Research Article

Influence of Emotional Factors (Positive, Negative) on the Usefulness of Product Reviews Based on Big Data

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Received 17 June 2022; Revised 3 August 2022; Accepted 12 August 2022; Published 27 August 2022

Academic Editor: Kapil Sharma

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In the era of prosperous online shopping, product reviews play a decisive role in users’ decision to purchase products. At the same time, it can also help businesses understand the corresponding deficiencies, to make targeted improvements. However, users’ comments are full of emotional colors, and these comments with strong emotional tendencies have a greater impact on consumers than ordinary comments, especially those with negative emotions. At present, most text sentiment analysis is oriented at the chapter and sentence level, and there are few sentiment analysis refined to product-specific attributes. Based on this, this paper is aimed at exploring the influencing factors of the emotional tendency of product reviews, analyzing a large number of reviews of a certain mobile phone product, and extracting the keywords of the influencing factors. This article summarizes six key influencing factors. Through the constructed conceptual model of emotional tendencies, it is concluded that the impact of negative emotional comments on consumption is much greater than that of positive emotional comments. Then, there is a further conceptual model of negative affective tendencies. This paper explores the causes of the influencing factors of negative affective tendencies. In this paper, the influencing factors of negative emotional tendencies are subdivided into 10 secondary factors. Through the reliability test, all secondary factors are above 87%. Then, after scoring the negative comment text code, a regression analysis was performed, and it was found that 10 secondary factors were significant, and the corresponding regression model was obtained.

1. Introduction

Product reviews are essential for any online business looking to increase Internet sales. Product reviews contain information about product attributes, customer requirements, and shopping experience. Today, research on product reviews and factors affecting usefulness has been carried out a little at home and abroad. However, most of the studies are fragmented, and most of them are studied from the perspectives of commodity types and review information content. However, when consumers collect product reviews and evaluate products, they will have personal emotions and different focuses. Therefore, the approval degree of reviews will be affected by some emotional tendencies of consumers, but few scholars take this as a research direction. However, this study analyzes by mining the emotional characteristics of consumers and integrating them into the model as influencing factors. This paper analyzes the affective factors of users’ product reviews. By building a model of factors that influence usefulness, this paper explores which factors should be paid attention to when merchants build an effective review system. In this way, the merchant’s review management strategy can be improved in the limited review resources, and the merchant can also gain the trust of consumers.

In today’s environment of diverse and personalized customer needs, emotional needs are becoming more and more important in customers’ decision to purchase products. This requires that the development and design of products not only meet the basic functional needs of customers but also meet the emotional needs of customers. Therefore, analyzing users’ emotional tendencies helps subsequent consumers to make reasonable consumption decisions. It has the significance of promoting sales for merchants on the Internet. Comments with positive sentiments also have a positive
impact on the sales volume of businesses, while comments with negative sentiments will also have a negative impact on the sales volume of businesses. Therefore, it is necessary to analyze the emotional factors in the user’s product reviews. Its research results provide theoretical basis for enterprises to understand customer needs, determine competition priorities, improve product quality, and improve service levels. It is of great significance to improve the competitiveness of enterprises and promote their development.

This paper studies the influencing factors of emotional tendencies of product reviews. In order to find the winning factors that stimulate positive emotional tendencies and the qualification factors that trigger negative emotional tendencies, through the reviews of a mobile phone product included, this paper extracts keywords and summarizes six influencing factors. The reliability test results indicated that the “agreement percentage” of the six factors were all greater than 80%. It shows that the set keywords have the necessary research reliability. The emotional influence factor model of linked product reviews shows that negative reviews with negative emotions have a greater impact than positive reviews with positive emotions. The regression coefficients of factors affecting negative emotional tendencies show that in product reviews, customers are more concerned about factors related to product quality. That is to say, merchants want to improve customer satisfaction, and they need to strictly control the quality of products.

