Research on User Satisfaction of Shared Motorcycle APP Based on Kano Model

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Abstract

This article focuses on improving the current shared motorcycle market and consumer demand. Based on the SERVQUAL model and the Kano model, it provides practical guidance for shared motorcycle companies to improve operation management and marketing by investigating the current situation of shared motorcycle use, the causes of problems, and the current APP usage and liking. In this way, it provides theoretical and practical reference for other shared business application innovations based on mobile phone APP.

Keywords: *SERVQUAL model, Kano model, Shared motorcycle*

1.INTRODUCTION

In the context of the development of the sharing economy, the penetration rate of shared travel has gradually increased, according to data from iMedia Research [1]. In 2020, the scale of mobile travel users in China have reached 602 million. The travel difficulty of "last kilometre" have promoted the formation of shared motorcycles. It is expected that more than 8 million vehicles will be released on shared motorcycles in 2025, with a rapid growth rate of 41.4%. The release of the market value of shared motorcycles has quickly attracted major platforms to steadily promote the launch layout.

Through the analysis of literature search and the use of social surveys, it is found that the shared motorcycle APP is a link of the shared service, and it is obviously not comprehensive enough to study the willingness to use the shared motorcycle APP only from the perspective of the difficulties in using and city govern. With the entry of major platforms, the market competition has become increasingly fierce. Therefore, small and medium-sized enterprises are actively developing core technologies and hope to form their own competitiveness. By differentiating their products, the enterprises will be able to meet customer needs better to grab more market.

2.LITERATURE REVIEW

Most of the research on the sharing economy in the field of transportation and travel is based on shared bicycles. In terms of shared motorcycles, most of them are researched on government supervision [7] and the current status of development [4][13], and there is no research involving the selection factors of shared motorcycle users.

In this paper, the research method related to shared bicycles and consumer behaviour is extended to shared motorcycles, aiming to explore the impact of the function of shared motorcycle APP on the user experience.

2.1. SERQUVAL Theory

Based on total quality management theory, the American marketer Parachuraman et al. (2002) [8] proposed the SERVQUAL theory, which is a new service quality evaluation system proposed in the service industry, and its core lies in finding the difference between the perceived service quality of consumers and their expected service quality. SERVQUAL theory divides quality of service into formability, reliability, responsiveness, assurance, and empathy. Each dimension can be subdivided into small variables designed to comprehensively summarize the properties of the service.

2.2. Kano Model

The Kano model was first invented by technology professor Noriaki Kano (1995) [2]. It categorizes and prioritizes user needs, based on analyzing the impact of user needs on user satisfaction. The Kano model divides product quality into five categorizes, attractive quality, unary quality, essential quality, undifferentiated quality

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and reverse quality factors. The questioning answer, which don't belong to the categorizes, will finally be deleted from the result.

Josip Mikulić (2011) [5] proposed problems with the Kano model, such as the time dimension. At the same time, it is pointed out that the Kano model can explore existing properties and unknown properties. Based on this, Arash Shahin (2013) [9] made corrections to the KANO model on the basis of extensive literature. Since 2018, many researchers have combined big data techniques with the Kano model, hoping to avoid the process of collecting questionnaires and process data more efficiently [3][10][11][12].

3.EMPIRICAL RESEARCH

3.1. Questionnaire Design

The decision to improve the quality of transportation services is to understand the status of the service quality from the perspective of customers on the basis of clarifying the attributes of the service quality, determine the priority of the service attributes, and then design the service quality improvement strategy [6]. Therefore, through the form of questionnaire survey, two-way communication with customers is formed, so as to identify the key elements that constitute transportation services, form many attributes of shared motorcycles in transportation services, and then design the attributes of shared motorcycles transportation services. Kano questionnaire. Therefore, in view of the five dimensions in the above SERVQUAL theoretical model, this study was adapted and designed into a Kano questionnaire based on previous related research.

The questionnaire is open to all groups. The first part of the questionnaire is information related to the demographic characteristics of customers. The second part is about the attributes related to shared motorcycle services, which is divided into five modules, user vehicle and program experience, shared motorcycles are safe and convenient to use, help users solve problems, enhance your brand's impression, and personalized service, which are corresponding to the five dimensions of SERVQUAL model. The questioner obtains a total of 31 pairs of entries.

