Research Article

Research on strategies of content production and operation in brand virtual communities from the perspective of user thinking—Taking Lululemon as an example

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ABSTRACT

Background: As a platform for value co-creation, branded virtual communities retain a large amount of user-generated content, which not only serves as a convenient way for brands to grasp consumer preferences but also influences the purchasing intentions of users themselves and other users. **Methods:** This paper takes the Lululemon Weibo community and Xiaohongshu community as an example, firstly, the paper uses Python to capture the text content generated by the members of the two communities, and then we clean and pre-process the acquired content. After that, with the help of the LDA model and the confusion evaluation index, we thematize the content generated by the members of the two communities and identify the hot topics. Finally, the paper makes a comparative analysis of the hot topics in the two Lululemon virtual communities. **Results:** Members of the two virtual communities pay attention to same topics like "Wear Sharing", "Life Sharing" and "Product Design". But there are still differences in the focus and constitution of the two communities. **Conclusions:** Enterprises can identify the hot topics through their brand virtual communities, which provide the basis for the motivation of user-generated content within the community, as well as provide inspiration for enterprises to output content and marketing within the community; enterprises also need to ensure that members of the community continue to participate in community interactions and to ensure that the quality of user-generated content. High-quality user-generated content not only provides companies with effective information but also but also retains old members and attracts new members. Therefore, this paper also provides suggestions for enterprises from three perspectives: community content, community atmosphere, and platform environment.

Keywords: user-generated content; brand virtual community; latent Dirichlet allocation

1. Introduction

With the arrival of the Web 3.0 era, various social networking applications and social media platforms have developed rapidly. The way of human beings use the Internet has therefore changed dramatically: It has changed from simply searching for information to establishing and maintaining online social relationships, from browsing web pages to producing, exchanging and sharing information based on online social relationships[1].

Firstly, the relationship between consumer groups has become closer, and they became the real meaning of the consumer group with continuous interactions and sharing[2], which enabled the group to have a greater

influence on the consumers; Secondly, the status of consumers has changed, and consumers can obtain relevant brands and products information on social platforms anytime and anywhere and can also exchange and share information with other consumers. The influence of consumers is gradually expanding, and enterprises have lost their voice in the market; thirdly, consumers' decision-making process has changed. Consumers have entered the era of independent information searching. Compared with the past enterprise-guided marketing behaviors, consumers now more trust the members in the group to which they belong.

In this context, brand virtual communities emerge as the main communication platforms between consumers, consumers, and brands. On social platforms, consumers are users, while users are also consumers. Enterprises who have lost their dominant positions need to strengthen their emotional links with users through continuous interaction. To achieve consumer self-value and enterprise value at the same time, they have to constantly improve consumer value, motivate consumers to create and share contents, and improve consumer satisfaction. The large amount of user-generated content in the brands' virtual communities becomes the real basis for brands to explore their consumers' preferences and needs, accurately place information resources, improve the depth of their interaction, and realize the value of both sides co-creating.

2. Related theories

2.1. User-generated content (UGC)

User-generated content (UGC) is created by users independently and shared with other users in the form of text, pictures, videos, etc. through social media platforms such as forums, microblogs, blogs, SNS communities, etc. It is voluntarily created by the users and provided free of charge. With the rapid development of Internet technology, social platforms have become more mature, and social user-driven business models have begun to emerge. User-generated content has thus become more socialized, while user-autonomous sharing and recommendation of content have a more direct impact on other users. User online data is becoming an increasingly important source of information for designers to capture users' experiences with products and services[3]. Dan He et al. believed that by mining the text data of related topics from user information exchange platforms and analyzing them through recognition and visualization, we can obtain information about users' concerns and preferences, thus grasping the mainstream trend of users' needs[4]. Liu et al. pointed out that Internet users take into account both the identity of content consumers and content makers and gradually turn to generator and disseminator of information. This kind of user-generated content is the textual embodiment of the user's thinking, but it also provides a convenient way for the brand to grasp the user's preferences, user needs, and so on[5]. Liu et al. suggested that user-generated content is a major breakthrough for brand equity enhancement for it points out a marketing direction in the era of consumer (user) sovereignty[6]. Wang et al. pointed out that user-generated content can produce continuous stimulation for consumers to realize purchase behavior and thus can participate in and influence the creation of corporate brand value[5].

