

RESEARCH ON TIK TOK USERS' SATISFACTION BASED ON FUZZY COMPREHENSIVE EVALUATION

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ABSTRACT. *The investigation is based on the user satisfaction index model in America; we constructed a new satisfaction scale based on the development characteristics of Tik Tok industry and the status of the platform, which affects the users' satisfaction from seven dimensions: perceived video content, perceived convenience, perceived e-commerce, perceived social, perceived service quality, customer expectation, perceived value. We decided to collect data through the questionnaire survey method. A total of 776 valid questionnaires were collected. The reliability and validity of the collected data were tested using SPSS, and the improved fuzzy comprehensive evaluation and weighted average method were used to quantify Tik Tok user satisfaction. The overall satisfaction of Tik Tok users on the Tik Tok platform is 3.543, and the satisfaction of all dimensions is obtained. Finally, some reasonable suggestions to improve user satisfaction on the Tik Tok platform are proposed, including strengthening the management of video content, enhancing the management of Tik Tok e-commerce, simplifying the operation process, improving user experience, and advancing the social function of Tik Tok short video.*

Keywords: Satisfaction, Fuzzy comprehensive evaluation, Weighted average method, Scale

1. Introduction. The short video industry is an important product of the current mobile Internet era, and its content can be uploaded to an independent short video platform or a comprehensive short video platform by ordinary users, professional users or professional institutions. Launched in September 2016, Tik Tok is a representative enterprise in the field of short video. By January 2020, the number of daily active users of it had exceeded 400 million. However, due to the small differences of various short video software, the competition in the short video industry is quite serious, so user satisfaction is related to the enthusiasm of users to continue to use the short video platform. Some scholars have studied users' satisfaction with short video platforms. Tao and Zhu [1] analyzed users' satisfaction with mobile short video App from four aspects: social needs, entertainment needs, cognitive needs, and self-expression. Chen and Feng [2] analyzed users' satisfaction with mobile short video App from three aspects: perceived entertainment, perceived ease of use and perceived usefulness. Wang et al. [3] analyzed users' satisfaction with short video App from the aspects of media and social contact. Yang [4] analyzed users' satisfaction with short video App from three aspects: perceived entertainment, perceived usefulness and perceived social. Wang and Lu [5] analyzed user satisfaction with short video App from aspects of performance, content, quality, and user psychology. However, the above researches on user satisfaction of short video platforms are not particularly comprehensive, cannot accurately reflect the user's satisfaction with the short video platform and need to be further improved. And few scholars study the user satisfaction of

Tik Tok. Therefore, based on the research contents of the above scholars and the user satisfaction index model in the United States, this investigation innovated according to the development characteristics of the short video industry and the current situation of Tik Tok platform, and constructed a new scale, which analyzed the satisfaction of Tik Tok users from the seven dimensions that are perceived video content, perceived convenience, perceived e-commerce, perceived social, perceived service quality, customer expectation and perceived value. We used SPSS software to test the reliability and structural validity of the scale data, and then adopted the improved fuzzy comprehensive evaluation and weighted average method to obtain the satisfaction of users from all dimensions and the overall satisfaction of Tik Tok App and put forward relevant suggestions.

2. Theoretical Basis and Scale Design.

2.1. Theories about user satisfaction.

1) Customer satisfaction

Customer satisfaction is a measure index of customer satisfaction degree. Samples are often obtained through random surveys, and the weighted average method is used to obtain the corresponding results based on the scoring data of specific satisfaction indexes of customers.

2) Customer satisfaction model

In the early 1990s, American scholars Fornell et al. proposed an ACSI model [6], which includes perceived quality, customer expectation, perceived value, customer satisfaction, customer complaint and customer loyalty. Its logical relationship is shown in Figure 1.