According to SERQUVAL, determine the attributes:

Table 1: Attributes of SERVQUAL.

Part	Cognitive projects	Attributes
User vehicle and program experience	Location Services	f1
	Multi-party payments	f2
	Cycling reminders within the area	f3
	Important notification alerts	f4
	Display of parking/drop-off points	f5
	Real-time riding information display	f6
	Destination navigation	f7
	Vehicle body power balance inquiry	f8
Safe and convenient to use	Smart Car Finder	f9
	Request a drop-off point	f10
	Make a reservation for a car	f11
	Power outage warning service	f12
	Substation services	f13
	Temporary parking reminder service	f14
	Anti-false touch closure lock	f15
	Reserve a parking space	f16
	Parking guide	f17
	Body-to-body return device (P key)	f18
	Intelligent security system	f19
Help users solve problems	Vehicle fault feedback channel	f20
Enhance the brand's impression	Intelligent customer online services	f21
Personalized service	Account details	f22
	Ride & Promotion Push	f23
	Personalized cycling payment plans	f24
	User credit system	f25

3.2. Data Collection

The questionnaire was collected in the form of random distribution, such as the questionnaire network, and a total of 566 questionnaires were collected in March 2022. All the questions in the questionnaire were required, and the invalid answers were deleted. There are 545 valid questionnaires finally obtained. The effective questionnaire rate is 96.29%. Fig. 1 is user portraits.

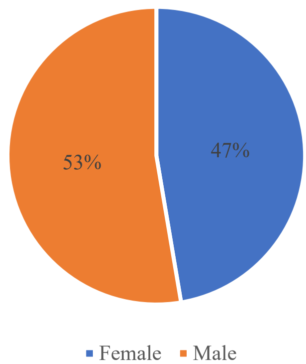

Figure 1: Gender ratio of users.

3.3. Data Processing

3.3.1. Kano model construction

Based on the research results of Meng Qingliang et al. (2015), a quantitative Kano model is constructed. Suppose to have *J* as the set of customers. *F* represents the service property of the *I*th collection, which form $F_i=\{f_i|i=1, 2\ldots n\}$, f_i represents the ith service property. x_{ij} and y_{ij} represents the f_i customer satisfaction evaluation of the service attribute realization and the non-realization, respectively, and its value can be obtained from the Kano questionnaire shown in Table 1. w_{ij} is the customer's evaluation of the importance of the service attribute f_i, the value of which can be obtained according to the importance scale of Table 2.

Table 2: Satisfaction Scale.

Questions	Satisfaction				
	Like	*As it should be*[1]	*Doesn't matter*	*Tolerable*	*Dislike*
Provide	1	0.5	0	-0.25	-0.5
Not Provide	-0.5	-0.25	0	0.5	1

Table 3: Importance Scale.

Unimportant	Somewhat importa nt	Significant	Important	Very important
0~0.2	0.2~0.4	0.4~0.6	0.6~0.8	0.8~1

Correspondingly, $\overline{X_i}$ and $\overline{Y_i}$ is the average of customer satisfaction when the property f_i is realized versus not realized. It is calculated as:

$$\overline{X_i} = \frac{1}{J}\sum_{j=1}^{J} w_{ij}x_{ij} \quad (1)$$

$$\overline{Y_i} = \frac{1}{J}\sum_{j=1}^{J} w_{ij}y_{ij} \quad (2)$$

The service attribute f_i can be expressed in the form of a vector, described as $f_i \sim \vec{r_i} \equiv (r_i, \alpha_i)$, where $r_i = |\vec{r_i}| = \sqrt{\overline{X_i}^2 + \overline{Y_i}^2} (0 \le r_i \le \sqrt{2})$ the vector $\vec{r_i}$ indicates the importance of the service attribute f_i to the customer, which is an importance index of the Kano model; the angle $\alpha_i = \tan^{-1}\left(\frac{\overline{Y_i}}{\overline{X_i}}\right) (0 \le \alpha_i \le \frac{\pi}{2})$ between the vector $\vec{r_i}$ and the horizontal coordinate axis is a satisfaction indicator.

