level at which reviewer characteristics and early reviews worsen or reduce subsequent online

reviews' bias based on the elaboration likelihood model. By analyzing data from Yelp, they find that some people, such as male reviewers and those who lack social connectedness, experience, or geographic mobility, are more apt to be impacted by previous reviews. In their study, reviewer and review characteristics are revealed as significant moderators of the relationship between prior and subsequent reviews.

Past studies have examined the effects of online reviewer characteristics on the social influence process in online reviews. Nevertheless, they have overlooked the relationships between network structural positions and online reviewer characteristics. Accordingly, in the next section, this study reviews previous research related to network structure and individual characteristics to offer rationale for exploring the role of network structural positions in online reviewer characteristics.

Network structural positions and individual characteristics

Prior studies have explored individual characteristics in network structural positions, such as lead users (Kratzer & Lettl, 2009), opinion leaders (Kratzer & Lettl, 2009; Lee et al., 2010; Litterio et al., 2017; Risselada et al., 2016; Van Eck et al., 2011), and susceptibility to influence (Lee et al., 2010). Among these studies, issues including network structural comparisons between different individual characteristics, network centrality and consumer influence, and measures of opinion leaders/influencers in the network have been discussed.

Network structural comparisons between different individual characteristics Kratzer and Lettl (2009) investigated whether lead users and opinion leaders occupy similar positions in social networks. They collected data from a sample of 537 children and analyzed the data via hierarchical linear modeling. Their results show that lead users among children seemingly have various ties between clusters; moreover, opinion leaders are locally positioned in children's clusters and possess multiple direct ties. Additionally, in exploring the role of opinion leaders in the new product adoption process, Van Eck et al. (2011) find that compared to nonopinion leaders, opinion leaders not only have more central network positions and more precise product knowledge but are also inclined to be more innovative and less susceptible to norms.

Network centrality and consumer influence Lee et al. (2010) explore whether a consumer's position in a social network relates to both opinion leadership and susceptibility to influence via two field network studies. Their findings reveal that people regard themselves as opinion leaders when perceiving themselves as central/popular in the network, but such a self-assessment is sometimes different from the perceptions of others in the network. The authors find that consumers with central positions in networks are quite susceptible to influences from others. In addition, Chatterjee et al. (2017) investigate the contingent role of network centrality in consumer-to-consumer influence. They suggest that central consumers in a group are usually influential, while a contradictory effect of centrality may lead to reactance instead of conformity among other members. Their results reveal the centrality and relational strength of consumer networks in conjunction via an experimental method, contributing to the network approach to consumer-to-consumer influence.

Measures of opinion leaders/influencers in the network Using the degree centrality of networks and self-reported opinion leadership as indicators of opinion leadership, Risselada et al. (2016) examine how these two indicators and the social network environment affect opinion leadership. They analyze data from the mobile telecom industry and find that degree centrality is indicative of opinion leadership; however, self-reported opinion leadership denotes opinion leadership merely under the right social circumstances. Moreover, different centrality measures of networks are used by Litterio et al. (2017) to identify influencers. Litterio et al. (2017) present a method to detect potential influencers based on centrality metrics. The proposed matrix integrates the eigenvector centrality and betweenness centrality of a social network and is examined on a Facebook fan page. Using NodeXL, agent-based simulation, and semantic analysis, their findings reveal that the proposed model is effective for detecting actors who have the potential to disseminate messages efficiently via their position within the network. In particular, they suggest that social network analysis is useful for detecting subgroups of components with specific features that are not evident by other methods.

The above review of past research shows that network structural positions are related to individual characteristics; specifically, individual characteristics of opinion leaders can be reflected by central positions in a network (Kratzer & Lettl, 2009; Lee et al., 2010; Litterio et al., 2017; Risselada et al., 2016; Van Eck et al., 2011). Accordingly, to understand how the characteristics of online reviewers relate to network structural positions, the characteristics of opinion leaders offer this study a useful basis for the development of research frameworks and hypotheses. Next, this study reviews research related to opinion leaders and illustrates how the characteristics of opinion leaders can be used as a research framework to guide an investigation of differences in the characteristics of online reviewers by network structural positions.

Characteristics of opinion leaders as a research framework

The concept of opinion leaders has been discussed since the 1940s. In a study by Lazarsfeld et al. (1944), interpersonal communication was found to have stronger impacts on people's attitudes and behavior than mass media usage in the context of voting behavior. In response to Lazarsfeld et al. (1944)'s research, Katz and Lazarsfeld (1955) further emphasized the importance of interpersonal communication in a two-step flow of communication. Katz and Lazarsfeld (1955) described social influence as a two-stage process in which opinion leaders play a significant role since they are influenced by the media and then pass on their influence to other people. Since Katz and Lazarsfeld (1955), opinion leaders have drawn much attention from researchers in diverse fields (e.g., Goldenberg et al., 2009; Leonard-Barton, 1985; Litterio et al., 2017; Muller & Peres, 2019).

Various definitions of opinion leaders have been revealed by previous research. For example, Katz and Lazarsfeld (1955) defined opinion leaders as people who were likely to influence other people in their immediate environment and suggested that opinion leadership is an essential component of the give-and-take of everyday interpersonal relationships. In addition, in the context of marketing, opinion leadership refers to not only an individual's tendency to affect the buying decisions of others (King & Summers, 1970) but also a social construct related to individuals' networks. For instance, Lee et al. (2010) described opinion leaders as those who receive information from marketers and subsequently pass on this information to other consumers within the opinion leaders' respective network. Litterio et al. (2017, p. 347) further suggest that opinion leaders "have the potential to influence buying behavior in both their first-order contacts and their broad network". Although these previous studies described opinion leaders in different ways, they conceptualized opinion leadership as not only a personal characteristic but also a social construct based on relations. Personal and social features have been suggested to be the main elements of opinion leader characteristics (Katz, 1957; Weimann, 1991).

Many researchers have used the three-dimensional framework proposed by Katz (1957) to explore the characteristics of opinion leaders in different contexts (e.g., Choi 2014; Goldenberg et al., 2009; Muller & Peres, 2019; Van Eck et al., 2011; Weimann, 1991; Winter & Neubaum, 2016). This framework includes three dimensions of opinion leader characteristics, including (1) who one is (personality traits); (2) what one knows (competence); and (3) whom one knows (social connectivity). The first two dimensions involve personal factors, while the third dimension focuses on individual social networks. Particularly, this framework suggests three dimensions of opinion leader features without

assigning specific variables to each dimension, making this framework applicable and adaptable to different research contexts. Accordingly, given that opinion leadership has been suggested to be a critical feature of individuals who can discriminate people in core network locations from the rest of the people within the network (Kratzer & Lettl, 2009; Lee et al., 2010; Litterio et al., 2017; Risselada et al., 2016; Van Eck et al., 2011), it is suitable to use the three-dimensional characteristics of opinion leaders as the research framework to examine the differences in online reviewer characteristics via core and peripheral network positions.

