

# Design is More Than Looks: Research on the Affordance of Review Components on Consumer Loyalty

Qiong Jia, Yurong Li, Shan Wang

Department of Management, Hohai Business School, Hohai University, Nanjing, People's Republic of China

Correspondence: Qiong Jia, #8 West Focheng Road, Jiangning District, Nanjing, People's Republic of China, Tel +86 13914488951, Fax +86-25-58099269, Email jiaqionghit@163.com

**Background:** Online review system contains multiple components, such as ratings, review text, product pictures, and video uploads, that could affect consumer loyalty. However, how the affordance of such components influences perceptions and behaviors of consumers remains unclear. We extend stimulus-organism-response (S-O-R) theory to the online review system. Specifically, we combine affordance theory and the technology acceptance model (TAM) to investigate the relations among the affordance of review systems, consumers' perceived beliefs, and their loyalty.

**Methods:** We surveyed 320 customers on their online shopping experiences in China. We tested our hypotheses using the partial least squares path structural equation modeling (PLS-SEM) method. We report the direct effect of affordances of review components on consumer loyalty and its indirect effects on consumer loyalty through perceived beliefs.

**Results:** Our results show that integrity and social interaction affordance of review components have significant relations with perceived ease of use, perceived usefulness, and perceived enjoyment. Intelligent topic mining reveals a positive relation on perceived enjoyment. Operability has a positive relation with perceived ease of use and perceived usefulness. These three consumer-perceived beliefs can mediate, to different degrees, the relationship between affordance of review components and consumer loyalty.

**Conclusion:** This research takes an innovative approach to offer insights into the relationships between IT affordances and consumer perceptions. We examine S-O-R theory through the lens of information technology and extend S-O-R theory by integrating IT affordances. Our research findings pave the way for businesses to design and implement more effective online review systems.

**Keywords:** online review, consumer loyalty, S-O-R theory, affordance theory, TAM model, review components

## Introduction

The COVID-19 pandemic has expedited the digital transformation of the world and led to a significant increase in online shopping.<sup>1</sup> As a result, many online shopping platforms are thriving and prosperous and they all face the competition for retaining their customers. As the direct interface to contact the consumers, the affordance-based design of the online platform is crucial to increase customer loyalty and achieve a high retention rate. Such design can create more satisfying shopping experience for consumers with demanded information and functions of the online review systems. Especially, online review system hosts user generated contents and is an indispensable source to help consumers make purchase decisions.<sup>2</sup> Poorly designed review systems can create shopping barriers and result in dissatisfied shopping experiences.<sup>3</sup> For example, some such systems tend to give irrelevant recommendations, lack of interaction features to encourage information sharing, and also make it difficult for consumers to find needed information. In contrast, well-designed review systems with affordance features, such as integrated functions, intelligent guidance, and user-friendly settings, can offer consumers an ease to use platform, lower their search cost so they will have an enjoyable shopping experience. Therefore, to stay competitive, online shopping platforms should improve their review system by incorporating affordance-based design.

Platform components can be the thrust to advance the basic elements of the systems. These are sites' basic objects, with simple encapsulation of data and methods. The components of websites can be used as entities in modularized affordance and users can see or click them displayed on the screen and react. Affordance proposed by Gibson,<sup>4</sup> also known as environmental empowerment, intuitive function, preset use, operable suggestion, and responsiveness, as well as other terms. It is defined as the purpose for which an item is really utilized. In other words, affordance involves features that make the use of objects obvious. We can directly perceive the action required to operate the object from the external environment, that is, the object perception property will provide us with a lot of potential action information and motivate us to interact with it. For example, when we see the well-designed intelligent key topic mining tags in the review system, we would click the extracted topic tag we are interested in to see more reviews. As shown in Figure 1, the Amazon platform has a set of affordance-based review components. For example, a keyword topic mining provides consumers with intelligent information extracted from reviews to assist their information processing. Other affordance-based components such as rating, comments, and helpfulness can ease customers' decision-making process.<sup>5</sup>

Previous studies show that online review components affect customer beliefs. For example, Dhaoui and Webster note that "Like and Share" functions affect consumer reviews, which in turn affect consumer behavior.<sup>6</sup> In addition, the votes in reviews can assist customers to find useful information more quickly.<sup>7</sup> The function of voting reviews can affect consumers' attitude and behavioral intention, which subsequently influence product sales.<sup>8</sup>

The affordance of review components is constantly shaped by the interactions between users and the technical characteristics of the components.<sup>9</sup> Scholars argue that affordance of review components can affect consumer perception and purchase intention.<sup>10</sup> Mitra and Jenamani<sup>11</sup> utilize natural language processing technology to mine online reviews to measure consumers' perceptions. Karimi and Wang propose that attributes of online review components can affect consumption by enhancing the perception of review helpfulness.<sup>12</sup>

Therefore, knowing how the affordance of review components relate with consumers' cognition and behaviors is crucial for platforms to improve their design in order to retain users. However, prior studies tend to focus only on the effect of individual functions of review components on consumer behavior without exploring the review system from

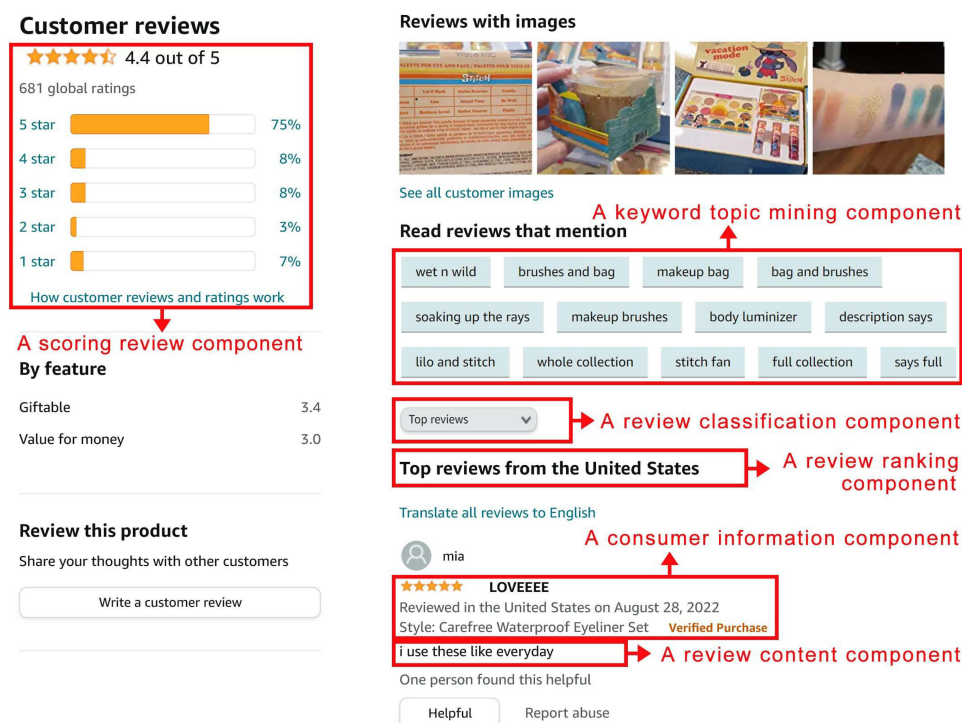


Figure 1 The review component on Amazon.com.<sup>5</sup>

a holistic view. Little is known about how the affordance of review components might affect consumer loyalty. Moreover, the underlying mechanism that drives the impact of online review components on customer loyalty is also unclear.