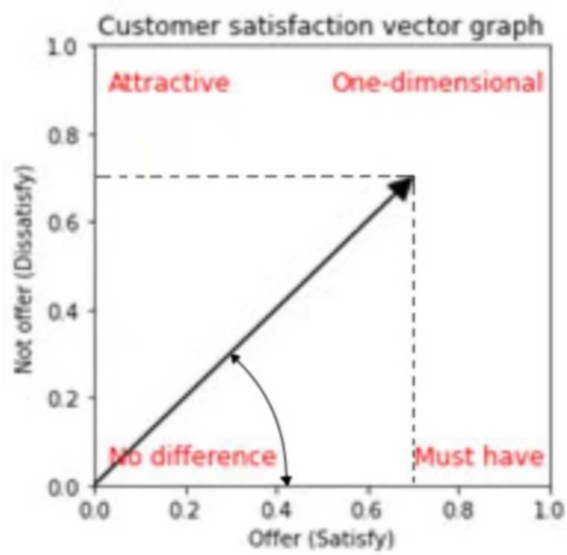

Figure 2: Customer satisfaction vector graph..

In addition, the Better_Worse coefficient of each functional attribute is calculated. Generally, the project with the higher absolute value of the coefficient is more worthy of priority implementation.

$$\text{Better/SI} = (A + O) / (A + O + M + I) \quad (3)$$

$$Worse/DSI = -1 * (O + M) / (A + O + M + I) \quad (4)$$

Better coefficient represents the increased satisfaction coefficient. The value of Better is usually positive, which means that if a certain functional attribute is provided, user satisfaction will be improved; the larger the positive value/closer to 1, the greater the impact on user satisfaction, and the stronger the effect of improving user satisfaction, the rise will be faster.

Worse coefficient represents the dissatisfaction coefficient after elimination. Its value is usually negative, which means that if a certain functional attribute is not provided, the user's satisfaction will be reduced; the more negative/closer the value is to -1, the greater the impact on user dissatisfaction, and the greater the effect of reducing satisfaction. The stronger, the faster the decline.

3.3.2. Kano model classification criteria

Draw a two-dimensional coordinate plot of the survey results, taking $\overline{X_i}$ and $\overline{Y_i}$ as the dividing line of the four quadrants. Table 4 is a classification table of quality factors for the Carnot model. Multiply the matrix of each factor to obtain a fifth-order matrix, judging the attribute category according to Table 4. Wherein, "A" indicates the charm quality factor; "O" indicates a one-dimensional quality factor; "R" indicates the reverse quality factor; "M" indicates the necessary quality factor; "I" indicates no difference in quality factor; "Q" indicates a questioning answer.

Table 4: Classification of quality factors.

		Has the service properties				
		Like	*Should be*	*Don't matter*	*Tolerable*	*Dislike*
Does not have the proper-ty	*Like*	Q	R	R	R	R
	As it should be	A	I	I	I	R
	Doesn't matter	A	I	I	I	R
	Tolerable	A	I	I	I	R
	Dislike	O	M	M	M	Q

After filtering out the invalid questionnaire, the error of fractional fractions is classified as Q when the data is processed, and all errors are less than 0.02, which does not affect the analysis results.

According to Tables (3) and Tables (4), the tangent of the Kano satisfaction indicator is calculated. The Kano importance metric for each service attribute f_i is calculated according to (1) and (2). Taking r_i as the initial importance. The dividing line of the four quadrants in the figure is the average of *X* and *Y* calculated from all attributes.