Through previous studies, it is known that user-generated content has become a convenient way for brands to grasp consumer preferences, and user-generated content is also important information that influences consumers' own and other consumers' purchase intentions. Currently, scholars' research on user-generated content mainly focuses on the motivation of user-generated content and the quality of user-generated content. Firstly, in the classification of motives for user-generated content, Zhao Y et al. divided motivation into 3 dimensions, including social-driven, technology-driven, and individual-driven, and 1 regulation set of demographic characteristics[7]; Liu et al. divided motives into 3 dimensions of intrinsic needs, social triggers, and technological triggers[7]; and Fan et al. added the perception of opportunities in the external environment and the perception of users' abilities[8]. Secondly, in the study of user-generated content quality, Jin believed that the current UGC quality problem mainly exists in three aspects: Content errors, spam content, and low

content value density[9]. Sun et al. point out that there is a problem of insufficient supply of content and little contribution in existing social media platforms, and also thought that there exists a fatigue effect on social media platforms, i.e., the longer the time they join the platforms, and the less willing they are to contribute to the content[10] . Xu et al. studied UGC quality from two angles: Content-based and user-based, where content-based is used for spam identification and rumor detection, and user-based can be used to find leaders' opinions and identify false subjects through UGC quality[7].

To sum up, user-generated content has the characteristics of spontaneity, awareness and interactivity. In the social media era, users create contents independently and share them in the form of text, pictures, etc. And theses user-generate content has a certain impact on other users. When enterprises make use of user-generated content in their brand virtual communities for content output and marketing, they should look for the motivation of community members to produce user content, and guide and motivate them to independently produce content; then, enterprises should pay attention to the quality of user-generated content, strengthen the quality of their output information in brand virtual communities, and also supervise all kinds of information in the communities.

2.2. Brand virtual community

Ferdinand Tönnies first put forward the term "community" in *Gemeinschaft und Gesellschaft: Grundbegriffe der reinen Soziologie*, and stated that the community is formed by the intimate relationship between people. Members of the community usually have strong senses of belonging and identity. In 1993, the sociologist Riegel Der first put forward the concept of "virtual community". He believed that the development of Internet technology has broken the geographical limitations between people, and that people use the Internet to communicate and share information and knowledge and build a virtual community based on similar interests and emotional resonance. Cheng and Zhou defined a network community as a community with consistent values formed in cyberspace based on common goals and under frequent interaction and communication[11]. Muniza believed that the brand virtual community is a special consumer group without geographical constraints, in which the consumers have the same brand consumption experience, and that the social relationship between these consumers is the basis of the brand community[12]. Yu and Zhu viewed brand virtual communities as a set of virtual online community relationships in which consumers interact with each other continuously based on the Internet and out of concern for and appreciation of the same brand[13]. Wang and Liu believed that brand virtual communities are firstly established by brands, consumers or third-party organizations and that the Internet is used as a medium for the participation and continuous interaction behavior of consumers with the same hobby[14].

In branded virtual communities, consumers are influenced by other consumers, brands, and platforms. In analyzing the business model of the community, Cheng et al. pointed out that the community economy industry mainly includes community operators, communication platforms (social platforms and self-built platforms), service or support platforms (trading platforms, payment platforms, etc.), and members of the community[11]. Positive inter-consumer interactions can give consumers a good sense of experience and increase their consumer satisfaction, Jing et al. verified that inter-consumer interactions have an indirect positive effect on consumer satisfaction[15]; Park argued that the most important factor influencing community members' pleasurable experience is the interaction behavior within the community[16], and community members' experience make a decisive impact on their attitudes towards and purchase of the brand[17]. Brand virtual communities become the main medium for brands and their community members to achieve mutual behavior. Wei et al. pointed out that the interaction between enterprises and consumers is the core content of all interactive relationships, and is also the main driving factor of brand equity generation[18]. Fang et al. believed that with the help of the community platform, consumers can participate in the process of enterprise value

creation, and enterprises can also understand the user's preferences, ideas, creativity, etc. promptly, to realize the matching of supply and demand between the enterprise and the consumer[19]. In addition, social platforms provide a communication platform for brand virtual communities and their users, and users interact with others through social platforms to obtain the required information and resources, and then satisfy their own needs[20]. Tu et al. believed that the interaction between users and platforms, which helps users better understand the services and functions of the platform and put forward reasonable suggestions for the platform's services, and which promotes users to share their experience with others, as well as the exchange and integration of user resources[20]. Based on the theory of resource exchange, Foa suggested that the interaction can realize the exchange of resources, and in the process of the exchange, the users and platforms can obtain the information needed by each other and integrate it, thus realizing the co-creation of value[21].