Research hypotheses

This study used the three dimensions of opinion leaders' characteristics as a research framework, integrating the variables relevant to explaining the characteristics of opinion leaders in each dimension in the literature: (1) who one is (reviews, photos, and early reviewers); (2) what one knows (words in reviews and expert labels); and (3) whom one knows (brands reviewed and friends). The hypotheses are developed below.

Who one is

Several individual characteristics of opinion leaders, such as demographic backgrounds, lifestyles, and social status, are included in the first axis (Muller & Peres, 2019; Summers, 1970). Among these features, lifestyle and innovation adoption are notable reviewer characteristics on online review websites.

Lifestyle Lifestyle has been defined as "a pattern of consumption that reflects a person's choices of how to spend his or her time and money…" (Solomon, 2019, p. 261). Regarding lifestyles, researchers suggest that opinion leaders actively participate in various activities and share abundant life experiences. For example, they are actively involved in the community and leisure activities, such as surfing the web, spending time with friends, listening to music, and being highly exposed to media (Aral & Walker, 2012; Keller & Berry, 2003; cited by Muller & Peres 2019). On review websites, such as Yelp and TripAdvisor, reviewers are allowed not only to review specific products or services that they have experienced via ratings, textual comments, and photos but also to share personal information in their profile pages, including location, Yelping time, consuming experiences (e.g., reviews, photos, and review time), etc.

Occupying central network positions relates to the degree to which individuals are opinion leaders (Lee et al., 2010). Accordingly, this study suggests that the online reviewers in

the core positions in the review network (i.e., core reviewers) have the features of opinion leaders—they are more actively involved in the review websites and thus share more reviews and photos on the review websites than reviewers in peripheral network positions (i.e., peripheral reviewers). The following hypotheses were proposed:

H1: Compared to peripheral reviewers, core reviewers write more reviews.

H2: Compared to peripheral reviewers, core reviewers share more photos.

Innovation adoption Many researchers have explored whether opinion leaders tend to be early adopters of new brands and products (e.g., Bai et al., 2018; Coulter et al., 2002). On online review websites, the early innovation adoption of reviewers can be reflected by the characteristics of early reviews (Bai et al., 2018).

Early reviews have been advocated by some websites. For example, Amazon initiated the Early Reviewer Program[1], which helps obtain early reviews of products with no or few reviews and helps shoppers make smarter purchase decisions. Additionally, on Yelp, users who write the first reviews of brands that they have experienced are labeled as the "First to Review".

Early reviews of a product tend to influence subsequent product sales, which is described as the herding effect (Bai et al., 2018). Bai et al. (2018, p. 1) suggest that the "review posting process can be considered as an adoption of innovations" and refer to individuals who post a review in the early stage as early reviewers. They attempt to investigate all features of early reviewers compared with the majority and laggard reviewers based on the theory of diffusion of innovations (Rogers, 1995). Their results indicate that higher helpfulness votes for early reviews given by others can be seen as a proxy measurement of opinion leadership and that the helpfulness scores received and the ratings of early reviewers tend to impact product popularity.

Following Bai et al. (2018), early reviewers can be considered early adopters, who reflect the characteristics of opinion leaders (e.g., Coulter et al., 2002). As the core members in a network tend to be opinion leaders and be more innovative (Van Eck et al., 2011), this study suggests that the features of early reviews can be applied to distinguish core and peripheral reviewers on review websites. Thus, the following hypothesis was proposed:

H3: Compared to peripheral reviewers, a higher proportion of core reviewers are early reviewers.

What one knows

The second dimension of characteristics—what one knows—includes one's competence, such as expertise and knowledge, to offer information or guidance regarding specific topics (Muller & Peres, 2019). It has been suggested that opinion leaders have more user experience and expertise than the average user (Venkatraman, 1989), and their influence has been found to come from domain expertise (Muller & Peres, 2019). In the context of online reviews, expertise has been defined as the reviewer's capabilities and credentials for writing quality reviews that offer useful information and are recognized by the community (Zhu et al., 2014). The expertise of online reviewers can be discussed in two aspects: cognitive efforts and expert labels.

Cognitive efforts Based on the elaboration likelihood model (ELM) (Petty et al., 1983), people use two routes to process information: the central route and the peripheral route. Individuals who are experts on the topic or who are highly involved in the field are inclined to use the central route for information processing and are less likely to be affected by others (Li et al., 2020; Zhu et al., 2014). The central route of information processing involves more cognitive effort than the peripheral route. Social conformity theory suggests a high possibility that individuals tend to employ an accuracy heuristic favoring the group majority if they expend little cognitive effort while processing a message (Cialdini & Goldstein, 2004). In contrast, people who expend extensive cognitive effort while writing a product review are inclined to use a central route (Li et al., 2020).

Language and words have been suggested to reflect cognitive effort and processes in the psychology literature (Joksimovic et al., 2014; Ma et al., 2013). When using cognitive mental processes in writing product reviews, individuals' reviews that exhibit cognitive words and a substantially increased number of words are associated with analytical and logical thoughts (Boals & Klein, 2005; Li et al., 2020; Ma et al., 2013).

Expert labels In addition to the number of cognitive words, reviewers' expertise is also reflected by the quality and quantity of their previous reviews, which are shown by an expert label (Li et al., 2020). For example, the "elite" label on Yelp[2] presents a clear signal of the reviewer's expert standing and competency in writing reviews. It is not based merely on the

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[1] Please refer to: https://www.amazon.com/gp/help/customer/display.html?nodeId=202094910.

[2] Please see: https://www.yelp.com/elite.

number of reviews that individuals write but on high-quality reviews, photos and tips, relationships with other users, and active voting involvement. Li et al. (2017) suggest that compared to nonelite reviewers, elite reviewers usually spend more effort and time and are highly involved in the online review community; accordingly, they are less likely to vote on other reviews as valuable or to depend on these reviews.

Based on previous studies (Lee et al., 2010; Van Eck et al., 2011), this study suggests that core reviewers are prone to being opinion leaders and thus have more expertise in specific product categories than peripheral reviewers (Lee et al., 2010; Muller & Peres, 2019). Compared to peripheral reviewers, core reviewers are more likely to expend more cognitive effort in writing reviews in specific product domains; thus, their reviews may contain more words. In addition, due to their higher interest and involvement in products, the quality and quantity of their reviews are better than those of reviews by peripheral reviewers (nonopinion leaders). Accordingly, the following hypotheses were proposed:

> H4: Compared to peripheral reviewers, core reviewers write more words in reviews.
> H5: Compared to peripheral reviewers, a higher proportion of core reviewers have expert labels.

Whom one knows

The third axis of characteristics describes whom one knows—the type of social connectivity that opinion leaders possess—namely, the social ties to other people that opinion leaders have (Goldenberg et al., 2009).