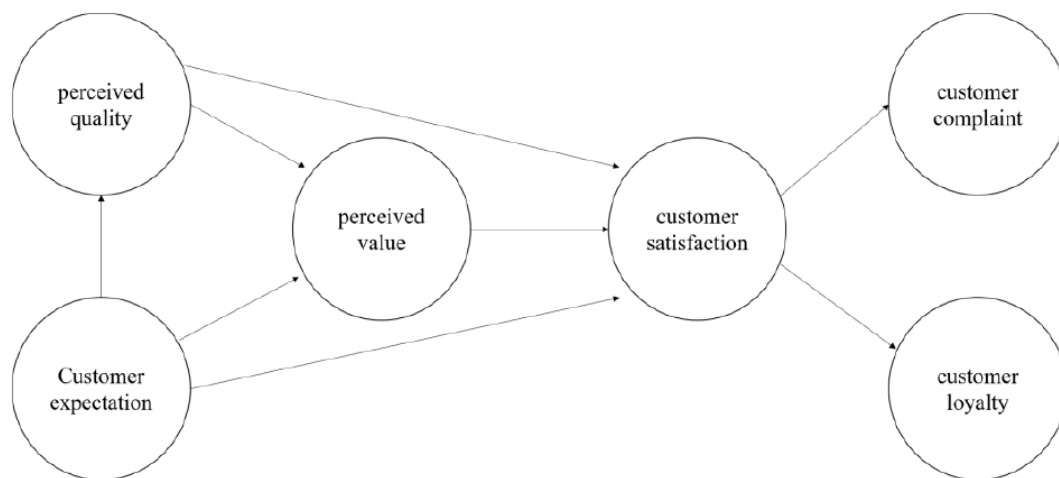


FIGURE 1. ACSI model

It can be seen from Figure 1 that customer satisfaction is the final target variable, customer expectation, perceived quality and perceived value are the cause variables of customer satisfaction, and customer complaint and customer loyalty are the result variables of customer satisfaction. The selection of the six structural variables in the model is based on the theory of customer behavior. Each structural variable contains one or more observation variables, and the observation variables are obtained through actual surveys and data collection.

2.2. Scale design. Based on the American user satisfaction index model, this scale combined the research of Tao and other scholars [1-8] on users' satisfaction with short video platform, according to the current situation of Tik Tok platform, and the influencing factors of Tik Tok user satisfaction are analyzed from seven dimensions that are perceived video content, perceived convenience, perceived e-commerce, perceived social, perceived service quality, customer expectation and perceived value.

1) Perceived video content refers to the degree to which user satisfaction is affected by audio and video content. The authenticity, richness, infectivity and acceptability of video information will all have an impact on user satisfaction.

2) Perceived convenience refers to the effect of operation convenience on Tik Tok user satisfaction. In the process of using short video software, convenient browsing operation will give users a good experience and increase user satisfaction.

3) Perceived e-commerce refers to confidentiality of users' personal information by merchants and platforms in Tik Tok during transactions, which can have an impact on Tik Tok satisfaction.

4) Perceived social refers to the satisfaction degree of users in social contact during the use of Tik Tok. If users are well satisfied in social contact, their satisfaction will be well improved; otherwise, it will have a negative impact on their satisfaction.

5) Perceived service quality refers to the degree to which the services provided in the future can meet the expectations of users before they use Tik Tok. The service quality of the platform mainly includes how strict the platform is in checking user information, how confidential the platform is in keeping user information, how fast it blocks false and illegal information, how it handles user complaints, how video pushing and additional functions affect users' satisfaction.

6) Customer expectation refers to the expectation that users have on the products or services they need. In the whole process of purchase, users will generate user satisfaction based on information from past purchase experience, price level and current product quality. Customer expectations are mainly about video content and social functions in this investigation.

7) Perceived value refers to a kind of overall evaluation of goods or services by users after comparing the benefits they feel they can get with the costs they pay in the process of getting, and the perceived value of Tik Tok mainly measures the software value and information value of users.

