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China Telecom 5G Analysis On The Path To Improve User Quality Satisfaction

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Abstract

With the rapid development of 5G technology, the telecommunications industry faces significant opportunities and challenges. Key factors such as user expectations, quality perception, value perception, and user satisfaction influence the competitiveness and market share of telecom companies. This paper, based on user behavior theory, examines the relationships between these factors and their impact on user loyalty. The findings provide theoretical and practical guidance for telecom marketing strategies in the 5G era, helping companies understand user needs, improve service quality, and enhance loyalty, ultimately promoting long-term growth.

Keywords: 5G technology, telecommunications industry, user expectations, quality perception, value perception, user satisfaction, user loyalty

1. Introduction

The telecommunications industry encompasses global communication services and technologies, including fixed-line phones, mobile phones, internet, broadband, and satellite communications. With rapid technological advancements, the industry is evolving, with 5G being a major breakthrough, offering faster speeds, lower latency, and increased system capacity. 5G is set to support the digital and intelligent transformation of various industries. However, telecom companies face criticism for unreasonable tariffs and poor service quality, which can result in low user satisfaction and market share. Chinese telecoms also struggle with issues like inaccurate user targeting and weak channel control. To succeed, companies must focus on understanding user needs, offering targeted products, and improving satisfaction.

2. Literature Review

With the rapid development and widespread application of 5G technology, user quality satisfaction has become one of the key indicators for improving the competitiveness of the telecommunications industry. As one of the major domestic telecommunications operators, China Telecom's 5G network service quality improvement directly affects user experience and satisfaction. Existing research mainly focuses on the components of user satisfaction in the telecommunications industry, the selection of evaluation indicators and the analysis of influencing factors, involving network coverage, service quality, pricing strategy, customer support and other aspects.

Gao Yongmei analyzed mobile user data, designed a user feature model, and built a big data processing framework for telecommunications using Hadoop[1]. She applied data fusion and service mining to support mobile consumption, consumer customization, and personalized marketing. Wang Zhaohui focused on transforming traditional network operators into comprehensive information service providers, emphasizing user-centered models and core technologies[2]. Zhang Ruijin developed a customer perceived value model for mobile data services and provided management suggestions based on empirical research[3]. Shah Sayed Kifayat studied the impact of anchor prices on consumer behavior and 5G project purchase intention[4]. Moqaddamerad Sara examined business model innovation in the context of 5G uncertainty, focusing on value, internal changes, and external opportunities[5].

The Telecommunications Customer Satisfaction Index (TCSI) model is a model that measures telecommunications service quality and user satisfaction. It evaluates user satisfaction with telecommunications service quality, price, brand image, etc. in an objective and quantitative way, thereby providing an effective tool to guide telecommunications companies to improve services and enhance user experience . Figure 1 shows the TCSI, which is a telecommunications customer satisfaction index model currently widely used in China. The model usually

includes seven indicators: brand impression, user expectations, quality perception, value perception, satisfaction, user complaints, and loyalty.

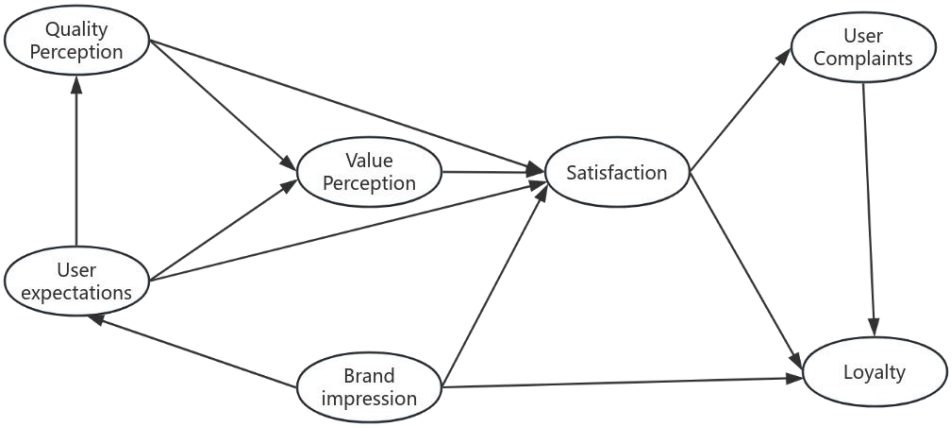

Figure 1. Telecom Customer Satisfaction Index Model

Based on the above research, the following hypotheses are proposed:

H1 : User expectations have a positive effect on quality perception

H2 : User expectations and quality perception have a positive effect on value perception

H3 : User expectations , quality perception , and value perception have a positive effect on user satisfaction

H4 : User satisfaction has a positive effect on user loyalty

3. Empirical Analysis

Table 1. Telecom company 5G service user satisfaction evaluation system

First level indicator	Secondary indicators	Level 3 indicators	variable
Satisfaction Index	User expectations	Overall expectations	Corporate image
			Trust level
			5G service expectations
	Quality Perception	Service Quality Perception	Package traffic
			Call Quality
			Broadband quality
			Tianyi HD TV quality
			Two-way broadband quality
		Service Quality Perception	Business Hall Services
			Online business hall service
			Customer service hotline
	Value Perception	Value Perception	Perception of price for a given quality
			Perception of service at a given price
			Competitive Comparison
	Customer satisfaction	Customer satisfaction	Overall satisfaction
			Expected Differences
	User loyalty	User loyalty	Continue to consume
			Referral Consumption
			Change of operator consumption

The research subjects from Table 1 are mainly the 5G user groups of telecommunications companies . In the pre-test stage, a total of 282 questionnaires were collected, of which 282 were valid . In the pre-test stage, this article used SPSS22.0 software for reliability analysis. In this valid questionnaire, the number of male users surveyed was

152, accounting for 53.9%, and the number of female users surveyed was 152, accounting for 46.1%, indicating that the sample size of male users is higher than that of female users. Age data is shown in the table above. Among the surveyed users, the largest number of people aged 26-36 is 88, accounting for 31.21%; followed by the 37-50 age group, with 86 surveyed, accounting for 30.5%; the number of users aged 18-25 is 79, accounting for 28.01%; the number of people over 50 years old is 29, accounting for 10.28%, and the user group is younger.

3.1 Descriptive Statistical Analysis of Variables

Table 2. Descriptive analysis

Secondary indicators	Sample size	average value	Standard Deviation
User expectations	282	3.96	0.986
Quality Perception	282	3.88	0.959
Value Perception	282	3.83	1.036
Customer satisfaction	282	3.82	1.009
User loyalty	282	3.86	1.035

Table 2 is the descriptive analysis results of the five secondary indicators. The sample size is 282, covering the statistical data of the five indicators of user expectations, quality perception, value perception, user satisfaction and user loyalty. The average value of user expectations is 3.96, and the standard deviation is 0.986; the average value of quality perception is 3.88, and the standard deviation is 0.959; the average value of value perception is 3.83, and the standard deviation is 1.036; the average value of user satisfaction is 3.82, and the standard deviation is 1.009; the average value of user loyalty is 3.86, and the standard deviation is 1.035. The average values of the five indicators are relatively close, and the standard deviation is small, indicating that the distribution of users in the sample on each indicator is relatively consistent, reflecting the relative balance in user experience.

3.2 Reliability and Validity Analysis

Table 3. Scale reliability test

variable	Number of questions	Cronbach's α coefficient	Overall Cronbach's α coefficient
User expectations	3	0.862	
Quality Perception	8	0.955	
Value Perception	3	0.922	0.982
Customer satisfaction	2	0.870	
User loyalty	3	0.908	

According to Table 3 , the reliability coefficients of individual variables and overall variables are acceptable because their coefficients exceed the high-requirement critical value and are even higher than 0.9 . The sample meets the conditions for further analysis and the questionnaire has reliable reliability and good consistency.

Table 4. KMO and Bartlett's test

KMO sampling suitability measure		0.97
Bartlett's test of sphericity	Approximate Chi-Square	7218.56
	Degrees of Freedom	231.00
	Significance	0.00

According to the Table 4， KMO and Bartlett tests, the KMO value of the data exceeds the very appropriate critical value of 0.97, the Bartlett test result is 7218.56, the degree of freedom reaches 231, and the significance level of 0.000 is met . All results show that the questionnaire has good validity .