This study, therefore, analyzes specific manifestations of affordance from the perspective of review system components. Using a combination of affordance theory and the technology acceptance model (TAM), framed by Stimulus-Organism-Response (S-O-R) theory,<sup>13</sup> it uncovers the mediated mechanism of customers' perceived beliefs. We consider four main affordances of the online review system—integrity, intelligent topic mining, operationality, and social interaction. These affordances may be viewed as stimuli to inspire consumers' perceived beliefs, including perceived ease of use, perceived usefulness, and perceived enjoyment. In the online review system context, we consider consumers' perceived beliefs as their comprehensive assessment of a product or service from a multi-dimensional perspective that bridge the gap between review system components and consumer loyalty.

Systematically analyzing the influence of affordances of review components on consumers' perceptions and loyalty, this article offers both theoretical and practical contributions. First, our research establishes the utility of a combined affordance model and TAM in the framework of S-O-R theory, innovatively mining the relations among these theories and extending their application. Second, this work verifies a stimulus mechanism between online review components and consumer loyalty, providing a new perspective on considering components' affordance. Third, the results have practical significance for platforms and consumers. Platform can make use of a better design strategy by considering the different influence effects of multiple review components in order to improve targeted customers' experiences and thus to retain them. The improved review system design can also provide convenience for customers to express their comments or search for information more efficiently.

## Theoretical Foundation

### S-O-R Theory

The S-O-R model suggests that the human body's accessing many stimuli (eg, visual or olfactory stimuli) in the environment (S) can affect inner emotional and cognitive mechanisms (O), which further motivate a response (R).<sup>15</sup> Donovan et al were the first to utilize the S-O-R model in the marketing area.<sup>14</sup> Subsequent scholars introduced the S-O-R model in examining consumers' behaviors on online shopping platforms.<sup>15</sup> Eroglu et al find that a website atmosphere (ie, security, convenience, and entertainment) can affect consumers' purchase intention.<sup>16</sup> Floh and Madlberger find that consumers' pleasant and impulsive feelings affect their impulse purchase behavior.<sup>17</sup> Considering website design as a stimulus, its navigation structure can affect consumer engagement, website atmosphere acceptance, and risk acceptance, all influencing purchase intention.<sup>18</sup> In sum, prior studies have employed the S-O-R model to explain the purchase behavior of customers, and they have not considered the affordances of review components as a stimulus in the online purchasing process.

### Affordance Theory

Affordance theory has shown great potential in understanding online shopping<sup>9,19</sup> because it can be a theoretical foundation for illuminating the performance of digital products adopted by organizations.<sup>20,21</sup> Hutchby applies the idea of affordance to explain the interaction between IT artifacts and actors.<sup>22</sup> Affordance can have different attributes that affect user behavior, depending on the environment.<sup>23</sup> The literature also summarizes several classifications of affordance. Faraj et al divide affordances into reviewability, re-combinability, and experimentation.<sup>24</sup> Treem and Leonardi<sup>25</sup> explore the affordances of visibility, editability, persistence, and association. Majchrzak et al propose that affordances include network-informed associating, meta-voicing, generative role-taking, and triggered attending.<sup>26</sup> These affordances can produce different outcomes for organizations.

In recent years, scholars have also applied affordance theory to online platforms. Sutherland and Jarrahi propose IT affordances of sharing economy platform technology.<sup>27</sup> De Rivera et al investigate how the technological affordances of digital platforms shape social interactions by intelligent topic mining platform architecture, interfaces, design, and information content.<sup>28</sup> Califf et al find that a platform's human-like technical characteristics are more widely accepted

than system-like characteristics on sharing platforms.<sup>29</sup> The existing research on affordances has gradually proposed the important role of technology and design in platform governance.

## TAM Model

The TAM model developed by Davis, based on theory of rational behaviors, is intended to predict and explain people's acceptance of information technology.<sup>13</sup> In the model, perceived ease of use and perceived usefulness are proposed as antecedents that lead to attitudes towards using the technology and then behavioral intention of adoption. Perceived ease of use means the degree to which an individual believes that using a specific technology is easy, while perceived usefulness indicates the degree to which an individual believes that the technology is effective.<sup>13</sup> As the TAM model can predict and explain factors influencing individuals' intention to adopt new technology, by analyzing individuals' attitude and behaviours, it has supplied a solid theoretical foundation for considerable research on constantly emerging innovative technology adoption in the fields of internet business, marketing, finance, and others.<sup>30</sup>

## Model Construction and Hypothesis Development

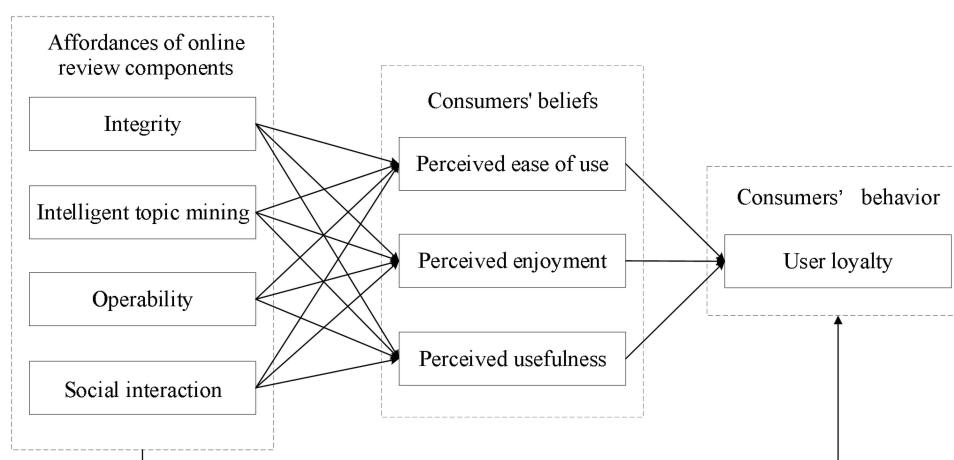
### Conceptual Model

Extending current S-O-R theory with constructs based on affordance theory and TAM theory, we establish a model of affordances, consumers' perceptions, and loyalty behavior in the context of review systems during online shopping, as shown in Figure 2. Based on the S-O-R model, the affordances of review components may be viewed as stimuli that can change consumers' internal cognitive mechanisms, perceptions, and then cause responses, such as a continuous purchase reaction.<sup>31</sup> In the model, the presence of affordance originates mainly from the interaction between characteristic information products (eg, online review components) and users. Based on the literature, we classify the features of the components into four categories including integrity, intelligent topic mining, operability, and social interaction.<sup>32–34</sup> Then, the interaction between IT products and users leads users to perceive or recognize the affordance. Users can perceive the technology expressiveness and continuously explore its potential. We include perceived usefulness, perceived ease of use, and perceived enjoyment as consumers' perceptions, according to the TAM model, that lead ultimately to users' continuous purchase behavior.