The number of connections has often been referred to as the degree of a node (Goldenberg et al., 2009). The degree centrality of an individual has been found to positively relate to opinion leadership (Hu & Van den Bulte, 2014; Iyengar et al., 2011; Risselada et al., 2016; Goldenberg et al., 2009) argue that opinion leaders are inclined to be interconnected; therefore, they dominate the acceptance or rejection of innovative methods, thoughts, and ideas. In addition, compared to nonopinion leaders, opinion leaders communicate with greater numbers of people, gain more information from the same sources, and have more exposure to mass media (Goldenberg et al., 2009; Katz & Lazarsfeld, 1955).

The degree centrality, which relates the number of links that a node has to the links of other nodes in the network, has been used to measure the centrality/significance of nodes in the network analysis method (Wasserman & Faust, 1994). Researchers have suggested that people with high degrees are central in the network and influence others (e.g., Keller & Berry 2003). For instance, Constant et al. (1996) suggest that central individuals have more diverse ties with other

members within the network, and comments from these diverse ties are more useful than those from ties with less diversity. In addition, Lee et al. (2010) also find that individuals with high degree centrality (connectivity) have more links to others from whom they are able to obtain resources and network information; in particular, they have greater impacts on others than those with smaller numbers of links. Moreover, research by Yoganarasimhan (2012) reveals that YouTube members' numbers of first- and second-degree connections positively affect the popularity of videos that they post.

Online review websites or websites with review functions have offered users opportunities to connect not only with brands via posting reviews but also with other users by adding friends. For example, Yelp users are allowed to see a reviewer's number of friends and to conveniently read reviews by all friends by clicking the "friends" button (Li et al., 2017). Similarly, Netflix also integrates its websites with other social media such as Facebook; thus, users can directly see product and service ratings by their friends (Blanchard, 2011). Referring to previous research (Lee et al., 2010; Van Eck et al., 2011), this study suggests that core reviewers in online reviews are more likely to be opinion leaders; therefore, they may have more connections with brands and other users than peripheral reviewers by reviewing brands and adding friends. Accordingly, the following hypotheses were proposed:

> H6: Compared to peripheral reviewers, core reviewers write reviews for more brands.
> H7: Compared to peripheral reviewers, core reviewers have more friends.

Methodology

Data collection

Sample This study used review data on the Yelp website as the sample, focusing on delivery restaurants in Taipei, Taiwan. The study selected the samples based on the reasons below.

First, as of September 30, 2010, there were 220 million reviews on Yelp[3]. As one of the largest online review websites in the United States, Yelp includes abundant review data, particularly for restaurants (Li et al., 2020). Second, Yelp initiated business in Taiwan in 2015. Taiwan has been a popular tourist destination for its local restaurants offering

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[3] Please see: https://www.yelp-ir.com/overview/default.aspx.

Table 1 Variable description

Variables	Description
Network structure positions	
Core reviewers	Reviewers who occupied a core position in the network, as measured by whether the reviewers had at least one higher centrality value (the centrality value was greater than the mean value) among three measures: degree centrality, closeness centrality, and betweenness centrality. If yes, they were assigned as "1".
Peripheral reviewers	Reviewers who occupied a peripheral position in the network, as measured by whether the reviewers had lower centrality values (the centrality values were smaller than the mean values) among three measures: degree centrality, closeness centrality, and betweenness centrality. If yes, they were assigned as "2".
Who one is	
Reviews	Number of reviews that the reviewer wrote.
Photos	Number of photos that the reviewer posted.
Early reviewers	Whether the reviewer was designated as the "First to review" in posted reviews (Yes = 1; No = 0).
What one knows	
Words in reviews	Number of words that the reviewers wrote in reviews.
Expert labels	Whether the reviewer was designated "elite" in posted reviews (Yes = 1; No = 0).
Whom one knows	
Brands reviewed	Number of brands for which the reviewer wrote reviews.
Friends	Number of friends that the reviewer had.

gourmet cuisine. During the COVID-19 pandemic, consumers' demands for food delivery have increased, as maintaining social distance has become essential to prevent infection. In particular, people have returned to premium media sources to obtain credible information and turned to online entertainment and shopping (Balis, 2020; Salinas, 2020). These phenomena have caused online review websites to be a significant reference for purchase decisions. Therefore, this study selected restaurant brands offering delivery services as the sample cases, which provided rich review data. Finally, Yelp contains rich information about how users connect with brands and other users on users' profile pages. Accordingly, Yelp served as a suitable candidate in this study for constructing a network of brands and reviewers and collecting data on reviewer characteristics.

Web scraping This study used a varied and large amount of complicated data. Thus, to collect the data efficiently, this study utilized Octoparse 8 software that provides web scraping techniques to gather data from Yelp. To ensure the reliability of the results, the researcher examined whether consistency existed between the real data and the scraped data by manually rechecking the data at random after web scraping on Yelp was finished. The results of rechecking showed that no mistakes existed in the scraped data. In addition, the researcher refined the data by using Excel to restructure the data, deleting redundant data and adjusting the format. These procedures were essential for statistically analyzing the data in the next step. The data were collected and analyzed during January 2021 and February 2021—a holiday season that includes important events in Taiwan (i.e., the New Year, Spring Festival, and Lantern Festival events). According to Hancock (2016), the volume of Yelp search queries in some categories, such as food shops, increases during key holiday periods. Accordingly, seasonal search trends on Yelp offered this study an opportunity to collect more data.

Operationalization of variables Nine variables were developed in this study: two positional characteristics (i.e., core reviewers and peripheral reviewers) and seven reviewer characteristics (i.e., reviews, photos, early reviewers, words in reviews, expert labels, brands reviewed, and friends). The operationalization of each variable in this study is listed in Table 1.

Common method biases (CMBs) This study used Octoparse 8 software to scrape review data from Yelp websites. The main advantage of this approach lies in "naturally occurring data" that can be analyzed, and it may cause fewer biases due to social expectations that can affect the data in research contexts (Müller et al., 2016; Schmiedel et al., 2018). Nonetheless, using the same method to conduct more than one measurement of different constructs may raise concerns about CMBs (Burton-Jones, 2009). Accordingly, this study reduced CMBs via the following procedural methods based on suggestions in the literature (Podsakoff et al., 2003, 2012).