2. Related Work

In recent years, many scholars have explored customer emotional factors to help companies better understand customer emotional needs. Exploring the emotional factors of product reviews can help companies understand their own shortcomings and control consumers’ concerns. The main purpose of Haddad et al.’s study was to examine the technological factors that influence the net benefits of big data within UAE government agencies. In this study, they used probabilistic random sampling to give researchers the opportunity to make equal selections from the sample frame. After removing 12 cases, they evaluated and analyzed the data results of 407 respondents. The current findings show that PU, PEOU, and SI have a significant direct positive effect on ATT, exceeding ATT which has a significant direct effect on NB [1]. Wu and Lin examined the combined impact of brands’ online product descriptions, eWOM content, digital retail platforms, and innovation adoption factors on consumer decision-making processes. The results from the intersubject experiment (N = 231) showed that consumers’ usefulness of product description, technical mobility, and product usefulness, perceptions of product ease of use, consumer review credibility, consumer review usefulness, consumer reviews, and retail user ratings-platform credibility directly or indirectly affect their attitudes and purchase intentions towards technological products [2]. The aim of Horie et al.’s study was to develop a method of showing only helpful reviews in order to reduce the burden on consumers. Assuming that useful reviews vary from consumer to consumer, finding the usefulness of a comment is not the same as the purpose for which the consumer browses the comment nor the consumer’s knowledge of the target product group for purchase. It can divide consumers into six categories. Next, it determines the factors for each set of useful reviews. Finally, it builds a model to evaluate the usefulness of each review for each group. It can confirm that the model can show more useful reviews to consumers [3]. McCloskey and Koch integrated information systems and marketing research by considering the usefulness of online product reviews in the context of Wang and Strong’s data quality framework. It examines product reviews for the degree of intrinsic impact on perceived usefulness of reviews. His examination of Amazon reviews for cheap experience products showed that word count, verified purchases, and grammatical errors had a significant positive effect on review usefulness. Ratings and the number of misspellings had a negative impact, suggesting that consumers used some discernment in assessing the credibility of reviews. Surprisingly, grammatical errors were found to have the opposite effect, with more grammatical errors being associated with more helpful comments [4]. The mentioned researches on the usefulness of reviews by emotional tendencies are relatively fragmented, and most of them are from the perspective of merchants.

The research on the emotional influencing factors of product reviews in the Internet has become the focus of research by many scholars. This study examined the determinants of online review usefulness and its impact on recipient purchase intentions. Thomas et al. developed and tested a model based on refined likelihood theory. The model applies structural formula modeling to data collected from 282 Yelp users. The findings suggest that ease of understanding, accuracy, counterpoint, completeness, relevance, and timeliness are important dimensions of argumentation quality. And review volume and consistency, reviewer reputation and expertise, product/service ratings, and website reputation are key peripheral cues. Furthermore, they identified argument quality and peripheral cues as determinants of review usefulness, which were ultimately found to have a positive impact on recipients’ purchase intentions [5]. Xiang et al. applied text analysis to compare three major online review platforms, namely, TripAdvisor, Expedia, and Yelp. The results show differences in how hotel products perform on these platforms. Information quality, as measured by linguistic and semantic features, sentiment, ratings, and usefulness, varies widely. This study is the first to compare and explore data quality in hospitality and tourism social media research. This study highlighted methodological challenges and contributes to theoretical development of social media analysis [6]. Park and Kim extracted linguistic and psychological features from review texts, such as word count, emotional tone, and analytical thinking embedded in review texts. By analyzing the product review characteristics of electronic products and clothing products, they found that reviewers used more words and longer sentences when writing product reviews for electronic products. Judging from the content characteristics of product reviews, in addition to many negative words, these reviews also contain many analytical words, which have greater influence. It also correlates more with cognitive processes (CogProc) than clothing.
product reviews. It was found that product reviews that were highly rated by reviewers in both product groups and deemed useful contained more total words, many expressions involving perceptual processes, and fewer negative emotions [7]. In response to the massive product reviews in Chinese Weibo (Weibo), Shi proposed an opinion-aware emotions [7]. In response to the massive product reviews involving perceptual processes, and fewer negative emotions contained more total words, many expressions that were highly rated by reviewers in both product groups and deemed useful.

3. Sentiment Factor Method in Product Reviews

This paper refers to finding out the key influencing factors affecting user satisfaction through sentiment analysis, which has positive significance for merchants to improve services and promote sales.