## Hypotheses Development

### Affordance of Review Component and Consumer Loyalty

Customer loyalty is generally known as a commitment to repurchase a preferred product or service. A loyal customer usually purchases from the same providers, has positive work-of-mouth (WOM), makes recommendation for the suppliers, and also holds a confident belief on the suppliers.<sup>35</sup> As the loyal purchase behavior can bring continuous



**Figure 2** Conceptual model.

value for sellers, numerous antecedents of customer loyalty for online shopping have been uncovered including online customer experience,<sup>36</sup> platform, interface design, trust, user peer interaction, relationship commitment and so on.<sup>37</sup> Among these factors, IT affordance has also been noticed by scholars in recent years. Kunkel et al examined that knowledge-focused affordances positively influenced customer loyalty. Scholars also verified that the affordance of Reddit platform lead to political loyalty and destination loyalty.<sup>38,39</sup> Based on the S-O-R framework, such loyal behavior can originate from stimuli that include internal and external sources of information, for example, the website quality<sup>40</sup> and reputation,<sup>41</sup> respectively. As important information cues, IT affordance has been previously utilized as stimuli in the S-O-R framework in recent studies. Tuncer explored the relationship between IT affordance (visibility, metavoicing, and guidance shopping<sup>42</sup>), flow experience, trust and social commerce intention. Fang et al linked the specific affordances (visibility, selectivity, persistence, and interactivity) for brand pages with brand loyalty and brand page endorsement.<sup>43</sup> In our research, as the features of review components, we manifest the affordance in the form of integrity, intelligent topic mining, operability, and social interaction.<sup>44-47</sup>

As the stimulus for customers' perceptions, integrity indicates the consumer perception in the complete functions of review components.<sup>44</sup> When the review system synthetically merges multiple media, such as text, figure, video, it encourages interaction, which has the potential to provide more cues as rich information. In accordance with media richness theory, the review components system is also the medium transmitting product or use experience information to customers via its level of richness.<sup>48</sup> Such communication is intended to reduce uncertainty and equivocality, and a rich medium uses multiple cues, feedback, and a large variety of language, allowing people to understand one another and reach consensus on difficult, unanalyzable, and conflicting issues.<sup>48</sup> Review components can be viewed as such media. The more integrated the review components, the more they can display integrated information such as rating score, comments texts, figures, videos, reviewer information, and so on, to the consumer. In turn, irritated by more useful information, consumers could make continuous purchase decisions. Previous work also reveals that a rich website or platform is successful in creating students' intention to behave, like visiting the gym.<sup>49</sup> Therefore, we adapt this view in the context of online review system and propose the hypothesis that:

H1: The integrity affordance of the review component has a positive relation with the consumer loyalty.

Intelligent topic mining refers to a consumer's perceptions about the intelligence of review components for providing concise and demanded information to consumers.<sup>45</sup> Many online products accumulate numerous online reviews, making it difficult for consumers to search useful information in short time. Automatic intelligent topic mining can outline the opinions and sentiments of large-scale user generated contents of previous customers, aiding capricious customers in making decisions with the embedded big data and machine learning algorithms. The consumers can quickly get the crucial evaluations from previous buyers based on the intelligent topic modelling. According to search cost theory,<sup>50</sup> such intelligent data mining functions can assist consumers to save time, avoid information overload, even curious to read reviews and feel enjoyable. Thus, the more intelligent the review components, the better the experience of consumers, leading to continuous purchase behaviors. The platform also can improve their product or service quality based on the word of mouth from online reviews, facilitating customer loyalty.<sup>51</sup> So, we propose the hypothesis H2 below:

H2: The intelligent topic mining affordance of the review component has a positive relation with consumer loyalty.

Operability affordance in review systems refers to consumers' perception of whether they can operate some actions, such as view, rating or post comments with review components, to present their sentiments.<sup>46</sup> When users search or post to get or give recommendations on the review system, they login, edit, view, or type using the components to receive others' or show their own opinions. Users can also share, like, or dislike comments. The convenient and easy operation affordance of review systems support customers to generate contents and engage consumers in proactively thinking about products or brands. Such engagement can lead to increased purchasing behaviors with the explanation of elaboration likelihood model.<sup>52</sup> Through generating the contents with operations, consumer is guided to elaborate on the advantage of a brand or product to them. As literature reveals, the more consumer involves in contents elaboration, the greater the succeeding purchase response.<sup>53</sup> Therefore, the operability affordance that facilitating consumer participation can improve customers' purchase experience, as well as their loyalty and repurchase intention. Thus, we propose the following hypothesis:

H3: The operability affordance of the review component has a positive relation with consumer loyalty.



Social interaction<sup>47</sup> refers to consumers' belief if the platform can support their communicating and exchanging information with one another. Currently, potential customers can interact with the previous buyers and inquiry the details about the product or service by review system. They can also praise and follow other customers with attracting purchase taste by browsing their previous recording comments in their pages on the website. Experienced customers themselves can also draw funds with their reputation or responsible comments. With such interaction, the shopping platform also become a gathering market with higher levels of stickiness and activity, increasing social value for both the customers and platform. The review system of website aids as social channels allowing consumer to socialize and interact, promoting the information exchange.<sup>54</sup> Previous literature also reveals that social interaction has a direct relation to consumer purchase intention<sup>55</sup> and loyalty for electronic business.<sup>56</sup> Therefore, we propose that social interaction of the review component has a positive relation with consumer loyalty (H4).

H4: The social interaction affordance of the review component has a positive relation with consumer loyalty.

### Affordance of Review Component and Consumer Perceived Beliefs

Based on the S-O-R framework, stimuli from environment can arouse perceptions and experiences of individuals.<sup>15</sup> Affordance of review systems can be the environment cues in the online shopping context, which trigger the perceptions of customers. Abundant literature also has explored the influence of affordance of technology artifacts on cognitive perceptions.<sup>9,43,57,58</sup> Previous research has insisted that the features of affordance are discrepant in different contexts.<sup>23</sup> For example, for the online social commerce, visibility, metavoicing, and guidance shopping affordance affect the trust and then the purchase intention.<sup>42</sup> Interaction, information and navigation have effects on consumer satisfaction and then the social networking sites stickiness.<sup>58</sup> For the online review systems, we consider the integrity, intelligent topic mining, operability and social interaction affordance as the technique features due to their importance for the design of the systems. Based on the evidence of previous literature, S-O-R theory and TAM model, we hypothesize that the proposed affordance has relations with consumers' perceptions, respectively.

Consumer loyal behavior can originate from stimuli that include internal and external sources of information, for example, the website quality<sup>40</sup> and reputation,<sup>41</sup> respectively. As important information cue, the integrity of review component assures that customers can generate or obtain more information via complete functions of the review system, such as post texts, photos and video, etc. Thus, the integrated system can lead to media richness, which can positively affect consumers' perceived usefulness<sup>59,60</sup> and perceived ease of use.<sup>61</sup> Thus, we propose H1a and H1b. Furthermore, the integrated review systems provide interactive multimedia technologies with various formats to present customers' experience with the products. Customers can also communicate with each other and get a hedonic evaluation from the positive feedback, which is a kind of perceived enjoyment, the customer's demands for entertaining and emotional release.<sup>62</sup> Accordingly, we propose H1c.

H1a-1c: The integrity affordance of the review component has a positive influence on (a) perceived ease of use, (b) perceived usefulness and (c) perceived enjoyment.