3.3 Correlation Analysis

Correlation analysis is to analyze the correlation between two or more dimensions to evaluate the degree of association between each factor. This correlation analysis was still conducted using SPSS 22.0 software. The results are shown in Table:

Table 5. Correlation analysis of each dimension

Dimensions	User expectations	Quality Perception	Value Perception	Customer satisfaction	User loyalty
User expectations	1				
Quality Perception	.876**	1			
Value Perception	.803**	.905**	1		
Customer satisfaction	.796**	.883**	.912**	1	
User loyalty	.802**	.884**	.884**	.895**	1

As shown in Table 5 , this paper uses the correlation analysis method to study the correlation between the dimensions of user expectations, quality perception, value perception, user satisfaction, and user loyalty. Specific analysis shows that user expectations, quality perception, value perception, user satisfaction, and user loyalty are all significant, and the correlation coefficient values are all greater than 0, indicating that there is a positive correlation between user expectations, quality perception, value perception, user satisfaction, and user loyalty .

4. Regression Analysis

4.1 The Impact of User Expectations on Quality Perception

According to the hypothesized model CM-CSI, customer expectations are first taken as the influencing factor and set as the independent variable, and then the factor of perceived quality is taken as the dependent variable for regression analysis and calculation.

Table 6. Impact of user expectations on quality perception (test parameters)

R	R-square	Adjusted R-squared	Error in standard estimates	Durbin Watson	F	Significance
0.88	0.77	0.77	0.48	1.92	923.88	0.00

Table 7. Regression model analysis (quality perception)

	Unstandardized coefficients		Standardized coefficient	t	Significance
	B	Standard Error	Beta		
(constant)	0.47	0.12		3.98	0.00
User expectations	0.90	0.03	0.88	30.40	0.00

From the table 6 and table 7, the adjusted R-square of the result of the impact of user expectations on perceived quality is 0.77 , indicating that the independent variable explains 77 % of the dependent variable , indicating that the explanatory power is strong and the significance is 0.00 . Therefore, there is a significant positive correlation between user expectations and quality perception, which shows that the hypothesis "H1: user expectations have a positive effect on quality perception " is valid.

4.2 The Impact of User Expectations and Quality Perception on Value Perception

Table 8. The impact of user expectations and quality perception on value perception (test parameters)

R	R-square	Adjusted R-squared	Error in standard estimates	Durbin Watson	F	Significance
0.91	0.82	0.82	0.44	1.89	629.60	0.00

Table 9. Regression model analysis (value perception)

	Unstandardized coefficients		Standardized coefficient	t	Significance
	B	Standard Error	Beta		
(constant)	0.01	0.11		0.12	0.90
User expectations	0.05	0.06	0.05	0.85	0.39
Quality Perception	0.93	0.06	0.87	16.36	0.00

From the table 8 and table 9 , we can see that the adjusted R-square of the value perception is 0.82 , with a significance of 0.00, indicating that the independent variable explains 82 % of the dependent variable, indicating that the explanatory power is strong. Therefore, for value perception , it has a significant positive correlation with user expectations and quality perception , which shows that the hypothesis "H2: user expectations and quality perception have a positive effect on value perception " is valid.

4.3 The Impact of User Expectations , Quality Perception and Value Perception on User Satisfaction

Table 10. The impact of user expectations , quality perception and value perception on user satisfaction (test parameters)

R	R-square	Adjusted R-squared	Error in standard estimates	Durbin Watson	F	Significance
0.92	0.85	0.85	0.39	1.99	532.91	0.00

Table 11. Regression model analysis (user satisfaction)

	Unstandardized coefficients		Standardized coefficient	t	Significance
	B	Standard Error	Beta		
(constant)	0.16	0.10		1.64	0.10
User expectations	0.07	0.05	0.07	1.41	0.16
Quality Perception	0.28	0.07	0.26	3.93	0.00
Value Perception	0.60	0.05	0.62	11.45	0.00

As can be seen from the table 10 and table 11 , the adjusted R-square is 0.85 , indicating that the independent variable explains 85 % of the dependent variable , indicating that the explanatory power is strong and the significance is 0.00. Therefore, for user satisfaction , it has a significant positive correlation with user expectations , quality perception and value perception , which shows that the hypothesis "H3 : user expectations , quality perception and value perception have a positive effect on user satisfaction " is established.