3.1. Process of Sentiment. In general, the conceptual model of sentiment analysis of comment text is mainly composed of comment text information acquisition module, comment text information preprocessing module, comment text sentiment classification model, and classification result analysis module [9]. Different users have different shopping experiences on business websites, and product reviews on business websites reflect the user’s preference for the product. The acquisition of comment text information is the basic link of sentiment analysis, which selects comment information in a certain field according to the research purpose. There are duplicate or false information in the obtained user comment information, so it is necessary to preprocess the obtained text information, which is the basis for obtaining accurate sentiment analysis results [10, 11]. Then, it applies the appropriate sentiment classification model to judge the sentiment tendency of the preprocessed text information. Finally, a comprehensive analysis is performed on the sentiment classification results [12], as shown in Figure 1.

3.2. Influence of Product Reviews. The impact of product reviews on consumers: before shopping online, consumers must browse the product reviews. This work guides users through the entire process of purchasing items and making accurate purchasing decisions [13, 14]. First, it affects consumers’ purchasing decisions. General consumers tend to read historical reviews of commodities before making consumption behaviors. Second, it affects the decision-making process of consumers [15, 16]. Based on the theory of consumer purchase decision-making, related scholars believe that consumers will search for relevant information about products as much as possible to reduce uncertainty and enhance purchase confidence [17]. When a research company conducted a survey on the influence of consumer reviews on purchases, they found that product reviews run through the entire decision-making process of users [18, 19].

The impact of product reviews on merchants: product reviews are an important factor for merchants to increase sales [20]. Merchants can perceive the real experience of buyers using products through the online reviews of products, and then grasp the advantages and disadvantages of their products, and grasp the needs of consumers, to improve the quality of products and services [21]. Moreover, since online reviews also influence consumers’ purchasing decisions, online reviews are closely related to the sales volume and performance of merchants. It has been favored by many businesses [22, 23].

3.3. Factors Affecting Usefulness of Reviews. In the present Internet age, the sender of information, the receiver of information, the information itself, and the feedback of information are the basic elements of information dissemination given by the theory of dissemination of persuasion. The theory of communication persuasion refers to the communication activities that make the recipient accept a certain point of view or engage in a certain behavior through persuasion or propaganda. The first three elements will affect the effect of feedback [24, 25]. Generally speaking, the commenter is the publisher of the information. Comment readers are the recipients of information, the information itself is the content of the comment, and the vote on whether the comment is useful is feedback. This also constitutes a fundamental aspect of research in this field [26]. Recent research has found that the timeliness of comments also affects the
feedback effect. Therefore, the timeliness of such data is also considered in the study of influencing factors, which is studied from the four dimensions of reviewers, review readers, review itself, and the number of days of publication [27, 28]. Sentiment analysis studies the information of review content, so this study only considers the textual features of review influencing factors.

In the current research, there are not many studies on the factors affecting the usefulness of the review information itself, but when people refer to product reviews, they first browse the information content of the review and then the other elements of the review [29]. Therefore, the characteristic influence of the comment itself has a leading role. If the content of the text cannot attract the attention of review readers, the rest of the impact is impossible to talk about [30]. For the features of reviews, this paper chooses to start from the content features of reviews and the review features of products.

4. Experiments on Emotional Factors in Product Reviews

4.1. Role of Product Reviews. With the rise of Internet shopping malls, in today’s era of information explosion, customers decide whether to buy or not based on the feedback content of other users by querying product review information. To explore the importance of product reviews, this article presents survey data on the impact of product reviews on consumers over the past few years, as shown in Figure 2.