Online review information accumulated in the system continuously increases with more transactions, resulting in a high search cost of probing the most demanded information about products.<sup>63</sup> Intelligent topic mining using machine learning algorithms can reveal key opinions people care about a product and efficiently provide useful information to potential buyers. Because customers can avoid scanning reviews one by one, such intuitive presentation of critical information derived from a huge number of reviews also provides convenience for them. Therefore, we propose the following H2a and H2b. Intelligent topic mining of the review component also reduces the time it takes for consumers to find useful information and offers a more pleasant shopping experience.<sup>7</sup> Therefore, we predict that intelligent topic mining of the review component positively influences perceived enjoyment (H2c).

H2a-2c: The intelligent topic mining affordance of the review component has a positive relation with (a) perceived ease of use, (b) perceived usefulness and (c) perceived enjoyment.

According to TAM theory, technology acceptance starts from the exterior factors (system design features) that activate cognitive reactions (perceived ease of use and perceived usefulness), then form affective feedback (attitude toward using technology/intention), leading to use behaviour.<sup>13</sup> Operability affordance of review systems usually requires friendly man-machine interface design and simple operation. The design of each functional process, for example, posting a review or adding videos, should be smooth, natural, straightforward and clear. It is necessary to follow consistent

standards for the operation buttons, shortcut keys. Once the operation fails, users can obtain timely information feedback or guidance in case of wasting user's click operation on the page and process. All these design for strengthen operability affordance are to motivate consumers' goodwill towards the system and platform and avoid burdening the operator with additional confusion. Therefore, with such deliberated design for operation, consumers can feel that they can operate on the review system to send or get information easily, leading to the following hypothesis H3a.<sup>64</sup>

Moreover, if the websites design the review systems with user-friendly operation, consumers would like to contribute contents, which will facilitate the generation of more useful information to support consumers' decision. More accumulated useful information can assure the information quality, which has been verified to be a positive factor to promote consumers' perceived usefulness.<sup>65</sup> Thus, the hypothesis H3b is also proposed. Besides, the operation features bring not only utilitarian perceptions as mentioned above, but also could affect the hedonic feeling of customers. Customers usually reply or write the comments utilizing the operation features. Given the importance of online reviews, both the platform and businesses attempt to increase consumers' enjoyment of review reading or writing. Both financial and nonfinancial incentives have relations with enjoyment of review writing.<sup>66</sup> The well-designed operation affordance can also be viewed as a type of nonfinancial motivation that makes consumers feel such reading or writing enjoyment with advanced auxiliary function, for example, the automatic self-corrected spellings, voice recognition, interesting emoji toolkits, and so on. Therefore, we proposed that the operation affordance has relations with perceived enjoyment of consumers in H3c.

H3a-3c: The operability affordance of the review component has a positive relation with (a) perceived ease of use, (b) perceived usefulness and (c) perceived enjoyment.

The social interaction affordance supports consumers to communicate with others, including the customer service, sellers and other buyers. For example, once consumers have difficulties in understanding, editing or posting reviews, they can timely get the assistance by interacting with others. Consumers can absorb information and operate not only by themselves but also other experienced people. Therefore, we propose the hypothesis H4a. Moreover, in the process of social interaction, other people's beliefs and behaviors can affect consumers according to the social influence theory. Such social impact from interaction has been verified to influence perceived usefulness and then adoption behavior.<sup>67</sup> Therefore, we also assume that in the online review system context, the social interaction can lead consumers to have the perceptions of usefulness, as shown in H4b. Besides, as the literature shows, the social interaction process in virtual environment can reinforce the perception of social presence of customers and then let them experience more shopping enjoyment.<sup>68,69</sup> Review systems with social interaction components should facilitate consumers' perceived enjoyment of the platform (H4c). Therefore, we propose the hypothesis H4c.

H4a-4c: The social interaction affordance of the review component has a positive relation with (a) perceived ease of use, (b) perceived usefulness and (c) perceived enjoyment.

### Consumer Perceived Beliefs and Consumer Loyalty

Previous literature has acknowledged that consumer perceived beliefs are presumed to be antecedents for loyalty and continuance intention.<sup>70</sup> Abundant evidences from literature have verified that consumers' pleasant or impulsive feeling is intrinsic motivation affecting their repeated consumption impulse and expenditure.<sup>17,71</sup> The link between consumer beliefs and loyalty is also consistent with the conventional value loyalty model.<sup>72</sup> Especially, the impressive or convenient use experiences such as perceived ease of use, perceived usefulness, and perceived enjoyment can make customers obtain the special value. The consumer perceptions including perceived ease of use and usefulness can provide utilitarian value, while perceived enjoyment leads to hedonic value. Both value for customers can eventually motivate consumer loyalty. Furthermore, based on the TAM model, external variables affect perceived usefulness and perceived ease of use, which will affect purchase intention.<sup>13</sup> Hence, we propose that perceived usefulness and perceived ease of use influence consumer loyalty (H5 and H6). Previous studies have proposed an empirical relation between perceived enjoyment and loyalty.<sup>73,74</sup> Perceived enjoyment has a significant effect on interest in repurchasing,<sup>71,75,76</sup> we also predict that perceived enjoyment influences consumer loyalty<sup>77</sup> (H7). Based on the classification of consumption value and TAM model, we propose:

- H5: Perceived ease of use has a positive relation with consumer loyalty.  
 H6: Perceived usefulness has a positive relation with consumer loyalty.  
 H7: Perceived enjoyment has a positive relation with consumer loyalty.

### The Mediating Role of Consumer Perceived Beliefs

Based on S-O-R theory, the stimulus firstly influences the change of consumer-perceived beliefs and then such cognitive perceptions have effects on responses of consumers, such as customer loyal purchase behavior.<sup>15</sup> The organism in the mediation position means that the customers' affective and cognitive condition bridges between both stimuli and responses of the customers. In our study, such cognitive perception indicates the perceived ease of use, usefulness and enjoyment. Furthermore, based on TAM model, previous studies have tested that perceived ease of use and perceived usefulness completely mediate the influence of external variables on adoption behaviors.<sup>78-83</sup> Previous studies show that website navigation structure influences purchase intention by the mediation of consumer participation, website atmosphere acceptance, and risk acceptance.<sup>18</sup> Similarly, we propose that customers will consider these online review components to be useful and to provide ease of use in their purchase decision process.<sup>84</sup> So, we hypothesize that consumer perceived beliefs mediate the relation between review components and consumer loyalty (H8 and H9). Besides, considering the specific features of the systems, studies have included the mediation role of perceived enjoyment between the environmental stimuli and customer repurchase behaviors.<sup>85</sup> Perceived enjoyment is also a type of emotional response that can mediate between the stimuli and behavior intentions. Therefore, we predict that perceived enjoyment mediates the relation between review components and consumer loyalty (H10).

H8a-8d: Perceived ease of use mediates the relations between the affordances of review components (a) integrity, (b) intelligent topic mining (c) operability, (d) social interaction and consumer loyalty.

H9a-9d: Perceived usefulness mediates the relations between the affordances of review components (a) integrity, (b) intelligent topic mining (c) operability, (d) social interaction and consumer loyalty.

H10a-10d: Perceived enjoyment mediates the relations between the affordances of review components (a) integrity, (b) intelligent topic mining (c) operability, (d) social interaction and consumer loyalty.

