How community interactions contribute to harmonious community relationships and customers' identification in online brand community

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ABSTRACT

As a proxy for the vitality of online brand community, effective interaction has always been viewed as a prerequisite for the formation of harmonious organization atmosphere and high degree of organizational identity. To investigate the process, this study proposes a model delineates the relationship among community interactions, harmonious community relationships, and customers' community identification. The findings, based on 665 valid samples, reveal that different community interactions (product-information, human-computer, and interpersonal) have different effects on harmonious community relationships (customer-brand and customer-other customers' relationships), which in turn influences customers' identification with community. Furthermore, these community interactions have an interactive effect on harmonious community relationships. Based on the analytical results, this study concludes with some managerial and research implications.

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1. Introduction

The infusion of information technology and the increase of customer sovereignty consciousness have redefined the roles of customers play in all aspects of business. They are no longer the passive receivers of value provided by the enterprises, but co-creators of value along with product innovation and competitive strategy (; Luo, Zhang, & Liu, 2015; Payne, Storbacka, Frow, & Knox, 2009; Prahalad & Ramaswamy, 2004). For obtaining more empowerment and effectively controlling over the service process, customers, especially younger generations, are more inclined to interactions in virtual environment compared to face-to-face communication (Köhler, Rohm, Ruyter, & Wetzels, 2011; Clarkson, 2010).

Engaging customers in the service experience by building online platform has become an important issue for researchers and marketers (Kuo & Feng, 2013; Köhler et al., 2011). These so-called online customer platforms, defined here as company-hosted online brand communities, are increasingly becoming an integral element for stimulating customer interactions (Wu, Huang, Zhao, & Hua, 2015; Wu, Ku, & Liao, 2015b; Wang, Yeh, & Yen, 2015). Due to the char-

acteristics of high and continuous multi-party communications without time and geographical bound, members of online brand communities can easily share product information and interact with each other, and consequently develop harmonious community relationships as well as community identification (Laroche, Habibi, & Richard, 2013; Heinonen, 2011). Online brand community is not only a physical place, but, in reality, is a set of social relationships linking a brand with its customers, customers with other customers, which constitute a basic framework of community relationships (Luo et al., 2015; McAlexander, Schouten, & Koenig, 2002; Muniz & O'guinn, 2001). For customers, relationship establishment and identity formation are easily shaped in the process of interactive activities. Therefore, it is imperative for firms to carry forward a success for stronger relationships with customers and customer identification with community.

Relational marketing or building customer relationships has attracted much interest from researchers and practitioners by enhancing customer loyalty (Berry, 1995; Zinkan, 2012; Kuo & Feng, 2013). Currently, most research predominantly focuses on customer-brand relationships, neglecting the effects of customer-other customers' relationships (Wu, Huang, Zhao, & Hua, 2015; Wu, Ku, & Liao, 2015b; Kim, Jeon, & Hyun, 2011). However, as an important part of community triangle relationships, customer-to-customer relationships play a significant impact on community performance and efficiency, so the further study of this is very

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promising (Andersen, 2005; McAlexander et al., 2002; Muniz & O'guinn, 2001).

Members' strong identification with online community has been considered as an important force of community effectiveness (Qu and Lee, 2011; Carlson, Suter, & Brown, 2008; Algesheimer, Dholakia, & Herrmann, 2005; Bagozzi & Dholakia, 2002). Once customers become identified with brand community, it is highly likely for them to actively engage in the community activities and show various types of positive member behaviors. However, how to effectively activate members' community identification has not been fully revealed yet. In an attempt to enrich the existing literature on relational marketing in online communities, based on uncertainty reduction theory and social identity theory, we develop and empirically test an integrated research model to identify how online community interactions contribute to harmonious community relationships and customers' community identification. Moreover, in order to understand the effect mechanism of community interactions more clearly, we make an interactive effect and mediating effect analysis on them respectively.

2. Literature review

2.1. Uncertainty reduction theory

As one of the classical theories about the perception formation and relationship development in interpersonal communication, uncertainty reduction theory indicates that people/organization will face a high uncertainty of the cognitive state in the initial contact phase (Berger & Calabrese, 1975). In order to reduce the uncertainty, they tend to exchange, search and collect information through various behavior manners (Daft & Macintosh, 1981; Tidwell & Walther, 2002). According to Berger and Calabrese (1975), low amounts of uncertainty correspond with greater development of relationships.

Due to the lack of face-to-face communication, members in virtual environment have higher perceived risk (Kunz & Seshadri, 2015). To reduce uncertainty and equivocation, customers tend to obtain information in interaction activities of online brand community. Some members may ask frequently asked questions by the means of using computer-mediated interactive platform; some may obtain information by browsing the user-generated content; others may get help or support through directly communicating with members. In community interaction process, customers will increase their understanding and decrease the uncertainty about brand and other customers, resulting in narrowing the distance of customer-to-brand and customer-to-other customers (McAlexander et al., 2002; Muniz & O'guinn, 2001). Thus, it can be said that community interactions play an important role in developing intimate relationships between customer and brand, and customer and other customers from the perspective of uncertainty reduction theory (Berger & Calabrese, 1975). Based on the above analysis, according to the uncertainty reduction theory, this study constructs a conceptual model to explore how community interactions contribute to the harmonious community relationships.

2.2. Community identification

Social identity is defined as an individual's recognition of own membership of a social organization, involving value and emotional connotation (Tajfel, 1981). In other words, the member's cognition that he/she belongs to a brand community spurs him/her to classify them into the community category. Thus, social identity becomes an important criterion to examine connections between individuals and social group (Palmer, Koenig-Lewis, & Jones, 2013).

Community identity originates from group identity, which is a special type of social identity, where individuals prescribe themselves by their membership. As the core characteristic, community identification refers to group sense of belonging individuals perceive from community (Algesheimer et al., 2005), essentially describes the psychological bonds between members and social group they belong to, meaning they identify with the norms, traditions, customs and goals of community (Tajfel, 1981). When members find the community shares a unique feature with them, they are more likely to take community as a desirable goal of social realization and identification (Heere et al., 2011). Some research has pointed out that community identification is an important decision variable of community members' behavior and attitude (Muniz & O'guinn, 2001; Algesheimer et al., 2005), so it is necessary to explore the formation mechanism of community identification.