Nowadays, many scholars believed that a brand virtual community is a platform for value co-creation[22], and some researchers have also studied the co-creation behaviours and outcomes of members of a brand's virtual community with a value co-creation perspective. Tang et al. pointed out that a large number of business practices have confirmed that the virtual brand community is an important scene for enterprises to shape and promote their brands, and recognizing and grasping the motives and interests behind customers' value co-creation behaviors in the community can promote the better creation of value by customers and enterprises[23]. Yu et al. considered the brand virtual community as an extension of value co-creation in the field of digital marketing and believed that companies transfer more brand creation and communication power to consumers in brand virtual communities, and influence the process of brand value by constructing virtual brand communities or communities and using digital technology support to motivate consumers to actively participate in community interactions[24]. Li et al, believed that building a virtual brand community is an important way for enterprises to enhance brand competitiveness, and the value co-creation behavior of users in the virtual brand community is directly related to the success or failure of the community operation[25]. Meanwhile, in the virtual brand community, the frequency of the value co-creation behavior of the users is the main indicator of the community's prosperity, which means the more frequently the value co-creation behavior is generated, the more prosperous the community is[25].

In summary, in this paper, the brand virtual community is a platform for value co-creation, and members of the brand virtual community participate in value co-creation by interacting with other members and brands, which generates user-generated content and becomes the basis for enterprises to study members' behaviors and preferences. Therefore, based on grasping member-generated content, enterprises can identify and output member interest topics in the brand virtual community, and promote member-brand interaction and member-member interaction, so that community members continue to participate in value co-creation with enterprises through the brand virtual community.

3. Data acquisition and data processing

At present, research on user-generated content mostly focuses on the motivation and quality of user-generated content, and most of the research adopts the research method of structural equations. Some scholars analyze user-generated content from the perspective of emotion, and the traditional text classification methods applied to emotion classification are Naive Bayesian, K-Nearest Neighbor, Support Vector Machine, Decision Tree, and so on. Huang et al proposed the SRTSM model for Weibo users to analyze the emotional tendency of Weibo topics, which is based on the traditional LDA to add the emotional layer and Weibo users' relationship parameters, and then take the Gibbs sampling method to analyze the microblogging topics and emotions by using the SRTSM model[26]. However, some scholars have pointed out that the judgment of the emotional tendency of UGC is still limited to the semantic scope, and the depth and breadth of the

quantification of emotional words for the current situation are still to be improved.

This paper uses the empirical research method to classify the UGC text in the virtual community of the Lululemon brand using the LDA model, generate a custom thesaurus by combining the actual captured text content based on the existing stop word list and emotion thesaurus, and then pre-process and clean the captured contents, and then combine them with the perplexity evaluation index to realize the thematic clustering of the text content. Finally, the topics of interest of community members in Lululemon's Weibo community and Xiaohongshu community can be identified, helping the brand to grasp the interest preferences of community members and provide inspiration for Lululemon's content output and marketing in its brand virtual community.

3.1. Data mining and preprocessing

At present, on mainstream social platforms such as Weibo and Xiaohongshu, members of virtual communities of sports brands realize the output of user-generated content with members with similar interests by adding brand labels to posts or comments. This paper takes the official topic communities created by Lululemon on Weibo and Xiaohongshu as the observation communities, and selects the observation communities based on the number of members and the activity level of the official topic communities (i.e., the number of readings, the number of discussions, and the active time of members, etc.), and thus selects the two topic communities of #lululemon# and #Today wear lululemon on Weibo and Xiaohongshu platforms.

End of 11 April 2023, the total number of readings in the topic community #lululemon # on Weibo is 130 million, the number of discussions, 37,000, and the number of originals, 7028. The total number of views on the Xiaohongshu #Today wear lululemon topic community is 365 million, and the amount of interaction (i.e., the number of readings and posts) is greater than 1,000 per day in the past 30 days. This paper uses Octopus software to collect user-generated content in #lululemon# and #Today wear lululemon topic communities separately. According to the posting time, it collects the text data contents in the first 50 pages at one time, and the collection fields include user nicknames, post contents, comments, the number of retweets, likes, and comments, and so on, with a total of 726 texts collected.