## Methodology

### Participants and Procedures

To verify the proposed theoretical model and hypotheses, we conducted a survey on a leading data collecting platform (credamo.com) in China. We designed a questionnaire that uses the consumer's point of view, and includes consumers who fill in the questionnaire (participants); review components provided on different types of shopping platforms (independent variables), consumers' perceptions of review components (mediating variables), and consumer loyalty (dependent variable). We employed translation and back-translation between English and Chinese to ensure the survey's cross-cultural equivalence.<sup>86</sup> Results from a pilot study of 20 users (excluded from the main investigation) indicated that the scales were reliable and valid. To confirm an appropriate sample size, we used G\*Power 3.0 software referring to power analysis of Cohen (1988).<sup>87</sup> The calculation showed a minimum sample size of 272 for the proposed model (setting with two tails, power  $1-\beta$  error prob=0.95,  $\alpha$  err prob=0.05, effect size  $f^2=0.05$ , Number of predictors=7). For further verification, we also demonstrated the sample size with the equation of Cochran (1963).<sup>88</sup> The finite populations with setting of 842.1 million online shopping users in China,<sup>89</sup> the critical value of desired level of confidence  $Z=1.65$ , margin of error  $e=0.05$ , and maximum probability of variation in the distribution  $p=0.5$ . According to these general parameter settings and equation of Cochran (1963), the minimum sample size is 273. For further accuracy, extending this minimum required size, 327 questionnaires were given randomly to consumers with experience in online shopping websites from 103 cities of 29 provinces in China to answer the questionnaire by a leading survey platform (credamo.com). Seven were eliminated as invalid because of inconsistent answers, leaving 320 valid questionnaires. We used partial least squares structural equation modeling method (PLS-SEM) to analyze the data. Following the guidelines outlined in the Declaration of Helsinki, the Ethics Committee of Hohai University reviewed and approved this research. All participants were informed of the confidentiality of their responses and all provided their informed consent.



## Measurements

According to the model, we used multidimensional scales to measure the constructs, using a 5-point Likert scale, where 1, “strongly disagree” and 5, “strongly agree”. All the items for each construct were adapted from the literature. Five items concerned consumer loyalty;<sup>90</sup> four items concerned perceived usefulness;<sup>91</sup> and three items were used, respectively, for integrity;<sup>32</sup> intelligent topic mining;<sup>33</sup> operability;<sup>34</sup> social interaction;<sup>33</sup> perceived ease of use;<sup>46</sup> and perceived enjoyment.<sup>92</sup> The final questionnaire comprised 32 questions, of which 7 were general and 25 were multi-dimensional. The measurement items are shown in Table 1. To improve statistical estimates for hypothesized effects, we also controlled some covariates including gender, education, age, online shopping frequency, most visited platforms, and income in our model.

## Descriptive Analysis

Descriptive statistics from the questionnaires are shown in Table 2. Gender was almost balanced, and most of the participants were concentrated in the age group of 18–40 years old, consistent with the statistical data of principal group

**Table 1** Measurement Items

Variables	Sources	Questions
Integrity	Huang and Hsieh <sup>32</sup>	1. I perceive that the frequently used review components are fully functional. 2. I notice that the review components are not missing when using it. 3. I perceive that what I want to know can be found through the review components.
Intelligent topic mining	Novak, Hoffman and Yung <sup>33</sup>	1. I notice that the review components can help me filter information intelligently. 2. I notice that the review components have the function of intelligent keyword topic mining. 3. I notice that the review components have a smart S-O-Rting function.
Operability	Liaw and Huang <sup>34</sup>	1. I notice that it is easy to operate the review components. 2. The review components I notice is easy for me. 3. I notice that it is easy to use components.
Social interaction	Novak, Hoffman and Yung <sup>33</sup>	1. I notice that I can communicate with others through the review components. 2. I notice that I make friends when using the review components. 3. I notice that I can interact with others on the review components.
Perceived usefulness	Mäntymäki and Salo <sup>91</sup>	1. I feel a lot of time saved after using review components. 2. I feel that the review components make my shopping/video browsing process easier. 3. I feel that using the review components can help me make purchase/video browsing decisions. 4. I feel that using the review components can help me learn more information.
Perceived ease of use	Wagner, Vollmar and Wagner <sup>46</sup>	1. I felt that the review components make it easier for me to get information. 2. I felt that using review components allows me to get information faster. 3. I felt that using review components can make my shopping/video browsing process more smoothly.
Perceived enjoyment	Webster and Ho <sup>92</sup>	1. I feel very happy when I browse the reviews. 2. I feel that it makes me happy to support or like other consumers by using the review components. 3. I feel that it makes me happy to reply other consumers by using the review components.
Consumer loyalty	Bhattacharjee <sup>90</sup>	1. I will continue to use the current e-commerce platform. 2. Although there are alternative platforms, I will not stop using this e-commerce platform. 3. I will continue to use this e-commerce platform frequently in the future. 4. I would like to share and recommend this e-commerce platform with my friends and family. 5. If I had to choose again, I would still choose this e-commerce platform.

of online buyers in China with over 70% percentage, showing the representativeness of the sample.<sup>93</sup> The majority of the participants have education background higher than junior college and more than 70.9% of them are well-educated with undergraduate college degree, which also ensures the understanding ability for the survey and response quality. Ten popular platforms for online shopping have been included and the top three were Taobao, JD, and Pinduoduo. All these platforms have review systems with some diverse components, which add the external validity of our study and extend its practical implications for various platforms. Nearly half of the sample reported their frequently usage of shopping platforms several times a week.

## Data Analysis and Results

### Convergent Validity and Reliability

We applied three metrics to assess convergent validity and reliability: Average Variance Extracted (AVE), Cronbach's Alpha, and Composite Reliability (CR) for multiple item scales. As shown in Table 3, AVE and CR values for the constructs were all reasonable.<sup>94</sup> The composite reliabilities were 0.831 or higher, and AVE values were 0.622 and above. Cronbach's alpha values were higher than 0.70, which is acceptable,<sup>95</sup> Therefore, the measurement items that we adopted converged on the same latent construct and revealed internal consistency.

**Table 2** Demographic Profile of the Respondents

<b>Sample Size</b>	<b>320</b>
<b>Gender</b>	
Male	45.3%
Female	54.7%
<b>Age</b>	
18–24	35.9%
25–30	33.8%
31–40	23.8%
41–50	3.8%
51–60	2.7%
<b>Education level</b>	
Junior high school	0.3%
Junior college	11.6%
Undergraduate college	70.9%
Master degree or above	17.2%
<b>Platform</b>	
JD	19.1%
Pinduoduo	10.9%
Taobao	61.9%
Tmall	4.7%
Vipshop	0.6%
TikTok	0.6%
Meituan	1.3%
Suning	0.3%
Little Red Book	0.3%
Quick hand	0.3%
<b>Frequency</b>	
Hardly in use	0%
Once a month or less	3.1%
Once a week	29.4%
Several times a week	47.5%
Once a day	7.5%
Several times a day	12.5%

**Table 3** Convergent Validity, Reliability Measurement and Loading

Constructs	Cronbach's Alpha	Composite Reliability	AVE	Factor Loadings	Items
Integrity (IN)	0.721	0.843	0.642	0.832	IN1
				0.817	IN2
				0.753	IN3
Intelligent topic mining (ITM)	0.700	0.833	0.625	0.812	ITM1
				0.81	ITM2
				0.748	ITM3
Operability (OP)	0.710	0.837	0.632	0.806	OP1
				0.771	OP2
				0.806	OP3
Social interaction (SI)	0.711	0.839	0.634	0.826	SI1
				0.822	SI2
				0.764	SI3
Perceived ease of use (PEU)	0.703	0.835	0.628	0.837	PEU1
				0.767	PEU2
				0.771	PEU3
Perceived enjoyment (PE)	0.715	0.841	0.638	0.761	PE1
				0.82	PE2
				0.814	PE3
Perceived usefulness (PU)	0.701	0.831	0.622	0.795	PU1
				0.794	PU2
				0.776	PU3
Consumer loyalty (CL)	0.727	0.846	0.647	0.805	CL1
				0.807	CL2
				0.776	CL3