2.3. Online brand community interactions

Community originated from sociology, in reality, is a socially networked group, so social interaction inevitably becomes an important content of community interactions (Nambisan & Baron, 2009; Nambisan, 2002). Social interaction mainly manifests interpersonal interaction in the community settings (Wang, Chan, & Yang, 2013). Interpersonal interaction is defined as person-to-person communication among peer customers, and essential for establishing and developing social relationships (Nmbisan and Baron, 2009). Scientific interpersonal interaction mechanism is an important guarantee of community socialization (Nmbisan and Baron, 2009; McAlexander et al., 2002). With the deepening of customer and organizational socialization, interpersonal interaction has attracted wide attention from the researchers and businesses (Moschis and Churchill, 1978).

Access to information on firms' product/service usage, technology and marketing is the primary purpose of customers who join brand community. And they are very willing to communicate product consumption experience with other members in brand community (McAlexander et al., 2002). Therefore, product-related content become the indispensable aspect of brand community interactions (Kuo & Feng, 2013; Nambisan & Baron, 2009). As an interaction rooted in the context of product, stimulating product-information interaction among community members has been an important channel for the implementation of firms' marketing strategy.

Firms have long invested in technology for reducing the cost of customer support and improving the quality of the customer experience. Computer-mediated interaction in community is attained through variety strategies such as information and graphics presentation, page navigation and design, search functionality, link use and predictive systems (Andrews, Preece, & Turoff, 2002). The interaction characteristic is mentioned as human-computer interaction, which reflects the responsiveness of community or "the potential for immediate feedback from the receiver" (Te'eni, 2001).

Based on the above-mentioned research streams, in this study, the focus is on three dimensions of online community interactions: product-information interaction, human-computer interaction and interpersonal interaction. The three dimensions are viewed as reflecting customers' actual interaction experience in online brand community and, as such, as potentially establishing and developing community relationships (Zaglia 2013; Zhou, Zhang, Su, & Zhou, 2012). Next, the research model that captures these relationships is presented.

3. Research hypotheses

3.1. Community interactions and harmonious community relationships

Since the topic of product-information interaction regards product-technology, product-use, and product-market knowledge, increasing in such interaction should provide customers with great opportunities to acquire various aspects of the product (Jeppesen & Molin, 2003). Compared with the mere product-information sharing, product-information interaction can reflect the initiative and enthusiasm of the customers search information, and the two-way communication among the community actors, which is more conducive to strengthen customers' awareness of the product. With the deepening of understanding of the product, customers will feel a natural affinity with the brand, making them easier to identify the quality and attributes of brand, and more likely to develop long-term dependability for the brand (Ha & Perks, 2005). Thus, it is concluded that the greater the extent of product-information interaction among customers is, the greater the potential to derive the associated relationships between customers and brand is.

Within a community established on the basis of brand, the primary link between members is their affiliation with the brand's products, meaning that product-related information interaction is a very important bridge for customers to know one another and build social ties with each other (Nambisan & Baron, 2007; Muniz & O'guinn, 2001). In addition, a primary purpose of many customers in brand community is to obtain product-related knowledge for decision-making. The useful product-information interaction can help them timely solve problems and effectively make decisions, enhancing customers' goodwill, thus strengthening the bond among members of the community to a certain extent (Algesheimer et al., 2005).

Based on the above analysis, we thus propose H1a to b, as follows:

H1. Product-information interaction positively influences customer-brand (a) and customer-other customers (b) relationships.

Convenient and timely communication plays a pivotal role in enhancing mutual understanding, and may even as seen as the foundation for reinforcing social ties (Te'eni, 2001). Human-computer interaction underlines the interactivity nature of technology mediation in online brand communities. Communication in the computer-mediated environment generally emphasizes platform' usability, friendliness, and channel capacity, which offer members a full-service experience (Nambisan, 2002). A better website experience of community communication, such as free participation and convenient interaction, contributes to the relationship development between the important actors of community (McAlexander et al., 2002). Moreover, wonderful community interactive experience also shows the firm supports community development and attaches importance to customers, which establishes a good brand image in the minds of customers. Besides, customers can easily discuss with other customers and quickly respond to questions, which make those members perceive attention and recognition from peer members (Te'eni, 2001; Kuo & Feng, 2013); thus engender sense of belonging and develop social friendship between them (Muniz & O'guinn, 2001). Therefore, we propose the following hypotheses:

H2. Human-computer interaction positively influences customer-brand (a) and customer-other customers (b) relationships.

In online community environment, high level of interpersonal interaction creates an atmosphere of active communication and mutual aid (Yadav & Varadarajan, 2005). As the brand spokesperson, favorable community environment is a powerful tool for brand promotion, which makes customers recognize the brand they can trust and rely on. At present, in China, the phenomenon of engaging in marketing activities by the interpersonal relationship is universal, known as the "interpersonal relationship marketing". Different with the traditional business marketing, interpersonal relationship marketing not only meets the emotional needs of customers, bus also builds a solid bridge between firm and customers.

Seeing from the meaning of the notion of feedback Shannon and Weaver (1949) put forward in communication processes, interpersonal interaction can contribute to the development of a "sense of mutual interdependence and connection" or a "feeling that they know each other" (Nambisan & Baron, 2009; Burgoon et al., 1999; Rafaeli & Sudweeks, 1997). With close interpersonal communication, customers deepen their understanding to each other continuously and grow their relationship step by step (Muniz & O'guinn, 2001). People do not only pursue money, but also social needs for realizing self-value. Strong interpersonal communication can induce a feeling that "peer customers truly understand their particular problem, thus facilitating the development of a mutual understanding or social identity that holds the community together" (Nambisan & Baron, 2009). It is not hard to find interpersonal interaction is the lubricant of harmonious customer-other customers relationships.

Hence, the third hypothesis is stated as:

H3. Interpersonal interaction positively influences customer-brand (a) and customer-other customers (b) relationships.

3.2. Harmonious community relationships and community identification

In brand community context built around the firm's products, as a bridge connecting customers, brand consumption experience has become an important topic of communication with other customers. Harmonious customer-other customers relationship enhances the credibility of brand experience, so as to promote customers' brand awareness (Muniz & O'guinn, 2001). Psychologically, friendly relationships among community members "take such forms as feeling connected and similar to each other" (Burgoon et al., 1999). Existing studies have confirmed that the behavior and thought of perceivers within a group is vulnerable to the surroundings (Wertz, 1987). That means that the relationship a customer builds with the brand can easily influence other customers around. Therefore, harmonious customer-other customers relationship can improve the development of customer-brand relationship.

As the proxy of individual emotional state and sense of belongingness to a social group (Wang et al., 2015), with the increasing prevalence of social media, community identification is increasingly concerned by researchers and practitioners. According to social identity theory and uncertainty reduction theory, favorable relationships within the organization can enhance each other's trust, which provides an environment with less perceived risk and uncertainty; thus facilitates member to be more addictive to the relationship with the organization itself (Zhao, Lu, Wang, Chau, & Zhang, 2012; Chiu, Huang, Cheng, & Sun, 2015). That is to say, in online brand community, harmonious community relationships reduce uncertainty and generate a more relaxing and comfortable environment that in turn facilitates members' sense of belonging to the community and helps them to identify with the community (Zhao et al., 2012).