![Figure 2: Data on the impact of product reviews on consumers.](image)

<table>
<thead>
<tr>
<th>Influencing factors</th>
<th>Definition</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product factor</td>
<td>Reasonable product design, fine craftsmanship, and good quality</td>
<td>Appearance, color, workmanship, etc.</td>
</tr>
<tr>
<td>Price factor</td>
<td>Competitive price, perceived price</td>
<td>Expensive, cheap</td>
</tr>
<tr>
<td>Service factor</td>
<td>Attitude of employees during sales</td>
<td>Attitude, service level</td>
</tr>
<tr>
<td>Information factor</td>
<td>Product information matches product description</td>
<td>Description consistent, consistent</td>
</tr>
<tr>
<td>Shipping factor</td>
<td>Delivery speed and time, delivery price</td>
<td>Logistics delivery, express time</td>
</tr>
<tr>
<td>Marketing strategy factors</td>
<td>Returns, promotions, product types</td>
<td>Returns, promotions, free shipping</td>
</tr>
</tbody>
</table>

The survey data in Figure 2 shows that in the past few years, the proportion of people who strongly believe in relevant product reviews and make purchasing decisions through them has increased, from 67% in 2011 to 88% in 2014. The proportion of people who do not believe in related product reviews has shown a downward trend, from 33% in 2011 to 13% in 2014. It can be seen that merchants must pay attention to consumer product reviews, which play a vital role in the revenue and sales of merchants.

4.2. Data Sources. This paper takes the online users’ comments on the products of mobile terminal products in an Internet mall as the research object. In order to facilitate the analysis of product reviews in the experiment, neutral reviews are not included in this experiment, and redundant data and invalid data are removed through preliminary processing. A total of 4400 positive sentiment comments and negative sentiment comments were collected in this paper, including 2200 positive comments and 2200 negative comments. And this paper combines the relevant research literature to extract the corresponding evaluation words. In this paper, the influencing factors are integrated into six aspects, namely, product factor, price factor, service factor, information factor, transportation factor, and marketing strategy factor. And the influence of each aspect on customer satisfaction is studied separately, and the influencing factors are used as independent variables. Customer satisfaction is the dependent variable, and the definitions of these six influencing factors are shown in Table 1.
Therefore, through the above summary, a conceptual model of the influencing factors of product review sentiment tendency is constructed, as shown in Figure 3.

4.3. Data Preprocessing. In this study, two researchers (both at the master’s level) used the method of coding independent determinants of the same text to construct the coding table. It also uses the “Encoding Compare” query function in NVivo8. NVivo is a software that supports qualitative and mixed research methods. Its coding comparison query compares codings done by two users to measure “reliability between raters” or the degree of agreement of coding between users. This article compares the factors identified and coded content by two researchers and measures the degree of agreement of the original data by calculating the “percentage of agreement T_x.” Reliability refers to the consistency, stability, and reliability of test results. Generally, internal consistency is used to express the reliability of the test. The higher the reliability coefficient, the more consistent and reliable the results of the test are. And systematic error has no effect on reliability.

\[
T_x = \frac{T_b}{T_b + N_b},
\]

Among them, \(T_b\) represents the number of mutually agreed codes; \(N_b\) represents the number of mutually disagreeable codes. The running result is shown in Figure 4.

Figure 4 is the query result of the reliability of keywords. It is generally considered that when the reliability is above 0.7, it is reliable. The figure shows that the “agreement percentage” of the 6 factors is greater than 80%, indicating that the coding consistency between the two coders is high, the coding results have the necessary research reliability, and the set keywords have high operability.

This article uses the keyword search in the query function provided by NVivo8. NVivo 8 is an easy-to-use data analysis tool; the software supports a variety of content import for data analysis. It can meet the operational needs of different researchers. It also has a simple interface and fast processing speed. With reference to the above factors and keywords, this article conducts a reference point query. The encoding result is shown in Figure 5.

The reference point query results are shown in Figure 5, in which Figure 5(a) is a reference point for good reviews, with a total of 954 reference points, and Figure 5(b) is a production test point for bad reviews; the total number of reference points is 1281. By linking the emotional influence factor model of product reviews, it can be seen that the impact of negative reviews with negative emotions is greater than that of positive reviews. There are four factors that have the greatest influence on negative emotional comments, which are information factor, marketing strategy factor, service factor, and product factor.

4.4. Determination of Negative Influencing Factors. In order to find out the reasons for the negative comments, this paper considers the above factors as first-level factors. Each primary factor is further divided into several secondary factors. For example, information factors include two secondary factors, information consistency and comprehensiveness of information, and quality factors are divided into manufacturing factors, design factors, and quality factors. The specific classification is shown in Figure 6.