## Discriminant Validity

To evaluate discriminant validity, we first calculated a matrix of correlations among constructs with reflective measures, replacing the diagonal with the square root of the AVE (see Table 4). The matrix indicated that the square-root of AVE for each construct was higher than the elements of the diagonal. We then used the heterotrait-monotrait ratio of correlations (HTMT) on assessing discriminant validity in variance-based SEM proposed by Henseler et al.<sup>96</sup> All HTMT values were smaller than the 0.90 threshold (see Table 5). To further evaluate for multicollinearity, a collinearity test was made by calculating the variance inflation factor (VIF) when regressing the means of the first-order constructs on the mean of the repeated indicators of their corresponding second-order constructs. The VIFs, ranging from 1.169 to 1.526, satisfying the 3.3 threshold and verifying that the data were acceptable in terms of degree of multicollinearity.<sup>97</sup> To summarize, we obtained robust evidence for the discriminant validity of the constructs in this research.

## Direct Effects

We used the PLS-SEM approach to assess the predictive performance of the structural model. The results indicated an  $R^2$  value of 0.448, which means that about 44.8% of the variance in consumer loyalty could be described by the proposed model. Moreover, 36.1% of the variance PEU ( $R^2=0.361$ ) was explained by four independent variables (IN, ITM, OP, SI); 27.7% of the variance PE ( $R^2=0.277$ ) was explained by four independent variables (IN, ITM, OP, SI); and the four exogenous variables explained 38% of the variance in PU. The results strongly support the research model in explaining factors related to the consumer loyalty feature of review components.

We further analyzed t-statistics and path significance levels for each hypothesized relationship using the bootstrapping method and obtained path coefficients. The results, shown in Figure 3, provide support for some of the hypotheses with a high level of statistical significance. Integrity had a significant impact on perceived ease of use ( $\beta=0.377$ ,  $t=5.029$ ,  $p<0.001$ ), a significant impact on perceived usefulness ( $\beta=0.267$ ,  $t=4.095$ ,  $p<0.001$ ), and a significant impact on

**Table 4** Correlations Between Constructs (Square Root of AVE on Diagonal)

	IN	ITM	OP	PEU	PE	PU	SI	CL
IN	0.801							
ITM	0.415	0.790						
OP	0.447	0.312	0.795					
PEU	0.548	0.345	0.421	0.792				
PE	0.460	0.396	0.228	0.517	0.799			
PU	0.503	0.353	0.509	0.608	0.443	0.788		
SI	0.410	0.318	0.346	0.374	0.331	0.383	0.796	
CL	0.436	0.334	0.420	0.597	0.449	0.541	0.285	0.804

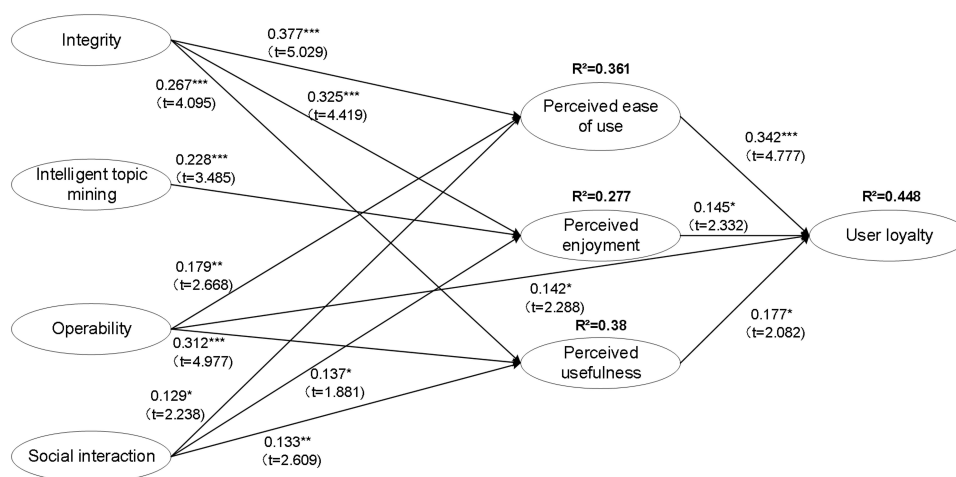
**Abbreviations:** IN, Integrity; ITM, Intelligent topic mining; OP, Operability; SI, Social interaction; PEU, Perceived ease of use; PE, Perceived enjoyment; PU, Perceived usefulness; CL, Consumer loyalty.

**Table 5** Heterotrait-Monotrait Ratio (HTMT)

	IN	ITM	OP	PEU	PE	PU	SI	CL
IN								
ITM	0.579							
OP	0.628	0.437						
PEU	0.758	0.486	0.586					
PE	0.636	0.560	0.317	0.726				
PU	0.704	0.504	0.720	0.870	0.627			
SI	0.569	0.450	0.489	0.524	0.462	0.544		
CL	0.604	0.464	0.585	0.834	0.622	0.760	0.395	

**Abbreviations:** IN, Integrity; ITM, Intelligent topic mining; OP, Operability; SI, Social interaction; PEU, Perceived ease of use; PE, Perceived enjoyment; PU, Perceived usefulness; CL, Consumer loyalty.

perceived enjoyment ( $\beta=0.325$ ,  $t=4.419$ ,  $p<0.001$ ), supporting H1a, H1b, and H1c. The relations between intelligent topic mining on perceived ease of use ( $\beta=0.092$ ,  $t=1.389$ ,  $p=0.166$ ) and perceived usefulness ( $\beta=0.089$ ,  $t=1.451$ ,  $p=0.148$ ) are insignificant, without supporting H2a and H2b. Intelligent topic mining had a significant impact on perceived enjoyment ( $\beta=0.228$ ,  $t=3.485$ ,  $p<0.001$ ), supporting H2c. Operability had a significant impact on perceived ease of use ( $\beta=0.179$ ,  $t=2.668$ ,  $p<0.01$ ), a significant impact on perceived usefulness ( $\beta=0.312$ ,  $t=4.977$ ,  $p<0.001$ ), supporting H3a and H3b. The relation between operability and perceived enjoyment is insignificant ( $\beta=-0.036$ ,  $t=0.605$ ,  $p>0.05$ ), without

**Figure 3** Research model with finding.

**Notes:** \*Significant at  $p < 0.05$  level, \*\*Significant at  $p < 0.01$  level, \*\*\*Significant at  $p < 0.001$  level, the coefficients in the figure are standardized coefficients.

supporting H3c. Social interaction had a significant impact on perceived ease of use ( $\beta=0.129$ ,  $t=2.238$ ,  $p<0.05$ ), perceived usefulness ( $\beta=0.133$ ,  $t=2.609$ ,  $p<0.01$ ) and perceived enjoyment ( $\beta=0.137$ ,  $t=1.880$ ,  $p<0.05$ ), supporting H4a, H4b and H4c. Perceived ease of use ( $\beta=0.342$ ,  $t=4.777$ ,  $p<0.05$ ), Perceived usefulness ( $\beta=0.177$ ,  $t=2.082$ ,  $p<0.001$ ), and perceived enjoyment ( $\beta=0.145$ ,  $t=2.332$ ,  $p<0.05$ ) had a significant impact on consumer loyalty, supporting H5, H6 and H7.