According to the above dimensions, a survey scale of users' satisfaction during the use of Tik Tok was set up, as shown in Table 1.

All the items of variables in the scale were measured by Likert5 grade scale, and the respondents were required to score according to their own experience and preferences 1 ~ 5, which respectively represented "very dissatisfied, not very satisfied, generally satisfied, relatively satisfied, very satisfied".

3. Data Collection. The object of the empirical research is users of Tik Tok. A combined online and offline survey method is adopted to collect a total of 800 questionnaires. Invalid questionnaires with too many blanks or inconsistencies are eliminated, and 776 valid questionnaires are obtained. Among the samples, 52.06% were female and 47.94% were male. The post-90s generation accounts for 46.52%, the post-80s generation accounts for around 30.92%, the post-70s generation accounts for 10.57%, the post-00s generation and below accounts for 7.35%, and the post-60s generation and above accounts for 4.64%. The proportion of educational background is 49.48% in universities and junior colleges, 16.49% in postgraduates and above, 29.65% in senior high schools and technical secondary schools, and 4.38% in junior middle schools and below. It is basically consistent with the demographic characteristics of Tik Tok App users [9].

4. Data Analysis.

4.1. Reliability and validity test. In order to understand whether the scale constructed in this article is effective and stable, the SPSS software is used to analyze the reliability of the data of the subscales and total scales of various dimensions collected through the questionnaire, and *Cronbach's α* coefficient and *KMO* value of each scale and total scale were obtained, as shown in Table 2.

TABLE 1. Tik Tok user satisfaction measurement scale

Variable	Item description
Perceived video content	1) Your satisfaction with the authenticity and accuracy of Tik Tok video information
	2) Your satisfaction with the rich and colorful content of Tik Tok video
	3) Your satisfaction with the infectivity of Tik Tok video content
	4) Your satisfaction with the acceptability of Tik Tok video content
Perceived e-commerce	5) Your satisfaction with the information security in the commodity trading process on Tik Tok platform
	6) Your satisfaction with the variety of products provided by Tik Tok platform
	7) Your satisfaction with the quality of products sold on Tik Tok platform
Perceived social	8) Your satisfaction with the after-sales service of products on Tik Tok platform
	9) Your satisfaction with Tik Tok's extended social circle
	10) Your satisfaction with the recognition achieved by Tik Tok
Perceived convenience	11) Your satisfaction with using Tik Tok to communicate with people with common topics
	12) Your satisfaction with the ease of operation of Tik Tok
	13) Your satisfaction with the convenience of Tik Tok video production and release
	14) Your satisfaction with the convenience of Tik Tok video sharing
Perceived service quality	15) Your satisfaction with Tik Tok traffic consumption
	16) Your satisfaction with the response speed of Tik Tok page
	17) Your satisfaction with the strict user information audit system of Tik Tok platform
	18) Your satisfaction with the confidentiality of users' information on Tik Tok platform
	19) Your satisfaction with the effective blocking of false information on Tik Tok platform
	20) Your satisfaction with the blocking of illegal information such as pornographic gambling on Tik Tok platform
	21) Your satisfaction with Tik Tok audio and video push
22) Your satisfaction with Tik Tok's handling of user complaints	
Customer expectation	23) Your satisfaction with the additional functions of Tik Tok
	24) Your satisfaction with what you have learned by using Tik Tok
	25) You gain entertainment satisfaction by using Tik Tok
Perceived value	26) Your satisfaction of releasing negative emotions through Tik Tok use
	27) You enrich the satisfaction of making friends by using Tik Tok
	28) Your satisfaction with your willingness to use Tik Tok
	29) Your satisfaction with the value of Tik Tok

It can be seen from Table 2 that the *Cronbach's* α coefficient value of both the subscale and the total scale exceeds 0.8 and the *KMO* value exceeds 0.7 [10], indicating that the questionnaire used in this investigation has good internal consistency and good reliability and validity.