As can be seen from Figure 6, there are a total of 10 negative comments. These 10 factors serve as guidelines for our data analysis below. First, it scores negative reviews. The scoring process needs to compare the content elements of the evaluation and convert the comments into quantitative data one by one. In fact, the scoring process is a process of quantifying customer reviews with subjective attitudes. The scoring rules are as follows: (1) the scores of each factor are divided into 4 grades, ranging from -3 points (very bad) to -1 points (not good), and no mention is 0 points. (2) The total score of negative comments is -1, -2, and -3. Secondly, this paper conducts regression analysis on the data.

The reliability test results of its regression analysis are shown in Figure 7.

Figure 7 is the reliability test result of the regression analysis of the scoring data. The reliability test results show that the reliability analysis results of the listed secondary factors are all above 90%. It shows that the secondary factor keywords of the four influencing factors of negative sentiment in the figure have high consistency and credibility. And in the negative emotional tendency, the influence of service factors and product factors in Figure 7(a) is greater than that of information factors and marketing strategy factors in Figure 7(b).
5. Product Review Usefulness

5.1. Usefulness of Product Reviews by Influencing Factors of Emotional Tendencies. In order to better compare the importance of the influence of emotionally inclined product reviews on consumers, we extracted the number of occurrences of keywords of each influencing factor in the sample, and the statistics are shown in Table 2.

As shown in Table 2, among all the influencing factors, the product factor with the highest frequency is mentioned, followed by the price factor, and the mentioned frequency of these two factors accounts for 58.59% of the total sample. The least frequently mentioned factor is the impact of delivery.

Figure 8 shows the positive and negative statistical results of each influencing factor. Figure 8(a) shows the frequency of positive feedback of each factor. According to the frequency of mentions, the price factor appears the most in the positive feedback comments, followed by the product factor. It shows that if the customer is satisfied, in theory, the first factor is the price, followed by the product factor. Marketing policies are largely ignored. Figure 8(b) shows the negative feedback frequency of each factor, in which the product factor has the highest occurrence, followed by the service factor. That is, if the customer is not satisfied, it is mainly because of the product factor, followed by the price factor. Through the analysis, it can be seen that the frequency of mentioning the price factor in positive comments is most different from that in negative comments. And the number of mentions in positive comments is far greater than the number of mentions in negative comments. It shows that the price can easily lead to customer satisfaction, which will
lead to positive reviews. The frequency of mentioning product factors in positive reviews is quite different from that in the negative plane, and the number of mentions in negative reviews is much greater than that in positive reviews. It shows that product factors can easily lead to customer dissatisfaction, which will lead to negative reviews.

5.2. Two-Sample Z-Test. This study uses a single review as the unit of analysis. For each influencing factor, we performed a two-sample Z-test on the sample proportions of positive and negative reviews. A two-sample Z-test can be performed on means with known variance. It is used to test the null hypothesis that there is no difference between the two population means, not other hypotheses of one or both. In order to analyze emotional tendencies, the first step is to put forward hypotheses and verify the influencing factors. The hypotheses are shown in Table 3.

To verify K1-K6 in Table 3, a two-sample Z-test was performed on the corresponding influencing factors. The results of the Z test are shown in Table 4.

The test results in Table 4 show that there are differences ($P < 0.05$) between positive and negative reviews of product quality, customer service, commodity price, and commodity information, rejecting hypotheses K1, K2, K3, K4, and K6. Among them, there were significant differences between positive and negative reviews on product quality, customer service, and commodity prices ($P < 0.01$.

Table 2: Statistics of the total frequency of occurrence of each factor.

<table>
<thead>
<tr>
<th>Influencing factors</th>
<th>Quantity</th>
<th>Frequency</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product factor</td>
<td>2200</td>
<td>720</td>
<td>32.73%</td>
</tr>
<tr>
<td>Price factor</td>
<td>2200</td>
<td>569</td>
<td>25.86%</td>
</tr>
<tr>
<td>Service factor</td>
<td>2200</td>
<td>367</td>
<td>16.68%</td>
</tr>
<tr>
<td>Information factor</td>
<td>2200</td>
<td>296</td>
<td>13.45%</td>
</tr>
<tr>
<td>Shipping factor</td>
<td>2200</td>
<td>136</td>
<td>6.18%</td>
</tr>
<tr>
<td>Marketing strategy factors</td>
<td>2200</td>
<td>147</td>
<td>6.68%</td>
</tr>
</tbody>
</table>

Figure 6: Conceptual model of negative affective factors.