Based on the aforementioned analyses, the following hypotheses are proposed:

H4. Customer-other customers relationships positively influences customer-brand relationships.

H5. Customer-brand relationships (a) and Customer-other customer relationships (b) positively influences community identification, respectively.

3.3. Interactive effects

According to resource complementarity theory, one resource or capability can reinforce the impact of another capability, eventually enhancing effects on the outcomes (Teece, Pisano, & Shuen, 1997). In the marketing literature, some researchers have argued that technology and other marketing resources have interactive effects on business accomplishments (Song, Droge, Hanvanich, & Calantone, 2005; Rapp, Trainor, & Agnihotri, 2010). Along these same lines of logic, technology-enabled interactions will exhibit resource complementarity when coupled with other interaction characteristics resulting in closer community relationships in online brand community (Trainor, Andzulis, Rapp, & Agnihotri, 2014). Specifically, computer-mediated brand community can make product-information interaction more extensive and in-depth; make interpersonal communication more smooth and timely, which ultimately contribute to the development of positive customer-brand and customer-other customers relationships. It can be said that the human-computer interaction characteristic of brand community uses the transmission and communication channel it provides, and other community interaction characteristics have a positive interactive effect on community relationships.

Although we divided community interactions into product-information interaction and interpersonal interaction from the perspective of interaction content, the information interaction and interpersonal communication are not an independent process from the interaction process, and overlap sometimes. Interpersonal interaction is a lubricant for feelings, which easily transfer strangers into acquaintance. In a brand community integrated with interpersonal interaction characteristic, customers are more willing to share product information, which further continues the interaction process.

Therefore, based on above, we posit:

H6. Product-information interaction and human-computer interaction have a positive interactive effect on customer-brand relationships (a) and customer-other customers relationships (b), respectively.

H7. Interpersonal interaction and human-computer interaction have a positive interactive effect on customer-brand relationships (a) and customer-other customers relationships (b), respectively.

H8. Product-information interaction and interpersonal interaction have a positive interactive effect on customer-brand relationships (a) and customer-other customers relationships (b), respectively.

3.4. Control variables

To evaluate the proposed research model, descriptive statistic variables are included as the control variables. According to the prior study, the age and gender could influence individual affect and physiology (Levenson, Carstensen, & Gottman, 1994). So these attributes are likely to affect customers' relationship development with community. Thus, we explicitly control the direct effects of age and gender on customer-brand relationships, customer-other customers relationships, and community identification. Participation in the community may also affect the community relationships and community identification. Therefore, we included how frequently the customers visit community as a control variable.

Based on the points discussed above, we propose an integrated research framework (Fig. 1). The model treats community interac-

tions as key factors affecting harmonious community relationships and community identification in online brand community. In the follow-up section, we will define the research constructs and elaborate upon their hypothesized relationships.

4. Research methods

4.1. Measurement development

All multi-item scales used within this research were developed and adapted from scales used in the existing research (as shown in Appendix A). Product-information interaction, human-computer interaction and interpersonal interaction were operationalized using adapted scales from Wang et al. (2013) and Nambisan and Baron (2009), which represent online brand community interaction characteristics. Measures of Customer-brand relationships and customer-other customers relationships came from McAlexander et al. (2002) and Habibi, Laroche, & Richard (2014). The scale captures the extent to which online community relationships are harmonious and friendly. Community identification was developed from Algesheimer et al. (2005) and Mael and Ashforth (1992) scale items. The scale consists of three items that assess the strength of customer's relationship with the online brand community.

All items were measured using a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). To ensure the adequacy and clarity of each question and confirm potential problems in the questionnaire, this study invested six experts and six online community members to review the questionnaire, helping to modify ambiguous expression, which supported the content validity of the questionnaire. For purifying and validating the measures, we conducted a pretest with 60 online community members to evaluate the overall interpretability and clarity of the survey questions. All the items loaded properly on their intended scale. According to the participants' responses, we made a few minor modifications.

4.2. Data collection and sampling

In China, the smartphone utilization rate reaches to 74% and has broad market prospect. Focus group participants of this study were recruited from a credited China smartphone's online brand community that has more than 19 million members. Everyday a variety of interaction activities have happened in the smartphone brand community, which provides with sufficient content to analyze. Thus, we think that it is very suitable for collecting empirical data from the target community to validate our research framework. We collected a sample of very active (i.e., visit in the brand community more than 2–3 times a week in the past two month) online brand community members. The survey was administered online so we were able to measure the time participants spent on each question and prevent them from filling out the questionnaire more than once; we made sure that members was exposed to the program. In order to encourage respondents to complete the questionnaire, we offer gifts to reinforce the sample return rate. Of the 981 completed surveys returned, 286 surveys were screened because they were not very active members of online brand community. In addition, 30 surveys were dropped for data quality concerns (e.g., only choose one answer for all questions). The remaining 665 responses were analyzed.

Table 1 shows the demographic characteristics of the sample subjects. Of those, responses were balanced among the sexes (male: 52.0%, female: 48.0%) and the majority of respondents were between 20 and 39 years of age (76.7%). Furthermore, most respondents visit the community at least two times a week.
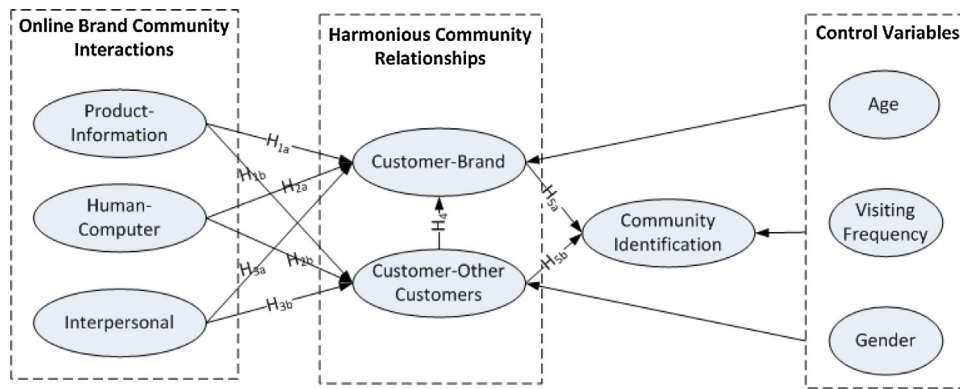
Fig. 1. Research model.