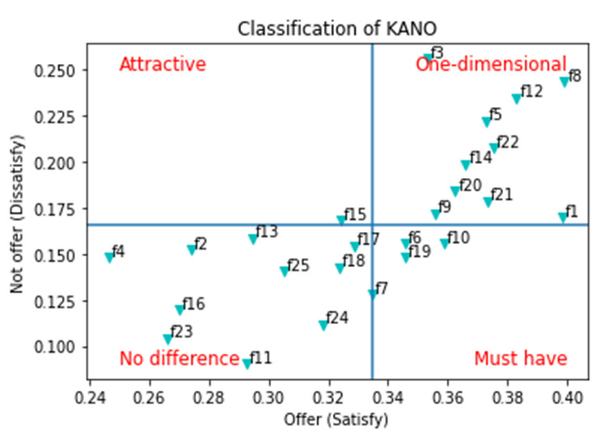

Figure 3: Result of classification.

At the same time, calculate the Better-worse coefficient of each indicator according to formula (3) and formula (4), as shown in Table 7:

Table 5: Better_worse coefficient.

Attributes	Better	Worse
f1	0.3766	-0.3095
f2	0.3555	-0.2957
f3	0.3497	-0.4855
f4	0.3635	-0.4033
f5	0.4345	-0.4667
f6	0.4209	-0.3348
f7	0.4442	-0.3050
f8	0.4252	-0.4951
f9	0.4452	-0.3819
f10	0.4459	-0.3309
f11	0.4850	-0.2597
f12	0.4146	-0.4714
f13	0.4448	-0.4246
f14	0.4502	-0.3834
f15	0.4109	-0.3870
f16	0.4125	-0.3123
f17	0.4358	-0.3532
f18	0.4467	-0.3109
f19	0.4228	-0.3060
f20	0.4042	-0.3829
f21	0.4185	-0.3580
f22	0.3971	-0.4208
f23	0.4221	-0.3034
f24	0.4201	-0.2729
f25	0.4754	-0.3111

The result can be concluded into a tablet,

Table 6: Classification result.

Attribute category	Attributes
Attractive quality attributes	f15
One-dimensional mass properties	f1, f3, f5, f8, f9, f12, f14, f20, f21, f22

No difference in mass attributes	f2, f4, f16, f17, f18, f23, f24, f25
Required quality attributes	f6, f7, f10, f19

3.4. Data Analysis

According to the analysis results, the function that needs to be improved the most is "Anti-false touch closure lock". During the ride, customers often put their mobile phones in their pockets or bags, which is extremely likely to cause accidental touches and lead to power failure of the shared motorcycles. This greatly affects the experience of users, which can attract more users to use the shared motorcycle.

Improving the accuracy of location services (f1, f3, f5, f9), message reminder services (f8, f12, f14, f22) and online customer service (f20, f21) can effectively improve customer satisfaction.

3.4.1. Build a positioning integrated system

In terms of user riding convenience, if users ride in an unfamiliar environment, they generally need to open the navigation APP and the shared motorcycle APP at the same time. The simultaneous use of two APPs makes the user's operation troublesome. Building a positioning and navigation system can realize the simultaneous realization of multiple functions in one APP during the user's riding process. At the same time, the navigation system can ensure more accurate cost calculation and cost estimation, so that users can understand the distance and cost before riding; in addition, when the user rides beyond the service area, it can make timely reminders, which is convenient for users to locate and find services area and available vehicle locations.

In terms of user riding safety, building a positioning and navigation system can record and warn users of illegal riding behaviours. When the user has a dangerous riding behaviour, under the positioning system, the vehicle can give the user a timely warning, remind the user to abide by the traffic rules, and enhance the user's safety awareness. At the same time, record such users, and improve the standard of car use through measures such as credit scores.

3.4.2. Improving message reminder system

Notification reminders can prompt important information in time for users to view, bringing great convenience.

When paying the riding fee, the user can choose to recharge and deduct the fee on the platform, or choose the joint payment function of multiple platforms. Account transparency informs users of the billing rules in advance to reduce user objections to charges after riding, and provides customers with detailed bills, which can reduce users' objections to fees caused by non-disclosure of fees.

When parking temporarily, users generally complain about two problems: the first is that the vehicle is automatically locked after temporary parking or is ridden by others; the other is that the temporary parking fee is high. Therefore, it is necessary to set a reminder function, on the one hand to remind the user of the longest temporary parking time and the temporary parking fee, and on the other hand to remind the subsequent user that the vehicle has been temporarily locked. Setting a temporary parking reminder can effectively solve some temporary parking problems and facilitate users to use and park vehicles.