In this paper, with the help of Excel and Python, the crawled text data is pre-processed, which includes data cleaning, removing useless fields, word splitting processing, and so on. Specifically, 1) Deleting non-essential fields such as hypertext links, images, emoticons, and null values; 2) Segmentation of text data by using jieba, and this paper generates a customized deactivation lexicon based on the deactivation lists of deactivation words of the Harvard University, deactivation words of the Sichuan University's Machine Intelligence Laboratory, deactivation words of Baidu, and deactivation words of the Chinese language; 3) De-emphasis is performed on the processed text data to enhance the originality of the text data.

3.2. Data analysis and results

The LDA topic model is a hierarchical Bayesian model that has three levels: document, topic, and word. The model is essentially a multilevel Bayesian probabilistic graphical model, i.e., each document corresponds to a word that obeys the Delicacy distribution $\bar{q}$, each topic corresponds to a word that obeys the Delicacy distribution $\bar{J}$, and the document-topic distribution α parameter and topic-word distribution β parameter obey the Delicacy distributions $\bar{\alpha}$ and $\bar{\beta}$. The LDA topic model assumes that there are several potential topics in each document, and the words in the document are all generated by a single topic, and the model can be used for mining and constructing potential topic information for large-scale corpora. Therefore, this paper crawls the user-generated contents in Lululemon's Weibo virtual community and Xiaohongshu virtual community and uses the LDA topic model to construct topic models for the crawled contents.

### 3.2.1. Determine the optimal number of topics

In this paper, the perplexity evaluation index is used to determine the optimal topic number of a document. Its formula is shown below, where M is the test set; D is the number of texts; m_i is the sequence of words in the document m; N_i is the number of words in the document m. The index is mainly used to evaluate the probability distribution or the number of words in the document. This index is mainly used to evaluate the probability distribution or probability model to predict the advantages and disadvantages of the sample data, so it can be used to determine the number of document topics.

$$Perlexity(M) = exp\left\{-\frac{\sum_{i=1}^{D} lnp(m_i)}{\sum_{i=1}^{D} N_i}\right\} \tag{1}$$

The LDA topic model is used in genism to categorize the processed interactive information data. The integers are set in the interval of 2–19 as the number of topics, and the log _ perplexity () function is called to calculate the value of perplexity and generate the perplexity line graph, where the horizontal axis is the number of potential topics, and the vertical axis is the value of perplexity.

Usually, the confusion degree shows a decreasing trend with the increase in the number of potential topics, and the smaller the value of the confusion degree is, the stronger the ability to generate topic models. However, in practical applications, in addition to considering the value of perplexity, the generalization ability of the topic model should also be considered, given that the complexity of the model and the number of parameters need to be considered comprehensively. As a result, this paper presents the following conclusions:

As shown in **Figure 1**, the perplexity fold of the topic number of the #lululemon# topic community shows an increasing trend in general. However, the perplexity value shows a significant decrease at the point where the potential topic number is 4. But taking into account the generalization ability and complexity degree of the model, this paper selects the point where the local minima of the perplexity fold correspond to the point with the potential topic number of 4 as the value of the topic parameter, i.e., the optimal number of topics is 4.
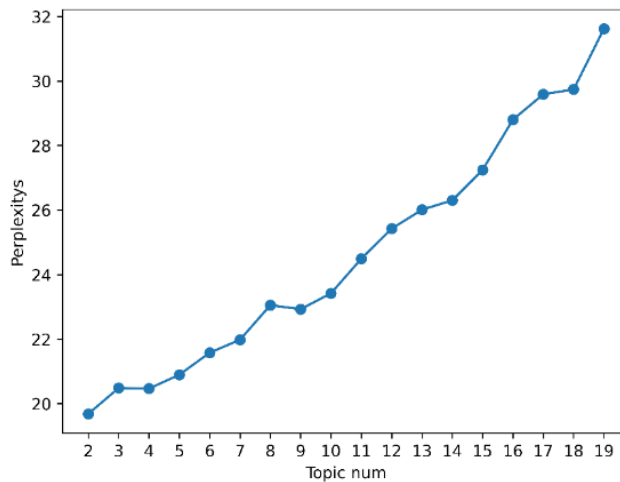
Figure 1. Weibo virtual community #lululemon# in the number of topics confusion degree line graph.