## Mediating Effects

To verify multiple mediation effects,<sup>98</sup> the bootstrapping technique repeatedly applies random sampling and provide inference about the collected data from resampled data. The results of calculating for mediating effects are shown in Table 6, in which integrity, intelligent topic mining, operability, and social interaction are the independent variables; perceived usefulness, perceived ease of use, and perceived enjoyment are the mediators; and consumer loyalty is the dependent variable. Initially, a model was verified in which integrity is the independent variables (model 1 in Table 6). As Table 6 shows, integrity did have a statistically significant effect on consumer loyalty ( $\beta=0.155$ ,  $t=3.592$ ,  $p<0.001$ ), supporting H1. When the mediators perceived usefulness, perceived ease of use, and perceived enjoyment were included in model 1, integrity did not have a significant direct effect on consumer loyalty ( $\beta=0.026$ ,  $t=0.548$ ,  $p>0.05$ ). A verification of the specific indirect effects indicates that perceived ease of use, perceived usefulness, and perceived enjoyment were mediators in that none of their 95% CIs contained the value 0, fully mediating the relationship between integrity and customer loyalty, supporting H8a, H9a and H10a. In model 2, intelligent topic mining did have a statistically significant effect on consumer loyalty ( $\beta=0.218$ ,  $t=4.051$ ,  $p<0.001$ ), supporting H2. When the mediators perceived ease of use, perceived usefulness, and perceived enjoyment were included in model 2, intelligent topic mining did not have a significant direct effect on consumer loyalty ( $\beta=0.0431$ ,  $t=1.0978$ ,  $p>0.05$ ). A verification of the specific indirect effects indicated that perceived usefulness and perceived ease of use were not mediators between the intelligent topic mining and customer loyalty because both of their 95% CIs contained the value 0; only perceived enjoyment was mediator, as its 95% CIs did not contain the value 0. These results verify the H10b, while not supporting H8b and H9b. In model 3, operability had a statistically significant effect on consumer loyalty ( $\beta=0.252$ ,  $t=3.082$ ,  $p<0.001$ ), supporting H3. When the mediators perceived usefulness, perceived ease of use, and perceived enjoyment were included in model 3,

**Table 6** Summary of Tests of Mediating Effects

Model	Total Effect of IV on DV		Direct Effect of IV on DV		Indirect Effects				
	Coefficient	t value	t value	estimate			Point Coefficient	BC 95% CI	
								Lower	Upper
Model1: IN as the IV	0.155	3.592	0.026	0.548	Total Mediators	PU	0.182	0.102	0.283
						PEU	0.040	0.003	0.102
						PE	0.103	0.049	0.171
Model2: ITM as the IV	0.218	4.051	0.043	1.098	Total Mediators	PU	0.038	0.007	0.079
						PEU	0.068	0.011	0.127
						PE	0.016	-0.004	0.043
Model3: OP as the IV	0.252	3.082	0.141	2.671	Total Mediators	PU	0.026	-0.005	0.064
						PEU	0.026	0.004	0.058
						PE	0.113	0.027	0.204
Model4: SI as the IV	0.075	1.967	-0.029	-0.732	Total Mediators	PU	0.059	0.004	0.119
						PEU	0.059	0.128	0.122
						PE	-0.006	-0.027	0.013
					Total Mediators	PU	0.071	0.019	0.131
						PEU	0.021	0.000	0.052
						PE	0.035	0.002	0.075
						PE	0.016	0.000	0.042

**Abbreviations:** IN, Integrity; ITM, Intelligent topic mining; OP, Operability; SI, Social interaction; PEU, Perceived ease of use; PE, Perceived enjoyment; PU, Perceived usefulness.



operability still had a significant direct effect on consumer loyalty ( $\beta=0.1413$ ,  $t=2.6709$ ,  $p<0.001$ ). A verification of the specific indirect effects indicated that perceived usefulness and perceived ease of use were mediators between operability and customer loyalty, with none of their 95% CIs containing the value 0, and perceived enjoyment was not a mediator. The results support H8c and H9c, but not H10c. In model 4, social interaction had a statistically significant influence on consumer loyalty ( $\beta=0.075$ ,  $t=1.967$ ,  $p<0.05$ ), supporting H4. When the mediators perceived usefulness and perceived ease of use were included in model 4, social interaction also did not have a significant direct influence on consumer loyalty ( $\beta=-0.0292$ ,  $t=-0.732$ ,  $p>0.1$ ). But such effects might be fully mediated by the three factors, specifically, the analysis of specific indirect effects showed that perceived usefulness, perceived ease of use and perceived enjoyment were mediators between the affordances of social interaction and consumer loyalty, with none of their 95% CIs containing the value 0, revealing significant mediation effects between the affordance of social interaction and consumer loyalty. The results support H8d and H9d, and H10d.

## Discussion

With empirical research, we verify the existence of influencing mechanisms among review components, consumer perceptions, and consumer loyalty of online shopping platforms. First, this study confirms that the affordances of online review components including integrity, intelligent topic mining, operability, and social interaction have relations with the consumer loyalty significantly and hypotheses 1–4 have been supported. These outcomes are in accordance with earlier literature on affordance and consumer loyalty, with extending these interesting relations into review system context of online shopping.<sup>39–43</sup> Especially, considering the characteristics of online review system, among the affordances, operability has the stronger effects on loyalty than other affordances, followed by intelligent topic mining, integrity, and social interaction. Operability features of review systems can make consumers conveniently generate contents for feedback and improve their purchase experience according to the elaboration likelihood model.<sup>53</sup> The platforms can focus more on improving the operability of the review systems to encourage the engagement of consumers. With the development of intelligent text mining algorithms, platforms can provide key information for customers from huge amount of reviews automatically. This is also an important aspect to attract customers by saving their search cost.

Integrating affordance theory with TAM model, the internal influencing mechanism is further explored by verifying the impact of affordances of online review components on consumer beliefs and find that to which degree the different affordances of review components influence what kind of perceived beliefs.<sup>8</sup> In view of the empirical results, the findings that online review component has a positive relation with consumer perceived beliefs are consistent with those of prior studies.<sup>7,32,59,99,100</sup> Specifically, integrity has a positive relationship with perceived ease of use, perceived enjoyment, and perceived usefulness. These findings enlighten that if the platform could consistently have the targeted improvement to complete the functions of their review systems, they can affect the consumers' different perceived belief. For example, to make consumers feel more ease of use, the business can focus on expanding more functions of integrity, operability, and social interaction, among which the integrity has the strongest impact. If the business wants to increase customer perception about usefulness of the review system, they can improve operability, integrity and social interaction of the system. The most effective affordance is operability to make customer feel usefulness, and then the integrity and social interaction. Besides, the most effective factor for facilitating perceived enjoyment is integrity, and then intelligent topic mining and social interaction. These conclusions are consistent with the previous literature.<sup>101,102</sup> These findings can motivate platform designers to consider the targeted design for review components with attaining certain affordances to satisfy consumer-specific demands.<sup>103</sup> For example, the intelligent topic mining of review components' positive effect on perceived enjoyment suggests that the smarter the review components designed by platforms, the more enjoyable consumers could feel. Platforms should update their comment component to unremittingly advance the affordances of review components so as to improve consumers' experience.<sup>104,105</sup> It is also noted that intelligent topic mining influences perceived enjoyment but there is no significant effect on perceived usefulness and perceived ease of use. This may be because the intelligent topic mining functions are automatically generated by the platform algorithms and consumers do not need to engage in and use the components so they cannot feel the ease of use. Because consumers can also get detailed information from the full reviews, they may insignificantly feel the usefulness of the intelligent topic mining affordance. Operability also shows insignificant relations with perceived enjoyment. This may be because disgruntled customers are more likely to operate the components to

complain and leave long comments, but the happy customers usually do not operate the systems and leave long reviews. Both of them are not easy to feel the enjoyment in the process of operation the review components.<sup>106</sup>