Table 1
Demographics of the survey respondents (N = 665).

Demographic profile	Categories	Frequency	Percent (%)
Gender	Male	346	52.0
	Female	319	48.0
Age (in years)	19 or younger	128	19.2
	20–29	294	44.2
	30–39	216	32.5
	Above 40	27	4.1
Education	High school or below	266	40.0
	College	299	45.0
	Graduate or above	100	15.0
Visiting frequency (times per week)	2–3 times	105	15.8
	4–5 times	238	35.8
	6–7 times	265	39.8
	Over 8 times	57	8.6

5. Data analysis and results

5.1. Tests for common methods variance

Because a single respondent completes all questionnaire items, common methods variance may exist. For ruling out common methods variance, in addition to ensuring the anonymity and confidentiality of respondents based on the suggestions of Chang, Van Witteloostuijn, and Eden (2010), this study also uses two methods to test the survey data. First, we use Harman's single-factor test to analyze the variance proportion of a single factor (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The results show that the first component with the largest eigenvalue does not explain more than 50% of all variance (21.9% of variance), suggesting that the questionnaire does not exhibit common method variance. To further check common methods variance, we conduct a CFA on competing models that increase in complexity (Podsakoff et al., 2003). Our findings indicate that the simple factors yield a better fit the data: $\chi^2(152) = 5931.008$, RMSEA = 0.239, GFI = 0.394, CFI = 0.142, NFI = 0.141; whereas the nine factors model fit the data as well: $\chi^2(137) = 249.594$, RMSEA = 0.035, GFI = 0.961, CFI = 0.938, NFI = 0.964. Thus, the nine factors model yield a better fit of the data than the simple factor models. In summary, it was not a significant issue about common methods variance in this study.

5.2. Verification of the proposed model and hypotheses

Drawing on the two-step approach recommended by Anderson and Gerbing (1988), this study employed the structural equation modeling (SEM) to verify the proposed model and hypotheses. Taking into account the good compatibility of AMOS and SPSS, and good

visibility, a variety of statistical indicators, we adopted Amos 17.0 to make the analysis. We first examined the skewness and kurtosis of the data to assess the normality of samples. The test showed that the skewness and kurtosis values were within the acceptable threshold (Kline, 1998).

5.2.1. Measurement model analysis

The reliability, convergent validity, and discriminant validity of the scale were examined by using confirmatory factor analysis (CFA). The Kaiser-Meyer-Olkin (KMO) statistics for sample is 0.868, indicating that the data is amenable for factor analysis (Kaiser, 1974). AS shown in Appendix B, all indicators loaded on the expected factors and are higher than 0.7, while loadings on other factors for all indicators are lower than 0.4, suggesting good convergent and discriminant validity (Chin, Gopal, & Salisbury, 1997).

A 6-factor measurement model is set up to further assess construct reliability and validity according to the CFA approach. Table 2 lists the completely standardized factor loadings which are above recommended cut-off point of 0.6 and statistically significant composite reliability (CR) and average variance extracted (AVE), indicating strong evidence of convergent validity (Fornell & Larcker, 1981).

Table 3 shows the mean, standard deviation, and square root of average variance extracted (AVE), as well as the correlations between the constructs. Comparing the square root of the AVE with the correlations among the constructs indicates that each constructs is more closely related to its own measures than to any other construct, demonstrating discriminant validity (Fornell & Larcker, 1981).

5.2.2. Structural model analysis

After examining the measurement validity and reliability, we tested the test the structural equation modeling using AMOS. The fit indices indicate a satisfactory fit for the model: $\chi^2/df = 3.465$, RMSEA = 0.061, GFI = 0.921, CFI = 0.934, NFI = 0.910. The estimated path coefficients of the structural model were examined to assess the hypotheses. In Fig. 2, apart from H1b, H2b and H3a, the remaining direct hypotheses formulated in this research are supported.

Product-information interaction has non-significant effect on customer-other customers relationships (Hypothesis 1b). Since explosive growth of network information, now customers are in the life of excessive marketing every day, which make them separate themselves from the information source if they think the information is useless. Therefore, from the perspective of proportionality principle, excessive product-information interaction is likely to be considered as a marketing means in online brand community (Li, Wei, Tayi, & Tan, 2015), thus may affect the relationship development among customers.

Table 2
Test results of internal reliability and convergent validity.

Construct	Items	Internal reliability	Convergent validity		
		Cronbach's α	Factor loading	Composite reliability	Average variance extracted
PI	PI1	0.78	0.84	0.79	0.56
	PI2		0.77		
	PI3		0.62		
HC	HC1	0.83	0.76	0.83	0.62
	HC2		0.76		
	HC3		0.84		
II	II1	0.83	0.76	0.83	0.63
	II2		0.79		
	II3		0.82		
CB	CB1	0.89	0.81	0.89	0.68
	CB2		0.89		
	CB3		0.87		
	CB4		0.72		
COC	COC1	0.87	0.86	0.86	0.68
	COC2		0.82		
	COC3		0.79		
CI	CI1	0.88	0.84	0.88	0.71
	CI2		0.89		
	CI3		0.79		

Note: PI = product-information; HC = human-computer; II = interpersonal interaction; CB = customer-brand; COC = customer-other customer; CI = community identification.

Table 3
The mean, standard deviation, and correlation matrix.

Construct	Mean	S.D.	Construct					
			PI	HC	II	CB	COC	CI
PI	5.42	1.09	**0.75**					
HC	4.91	1.46	0.31	**0.79**				
II	5.02	1.31	0.20	0.02	**0.79**			
CB	4.78	1.47	0.71	0.40	0.23	**0.83**		
COC	4.71	1.52	0.17	0.07	0.41	0.27	**0.83**	
CI	4.97	1.35	0.22	0.07	0.57	0.31	0.65	**0.84**