Table 2 Example of an adjacency matrix

Brands Reviewers	A	B	C	D	E	F	G	H	I	J
A	0	1	0	1	1	1	0	1	1	0
B	0	1	0	0	0	0	1	0	0	0
C	1	1	1	1	1	0	0	1	1	1
D	0	1	1	1	1	1	1	1	1	0
E	0	1	0	1	0	0	1	0	0	0
F	0	1	0	1	0	0	1	0	0	0
G	0	1	0	1	0	0	1	0	0	1
H	0	0	0	1	0	0	1	0	0	1
I	0	1	0	1	0	0	1	0	0	1
J	0	1	1	1	0	0	0	0	1	1

First, the data collected from Yelp in this study were from various sources. Second, Yelp users are allowed to reduce the risk of being personally identified by using the service pseudonymously; thus, they can rate and review brands as honestly as possible[4]. Additionally, Yelp uses recommendation software[5] to regularly analyze billions of data points from all reviews, reviewers and businesses to evaluate the reliability and usefulness of each review. Unfairly biased reviews, such as solicited reviews and reviews involving conflicts of interest, are detected and not recommended by the software. These reviews do not factor into a business's overall review count or star rating to ensure the integrity of the content on Yelp. Finally, the variables of focus in this study were fact-based and not vague concepts, which could be measured based on naturally occurring data on the Yelp website. These data were gathered by the unobtrusive method of web scraping, therefore possibly reducing instrument biases (Müller et al., 2016).

Data analysis

Segmentation of core and peripheral reviewers

To segment core and peripheral reviewers, this study conducted two procedures: reviewer–brand network construction and centrality measures.

Construction of the reviewer–brand network To detect the positions occupied by the reviewers in the Yelp network, this study constructed a reviewer–brand network. This study used an adjacency matrix to construct the relationships among the reviewers and brands. Two types of adjacency matrices were available for use in this study to construct the reviewer–brand network: a binary matrix and a weighted matrix. The former uses dichotomous values (0 and 1) to represent the presence/absence of relationships/links among nodes in a network, while the latter uses continuous values to reveal the strength of relationships/links among nodes in a network (Hansen et al., 2011). In this study, the strength of review relationships between reviewers and brands (i.e., the review frequency) was not a main issue of focus; therefore, a binary matrix was used to generate the reviewer–brand network.

The adjacency matrix was denoted as [αij] numbers of reviewers × numbers of brands. This study used binary values in the adjacency matrix cells. That is, if reviewer i had reviewed brand j, entry αij was equal to 1; however, if reviewer i had not reviewed brand j, entry αij was equal to 0. An example is shown in Table 2. The constructed adjacency matrix was used to map and analyze the structural relationships among reviewers and brands with the software package UCINET.

Centrality measures There are three types of centrality measures: degree, betweenness, and closeness centrality (Wasserman & Faust, 1994). Despite slight differences in conceptual meanings, each of the three measures was helpful in this study for identifying core reviewers in the Yelp reviewer–brand network.

According to Freeman (1979), the degree centrality measures the number of direct links that a node has with other nodes. The higher the degree centrality of a node is, the greater the number of people whom the node contacts (Kratzer & Lettl, 2009). Betweenness centrality measures the likelihood of node activation by using a specific path (Freeman, 1979), involving the extent to which a node is a significant intermediary between other nodes' connections within the network (Muller & Peres, 2019). Closeness centrality measures how

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[4] Please see: https://terms.yelp.com/privacy/en_us/20200101_en_us/.

[5] Please see: https://trust.yelp.com/recommendation-software/.

Fig. 1 Country origins of the samples (n = 335)
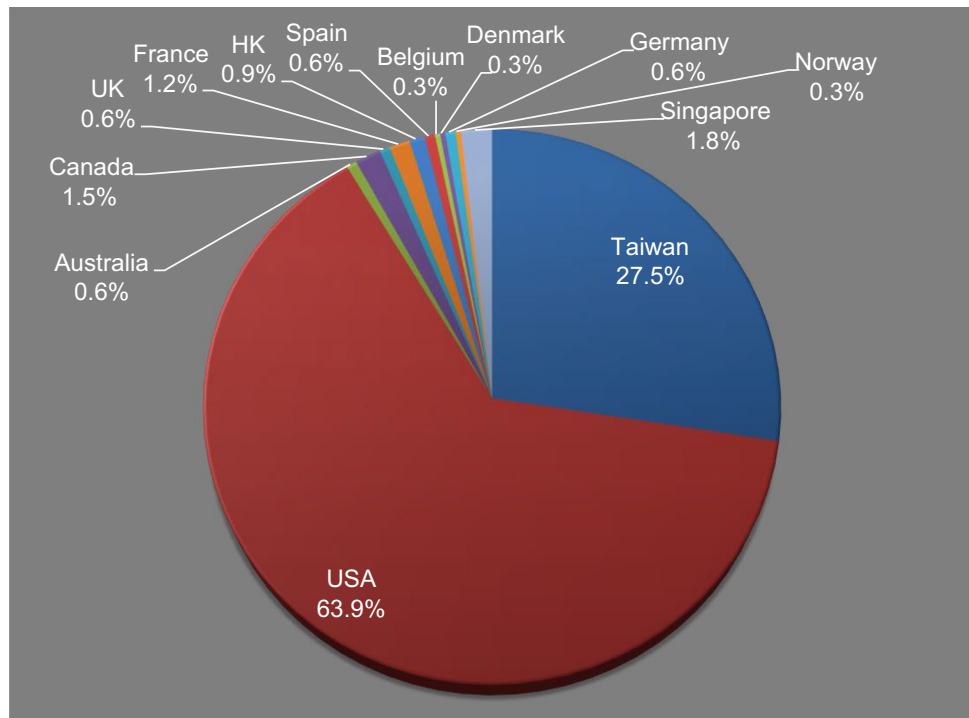
close a node is to other nodes in the network (Muller & Peres, 2019; Sabidussi, 1996).

It is supposed that a node with higher closeness centrality has better connections to other nodes and has easier access to information in the network (Muller & Peres, 2019). Accordingly, this study used all three measures to segment core and peripheral reviewers via UCINET software. The segment criterion was developed as follows: if the centrality value of a reviewer was smaller than the mean value in all measures, the reviewer was classified as a peripheral reviewer; if not, the reviewer was classified as a core reviewer.

Statistical analysis

To examine the proposed hypotheses, this study analyzed the data by employing Statistical Package for the Social Sciences software (SPSS for Windows). The study used independent-samples *t* tests to examine whether differences existed among core and peripheral reviewers regarding the continuous variables (i.e., reviews, photos, words in reviews, brands reviewed, and friends). In addition, the dichotomous variables, including early reviewers and expert labels, were analyzed by cross-tabulations.