Moreover, based on the SOR model,<sup>32</sup> the findings of the mediation analysis show the mechanism between the affordance of review components and customer loyalty. The consumer perceived beliefs mediate the relationship between affordance of review components and consumer loyalty.<sup>18</sup> The affordances of online review components have all imperceptibly relations with consumers' perception, which have positive relations with the perceived usefulness, perceived ease of use and perceived enjoyment,<sup>59,61,68</sup> and thus to provide more useful information, improve customers' purchase experience, and encourage consumers to make purchase decisions.<sup>7,50</sup> From the above analysis, it seems that the overall perception of consumers is a significant indicator that influences consumer loyalty in online shopping environment.<sup>99</sup> Consumers' repurchase intention or loyalty is formed by an adequate evaluation of diverse decision-making factors.<sup>107</sup> Specifically for probing into the detailed mediation effects, perceived usefulness and perceived ease of use play mediating roles between the affordances of integrity, operability, social interaction and customer loyalty. These two factors from TAM model present their critical effects to induce the repurchase behavior when using the review systems, in line with previous studies.<sup>61,66,68</sup> But their mediation effects are not significant for the relations between intelligent topic mining and customer loyalty. This reminds that the designers could pay more attention to improve the usefulness of the intelligent topic mining by improving the algorithms. Meanwhile, perceived enjoyment mediates the relations between affordances of integrity, intelligent topic mining, social interaction and customer loyalty. The results show that the consumers' use for systems are also usually based on practical and hedonic considerations. Therefore, the platforms should focus on both the two types of feelings of customers when they access to the affordances of the review systems. But perceived enjoyment does not mediate the relations between the affordance of the operability and customer loyalty. This show that the operability is more inclined to relate with customers' loyalty by the practical aspects (PU and PEU) not the hedonic demands (PE). In all, referring to the different mediation effects of customer beliefs, platforms should improve consumers' perception and consumers' online shopping experience by optimizing the affordances of existing review components. The designers can emphasize different affordances of review components to stimulate targeted perceptions that they want to make customers have impressive experiences. From the platform point of view, doing so can also increase the platform's revenue and achieve a competitive advantage.

## Conclusion

Considering various affordances of the review component, this study examines the relationship among review components' attributes, consumers' perceived beliefs, and consumer loyalty. In the framework of S-O-R, we start from the perspective of affordance and analyze attributes of online review components, including integrity, intelligent topic mining, operability, and social interaction. We develop a more comprehensive model of how review components affect consumer loyalty through consumer perceptions. Following TAM theory, we demonstrate the mediating effect of consumer perceptions in the relation between online review components and consumer loyalty. We conclude that platforms can meet the changing needs of consumers through targeted strategies that optimize the functionality of review components in order to improve consumer perception and consumer loyalty.

## Theoretical Implications

This research makes several theoretical contributions. First, the study provides valuable insights into consumer loyalty of platforms based on our model that combines affordance and consumers' perceptions in the framework of the S-O-R model. This research also develops the application field of S-O-R, viewing online review components as a stimulus variable that acts on consumer loyalty through perceived beliefs as a mediating mechanism. Further, the results verify that perceived ease of use, perceived usefulness, and perceived enjoyment have significant mediating effects, in accordance with TAM theory. Second, this study applies affordance theory to online platforms and investigates how the online review components' affordances of integrity, intelligent topic mining, operability, and social interaction affect consumers' perception. Affordance theory provides a good theoretical basis for how online review components affect consumer loyalty; the study provides more detailed information on the effects of different such affordances on

customer beliefs. Finally, this study enriches the literature on consumer loyalty. As far as we know, our study is the first to focus on the influence of online review components on consumer loyalty.

## Practical Implications

The findings propose that more attention should be paid to the design of review components of shopping platforms, as their affordances are linked to consumers' perception and behaviors. A well-designed review component can save consumer resources and improve consumer experiences. Based on an understanding of the relations between affordance, psychological features, and behavior, shopping platforms could benefit from updating and improving components to meet consumers' needs as much as possible. Doing so would not only enhance consumers' perceived value and loyalty but also provide suggestions for updating review components and assist online businesses to retain more consumers.

Platform designers and marketers have a priority to consider consumer perceived beliefs and loyalty. As demonstrated by this research, well-designed affordances of platform reviews components can be viewed as a shortcut to create extra connections with customers. As the results show that the four review component affordances have relations with specific customer perceived beliefs, platform designers can make effective use of the research outcomes with in-depth knowledge to better shape platform targeted design especially in review system. In addition, although intelligent topic mining has relatively less relation with customer perceived beliefs, it is unsuitable for platform designers to conclude that less consideration. Instead, this finding may be due to the current lack of platform development, which offers a new inspired path for designers to adopt innovative technologies such as machine learning for text mining to enhance the effectiveness review component. In all, practitioners can continuously keep watchful eyes on updating and improving these components to attract more loyal customers.

The outcomes about the significance of customer perceived beliefs can be of special interest to platform designers. Our results suggest that customer perceived beliefs are helpful to boost customer loyalty for a platform. Designers should spend more energy on improving the loyalty of both new and old clients by increasing their perceptions on ease of use, enjoyment, and usefulness.

## Limitations and Future Research

There are also several limitations and expectations for future study. This article investigates the affordances of review components on consumers' perceptions and loyalty. It does not consider the overall construction of websites or other perceptions consumers may have when using a platform. Moreover, this study considers merely four affordances of review components in this model. In the context of review system of platform, future research is encouraged to explore more affordances of review components for users with the improvement of advanced artificial intelligence technology. Also, we collected data only in China. More samples from various countries and cultures would be important for further verifying the relationships we found. Besides, this study innovatively integrates the insights of affordance, S-O-R, and TAM model to explore the impact of review components on consumers' perceptions and loyalty. Promising paths for future research also lie in merging with other applicable theories to extend our findings. Finally, future research can also compare affordances of review components among various platforms, and the lab experiments can also be made to enrich the insights about the casual relationships between specific affordances of review components for customer beliefs and behaviors.<sup>108,109</sup>

## Ethics Statement

This study was approved by the Ethics Committee on Human Experimentation of Hohai University and was performed in accordance with the Helsinki Declaration principles. We gave all participants written informed consent and explained the purpose of the study when sending out the questionnaires. All participants were informed that participation in the study was voluntary and were assured that all data would be kept strictly confidential and used only for academic research.

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## Disclosure

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