Note: The diagonal line of the correlation matrix represents the square root of AVE; off-diagonal elements are the correlations among constructs.
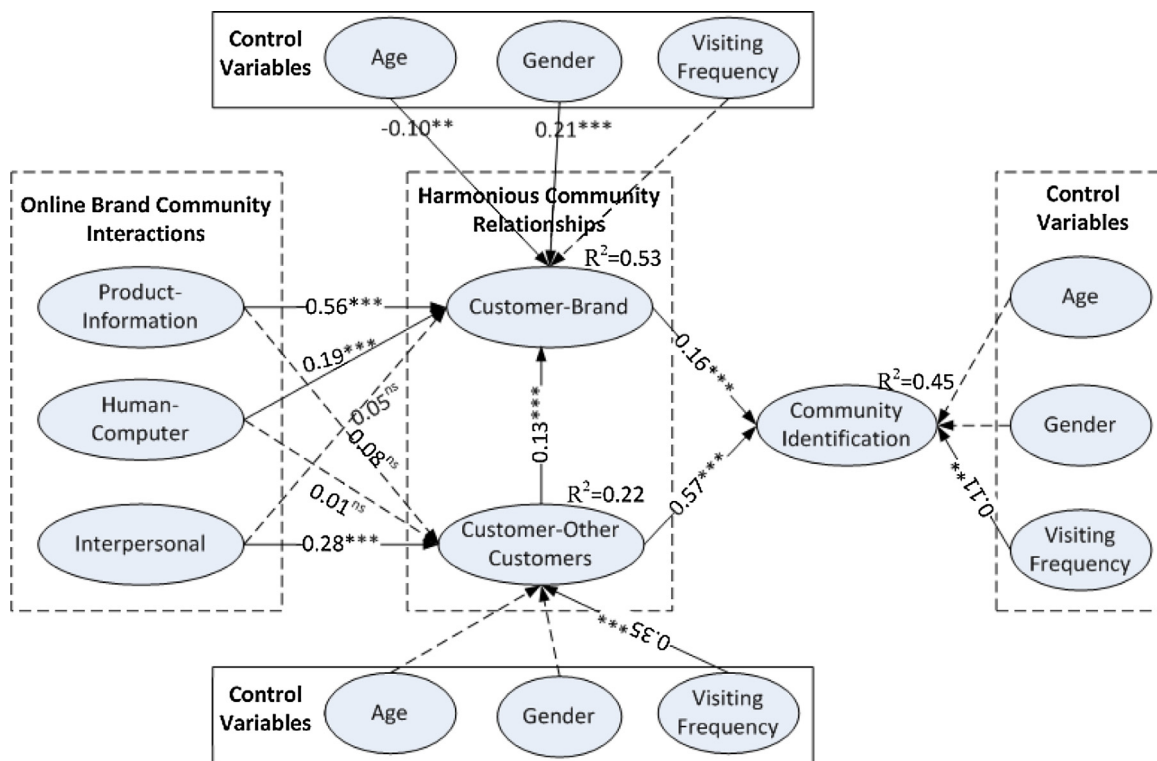
Notes: ***p<0.001; ** p<0.01; *p<0.05; ns, not significant

Fig. 2. Structural equation modeling results.   *Notes:* ***p < 0.001; ** p < 0.01; *p < 0.05; ns, not significant

Human-computer interaction shows non-significant impact on customer-other customers relationships (H2b). Brand community integrated with convenient information technology better caters to the customers' needs, and facilitates the communication between firm and customers, and among customers. Compared to the special social platform and face-to-face communication, although online brand community has good performance of human-computer interaction that effectively transfers information for partners, it may not be enough for a limited time to produce a profound impact on the weak social relationships, such as customer-other customers relationship (Laroche et al., 2013).

Interpersonal interaction shows no significant effect on the customer-brand relationships (H3a). On the one hand, in virtual social network, the authenticity and credibility of interpersonal interaction is vulnerable to be questioned (Johnson & Kaye, 2014), which may to some extent affect the relationships between actors. On the other hand, interpersonal interaction in brand community usually involves consumption experience, and negative experience has stronger effect than positive, especially in online environment, which may affect customers' confidence in the brand (Lanier & Rader, 2015).

All harmonious community relationships have significant impacts on community identification (H5a and b). However, relative weights of harmonious relationships are different, among which customer-other customers relationships (H5b: $\beta = 0.57$) have the largest impact on community identification compared to the customer-brand relationships (H5a: $\beta = 0.16$). In addition, the study reveals that customer-other customers relationships actively promote the development of customer-brand relationships (H4), indicating that the harmonious and friendly ambiance among members provides members a high-level corporate platform to learn more about brand, solve product problems, and enjoy consumption experience.

5.2.3. Interactive effects analysis

This study evaluated the interaction effects by using an orthogonalizing technique in LISREL 8.70, which is appropriate to test interaction effects (Little, Bovaird, & Widaman, 2006; Marsh, Wen, & Hau, 2004). The data shows that only H6a and H7b pass the significant test, while other hypotheses of interactive effects do not get supported (See Fig. 3a and d).

Based on the standard practices suggested by Aiken and West (1991) from moderated regression analyses, this study attempts to plot interaction form. As shown in Fig. 4a and d, as human-computer interaction is presented within online community, the greatest impact on customer-brand relationships comes when product-information interaction is more prevalent. And as human-computer interaction appears, the greatest impact on customer-other customer relationships comes when interpersonal interaction is more remarkable. In Fig. 4b, c, e and f, two approximate parallel lines also further confirm the non-significant interactive effects.

5.2.4. Mediating effects analysis

To understand more in-depth the role of customer-brand relationships in forming community identification, we make mediating effect analysis to evaluate whether harmonious community relationships mediate the relationship between online brand community interactions and community identification.

This study evaluated the mediating effects by using the mediated regressions approach in SPSS, which require the estimation of three separate equations (Baron & Kenny, 1986). The results illustrate that (1) when product-information interaction influences community identification through the mediator of customer-brand relationship indirectly; (2) when product-information interaction influences community identification through the mediator of customer-other customers relationship indirectly and directly; (3) when interpersonal interaction influences community identification through the mediator of customer-brand relationship and customer-other customers relationship indirectly and directly (See Table 4).

6. Discussion and implications

6.1. Discussion of findings

To understand how community interaction contributes to harmonious community relationships and customers' identification in online brand community, we build a conceptual model to examine the relationships among community interactions, harmonious community relationships, and community identification. In line with social identity theory and uncertainty reduction theory, our results show that community interactions significantly improve customer-brand relationships and customer-other customers relationships in online brand community. In turn, these two community relationships have positive impacts on customers' identification with community. This indicates that convenient, frequent and continuous community interactions can enhance customer's relationships with brand and other customers. The member can perceive more membership and identification due to these good relationships.