Results

Core and peripheral reviewers

This study collected 93 brands and 413 reviews that included a total of 32,140 words and were written by 335 reviewers from 13 countries (see Fig. 1). Through Ucinet software, three centrality measures (i.e., degree, closeness, and betweenness centrality) of all reviewers were analyzed. The study segmented core and peripheral reviewers based on the mean values of three centrality measures: degree centrality (0.013), closeness centrality (72.02), and betweenness centrality (0.03). The results revealed 111 core reviewers with at least one higher centrality value (greater than the mean value) among the three measures

Table 3 Independent-samples *t* tests between core and peripheral reviewers regarding centrality measures

Centrality measures	Core reviewers (n = 111)	Peripheral reviewers (n = 224)	*t* value
Degree centrality	0.018	0.011	7.301***
Closeness centrality	210.059	3.615	110.207***
Betweenness centrality	0.008	0.000	5.307***
Three indexes	207.281	5.016	7.514***

***p < 0.001

Table 4 Independent-samples
t tests between core and
peripheral reviewers

Variables	Core reviewers	Peripheral reviewers	*t* value	Hypotheses
Reviews	215.1	141.84	1.731	H1: Not supported
Photos	776.41	371.79	2.004*	H2: Supported
Words in reviews	96.46	95.68	0.07	H4: Not supported
Brands reviewed	1.68	1	7.253***	H6: Supported
Friends	216.18	183.03	0.585	H7: Not supported

*$p < 0.05$; ***$p < 0.001$

and 224 peripheral reviewers with lower centrality values for all measures (smaller than the mean values).

This study further investigated whether the two classified groups had significant differences in the three types of centrality. Based on an independent-samples *t* test in SPSS software, the results in Table 3 show that the two groups were significantly different in terms of degree centrality ($t = 7.301$, $p < 0.000$), closeness centrality ($t = 110.207$, $p < 0.000$), betweenness centrality ($t = 5.307$, $p < 0.000$), and the three measures combined ($t = 7.514$, $p < 0.000$).

Examination of the hypotheses

This study carried out an independent-samples *t* test to examine whether significant differences existed between core and peripheral reviewers regarding five variables: reviews, photos, words in reviews, brands reviewed, and friends.

The results in Table 4 show that compared to peripheral reviewers, core reviewers exhibited significantly more photos ($t = 2.004$, $p < 0.05$) and more brands reviewed ($t = 7.253$, $P < 0.001$). Accordingly, H2 and H6 were supported. However, no significant differences between core and peripheral reviewers were found in terms of reviews, words in reviews, and friends. Thus, H1, H4, and H7 were not supported.

Two variables were cross-tabulated using chi-square tests: early reviewers and expert labels. As shown in Table 5, a significantly higher proportion of core reviewers than peripheral reviewers were early reviewers (x^2 (1) = 31.044, $p = 0.000$). Therefore, this result supported H3. Nevertheless, there were no statistically significant differences between core and peripheral reviewers in expert labels (x^2 (1) = 0.261, $p = 0.745$). Accordingly, H5 was not supported.

Discussion

Discussion of the results

This study attempted to understand the relationship between network structural positions and reviewer characteristics in online reviews via a research framework based on three

dimensions of opinion leader characteristics. By comparing core and peripheral reviewers, the study confirmed that three characteristics significantly differed between the two groups (i.e., photos, early reviewers, and brands reviewed), while four features did not show differences (reviews, words in reviews, expert labels, and friends). The findings are further discussed below.

Who one is Regarding the first dimension, the results of this study partially support the findings of previous research on opinion leaders. This study found that compared to peripheral reviewers, core reviewers shared more photos on the review website. This result supports previous studies that have explored the lifestyles of opinion leaders. Several researchers indicate that opinion leaders actively participate in activities in the community and undertake various leisure activities, including listening to music, being highly exposed to media, spending time on the web, etc. (Aral & Walker, 2012; Keller & Berry, 2003; cited by Muller & Peres 2019). On Yelp, reviewers are provided with multiple functions to reveal their lifestyles in their personal profiles, such as writing reviews, sharing photos, and evaluating other reviewers. In this study, photo sharing was found to be a feature that differentiated core and peripheral reviewers.

No difference was found between the two groups regarding the review numbers. A possible reason for this finding may be related to the motivations of Yelp users. Yelp is a third-party review website that solely offers review functions for users, which is different from other e-commerce websites with review functions (e.g., Amazon). Yelp users may have

Table 5 Chi-square tests between core and peripheral reviewers

	Core reviewers (%)	Peripheral reviewers (%)	x^2	Hypotheses
Early reviewers	16.2	0.9	31.044***	H3: Supported
Expert labels	13.5	15.6	0.261	H5: Not supported

***$p < 0.001$

more specific use motivations than users of e-commerce websites, which are to share and search for users' experiences with products/services. Accordingly, this may account for why the basic function of writing reviews was not the feature that differentiated core and peripheral reviewers.

Regarding early reviewers, the findings of this study confirmed that a significantly higher proportion of core reviewers than peripheral reviewers were early reviewers. Following Bai et al. (2018), this study regarded the review posting process as an innovation adoption. Accordingly, the results of this study support the arguments that opinion leaders are inclined to be early adopters of new brands and products (e.g., Bai et al., 2018; Coulter et al., 2002) and extend the innovation concept to the context of online reviews.

What one knows The study found that two indicators of expertise—words in reviews and expert labels—were not characteristics differentiating core and peripheral reviewers. These results contrast with previous research that regards expertise and knowledge as significant features of opinion leaders (e.g., Muller & Peres 2019; Venkatraman, 1989). The possible reasons may include the following.

First, language and words have been considered indicators of cognitive effort (Joksimovic et al., 2014; Ma et al., 2013); thus, this study used a greater number of words in reviews to reflect the expertise of core reviewers instead of nonverbal/imagery information processing by online reviewers. Several researchers have claimed that thoughts and the contents of cognitive structures are image-based (Christensen & Olson, 2002; Zaltman, 1997; Zaltman & Coulter, 1995). In addition to writing more words, an expert may exert more effort and spend more time expressing their thoughts via photos than nonexperts. This phenomenon may attenuate the associations between expertise and core reviewers.

Second, the elite label on Yelp is applied based on multiple indicators of reviewers' overall performance on Yelp, including the quality and quantity of reviews with text and photos, a history of being cordial to other users, active voting behavior, etc. (Li et al., 2020). This may increase the possibility that peripheral reviewers of delivery restaurants may have more active involvement and better performance in other product categories or that core reviewers of delivery restaurants may have less active involvement and poor performance in other product categories. These factors may have blurred the differences between core and peripheral reviewers in this study.

Whom one knows The results of this study revealed that the number of brands reviewed was a characteristic distinguishing core and peripheral reviewers, which supports research exploring the degree centrality (connectiveness) and opinion leaders (e.g., Hu & Van den Bulte 2014; Iyengar et al., 2011;

Risselada et al., 2016). Nevertheless, in this study, the number of friends was not found to be a differentiating feature between core and peripheral reviewers, which is different from previous research arguing that the nodes in the center of a network are connected to a relatively large number of other people (Goldenberg et al., 2009; Lee et al., 2010). A possible explanation may be related to the network type used in this study, as illustrated below.

