Impact of Flavor on Electronic Cigarette Marketing in Social Media

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Abstract: The electronic cigarette (e-cigarette) marketing is unregulated on social media currently. Flavor is one of the potent marketing strategies for e-cigarette manufactures and vendors. In this paper, we investigate the flavor-related e-cigarette marketing and online users' response to flavor-related e-cigarette marketing in Facebook. We find that the fruit flavor is most frequently promoted on social media e-cigarette marketing with a share of 33.19%, followed by nut (17.72%), candy & sweet (9.28%), alcohol (7.43%) and menthol (6.75%). With regard to the users' response to e-cigarette marketing, 85% of comments on flavor-related content (FC) happened within 84 hours, while it is 243 hours for 85% comments on content unrelated with flavor (named as miscellaneous content, MC). Furthermore, the ratio of positive content to negative content in FC (R_{FC}) is 1.4857; while R_{MC} is 0.8801. According to this work, we conclude that flavor plays an important role for online e-cigarette marketing with the boosting of user interaction and positive emotion.

Keywords: Electronic Cigarette, Flavor, Facebook, Electronic Liquid

1 Introduction

Electronic cigarettes - battery-powered devices that convert liquid nicotine into a vapor inhaled by the smoker, or "vaper" - were invented in China and came to the U.S. in 2007. Currently, there are an estimated 20 million American vapers. As the most important feature of e-cigarettes, the flavor contained in the liquid solution (also known as e-liquid or e-juice) is promoted widely. Meanwhile, e-cigarette manufacturers provide consumers with not only classic tobacco and menthol flavors but also a variety of youth appealing flavors including fruit, dessert, spice, candy, beverage, and bakery. A recent online survey finds that fruit flavors are the most popular with a 31% market share, followed by tobacco flavors (22%) and dessert flavors (19%) [1]. It is obvious that flavors of e-liquids become one of the potent marketing strategies for e-cigarettes.

Due to the similar impact that flavors have on tobacco, it is concerned that the variety of e-cigarette flavors might attract users, especially youths to start using e-cigarettes. Current e-cigarette use among high school students increased from 4.5 percent in 2013 to 13.4 percent in 2014, rising from approximately 660,000 to 2 million students [2]. There are a large variety of e-cigarette flavors available in the market. On average, each e-cigarette consumer uses three flavors [3]. However, there is little research about the impact of flavors for online users. In this paper, we investigate users' responses to flavor-related content in online e-cigarette marketing to reveal the impact of flavor on online users.

The remainder of this paper is organized as follows. The data collection is presented in Section 2. In Section 3, we present how to extract flavor-related content from user-generated content. We elaborate our preliminary findings including flavor distribution in online e-liquid marketing and users' response to e-liquid marketing in Section 4. Section 5 concludes this paper.

2 Collection of E-cigarette related Content on Social Media

To collect e-liquid flavor content, we reuse the data collection program implemented in our previous work [4,5]. This data collection program can retrieve user-generated content from Facebook fan pages. Facebook fan page is a public profile that enables users to share their business and products with Facebook users. The data collection on Facebook consists of two steps: offline data preparation and online data collection.

Table 1. E-cigarette related keywords for Facebook searches

Keywords	electronic cigarette, disposable cigarette, e-cig, e-cigarette, rechargeable cigarette, rechargeable kits, flavor cartridge, vaporizer, vaporized, vapor, vaping, mod, apv, refill cartridges, vaping pen, refills, cigalikes, mechs, vape pen, electronic pipe, cartomizer, clearomizer, atomizer, hookah, electronic hookah, shisha, electronic shisha, e-hookah, e-shisha, electronic cigar, e-cigar, electronic juice, electronic liquid, e-juice, e-liquid, electronic joint, e-joint, electronic spliff, e-spliff, vape, vaping, istick, coil tank, coil, rda

For the offline data preparation, we need to find out e-cigarette related fan pages using the keywords. We have defined a set of e-cigarette related keywords according to keyword lists[1]. The partial keywords are shown in Table 1. Based on the keyword searching, we find a large number of fan pages related with the given keywords. However, due to the ambiguity of keywords, some retrieved fan pages are unrelated with e-cigarette. To rule out the fan pages unrelated with e-cigarette, we manually classify the retrieved fan pages into 2 types (0: unrelated with e-cigarette; 1: related with e-cigarette) by two coders according to the profiles of

[1] http://www.bestclearomizer.com/ultimate-vaping-glossary/

fan pages. A third coder coded the fan pages for which there was no agreement between the first two coders. If the third coder disagreed with each of the first two coders, that fan pages are excluded. Meanwhile, the coders also checked whether the fan pages are written in English or not. In this paper, we only focus on the e-cigarette related fan pages written in English.