As shown in **Figure 2**, the perplexity fold of the topic number of the # Today Wear lululemon topic community shows an increasing trend. The perplexity value decreases at the point where the number of potential topics is 4. Therefore, this paper selects the point where the number of potential topics is 4 as the optimal number of topics for this topic model.
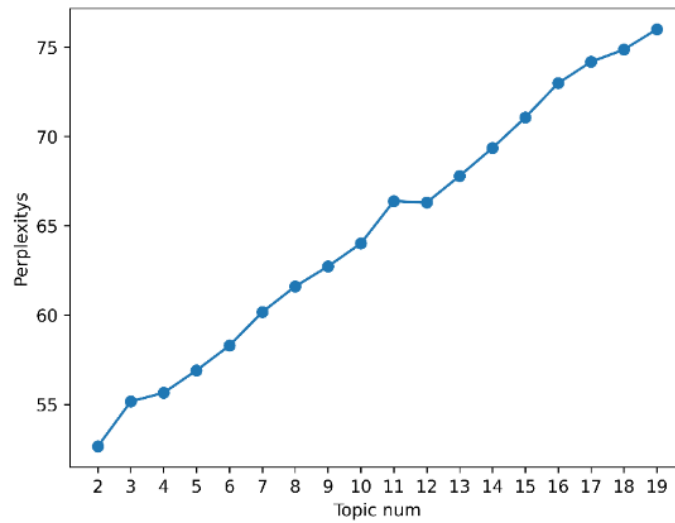
Figure 2. Xiaohongshu virtual community #Today wear Lululemon in the number of topics confusion degree line graph.

3.2.2. Theme construction

After evaluating the perplexity and determining the optimal number of topics of the interaction information data within the virtual communities of the four sports brands, the textual data are respectively subjected to lexicographic processing, which serves as the training set of the LDA topic model. The "topic-word" and "document-topic" probability distributions are generated by invoking the topic-word and doc-topic models. "Document-topic" probability distributions are generated by calling topic-word and doc-topic models. With the help of the sklearn machine learning tool, the Quantile Transformer module package is imported to scale each data feature under the same range or distribution to smooth the distribution of anomalies and reduce the influence of outliers, and the words in the probability distribution of "topic-word" are subjected to the attribution statistics and the topic connectivity, and with the help of eycharts tool, the topic relationship diagram is generated, as shown in **Figures 3** and **4**.

Figure 3. Weibo virtual community #lululemon# thematic relationship model.

Figure 4. Xiaohongshu virtual community #Today Wear Lululemon thematic relationship model.

4. Interactive contents mining and themes construction within Lululemon virtual communities based on user thinking
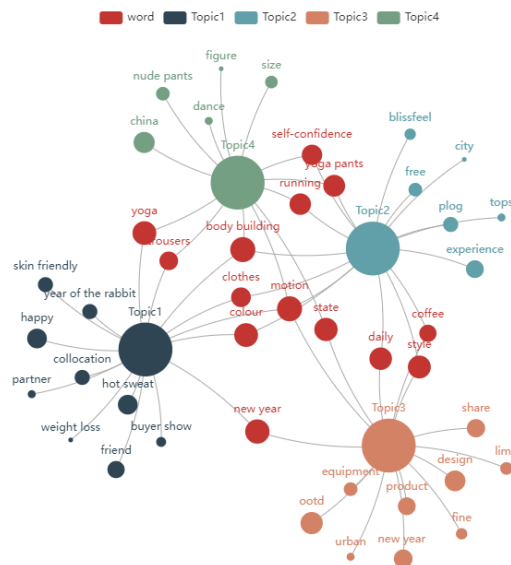
Social platforms provide a place for brand virtual communities to establish a platform for their members to communicate and interact online. However, different characteristics of social platforms also have an impact on community members, including user characteristics, user-generated content, and platform mechanisms.

The age of Weibo's users is concentrated between 18 and 30 years old, with the largest number of users coming from Guangdong, Beijing, and Jiangsu. According to Sheng et al.'s study of users participating in social sharing in the Weibo platform, it was found that female users accounted for a higher percentage of participation in social sharing[27]. In addition, the Weibo platform labels celebrities and Weibo accounts with a high number of followers in various fields as big "V" users, while the remaining non-V users are ordinary users who are the main group to share content on the Weibo platform. On the Weibo platform, fan groups are active, and the relationship between fans is further strengthened by star lists and star superlatives. Gao et al. pointed out that the fan group is a collection of long tail communities divided by stars, and there is an attributional relationship between stars and their fans, so it has a stronger relationship and is prone to generate collective network behavior[28].