Figure 7: Regression analysis scoring reliability test results.
There is little difference between positive and negative comments on logistics distribution and marketing strategies ($P > 0.05$), which supports K5. There is no significant difference between the mentioned frequency of logistics and distribution in the positive comments and the mentioned frequency in the negative plane. It shows that the difference between the probability of customer satisfaction and dissatisfaction caused by logistics distribution is not large.

### 5.3. Regression Results of Negative Emotional Influencing Factors

As shown in Figure 9, the regression coefficients of the influencing factors of negative emotional tendencies show that in product reviews, customers are more concerned about factors related to product quality. That is to say, merchants want to improve customer satisfaction, and they need to strictly control the quality of products. The second is the promotion and price reduction factor, that is, customers are more concerned about the rationality of prices and preferential strategies.

The regression analysis results of negative affective factors in Table 5 show that all 10 factors are significant. What is very significant is whether the description is comprehensive and whether the response in the service factor is timely.

In Table 5, $X$ represents the correlation coefficient, and the coefficient of determination is also called the goodness
of fit, which is the square of the correlation coefficient, so it is expressed as $X^2$. AR stands for the coefficient of determination, and its calculation formula is

$$AR = 1 - \frac{(a - 1)(1 - X^2)}{a - i - 1}.$$  

(2)

$a$ is the number of samples, $i$ is the number of variables, and $X^2$ is the coefficient of determination.

The correlation coefficient, goodness of fit, and determination coefficient in Table 5 are all above 87%. It shows that the degree of fit of the secondary influencing factors of negative sentiment in the table is relatively high, and it is a factor that has a greater impact on the sales of merchants in product reviews.

5.4. Negative Emotional Reasons. In order to summarize the negative sentiment reasons, it is first necessary to conduct variance analysis on the influencing factors. The analysis of variance part includes degrees of freedom, error sum of squares, mean square error, $F$ value, and $P$ value. The analysis results are shown in the table.

Assuming that the degrees of freedom are expressed as $Yz$, the regression degrees of freedom ($Yzr$), the residual degrees of freedom ($Yzc$), and the total degrees of freedom ($Yzs$) are calculated, since

$$i = 10, j = 2200.$$  

(3)

$i$ is the number of samples, and $j$ is the number of variables.

The regression degrees of freedom ($Yzr$) are

$$Yzr = i = 10.$$  

(4)

The residual degrees of freedom ($Yzc$) are

$$Yzc = j - i - 1 = 2189.$$  

(5)

The total degrees of freedom ($Yzs$) are

$$Yzs = j - 1 = 2199.$$  

(6)

Assuming that the sum of squared errors or variation is denoted as $Wg$, the regression variation ($Wgr$) representing the total deviation of the predicted value of the dependent variable from its mean value is

$$Wgr = \sum_{n=1}^{j} (\bar{Q}_n - \bar{Q})^2.$$  

(7)

The residual sum of squares ($Wgc$) that characterizes the total deviation of the dependent variable from its predicted value, also known as the residual sum of squares, is expressed as

$$Wgc = \sum_{n=1}^{j} (Q_n - \bar{Q}_n)^2.$$  

(8)

The larger the calculated value, the worse the fitting effect. The standard deviation of the above $Q$ value is given by $Wgc$.

Then, it means that the total variation ($Wgs$) is

$$Wgs = \sum_{n=1}^{j} (Q_n - \bar{Q}_n)^2.$$  

(9)

There is

$$Wgr + Wgc = Wgs.$$  

(10)

The coefficient of determination ($K^2$) represents the proportion of the regression sum of squares in the total square, that is

$$K^2 = \frac{Wgr}{Wgs}.$$  

(11)

The larger the value of the determination coefficient calculated by the above formula, the better the fitting effect.