More importantly, this study ascertains that community interactions have positive interactive effect on harmonious customer-brand relationships and customer-other customers relationships. Our results indicate that (1) the positive impacts of product-information on customer-brand relationships are greater for high human-computer interaction than for low human-computer interaction and (2) the positive impacts of interpersonal interaction on customer-other customers relationships are greater for high human-computer interaction than for low human-computer interaction. These findings not only provide support for the contingent views of social identity, but also contribute to the effective management of online brand communities. We believe that community interactions and harmonious community relationships should be simultaneously considered when one attempts to understand the drivers of community identification with the online brand communities.
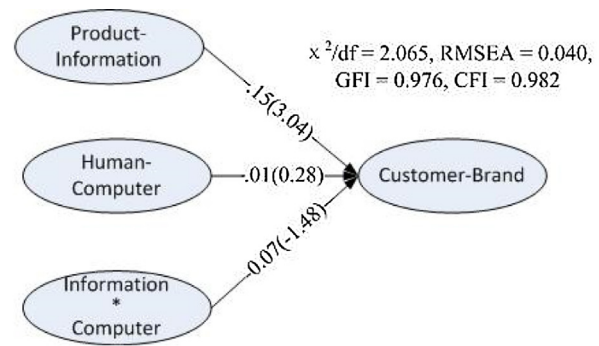
6.2. Theoretical implications

As the important entities within brand community, "customer-brand-customer" triangle has considered as the skeleton supporting steadiness of community (Muniz & O'guinn, 2001). The research of customer-brand relationships has a relatively long history; however, the customer-other customers relationships get relatively rare attention. Combining customer-other customers relationships with customer-brand relationships, this study puts forward the concept of harmonious community relationships. Furthermore, the research results also recognize the crucial roles of harmonious community relationships in determining customers' identification with online brand communities, especially, the importance of customer-other customers relationships as a key driver for customer-brand relationships. From the perspective of sustainable development, these findings point out a new direction for the study of brand community, and augment the prior literature by providing an improved understanding of what drives customer-brand relationships and community identification.
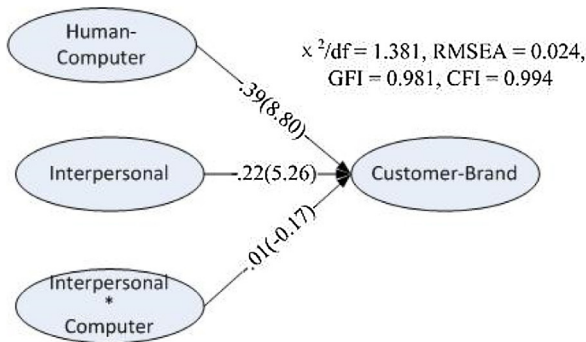
Another important contribution of this study is the examination of the interactive effects and mediating effects of product-information interaction, human-computer interaction, and interpersonal interaction on harmonious community relation-
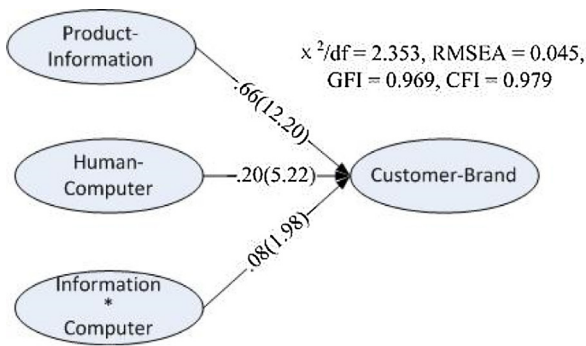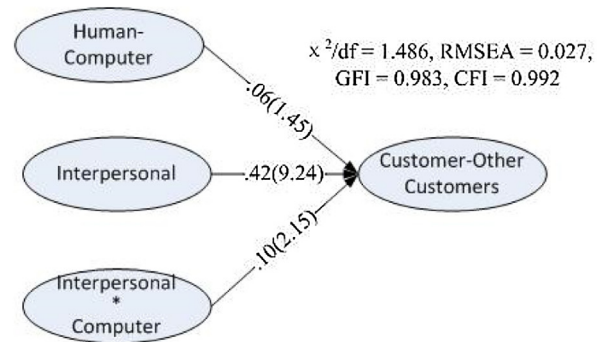
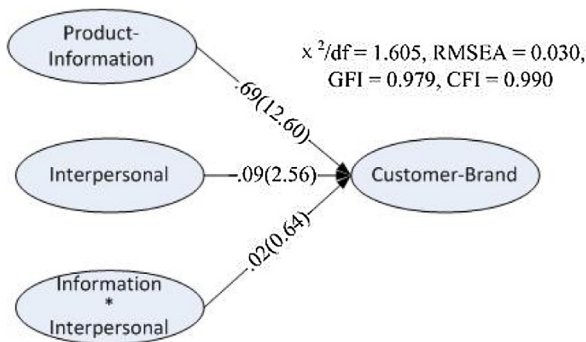**(a)** Human-computer and Product-information on Customer-brand

$x^2/df = 2.353$, RMSEA = 0.045, GFI = 0.969, CFI = 0.979

.66(12.20), .20(5.22), .08(1.98)

(b) Human-computer and Product-information on Customer-other customers

$x^2/df = 2.065$, RMSEA = 0.040, GFI = 0.976, CFI = 0.982

.15(3.04), .01(0.28), .07(-1.48)

(c) Human-computer and Interpersonal on Customer-brand

$x^2/df = 1.381$, RMSEA = 0.024, GFI = 0.981, CFI = 0.994

.39(8.80), .22(5.26), .01(-0.17)

(d) Human-computer and Interpersonal on Customer-other customers

$x^2/df = 1.486$, RMSEA = 0.027, GFI = 0.983, CFI = 0.992

.06(1.45), .42(9.24), .10(2.15)

(e) Interpersonal and Product-information on Customer-brand

$x^2/df = 1.605$, RMSEA = 0.030, GFI = 0.979, CFI = 0.990

.69(12.60), .09(2.56), .02(0.64)

(f) Interpersonal and Product-information on Customer-other customers

$x^2/df = 1.904$, RMSEA = 0.037, GFI = 0.978, CFI = 0.985

.09(1.97), .40(8.72), .06(1.330)

Fig. 3. Interaction effect results using orthogonalized indicators. *Note:* The t value is listed in the parentheses next to the standardized estimate.

ships. At present, some research on the impact of community interactions mainly focus on customers' perceived benefits (Wang et al., 2013; Kuo & Feng, 2013; Nambisan & Baron, 2007), and the research on the internal relationship structures of organization is rarely. From the view of sociology, interactions are the prerequisite for the development of harmonious and friendly relationships. Moreover, most research on community interactions only focus on the direct effect (Wang et al., 2013; Kuo & Feng, 2013; Nambisan & Baron, 2007), but ignore the complementarity between different interaction characteristics (Kohli, Devaraj, & Ow, 2012; Aral, Brynjolfsson, & Wu, 2012). Based on the above analysis,

this study analyzes the impact mechanism of community interactions from the perspective of customer relationships after referring to the existing research of community interaction (Wang et al., 2013; Kuo & Feng, 2013; Chang & Zhu, 2011; Nambisan & Baron, 2007; Hoffman & Novak, 1996). The results of interactive effects and mediating effects between community interactions and community relationships also verify the interpersonal communication theory and the notion of complementarity.