4.4 The Impact of User Satisfaction and User Complaints on User Loyalty

Table 12. The impact of user satisfaction and user complaints on user loyalty (test parameters)

R	R-square	Adjusted R-squared	Error in standard estimates	Durbin Watson	F	Significance
0.93	0.87	0.86	0.38	1.90	892.81	0.00

Table 13. Regression model analysis (user loyalty)

	Unstandardized coefficients		Standardized coefficient	t	Significance
	B	Standard Error	Beta		
(constant)	0.03	0.09		0.32	0.75
Customer satisfaction	0.43	0.05	0.42	8.84	0.00

From the above table 12 and table 13 , we can see that the adjusted R-square is 0.87 , indicating that the independent variable explains 87 % of the dependent variable, indicating that the explanatory power is strong and the significance is 0.00. For user loyalty , user satisfaction has a significant positive correlation with it, which shows that the hypothesis "H 4 : User satisfaction has a positive effect on user loyalty " is valid. The model equation of the independent variable for user loyalty is: user loyalty = 0.4 2 user satisfaction .

5. IPA Comprehensive Analysis

According to the two dimensions of importance and satisfaction of indicators, an IPA two-dimensional matrix analysis can be constructed, where the X-axis represents importance, the Y-axis represents satisfaction score, and the intersection of the two axes is divided into four quadrants (Figure 2). Since the indicators studied in this article are all important indicators, the four quadrants only represent the relative importance, not the absolute importance. High importance only means that it needs to be focused and urgently paid attention to, and low importance does not mean that it can be ignored. It is just a relatively high indicator that can be gradually improved.

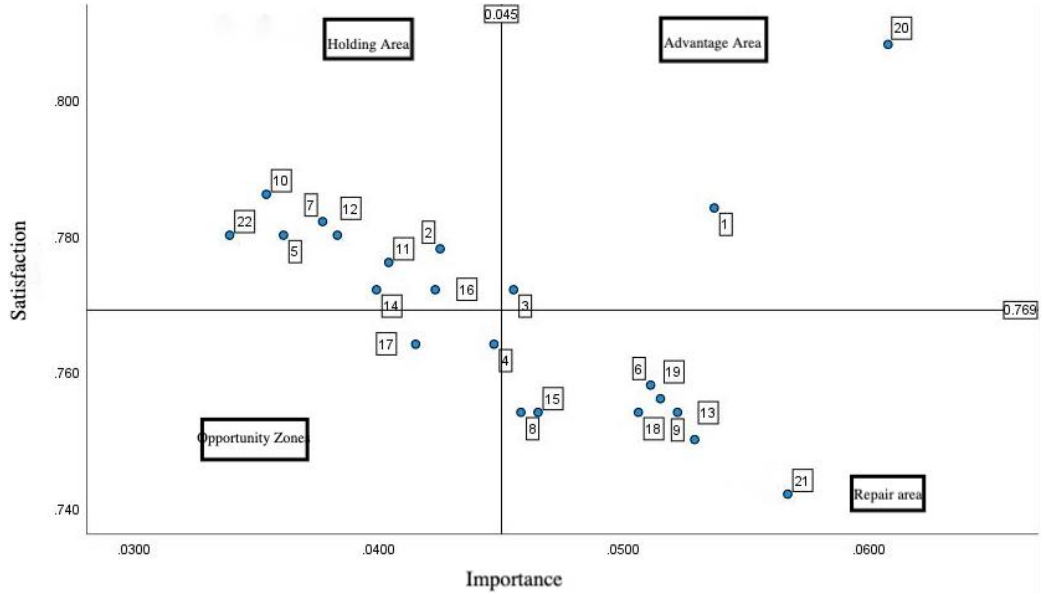

Figure 2. IPA rating matrix

5.1 The First Quadrant Advantage Area

The telecommunications company's 5G user satisfaction survey is the advantage area (Table 14). The importance score of the indicators in this quadrant is higher than 0.045 points, and the satisfaction score is higher than 0.769 points, indicating that users think the indicators in this area are very important and give satisfactory evaluations. The indicators in this area play an important role in improving user satisfaction and are the advantages of telecommunications companies' 5G . Telecommunications companies should pay attention to and develop indicators in this area.