Then, the content validity of the scale is evaluated, mainly through the empirical judgment method, considering the following three items: first, whether the items measured

TABLE 2. Reliability analysis table of each dimension scale and total scale

Variable	Item	<i>Cronbach's</i> α coefficient	<i>KMO</i> value
Total table	29	0.999	0.911
Perceived video content	4	0.862	0.872
Perceived convenience	5	0.876	0.746
Perceived e-commerce	4	0.835	0.837
Perceived social	3	0.845	0.735
Perceived service quality	7	0.867	0.781
Customer expectation	4	0.884	0.715
Perceived value	2	0.857	0.869

TABLE 3. Validity evaluation table

Expert	Item 1	Item 2	Item 3
Expert 1	0.91	0.94	0.81
Expert 2	0.88	0.86	0.87
Expert 3	0.89	0.87	0.75
Expert 4	0.92	0.91	0.84
Expert 5	0.93	0.84	0.79
Average	0.906	0.884	0.812

by the item really belong to the field to be measured; second, whether the items included in the test cover all aspects of the test field; the third is whether the proportion of test questions is appropriate. Validity evaluation in Table 3 is obtained through expert score (full score of 1).

The scores in the above table are all above 0.75, indicating that the scale constructed in this article has high validity.

4.2. Fuzzy comprehensive evaluation process. The basic idea of fuzzy comprehensive evaluation [11] is to use the principle of fuzzy linear transformation and the principle of maximum membership to evaluate the membership grade of the evaluated object through multiple factors and indexes. User satisfaction refers to a kind of psychological feeling or self-experienced feeling. The measurement criteria vary from person to person, which is fuzzy and generally difficult to be expressed with certain values. Tik Tok user satisfaction is considered from multiple levels, so the factors of fuzzy comprehensive evaluation method are also divided into grades to measure. The evaluation steps are as follows:

- 1) Determine evaluation indicators and evaluation sets
- 2) Determine the weight set of the evaluation index
- 3) Construct the weight judgment matrix
- 4) Weight calculation based on synthetic fuzzy comprehensive evaluation results
- 5) Evaluate decisions

According to the above steps, first of all, the data were normalized, and finally the membership statistical table of Tik Tok user satisfaction index was obtained. Then, the subjective weight of the first-level index and the second-level index was calculated by using the analytic hierarchy process, and the entropy value of the second-level index was calculated by using the entropy method, and the entropy value was normalized to obtain the entropy value of the first-level index. Finally, the weight of each second-level index and the comprehensive weight of the first-level index are calculated by using the set method of AHP and entropy method according to Formula (1).

$$W_i'' = 0.5(W + W_i') \tag{1}$$

The weights of the first-level indicators are shown in Table 4.

TABLE 4. Weights of each first-level index

Indicators	Weight
Perceived video content	0.150
Perceived convenience	0.054
Perceived e-commerce	0.068
Perceived social	0.035
Perceived service quality	0.116
Customer expectation	0.219
Perceived value	0.358

The Likert5 level scale is the judgment set of the evaluation index, and then the comprehensive evaluation value v_j of each index is calculated through the weighted average $M(\cdot, \oplus)$ in the matrix synthesis operation method. In the end, Formula (2) is used to calculate the overall satisfaction level of 3.543, which is between general and relatively satisfied, indicating that the overall satisfaction level of Tik Tok is relatively satisfied.

$$V_{SUM} = \sum_{j=1}^n b_j v_j \quad (2)$$

v_j represents the comprehensive evaluation value, and b_j represents the evaluation level.

According to Formula (2), the satisfaction value of each first-level index is calculated as shown in Table 5.

TABLE 5. Satisfaction of each level indicator

Indicators	Satisfaction
Perceived video content	3.6316
Perceived convenience	3.2627
Perceived e-commerce	3.5404
Perceived social	3.2626
Perceived service quality	3.3696
Customer expectation	3.6261
Perceived value	3.5813

5. Conclusions and Recommendations.

5.1. Conclusions.

1) The overall satisfaction of Tik Tok is 3.543, indicating that users of Tik Tok relatively recognize the overall image of Tik Tok. However, it also reflects that Tik Tok cannot give users great satisfaction in some aspects, and there is still room for improvement.