Xiaohongshu users are concentrated in the age group of 20–39 years old, with more users in the age group of 30–49 years old than in Weibo, and the largest number of users are from Guangdong, Zhejiang, and Beijing. Xiaohongshu platform is a typical representative of the "community+e-commerce" economic model, and from the beginning of the establishment of Xiaohongshu, it decided to build a virtual community as its development path. In the early stage, Xiaohongshu built a high-quality community by cooperating with online celebrities and creating stars in the community. At a later stage, Xiaohongshu relies on user-generated content to attract the interaction of ordinary users, which the Xiaohongshu platform through the experience of posting and other content to help ordinary users accumulate traffic, to achieve the production of community content and circulation[29]. At the same time, to increase the user viscosity, Xiaohongshu used "mark my life" as the slogan of the platform, to encourage users to show their real selves and further promote user-generated content[30]. Therefore, in the Xiaohongshu platform, the Internet Celebrity Economy is prevalent, and life topics are the

main topics that trigger the attention and interaction of Xiaohongshu users.

According to the LDA theme modeling results, in Lululemon's Weibo virtual community #lululemon#, the contents of its community members' interactive texts can be divided into 4 themes (as shown in **Figure 3**): Self-improvement, Life Sharing, Product Design, and Outfit Sharing. Theme 1 "Self-improvement", includes high-frequency words such as body building, yoga, state, weight loss, self-confidence, etc. Combined with the interactive content under the theme, it shows that members of the virtual community are happy to participate in discussions on fitness, weight loss, and cultivation of the mind, and are willing to share their personal experiences with other members and establish an interactive relationship in the process. Theme 2 "Life Sharing", includes high-frequency words such as clothes, running, daily, Plog (an abbreviated form of the Internet term "Photo Blog"), experience, Coffee, etc. Combined with the contents analysis in Theme 2, it can be found that members of this community are willing to share their daily life in the community, such as sharing the fun activities they have recently participated in, their daily outfit, and even their daily diets, etc. Theme 3, "Product Design", includes design, yoga pants, product, equipment, style, color, and other keywords, from which it can be seen that the community members are willing to discuss and exchange information about Lululemon product design, such as product collocation, the use of fabrics, wearing feeling and other topics; Theme 4 "Outfit Sharing", includes high-frequency words such as color, nude pants, yoga pants, and figure, etc. Combined with the interactive contents of the community members, it can be found that community members show high interest in the contents about Lululemon product matching, including the contents about Lululemon product matching in the sports scene and daily life scene. In the process of sharing personal outfits, these members communicate with others about the products and even stimulate other members' desire to buy.

According to **Figure 4**, the interactive contents of community members captured from Lululemon Xiaohongshu virtual community #Today Wear Lululemon can be divided into four themes, including Wearing Sharing, Shopping Sharing, Life Sharing, and Product Design. Theme 1 "Wearing Sharing" includes trousers, ootd, tops, motions, and other high-frequency vocabularies. Its main interactive contents are centered on the theme of Lululemon product matching, while community members are willing to share their outfit matching with other members and set up the interactive relationship. Theme 2 "Shopping Sharing" includes high-frequency words such as new products, lady, single item, shoes, tops, etc. Combined with the interactive content in this theme, it can be seen that, unlike Theme 1 "Wearing Sharing", in Theme 2 the community members only share their purchased products and discuss only about products. Theme 3 "Life Sharing" includes keywords such as bodybuilding, outdoor, coffee, comfort, daily, climbing, etc. According to the interactive information of the community members in Theme 3, it can be found that the community members share their daily lives, and the main contents are still focused on daily exercise and fitness. In the process of sharing their personal life, they attract other community members with the same interests, thus generating interactive behaviors. Theme 4 "Product Design" includes high-frequency words such as color, fabric, design, comfort, length, soft and breathable, etc. Combining the analysis of interactive contents of community members, it is shown that the community members seek the required product information by posting in the community to discuss with other members about products. The community members also show strong interest and willingness to participate in the posts about Lululemon's product evaluation.