Suppose the mean squared error is denoted by $PG$, the quotient was obtained by dividing the sum of squared errors

<table>
<thead>
<tr>
<th>Influencing factors</th>
<th>Z</th>
<th>Significance (P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product factor</td>
<td>-10.56</td>
<td>$P \leq 0.01$</td>
</tr>
<tr>
<td>Price factor</td>
<td>17.73</td>
<td>$P \leq 0.01$</td>
</tr>
<tr>
<td>Service factor</td>
<td>-14.53</td>
<td>$P \leq 0.01$</td>
</tr>
<tr>
<td>Information factor</td>
<td>0.76</td>
<td>—</td>
</tr>
<tr>
<td>Shipping factor</td>
<td>-6.29</td>
<td>$P &gt; 0.05$</td>
</tr>
<tr>
<td>Marketing strategy</td>
<td>-8.21</td>
<td>$P &gt; 0.05$</td>
</tr>
</tbody>
</table>

Table 4: Test results.
The regression mean square error FGr is

\[ F_{Gr} = \frac{W_{gr}}{Y_{zr}}. \]  \hspace{1cm} (12)

The residual mean square error FGc is expressed as

\[ F_{Gc} = \frac{W_{gc}}{Y_{zc}}. \]  \hspace{1cm} (13)

The smaller the value, the better the fitting effect.

For linear relationship judgment, the F value calculation formula for univariate linear regression is

\[ F = \frac{K^2}{(1/(j-i-1))(1-K^2)}, \]  \hspace{1cm} (14)

The data in Table 6 corresponds to the degree of freedom Yz as the column, the first row is the regression degree of freedom, the second row is the residual degree of freedom, and the third row is also the last row of the total degree of freedom. The P value represents the rejection rate, the probability that the model is false. It can see that 1 - P is the
probability that the model is true. Therefore, the smaller the $P$ value, the better.

From this, a regression model can be built

\[
\text{negative emotio} = 0.7 \times \text{product design} + 0.6 \\
\times \text{Manufacturing} + 0.8 \\
\times \text{product quality} + 0.4 \\
\times \text{Service Level} + 0.3 \\
\times \text{Service attitude} + 0.13 \\
\times \text{responding speed} + 0.4 \\
\times \text{consistent description} + 0.2 \\
\times \text{fully comprehensive} + 0.6 \\
\times \text{Promotional price reduction} + 0.2 \\
\times \text{Return Policy}.
\]

(15)

Then, the 10 factors are summarized, and the 10 factors are attributed to the following four aspects. These aspects are based on the five dimensions of the SERVQUAL scale, combined with the characteristics of Internet businesses. And it made a negative emotional cause attribution Figure 10.

It can be seen from Figure 10 that among the reasons for the negative emotional factors of product reviews, reliability is one of the first reasons, followed by caring. Merchants need to provide comprehensive and correct product information, deliver products within the specified time, and ensure that the delivered products are free of defects and quality assurance, and the service level and attitude of employees need to be guaranteed. The humanization of product design, promotion strategy, and service attitude all need the psychological benefit of customers. By solving the above problems, the dissatisfaction factors of customers can be effectively solved, and the generation of product reviews with negative emotional tendencies can be reduced. That is, it can increase the sales volume of the product sideways.

6. Conclusion

This paper systematically analyzes the content of a large number of customer review texts and digs out the influencing factors of the emotional tendencies of Internet merchants’ product reviews. It also extracts keywords and constructs a conceptual model of the influencing factors of emotional tendencies. This paper uses the two-sample Z test and regression analysis to explore the importance, reasons, and laws of the influencing factors of various emotional tendencies. And this paper further proves that reviews with negative emotional tendencies have a greater impact on consumers. Therefore, this paper focuses on the causes and analysis of negative emotions and gives some suggestions to Internet merchants. Among the negative affective factors, the factors related to the quality of the product are the main points that consumers pay attention to. That is to say, the product quality cannot be guaranteed, which will breed
negative emotions of consumers and affect the sales of products. The second is the guarantee of service attitude, which can also further enhance the goodwill of consumers and reduce negative emotional product reviews.

**Data Availability**

No data were used to support this study.

**Conflicts of Interest**

The author declares that there are no conflicts of interest regarding the publication of this article.

**References**