Most studies of organizational identification focus on the attraction of organization characteristics or the satisfaction of customers' interests (Ren et al., 2012), but few can carries on the analy-

(a) Human-computer and Product-information on Customer-brand

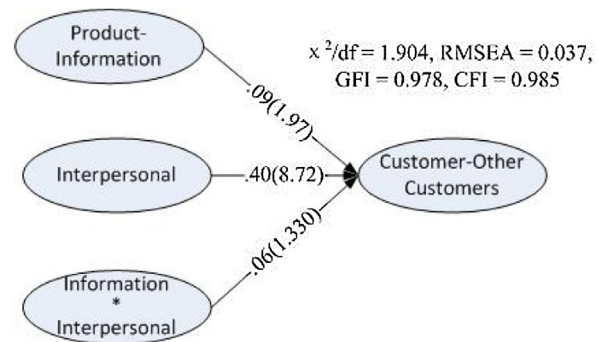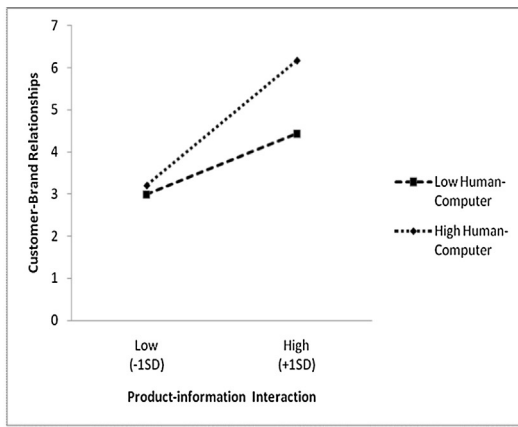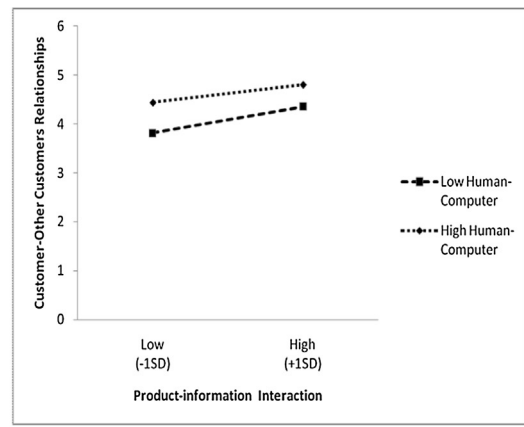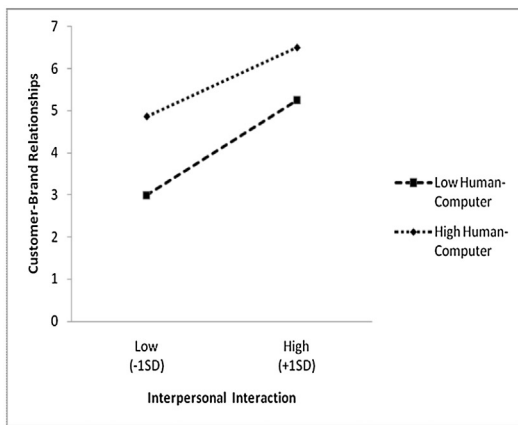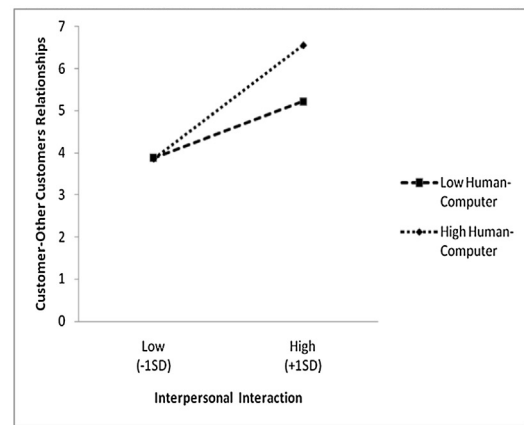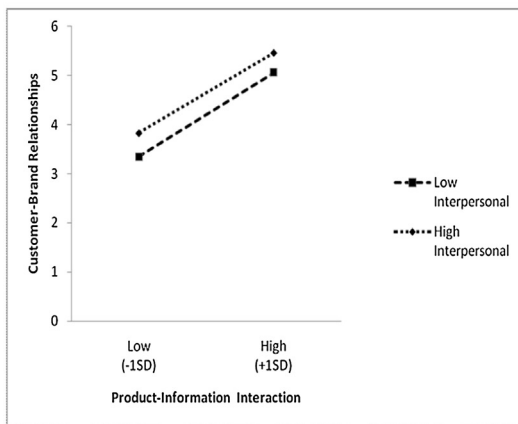**(b)** Human-computer and Product-information on Customer-other customers
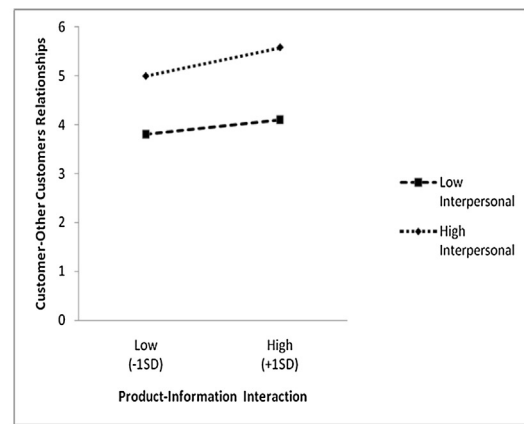
(c) Human-computer and Interpersonal on Customer-brand

(d) Human-computer and Interpersonal on Customer-other customers

(e) Interpersonal and Product-information on Customer-brand

(f) Interpersonal and Product-information on Customer-other customers

Fig. 4. Plots of interactive result.

sis from the perspective of organization internal relationships. However, harmonious internal relationships are the foundation of organizational stability and development. Our findings confirm that

an individual's identification with an online brand community is based on certain customer-brand relationships and customer-other customers relationships. This study extends prior studies on orga-

Table 4
The mediating effect results.