In the online data collection, we collect the content (including posts and comment) and interaction records in e-cigarette related fan pages using the Facebook APIs. Through the APIs, we can collect the public historical data on the fan pages. The data collection lasted from to March 8 2015 to April 12 2015. Totally, we got 4778 e-cigarette related fan pages with 472,435 posts and 5,606,020 comments.

3 Identify Online E-cigarette Marketing from Social Media

Online marketing refers to use a set of powerful tools and methodologies to promote products and services through the Internet. Generally, the information is embedded in the user-generated content and disseminated through the user activities (such as like, comment, and sharing) to increase the visibility of the products. To identify the content related with online e-cigarette marketing, we assume the content should cover three topics: e-cigarette topics, flavor topics, and business activities. The workflow to identify the online e-cigarette marketing is presented in Fig. 1.

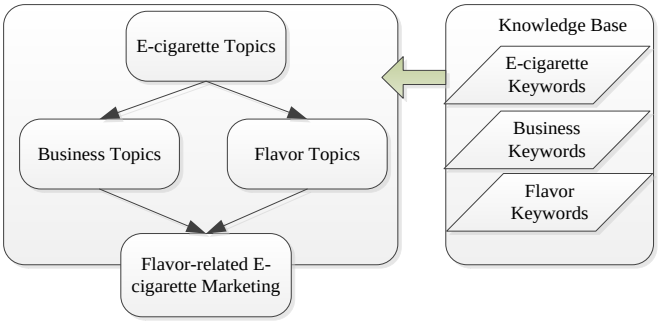

Fig. 1. Workflow to identify the flavor related e-cigarette marketing

First, we use the e-cigarette keywords to decide whether the textual inputs (posts) are related with e-cigarette. The e-cigarette keywords are partially presented in Table 1. Second, we check whether the content is related with business activities or flavor based on the outputs of first step respectively. To find business-related content, we integrate several keyword lists related with business activities[2, 3]. While for the flavor keywords, we assemble the flavor lists from different fla-

[2] http://nichehacks.com/buyer-keywords-list/
[3] http://miscellanea.hubpages.com/hub/How-to-Sell-your-Products-with-Buying-Keywords

vor manufacturers [4] to maximize the coverage of flavor-related keywords. Finally, we calculate the overlapping of the outputs of second step. The overlapping is the content which not only promotes e-cigarette products, but also is related with flavor. In total, we get 12,391 posts with 85,989 comments. This is the dataset for the following analysis.

4 Users' Response to Online E-cigarette Marketing

4.1 Distribution of E-cigarette Flavor in Social Media

Due to the variety of e-cigarette flavors, we try to group similar flavors into one flavor category. However, the flavor category varies by e-juice manufacturers and retailers. Even worse, the product names themselves often give no guidance, can be misleading, or can even be counterintuitive. To address this question, we adopt the vapor digest flavor categorizing system (VDFCS)[5] to place individual flavors from many different manufacturers into the appropriate flavor category. The creation of VDFCS is based on the 'primary flavor' of an e-liquid. In VDFCS, 12 flavor categories including *alcohol*, *beverage*, *candy & sweets*, *coffee & tea*, *fruit and tobacco* are defined. In this paper, we use the 11 flavor categories except *miscellaneous*.

To reveal the flavor-related content, we need to create the mapping from flavor-related keywords to 11 flavor categories. In the mapping step, we want to setup matches between keywords and flavor categories. To ensure the reasonability of mapping, two coders manually create the mapping respectively. When there is no agreement between the two coders, they will discuss together to decide the reasonable mapping.

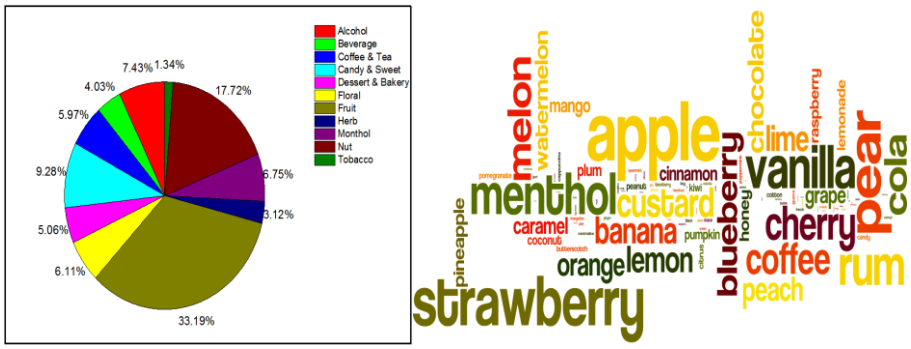

Fig. 2. The distribution of flavor in online e-cigarette marketing

As shown in Fig. 2, the fruity e-liquid is most frequently promoted on social media with a share of 33.19%, followed by nut (17.72%), candy & sweet (9.28%),