According to the user-generated content of Lululemon's Weibo virtual community #lululemon# and Lululemon Xiaohongshu virtual community #Today Wear Lululemon, it can be found that members of the two virtual communities pay attention to the same topics of "Wear Sharing", "Life Sharing" and "Product Design". These are popular topics that trigger interaction among members. However, there are still differences between Lululemon's Weibo virtual community #lululemon# and the Lululemon Xiaohongshu virtual community #Today Wear Lululemon:

Topics differences. In Lululemon's Weibo virtual community, the community members are more interested in self-improvement topics. They focus on both physical and psychological improvement and also share their improvements and insights in the community to attract other members with similar experiences or needs to establish an interactive relationship. In the Lululemon Xiaohongshu virtual community, the community members show stronger interaction on shopping-sharing topics. Since the Xiaohongshu platform realizes content communication mainly in the form of videos and pictures, the community members have a more intuitive visual experience of shopping-sharing topics, especially the topics related to product evaluation. These topics help the community members to obtain product information more conveniently and make purchasing choices more easily.

Members' differences. The main consumer of Lululemon is female consumers, so whether in its Weibo community or Xiaohongshu community, the information publishers and participants are mainly female users. However, a comparative analysis of the interaction between members of Lululemon's two virtual communities reveals that there are differences in the identities of the information publishers. In the Weibo virtual community #lululemon#, the officially certified users are the main content publishers, including actors, writers, microbloggers, and other users with a certain amount of followers. These users have become opinion leaders in the community. In the Lululemon Xiaohongshu virtual community #, Today Wear Lululemon, ordinary users take up a larger proportion of content publishing and content participation, i.e., users with <5000 followers and without the status of Xiaohongshu Darren blogger.

5. Content production and operation strategies within brand virtual communities

According to the previous literature review and the theme clustering and comparison results of member-generated content in Lululemon's Xiaohongshu community and Weibo community in Section 4, this paper takes two perspectives, user-generated content motivation and user-generated content quality, as its starting point. Firstly, producing user-generated content within the community can help brands grasp their members' preferences and effectively utilise members' points of interest for content production and marketing, guiding and motivating community members to create content on their own, thus increasing community activity and deepening the relationship between members and the relationship between members and brands. Secondly, enterprises need to strengthen the operation capability of brand virtual communities and provide community members with high-quality information experience while ensuring the quality of the community atmosphere and community environment. Therefore, this chapter particularly provides countermeasure suggestions for sports brand virtual communities from three aspects: Community content, community atmosphere, and community environment.

5.1. Identify the information needs of community members and deliver personalized content

Brand virtual community members gather together because of their similar interests, values, etc., but due to differences in their social characteristics, there are also differences in community members across brands and social platforms. Therefore, brand virtual communities can identify the different value needs and topic needs of their community members based on the network traces they leave behind within the virtual community. Then brands place topics strategically to attract their virtual community members to participate in content sharing, meanwhile, increasing the exposure of the brand and its products at the same time.

Lululemon originated in Vancouver and its brand concept is "Be all in" ("live out the possibility"). Its brand is inspired by yoga and always upholds the philosophy of a "hot sweat lifestyle", so it is important to highlight the personality proposition of a healthy lifestyle in the Lululemon brand virtual community.

According to the analysis of Lululemon brand virtual community members' interaction contents, it can also be found that the brand virtual community members show great interest in sports and life topics and that they share and interact with these topics. Thus, Lululemon can start from the common interest of its community members to strengthen the heat of discussion within the group while placing the community contents.

However, there are differences in the interests of virtual community members on different social platforms. Social platforms provide a communication platform for brand virtual community members and precipitate a large amount of user information, but the differences in user characteristics between social platforms result in differences between brand virtual communities on different social platforms. Therefore, the brand has to construct the brand virtual community based on the reality of the user. In Lululemon's Weibo virtual community, members pay more attention to self-improvement topics, including physical and psychological improvement, and their emotional needs are greater. In the Lululemon Xiaohongshu virtual community, members are more interested in topics such as shopping sharing, outfit sharing, and unboxing evaluation. Compared to Lululemon's Weibo virtual community, the proportion of ordinary users in the Lululemon Xiaohongshu virtual community is larger. Accordingly, Lululemon can put more self-growth topics on the Weibo platform to arouse members' interaction and participation, encouraging community members to actively share their life outfits on the Xiaohongshu platform to build a platform for community members' sharing and interaction.

5.2. Incentivize community members to create content to create a favorable community atmosphere

High-quality community content can help members participate in community interactions more easily and happily, thus helping community members gain an entertaining experience. Besides, the main interactive contents in the community are user-generated contents, which requires brands to incentivize and guide members to participate in content creation.