2) The highest rating of perceived video content is 3.632, indicating that Tik Tok users are most satisfied with the video content. Tik Tok video content is rich and can basically meet the needs of most users.

3) The satisfaction of perceived convenience and perceived social contact was the lowest, both of which were 3.263. Tik Tok mainly relying on convenient operation design meets user psychology, but feel portability satisfaction index is low, due to the fact that users of Tik Tok are less satisfied with its secondary indexes video sharing (need to save local before sharing) and traffic consumption (compared with TV series and movies, audio and video traffic consumption of the same length of time is more). In the aspect of Tik Tok social communication, most users pay more attention to entertainment and do not have a strong sense of identity for the “performance” content. Tik Tok’s function of expanding social circle has not been well applied, so its satisfaction is low.

4) Customer expectation and perceived value are higher than overall satisfaction. The expected satisfaction of customers was 3.626, and the perceived value was 3.581, both of which were higher than the average index value of 3.543, indicating that the value of Tik Tok App was recognized and accepted by users. Meanwhile, Tik Tok also met users' expectations in their life, emotional needs and other aspects to some extent.

5) Perceived e-commerce and perceived service quality indicators are lower than the overall satisfaction. The perceived service quality index value is 3.370, which is mainly reflected in the problems of Tik Tok App, such as miscellaneous advertising content, too many homogeneous videos pushed, and unpractical additional functions. In terms of perceived e-commerce, the satisfaction rate is 3.540, which is lower than the average index. This is mainly due to the emergence of content e-commerce and celebrity e-commerce. Moreover, Tik Tok platform recommends favorite products to users through precise positioning of big data, and users can buy favorite products on the platform. However, there are many problems in terms of transaction security, commodity types and after-sales service, which make users tend to be less satisfied.

5.2. Recommendations.

1) Strengthen the management of video content. Users of different ages, occupations and genders have different demands for short video content. Douyitong platform can regularly issue questionnaires or analyze the structure of users' demands for short video content through big data, and balance the structure of video content by recruiting hosts in different regions, so as to ensure users' reception of various types of short video. At the same time, it is necessary to strengthen supervision and increase punishment for illegal behaviors, so as to prevent users from knowing the law and breaking the law, and to resist vulgar or false information that disturb the social system to the greatest extent.

2) Strengthen the management of Tik Tok e-commerce. The platform may require operators to undertake the obligation of information disclosure, provide consumers with important information concerning the rights and interests of consumers in a reasonable manner and in a timely manner, and provide consumers with opportunities to reasonably review the terms of contracts and disclose operators' information related to transactions, such as the name, address, electronic contact information of the operator, the true description of the commodity, terms and conditions of the transaction, and after-sales service.

3) Simplify operation process and enhance user experience. Tik Tok platform may optimize the program and add video sharpness options, so that users can choose different levels of sharpness according to their own traffic situation and actual needs to achieve the purpose of saving traffic. The platform may also cooperate with telecom companies to launch software traffic-free services to save traffic for users and improve user satisfaction. At the same time, comprehensive quantitative evaluation of additional functions can be made to eliminate unnecessary plug-ins, strengthen technical investment, optimize background procedures, and increase the fluency of users.

4) Strengthen the social function of Tik Tok short videos. The platform may launch a bonus point reward mechanism, set up daily tasks, and conduct cumulative sharing rewards or random lottery rewards to guide users to share videos, improve users' social satisfaction with Tik Tok perception while promoting Tik Tok promotion, and may cooperate with Web celebrities or star as much as possible. In addition, it may also attract and increase users interaction through the amount of forwarding and playing of bloggers.

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