The network type used in this study was a reviewer–brand network (two-mode network) instead of an interpersonal network (one-mode network) (e.g., Goldenberg et al., 2009). The reviewer–brand network in this study included two node categories (i.e., reviewers and brands), which is different from a one-mode network, which only includes one node category (e.g., people). Using centrality measures to analyze the structure of a reviewer–brand network can reveal not only the core reviewers but also core brands that occupy the central positions in the network. Accordingly, the network type may be the reason why core reviewers were found to be connected to more brands reviewed rather than more friends compared to peripheral reviewers in this study.

Theoretical implications

This study has significant theoretical implications for academic research. First, this study is the first to explore the characteristics of online reviewers via network structural positions. Although past studies have explored the characteristics of online reviewers (Li et al., 2020; Ma et al., 2013; Wang et al., 2018), most of these studies have investigated the effects of these characteristics on the social influence process (e.g., Li et al., 2020; Ma et al., 2013; Zhang et al., 2016) rather than how they relate to network structural positions. Moreover, prior studies have also explored how network structural positions can be indicators of individual characteristics; however, they have focused on children (Kratzer & Lettl, 2009) and consumers (Lee et al., 2010) rather than online reviewers. Accordingly, this study advances the limited extant knowledge about understanding the characteristics of online reviewers from the perspectives of network structural positions.

Second, this study used the three-dimensional characteristics of opinion leaders on which previous studies focused (e.g., Goldenberg et al., 2009; Muller & Peres, 2019; Van Eck et al., 2011; Weimann, 1991) as the research framework for hypothesis development. The results of this study reveal that three characteristics of reviewers (i.e., the numbers of photos posted, early reviewers, and brands reviewed) in different dimensions of the research framework can significantly distinguish between core and peripheral reviewers in the network, which contributes to extending the applicability of this framework from the contexts of communications

(Katz, 1957; Weimann, 1991), innovation diffusion (Goldenberg et al., 2009), and social networking sites (Winter & Neubaum, 2016) to online review settings.

Third, this study enriches the methodological knowledge on online reviewer characteristics by using different techniques to extract and analyze online review data. In prior studies on the characteristics of online reviewers, researchers have investigated online review data via various approaches, including text mining (Li et al., 2020), quasi experiments (Wang et al., 2018), web page extraction (Zhang et al., 2016), etc. In contrast to these approaches, this study used a different approach that integrated web scraping, network analysis, *t* tests, and cross-tabulation analysis. In particular, the two software packages, Octoparse 8 and UCINET, used in this study have not been applied by researchers to explore online reviewer characteristics. Therefore, the methods utilized in this study provide researchers with a new approach for exploring issues related to the reviewer characteristics in online reviews.

Practical implications

The study also has several practical implications for business managers in two dimensions: marketing strategies and methodological application.

Marketing strategies This study provides brand managers in the delivery restaurant industry with useful information for devising so-called STP (i.e., segmentation, targeting, and positioning) marketing strategies. It is suggested that brand managers first check whether the reviews of their brands on Yelp have substantiality for use in segmentation analysis relative to their corporate goals. If they do, brand managers can use the methods presented in this study to extract online review data and segment the reviewers based on the characteristics that distinguish core and peripheral reviewers found in this study (i.e., the numbers of photos posted, early reviewers, and brands reviewed). Core reviewers represent the valuable segment in this study due to their central positions in the network and their opinion leader characteristics, which are different from those of peripheral reviewers. Accordingly, after reviewer segmentation, brand managers can target the core reviewers and devise related marketing communication strategies. For instance, brand managers can review the comments from core reviewers to see whether they spread positive electronic word of mouth (eWOM). If not, it is suggested that brand managers analyze the reasons that led to negative or neutral eWOM among the core reviewers and adjust their evaluation by improving products/ services or communicating with these reviewers.

Additionally, comments from core reviewers also provide brand managers with useful information to understand whether their brands are similar to or different from other competitors, given that core reviewers have more links with other brands (i.e., more brands reviewed) in the reviewer–brand network. Based on these reviews, brand managers can consider changing brand positioning strategies or modifying reviewers' perceptions to become consistent with the brand's intended positioning through marketing strategies.

Methodological application This study offers brand managers useful methodology references for segmenting markets on online review websites. The web scraping and network analysis methods used in this study do not require advanced coding skills, are easy and require less time. Before replicating the methodologies used in this study, brand managers inexperienced with these techniques can learn fundamental knowledge about how to use these methods via Octoparse 8[6] and UCINET[7] software tutorials, which are available online. These advantages benefit brand managers by offering them a new method that is different from traditional approaches to market segmentation.

Moreover, the methods presented in this study are applicable to other online review websites and industries. Brand managers may focus on other websites that offer the fundamental review functions of textual comments and numeral ratings, such as TripAdvisor and Amazon, to construct a reviewer–brand network. After scraping the data from these websites, brand managers can distinguish core reviewers from other reviewers in the network by using network analysis methods. Additionally, brand managers can also use the functions that reveal reviewer's characteristics (e.g., number of photos posted and early reviewer labels) provided by online review websites to detect the core reviewers in the network. The ease and applicability of these approaches may benefit not only brands in the delivery restaurant industry but also brands in other industries that pursue targeting valuable market segments in online reviews.

Limitations

This study has critical practical and theoretical contributions; nevertheless, some limitations of this study need to be addressed. First, 93 delivery restaurant brands in Taiwan and 335 reviewers of these restaurants on Yelp were used as samples in this study. The sample sizes and objects may have limited the generalizability of the findings. This study suggests that other researchers adopt the same approaches

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[6] Please see: https://www.octoparse.com/.

[7] Please see: https://sites.google.com/site/ucinetsoftware/home? form=MY01SV&OCID=MY01SV.

with larger sample sizes, use different review websites, or focus on various product categories to validate the findings of this study.

In addition, due to the data limitations on Yelp, this study could not identify the relationships among reviewers. On Yelp, reviewers can evaluate comments from other reviewers via votes of funny, cool, and useful. The numbers of votes in each category are revealed, but the corresponding voters are concealed. Therefore, this study constructed a reviewer–brand network that only centered on the relationships between reviewers and brands instead of a reviewer–reviewer network that revealed the connections (i.e., voting behaviors) among the reviewers. Future research could consider building different network types for online reviews, which may provide more insights into the reviewer characteristics of online reviews.

Finally, this study used the three-dimensional characteristics of opinion leaders to develop the research framework and hypotheses. Future research is advised to use other theoretical perspectives or constructs to explore the role of network structural positions in online reviewer characteristics. In this way, nuanced reviewer characteristics could be further clarified based on network structural positions.

Conclusions

This study attempted to investigate the differences in reviewer characteristics in online reviews by reviewer network structural positions. The findings of this study confirm that network structural positions are correlated with the characteristics of online reviewers. The findings on the characteristics that differentiated the core and peripheral reviewers in this study provide business managers with useful references for advising influencer marketing strategies. Additionally, the study also benefits academic researchers by offering them knowledge about the role of network structural positions in the characteristics of online reviewers, as well as a methodological guide for segmenting heterogeneous markets via network structural analysis. Nevertheless, to obtain thorough insights into online reviewer characteristics, a great amount of research remains to be conducted in the future.