[4] http://www.missionflavors.com/flavorlist.aspx
[5] http://www.vaporlives.com/eliquid-flavor-categories/

alcohol (7.43%) and menthol (6.75%). This means that fruity e-liquid is frequently promoted by the e-liquid vendors and manufacturers in social media. According to the findings in [1], fruity e-liquid is the most popular with a 31% market share. Our result explains why the fruity e-liquid has the largest market share. The nut e-liquid (17.72%) is the second most frequently promoted e-liquid in social media. The flavors in nut e-liquids contain almond, pecan, cashew, pistachio, etc.

Certain e-liquids even contain alcohol such as vodka, margarita, and rum. Although the amount of alcohol used in the e-liquids is very small, the flammable alcohol could ignite the vapor resulting in a fire. Additionally, poisoning can easily occur when vaping alcohol as the body has no way to reject the alcohol when inhaled. Despite of these consequences, the alcohol flavored e-liquids are still widely promoted on social media with a share of 7.43%.

4.2 Users' Response to Online E-liquid Marketing

To measure the impact of advertised flavor in e-liquid marketing in social media, we compare the users' response including comment patterns and emotional patterns in flavor-related content (FC) and miscellaneous content (MC). Here, MC refers to the content unrelated with e-liquid flavor.

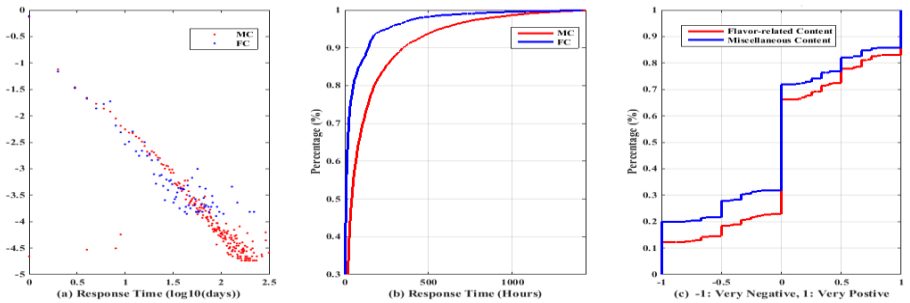

Fig. 3. The distributions of response time in FC and MC

To reveal the impacts of online e-liquid marketing to online user activities, we compare the temporal patterns of comments on FC and MC. As shown in Fig. 3a, the response time of comments has a heavy tail. The heavy-tailed distribution of response time means that most comments happened instantly after the posts is related. For FC, 77.02% of comments happened within 24 hours after the releasing of posts; which it is 74.04% for MC. On the other hand, the time range of response time for FC is shorter, which means the user interaction happened in a shorter time period. The cumulative distribution function (CDF) of response time is presented in Figure 3b. According to Fig. 3b, 85% of comments on FC happened within 84 hours, while it is 243 hours for 85% comments in MC. It demonstrates the flavor-related content in online e-liquid marketing can attract more user interaction within a shorter time period and the flavor-related content may boost the user activities in social media.

To measure the emotional patterns in the comments, we use the Stanford NLP package to extract the emotional words and classify those words into 5 categories: very negative, negative, neutral, positive, and very positive. In addition, the emoticons in the comments are classified into the 5 categories as well, according to the definitions of emoticons. As shown in Fig. 3c, for the flavor-related content, 12.29% is very negative; while it is 20.00% for MC. In terms of very positive emotion, it is 17.05% for FC vs. 14.24% for MC. In addition, we compare the ratios of positive content and negative content (R) in FC and MC. According to R, we find that the ratio for FC (R_{FC}) is 1.4857, while R_{MC} is 0.8801. This demonstrates that the comments for flavor-related content in e-cigarette marketing are more positive, and flavor-related cigarette marketing have positive effects for users' emotion.

5 Conclusions

In this paper, we focus on the impact of flavor for online users and investigate the users' response to flavor-related e-cigarette marketing in social media. We find the fruit flavor is most frequently promoted on social media with a share of 33.19%, followed by nut (17.72%), candy & sweet (9.28%), alcohol (7.43%) and menthol (6.75%). With regard to the users' response, flavor-related content in online e-cigarette marketing can attract more user interaction within a shorter time period and the flavor-related content may boost the user activities in social media. Meanwhile, users' response to flavor-related content in online e-cigarette marketing is more positive.

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