3.4.3. Improve customer service feedback system

Based on the analysis of user feedback data, establish a systematic and complete feedback and reply knowledge base, and form a customer service reply system with standardized terminology, rapid response, and scientific response to solve the problems of professionalism, timeliness, and effectiveness of customer service replies. This function can greatly improve user satisfaction, solve user problems, and reduce user dissatisfaction to the greatest extent, thereby optimizing user experience and enhancing users' willingness to continue to use. It can also improve customer service response efficiency and reduce customer service response costs. At the same time, set up manual online customer service to provide special professional answers to users with special circumstances.

4.CONCLUSIONS

This paper first uses both the SERVQUAL model and the Kano model to investigate, study and classify user needs, and distinguish the attributes that affect the user experience of shared motorcycles. Also, the paper for the first time focuses on the user experience of shared motorcycles APP and fills the blank in this aspect. By quantifying the vague customer satisfaction and importance, their psychological needs are mined.

From the research results, we can see that shared motorcycle companies should pay attention to the research and development of "Anti-false touch closure lock" function, which can help companies attract more customers. At the same time, improve the user experience of "Location Services", "Cycling reminders within the area", "Display of parking/drop-off points" and other functions. Optimizing these functions can allow customers to obtain a better consumption experience and encourage customers to continue to use the brand's shared motorcycles.

Businesses can find a focus that can cost differently for different types of functions. While improving development efficiency and saving costs, enterprises can also design products that are different from competitors, which helps better grasp the psychological needs of customers, and creates a better consumer experience.

REFERENCES

[1] Ai Media Consulting. (2019). 2019 Q2 shared bicycle quarterly data release research report. R.

[2] Kano, N. (1995). Upsizing the organization by attractive quality creation. J. Total Quality Management. 60–72.

[3] Lakshmanaprabu, S. K., Shankar, K., Gupta, D., Khanna, A., Rodrigues, J. J., Pinheiro, P. R. & V. H. de Albuquerque. (2018). Ranking analysis for online customer reviews of products using opinion mining with clustering. J. Complexity. 1–9.

[4] Liu, S. & Lan, Y. (2018). Analysis on the development status and problem countermeasures of shared motorcycles under the sharing economy model. J. Industrial Design. 2, 14-16.

[5] Mikulić, J. & Prebežac, D. (2011). A critical review of techniques for classifying quality attributes in the kano model. J. Managing Service Quality. 1, 46–66.

[6] Meng, Q., Jiang, X. & Bian, L. (2015). A decision-making method for improving logistics services quality by integrating fuzzy Kano model with importance-performance analysis. J. Journal of Service Science and Management. 3, 322–331.

[7] Nie, S. J. (2019). Research on government supervision of shared motorcycles. J. Journal of Chongqing University (Social Science Edition), 1, 162-177.

[8] Parasuraman, A., Berry, L. & Zeithaml, V. (2002). Refinement and reassessment of the SERVQUAL scale. J. Journal of retailing. 4, 114.

[9] Shahin, A., Pourhamidi, M., Antony, J. & Hyun Park, S. (2013). Typology of kano models: A critical review of literature and proposition of a revised model. J. International Journal of Quality & Reliability Management. 3, 341–358.

[10] Seo, S., Kim, C., Kim, H., Mo, K. & Kang, P. (2019). Comparative study of deep learning-based sentiment classification. J. IEEE Access. 8, 6861–6875.

[11] Shi, Y. & Peng, Q. (2021). Enhanced customer requirement classification for product design using Big Data and improved Kano Mode. J. Advanced Engineering Informatics. 49, 101340.

[12] Wang, A. & Gao, X. (2019). Multifunctional product marketing using social media based on the variable-scale clustering. J. Tehnicki Vjesnik-Technical Gazette. 1, 193–200.

[13] Zhou, R. & Zheng, Y. (2021). Analysis of problems and countermeasures of the development status of shared motorcycles. J. Logistics Science and Technology. 2, 78-80.