References

Ahani, A., Nilashi, M., Ibrahim, O., Sanzogni, L., & Weaven, S. (2019). Market segmentation and travel choice prediction in spa hotels through tripadvisor's online reviews. *International Journal of Hospitality Management, 80,* 52–77. https://doi.org/10.1016/j.ijhm.2019.01.003

Aral, S., & Walker, D. (2012). Identifying influential and susceptible members of social networks. *Science, 337*(6092), 337–341. https://doi.org/10.1126/science.1215842

Bai, T., Zhao, W. X., He, Y., Nie, J. Y., & Wen, J. R. (2018). Characterizing and predicting early reviewers for effective product marketing on e-commerce websites. *IEEE Transactions on Knowledge and Data Engineering, 30*(12), 1–14. https://doi.org/10.1109/TKDE.2018.2821671

Balis, J. (2020). *Brand marketing through the coronavirus crisis*. Retrieved August 15, 2020, from https://hbr.org/2020/04/brand-marketing-through-the-coronavirus-crisis

Blanchard, O. (2011). *Social media roi: Managing and measuring social media efforts in your organization*. Pearson Education.

Boals, A., & Klein, K. (2005). Word use in emotional narratives about failed romantic relationships and subsequent mental health. *Journal of Language and Social Psychology, 24*(3), 252–268. https://doi.org/10.1177/0261927X05278386

Burton-Jones, A. (2009). Minimizing method bias through programmatic research. *MIS Quarterly, 33*(3), 445–471. https://doi.org/10.2307/20650304

Chatterjee, P., Chollet, B., & Trendel, O. (2017). From conformity to reactance: Contingent role of network centrality in consumer-to-consumer influence. *Journal of Business Research, 75,* 86–94. https://doi.org/10.1016/j.jbusres.2017.02.012

Choi, S. (2014). The two-step flow of communication in twitter-based public forums. *Social Science Computer Review, 33*(6), 696–711. https://doi.org/10.1177/0894439314556599

Christensen, G., & Olson, J. (2002). Mapping consumers' mental models with zmet. *Psychology and Marketing, 19*(6), 477–501. https://doi.org/10.1002/mar.10021

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology, 55*(1), 591–621. https://doi.org/10.1146/annurev.psych.55.090902.142015

Constant, D., Sproull, L., & Kiesler, S. (1996). The kindness of strangers: The usefulness of electronic weak ties for technical advice. *Organization Science, 7*(2), 119–135. https://doi.org/10.1287/orsc.7.2.119

Coulter, R. A., Feick, L. F., & Price, L. L. (2002). Changing faces: Cosmetics opinion leadership among women in the new hungary. *European Journal of Marketing, 36*(11/12), 1287–1308. https://doi.org/10.1108/03090560210445182

Filieri, R., McLeay, F., Tsui, B., & Lin, Z. (2018). Consumer perceptions of information helpfulness and determinants of purchase intention in online consumer reviews of services. *Information & Management, 55*(8), 956–970. https://doi.org/10.1016/j.im.2018.04.010

Freeman, L. C. (1979). Centrality in social networks conceptual clarification. *Social Networks, 1*(3), 215–239. https://doi.org/10.1016/0378-8733(78)90021-7

Furner, C. P., & Zinko, R. A. (2017). The influence of information overload on the development of trust and purchase intention based on online product reviews in a mobile vs. Web environment: An empirical investigation. *Electronic Markets, 27*(3), 211–224. https://doi.org/10.1007/s12525-016-0233-2

Gao, B., Li, X., Liu, S., & Fang, D. (2018). How power distance affects online hotel ratings: The positive moderating roles of hotel chain and reviewers' travel experience. *Tourism Management, 65,* 176–186. https://doi.org/10.1016/j.tourman.2017.10.007

Goldenberg, J., Han, S., Lehmann, D. R., & Hong, J. W. (2009). The role of hubs in the adoption process. *Journal of Marketing, 73*(2), 1–13. https://doi.org/10.1509/jmkg.73.2.1

Guo, J., Wang, X., & Wu, Y. (2020). Positive emotion bias: Role of emotional content from online customer reviews in purchase decisions. *Journal of Retailing and Consumer Services, 52*. https://doi.org/10.1016/j.jretconser.2019.101891

Hancock, P. (2016). *How retailers capitalize on seasonal search trends on yelp*. Retrieved April 17, 2022, from https://blog.yelp.com/community/retailers-capitalize-seasonal-search-trends-yelp/

Hansen, D. L., Shneiderman, B., & Smith, M. A. (2011). Social network analysis: Measuring, mapping, and modeling collections of connections. *Analyzing social media networks with nodexl: Insights from a connected world* (pp. 31–50). Morgan Kauffman.

Hu, Y., & Van den Bulte, C. (2014). Nonmonotonic status effects in new product adoption. *Marketing Science, 33*(4), 509–533. https://doi.org/10.1287/mksc.2014.0857

Iyengar, R., Van den Bulte, C., & Valente, T. (2011). Opinion leadership and social contagion in new product diffusion. *Marketing Science, 30*(2), 195–212. https://doi.org/10.1287/mksc.1100.0566

Joksimovic, S., Gasevic, D., Kovanovic, V., Adesope, O., & Hatala, M. (2014). Psychological characteristics in cognitive presence of communities of inquiry: A linguistic analysis of online discussions. *The Internet and Higher Education, 22,* 1–10. https://doi.org/10.1016/j.iheduc.2014.03.001

Katz, E. (1957). The two-step flow of communication: An up-to-date report on an hypothesis. *The Public Opinion Quarterly, 21*(1), 61–78. https://doi.org/10.1086/266687

Katz, E., & Lazarsfeld, P. F. (1955). *Personal influence: The part played by people in the flow of mass communications*. The Free Press.

Keller, E., & Berry, J. (2003). *The influentials: One american in ten tells the other nine how to vote, where to eat, and what to buy*. The Free Press.

King, C. W., & Summers, J. O. (1970). Overlap of opinion leadership across consumer product categories. *Journal of Marketing Research, 7*(1), 43–50. https://doi.org/10.2307/3149505

Kotler, P., & Keller, K. L. (2006). *Marketing management*. Prentice Hall Pearson.

Kratzer, J., & Lettl, C. (2009). Distinctive roles of lead users and opinion leaders in the social networks of schoolchildren. *Journal of Consumer Research, 36*(4), 646–659. https://doi.org/10.1086/599324

Lazarsfeld, P. F., Berelson, B., & Gaudet, H. (1944). *The people's choice: How the voter makes up his mind in a presidential campaign*. Columbia University Press.