Model	Standardized coefficients Beta	Sig.	Dependent Variable	Mediating Effects
Product-Information	0.196	0.000	Community Identification	Completely
Product-Information	0.606	0.000	Customer-Brand	
Product-Information	0.036	0.437	Community Identification	
Customer-Brand	0.263	0.000		
Human-Computer	0.068	0.078	Community Identification	Non-significant
Interpersonal	0.491	0.000	Community Identification	Partially
Interpersonal	0.203	0.000	Customer-Brand	
Interpersonal	0.452	0.000	Community Identification	
Customer-Brand	0.194	0.000		
Product-Information	0.196	0.000	Community Identification	Partially
Product-Information	0.148	0.000	Customer-Customer	
Product-Information	0.114	0.000	Community Identification	
Customer-Customer	0.554	0.000		
Interpersonal	0.491	0.000	Community Identification	Partially
Interpersonal	0.343	0.000	Customer-Customer	
Interpersonal	0.335	0.000	Community Identification	
Customer-Customer	0.456	0.000		

nizational identification and shows that harmonious relationships are important impetus for members' identification with organization.

6.3. Practical implications

The study model and findings have several important implications for organizations wishing to establish harmonious relations and encourage customers' identification. The first implication is the presence of interactive effect. Many firms have realized the importance of information technology, but few give careful thought to how computer-mediated brand community effectively demonstrate function from the perspective of resource complementary. In view of the direct and interactive effect of human-computer interaction in the research results, firms should effectively play the role of human-computer interaction according to the needs of product-information interaction and interpersonal interaction. Managers and designers could implement product knowledge base to generate diverse, accurate and up-to-date product-information, and the use of structured feedback mechanisms, which allow customers to carry out efficient self-service in online brand community. In this instance, when firms couple product-information interaction and interpersonal interaction with nascent technologies, the impact on harmonious community relationships is magnified, which subsequently enhances customer relationships performance.

A second implication of the findings concerns the customers' organizational identification area. Although identification is important for an organization, it has not been clearly operationalized. The results of this study show that firms can win customers' identification through developing harmonious community relationships. In the Internet era, the viral propagation of information has a profound impact on customer-brand relationship, especially negative information, so it is necessary to carefully and timely deal with customers' feedback. The management of crisis public relations is an important ability for firms to launch marketing activities on social media. With the aggressive development of information technology and the enhanced awareness of customer rights, firms should consider giving customers more empowerment under the premise of proper guidance in online platform. For instance, online brand community can open up a "free activity" section, so that customers can organize activities according to their own preferences,

where firms provide some support. Despite the era of social media, firms still cannot ignore the impact of off-line activities. Taking into account the importance of face-to-face communication, firms should effectively integrate online and offline activities to enhance the interactions among customers.

6.4. Limitations and future research

Despite our efforts to conduct this research rigorously, readers should be cautions in generalizing these findings. First, this study identify that customers' interactions in online brand communities have important implications for harmonious community relationships, but it focuses on the effects of positive customer interactions and generally ignored the negative aspect of conversations and communications among members. Some researchers have reported that negative customer interactions, such as rude behavior and crowding (Hansen, Wilke, & Zaichkowsky, 2010; Huang, 2010). Further research might specially examine negative interactions in order to discover ways to reduce their effects, thereby improving customer relationship perform.

Second, as our data are collected from a smart phone online brand community in China, dedicated to high-end technology-advanced products, the results may allow creation of homogenous groups and reduce overall error variance (McGuigan, 1990). Future research in this field might focus on different industry environments, and on different cultural background groups.

Acknowledgments

Appendix A.

Measurement items of constructs.

Construct	Measurement item	Reference
Product-information interaction	PI1. Community interactions contained large amount of information about product usage (e.g., features, updates). PI2. Community contained large amount of information about product technology (e.g., standards). PI3. Community contained large amount of information about product market (e.g., competing products, pricing).	Wang et al. (2013); Nambisan and Baron (2009)
Human-computer interaction	HC1. The community's navigation and contents or links are very convenient to use. HC2. The community's design (e.g. color, layout) is very friendly. HC3. The community provides different ways (e.g. symbols, modules, video) to communicate with others.	Wang et al. (2013); Nambisan and Baron (2009)
Interpersonal interaction	II1. I generally receive quick reaction/feedback from other members on my ideas and contributions. II2. I always have close and intensive interactions with other members of online brand community. II3. There are plenty of two-way communications (e.g., communicate experiences, feeling) among members.	Wang et al. (2013); Nambisan and Baron (2009)
Customer-brand relationships	CB1. I value the heritage of the brand. CB2. If I were to replace the product, I would replace it with another product of the same brand. CB3. The brand is of the highest quality. CB4. I would recommend this brand to my friends.	McAlexander et al. (2002); Habibi et al. (2014)
Customer-other customersrelationships	COC1. I have met wonderful people in the community. COC2. I have a feeling of kinship with the other owners. COC3. I have an interest in the community because of the other members.	McAlexander et al. (2002); Habibi et al. (2014)
Community identification	CI1. I see myself as a part of the online brand community. CI2. If community members planned something, I'd think of it as something "we" would do rather than something "they" would do. CI3. When someone praises this community, it feels like a personal compliment.	Algesheimer et al. (2005); Mael and Ashforth (1992)

Appendix B.

Exploratory factor analysis.

Indicator	1	2	3	4	5	6
HC1	0.108	−0.027	0.009	**0.853**	0.016	0.064
HC2	0.152	0.025	−0.029	**0.828**	0.025	0.115
HC3	0.188	0.032	0.010	**0.857**	0.008	0.058
PI1	0.367	−0.018	0.108	0.098	0.073	**0.764**
PI2	0.350	0.093	0.036	0.095	0.045	**0.740**
PI3	0.173	0.042	0.007	0.075	0.041	**0.803**
II1	0.047	0.101	**0.830**	0.027	0.185	0.014
II2	0.078	0.067	**0.821**	−0.055	0.242	0.066
II3	0.094	0.219	**0.843**	0.016	0.122	0.050
COC1	0.088	**0.847**	0.167	0.040	0.227	0.018
COC2	0.080	**0.871**	0.137	−0.009	0.160	0.015
COC3	0.119	**0.809**	0.080	0.003	0.250	0.089
CB1	**0.768**	0.086	0.023	0.144	0.086	0.311
CB2	**0.861**	0.065	0.082	0.133	0.114	0.222
CB3	**0.843**	0.098	0.048	0.141	0.104	0.239
CB4	**0.772**	0.101	0.110	0.155	0.058	0.152
CI1	0.132	0.143	0.244	0.053	**0.842**	0.096
CI2	0.110	0.305	0.239	−0.010	**0.827**	0.014
CI3	0.104	0.412	0.191	0.017	**0.755**	0.068
Cumulative	30.995	48.815	58.024	66.167	71.272	76.248

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