Brands can actively focus on the hotspots of the current virtual community members to offer the topics and add entertainment incentives, encouraging members to share their own experiences, knowledge, and feelings about the brand and timely rewards. For example, content sharers or participants can be raffled off to enjoy product discounts and other incentives. By participating in brand topic interaction, community members can obtain social capital within the brand's virtual community, and it can improve the quality of the relationship between the brand and its members, and encourage community members to actively participate in interactions within the community, and ensures the group's activity. For instance, in Lululemon's Weibo virtual community, the brand can launch emotional topics for discussion, and in the Lululemon Xiaohongshu virtual community, the brand can publish topics about outfit sharing for discussion, and reward the members who participate in the discussion and get high attention.

In addition, the brand can also attract more opinion leaders and professional creators to participate in the brand's virtual communities. For example, the Weibo platform can be introduced to the "V" bloggers, in the Xiaohongshu platform can be introduced to the Xiaohongshu influencers. For Lululemon's Weibo virtual community #lululemon# in the official certification users are the publishers of the main content, including actors, writers, influencers, and other users with a certain amount of fans, these community members with a certain degree of influence can drive other members to participate in the discussion and sharing. For the Lululemon Xiaohongshu virtual community #, Today wear lululemon, although ordinary users take up a larger proportion of content publishing and content participation, the joining of professional creators can provide other community members with a higher quality content experience. Therefore, brand virtual communities should attract more opinion leaders and professional creators to join their virtual communities. On the one

hand, expanding the brands' exposure through their fans can attract more consumers to participate in their virtual communities and become members of the virtual communities. On the other hand, these experienced self-media bloggers can provide more professional opinions on the community's topic settings, and for the viewers, professional self-media bloggers have a higher level of contents creation such as text, pictures and videos to meet the aesthetic needs of the community members.

5.3. Emphasize the supervision of platform content to provide a high-quality community environment

Social platforms are the main platforms for building brand virtual communities, while the information on social platforms will have an impact on the willingness of brand virtual community members to interact and participate. On social platforms, brand virtual community members achieve interaction through online content sharing and dissemination and thus retain a large number of community member interaction information which contains effective information and bad information. Hence, the social platforms should regulate community members' interactive content, to create a positive and healthy community atmosphere. The platform members' self-information and their shared information should be strictly audited, false and harmful information should be purged and the publishers need to be warned, banned, or used other punitive measures to ensure a good community environment.

For the supervision of content on social platforms and brand virtual communities, platforms and brands should jointly assume the role of supervision and gradually set up managers on social platforms and in virtual communities to ensure that the platform norms and community norms are complied with in an all-round way. They should encourage members to report on undesirable users and contents and respond to and deal with the feedback from members promptly to improve the trust of members of the community in the platform and the brand. Social platforms and brands should also establish incentives and penalties to match the civilized norms of platforms and communities, such as setting up a hierarchy mechanism and linking it to the status of members. They can give corresponding incentives to members who comply with the civilized norms of communities and actively participate in interactions over a long period, imposing appropriate penalties on members who violate the civilized norms according to the degree of the egregiousness of their behaviors. Through the supervision of platforms and community contents, the quality of information and reputation of social platforms and virtual communities can be improved, and the chances of members encountering false information and bad information in the process of searching for information can be reduced. Consequently, platforms and brands are able to strengthen the trust of community members in social platforms and brands as well as the validity of searching for information.

6. Summary

In brand virtual communities, user-generated content is an important information resource for enterprises to study the behavioral motivation and interest of their community members. Therefore, this paper takes the Lululemon Weibo community and Xiaohongshu community as examples and explores the member-generated content in their brand virtual communities to identify hot topics, which are the basis for judging the user-generated content in the communities. Discovering the motivation of user-generated content is to help enterprises guide and motivate members to create and share on their own. Therefore, this paper thematizes the redundant user-generated content in branded virtual communities through the LDA model, which provides enterprises with inspiration for community content creation and marketing, meets the information and experience needs of community members, and enables them to continue to participate in interactions with the brand and ultimately realize the value co-creation.

In addition to discovering the motivation of user-generated content, companies also need to ensure that

community members continue to participate in community interactions and ensure the quality of user-generated content. High-quality user-generated content not only provides companies with useful information but also retains old members and attracts new members. Therefore, enterprises need to effectively monitor the community content and platform content to create a good community atmosphere and platform environment.

Author contributions

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Conflict of interest

The authors declare no conflict of interest.

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