Lee, E. J., & Shin, S. Y. (2014). When do consumers buy online product reviews? Effects of review quality, product type, and reviewer's photo. *Computers in Human Behavior, 31,* 356–366. https://doi.org/10.1016/j.chb.2013.10.050

Lee, S. H. M., Cotte, J., & Noseworthy, T. J. (2010). The role of network centrality in the flow of consumer influence. *Journal of Consumer Psychology, 20*(1), 66–77. https://doi.org/10.1016/j.jcps.2009.10.001

Lee, Y. J., Hosanagar, K., & Tan, Y. (2015). Do i follow my friends or the crowd? Information cascades in online movie ratings. *Management Science, 61*(9), 2241–2258. https://doi.org/10.1287/mnsc.2014.2082

Leonard-Barton, D. (1985). Experts as negative opinion leaders in the diffusion of a technological innovation. *Journal of Consumer Research, 11*(4), 914–926. https://doi.org/10.1086/209026

Li, H., Jeong, F. M., a., M., & Zhang, Z. (2020). To follow others or be yourself? Social influence in online restaurant reviews. *International Journal of Contemporary Hospitality Management, 32*(3), 1067–1087. https://doi.org/10.1108/IJCHM-03-2019-0263

Li, H., Zhang, Z., Meng, F., & Janakiraman, R. (2017). Is peer evaluation of consumer online reviews socially embedded? – an examination combining reviewer's social network and social identity. *International Journal of Hospitality Management, 67,* 143–153. https://doi.org/10.1016/j.ijhm.2017.08.003

Litterio, A. M., Nantes, E. A., Larrosa, J. M., & Gómez, L. J. (2017). Marketing and social networks: A criterion for detecting opinion leaders. *European Journal of Management and Business Economics, 26*(3), 347–366. https://doi.org/10.1108/EJMBE-10-2017-020

Müller, O., Junglas, I., vom Brocke, J., & Debortoli, S. (2016). Utilizing big data analytics for information systems research: Challenges, promises and guidelines. *European Journal of Information Systems, 25*(4), 289–302. https://doi.org/10.1057/ejis.2016.2

Ma, X., Khansa, L., Deng, Y., & Kim, S. S. (2013). Impact of prior reviews on the subsequent review process in reputation systems. *Journal of Management Information Systems, 30*(3), 279–310. https://doi.org/10.2753/MIS0742-1222300310

Mathwick, C., & Mosteller, J. (2017). Online reviewer engagement: A typology based on reviewer motivations. *Journal of Service Research, 20*(2), 204–218. https://doi.org/10.1177/1094670516682088

Muller, E., & Peres, R. (2019). The effect of social networks structure on innovation performance: A review and directions for research. *International Journal of Research in Marketing, 36*(1), 3–19. https://doi.org/10.1016/j.ijresmar.2018.05.003

Petty, R. E., Cacioppo, J. T., & Schumann, D. (1983). Central and peripheral routes to advertising effectiveness: The moderating role of involvement. *Journal of Consumer Research, 10*(2), 135–146. https://doi.org/10.1086/208954

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology, 63,* 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Risselada, H., Verhoef, P. C., & Bijmolt, T. H. (2016). Indicators of opinion leadership in customer networks: Self-reports and degree centrality. *Marketing Letters, 27,* 449–460. https://doi.org/10.1007/s11002-015-9369-7

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). Free Press.

Sabidussi, G. (1996). The centrality index of a graph. *Psychometrika, 31,* 581–603. https://doi.org/10.1007/BF02289527

Salinas, G. (2020). *Lessons from the pandemic - brand value and leadership in times of crisis*. Retrieved August 20, 2020, from https://brandfinance.com/insights/covid-19-brand-value-and-leadership-in-times-of-crisis

Schmiedel, T., Müller, O., & Brocke, J. (2018). Topic modeling as a strategy of inquiry in organizational research: A tutorial with an application example on organizational culture. *Organizational Research Methods, 22*(4), 941–968. https://doi.org/10.1177/1094428118773858

Solomon, M. R. (2019). *Consumer behavior: Buying, having, and being* (13th ed.). Pearson Prentice Hall.

Steur, A. J., Fritzsche, F., & Seiter, M. (2022). It's all about the text: An experimental investigation of inconsistent reviews on restaurant booking platforms. *Electronic Markets, 32*(3). https://doi.org/10.1007/s12525-022-00525-3

Summers, J. O. (1970). The identity of women's clothing fashion opinion leaders. *Journal of Marketing Research, 7*(2), 178–185. https://doi.org/10.2307/3150106

Van Eck, P. S., Jager, W., & Leeflang, P. S. H. (2011). Opinion leaders' role in innovation diffusion: A simulation study. *Journal of Product Innovation Management, 28*(2), 187–203. https://doi.org/10.1111/j.1540-5885.2011.00791.x

Venkatraman, M. P. (1989). Opinion leaders. Adopters, and communicative adopters: A role analysis. *Psychology and Marketing, 6*(1), 51–68. https://doi.org/10.1002/mar.4220060104

Wang, C. A., Zhang, X. M., & Hann, I. H. (2018). Socially nudged: A quasi-experimental study of friends'social influence in online product ratings. *Information Systems Research, 29*(3), 641–655. https://doi.org/10.1287/isre.2017.0741

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge University Press.

Weimann, G. (1991). The influentials: Back to the concept of opinion leaders? *Public Opinion Quarterly, 55*(2), 267–279.

Winter, S., & Neubaum, G. (2016). Examining characteristics of opinion leaders in social media: A motivational approach. *Social Media + Society, 2*(3), 1–12. https://doi.org/10.1177/2056305116665858

Yoganarasimhan, H. (2012). Impact of social network structure on content propagation: A study using youtube data. *Quantitative Marketing and Economics, 10*(1), 111–150. https://doi.org/10.1007/s11129-011-9105-4

Zaltman, G. (1997). Rethinking market research: Putting people back in. *Journal of Marketing Research, 34*(4), 424–437. https://doi.org/10.2307/3151962

Zaltman, G., & Coulter, R. A. (1995). Seeing the voice of the customer: Metaphor-based advertising research. *Journal of Advertising Research, 35,* 35–51.

Zhang, Z., Zhang, Z., & Yang, Y. (2016). The power of expert identity: How website-recognized expert reviews influence travelers' online rating behavior. *Tourism Management, 55,* 15–24. https://doi.org/10.1016/j.tourman.2016.01.004

Zhu, L., Yin, G., & He, W. (2014). Is this opinion leader's review useful? Peripheral cues for online review helpfulness. *Journal of Electronic Commerce Research, 15*(4), 267–280.

Zinko, R., Stolk, P., Furner, Z., & Almond, B. (2020). A picture is worth a thousand words: How images influence information quality and information load in online reviews. *Electronic Markets, 30*(4), 775–789. https://doi.org/10.1007/s12525-019-00345-y