Table 14. Indicators of the first quadrant advantage area

area	Serial number	Title	Level 3 indicators	Secondary indicators
Quadrant 1	1	Q3	Overall corporate image	User expectations
	3	Q5	Whether it meets expectations	User expectations

5.2 Second Quadrant Holding Area

The IPA analysis chart of the 5G user satisfaction survey of telecommunications companies is the retention area (Table 15). The importance score of the indicators in this quadrant is less than 0.045 points, that is, users do not attach much importance to the indicators in this area; the satisfaction score is higher than 0.769 points, indicating that customers have given satisfactory evaluations. The indicators in this area should be maintained. Telecommunications companies do not need to increase the cost and attention of the indicators in this area, and should invest more energy in the indicators that users value.

Table 15. Second quadrant advantage area indicators

area	Serial number	Title	Level 3 indicators	Secondary indicators
Second Quadrant	2	Q4	Trust level	User expectations
	5	Q9	Voice call quality	Quality Perception
	7	Q13	TV Quality	Quality Perception
	10	Q19	Online business hall service	Quality Perception
	11	Q21	Customer service hotline	Quality Perception
	12	Q23	Satisfaction with tariff	Value Perception

	14	Q25	Comparison with competitors, satisfaction with tariffs	Value Perception
	16	Q27	Company satisfaction	Customer satisfaction
	twenty two	Q33	Complaint handling results	User Complaints

5.3 The Third Quadrant Opportunity Zone

The third quadrant in the IPA analysis chart of the 5G user satisfaction survey of telecommunications companies is the opportunity zone (Table 16). The importance score of the indicators in this quadrant is less than 0.045 points, which means that users do not attach much importance to the indicators in this area; the satisfaction score is less than 0.769 points, indicating that customers give a low evaluation of satisfaction. The indicators in this area are opportunities for the development of telecommunications companies. Telecommunications companies need to increase the cost and attention of indicators in this area and should invest more energy in indicators in this area.

Table 16. Quadrant III Opportunity Zone Indicators

area	Serial number	Title	Level 3 indicators	Secondary indicators
The third quadrant	4	Q7	Data plan quality	Quality Perception
	17	Q28	Continue to consume	User loyalty

5.4 Fourth Quadrant Maintenance Area

The fourth quadrant in the IPA analysis chart of the 5G user satisfaction survey of telecommunications companies is the maintenance area(Table 17). The importance score of the indicators in this quadrant is higher than 0.045 points, that is, users attach great importance to the indicators in this area; the satisfaction score is lower than 0.769 points, indicating that customers give a satisfactory evaluation below the average. The indicators in this area should be improved quickly. Telecommunications companies need to not only increase the cost and attention of the indicators in this area, but also focus on investing more energy in the indicators in this area.

Table 17. Fourth quadrant maintenance area indicators

area	Serial number	Title	Level 3 indicators	Secondary indicators
Quadrant 4	6	Q11	Broadband quality	Quality Perception
	8	Q15	Two-way broadband quality	Quality Perception
	9	Q17	Business Hall Services	Quality Perception
	13	Q24	Satisfaction with the matching between tariff and service	Value Perception
	15	Q26	Overall satisfaction with the package	Customer satisfaction
	18	Q29	Recommend	User loyalty
	19	Q30	Change operator?	User loyalty
	twenty one	Q32	complaint	User Complaints

6. Conclusion

This study explores the influencing factors and improvement paths of China Telecom's 5G user satisfaction. Based on the results of regression analysis, this paper verifies four hypotheses and reveals the relationship between user expectations, quality perception, value perception, user satisfaction, and loyalty. User expectations have a significant positive impact on quality perception (H1 is verified); quality perception and user expectations jointly have a positive impact on value perception (H2 is verified); while user satisfaction is jointly affected by user expectations, quality perception, and value perception, and the impact of quality perception and value perception on satisfaction is more significant (H3 is verified); finally, user satisfaction and user complaints have an important positive effect on user loyalty (H4 is verified).

For the advantage area, continue to maintain and optimize the existing advantages; for the maintenance area, appropriately reduce resource investment; for the opportunity area, strengthen improvement and enhance user perception; for the maintenance area, focus on solving problems and improving user satisfaction in key areas.

Through scientific analysis and targeted improvement measures, China Telecom can better meet user needs, improve user loyalty, and thus gain a larger market share in the fierce market competition.

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