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Research on the influence of Service quality, passenger satisfaction and passenger loyalty on Fuzhou Metro Line 1

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ABSTRACT. *This paper takes Fuzhou Metro Line 1 as the research object, and concludes that the six dimensions of service quality have a significant positive impact on passenger satisfaction and passenger loyalty, except comfort. It is proposed to strengthen the visual construction of the subway and optimize the guiding signs, improve the efficiency of the access gates and optimize the surrounding environment information, strengthen personnel training and optimize the security inspection process, respond to passenger inquiries and improve passenger complaints, rationally plan vehicle connections and try to meet passenger demand. And other suggestions enhance passenger satisfaction and loyalty to Fuzhou Metro Line 1.*

KEYWORDS: *Fuzhou Metro; Service Quality; Passenger Satisfaction; Passenger Loyalty*

1. Introduction

With the implementation of the strategic objectives of the economic zone on the west side of the Straits, the scale of Fuzhou's urban area has continued to expand, and the residential areas of the citizens have continued to migrate to the suburbs, and people's travel space has become larger and larger. Therefore, the development of transportation is the basis for expanding the urban area. At the same time, along with the increase of traffic pressure in Fuzhou City, the development of Fuzhou Metro Rail Transit will solve the problem of traffic congestion in Fuzhou City, improve the quality of life and environmental construction of Fuzhou citizens, and adjust the urban layout structure and industrial structure. It is of great significance to the sustainable development of Fuzhou's urban economy. Therefore, this paper will study the services of Fuzhou Metro.

2. Model building

This paper reviews the past studies on service quality, customer satisfaction and customer satisfaction [1-2]. Based on the SERVPERF service quality modification model proposed by Cronin and Taylor (1992) [3]. This paper takes empirical study on the factors influencing customer loyalty of DiDi taxing [4] and Research on Customer Loyalty to Automotive Dealer [5] as references, and Combining the characteristics of Fuzhou Metro to increase the comfort dimension to construct this research model. As shown in Figure 1:

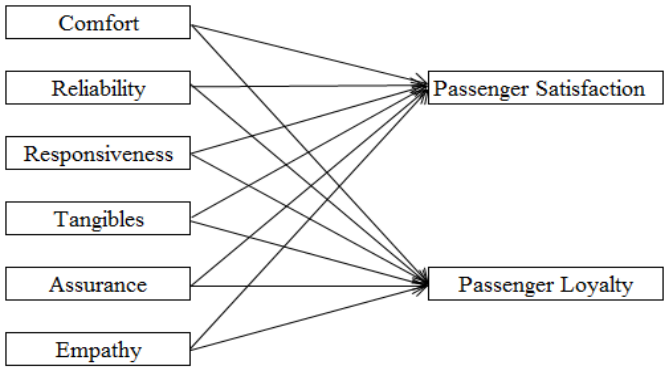

Figure.1 Research model of the influence of passenger satisfaction and passenger loyalty on service quality of Fuzhou metro line 1.

2.1 Research hypothesis

This study makes the following assumptions about the relationship between service quality dimensions and passenger satisfaction:

***H1**: Tangibles has a significant positive impact on passenger satisfaction.*

***H2**: Reliability has a significant positive impact on passenger satisfaction.*

***H3**: Empathy has a significant positive impact on passenger satisfaction.*

***H4**: Responsiveness has a significant positive impact on passenger satisfaction.*

***H5**: Assurance has a significant positive impact on passenger satisfaction.*

***H6**: Comfort has a significant positive impact on passenger satisfaction.*

In addition, Tang (2013) [6] studied the tangibility, reliability, guarantee, care and responsiveness of service quality of supermarkets, and used multiple items to measure customer satisfaction. The study confirmed that service quality of supermarkets had a positive impact on customer loyalty. Zhou (2018) [7]

constructed three dimensions of guarantee, responsiveness and fairness of returned goods service quality of enterprises based on the basis of predecessors and combined with the characteristics of online shopping returns. Therefore, this study makes the following assumptions about the relationship between service quality and passenger satisfaction:

H7*: Tangibles has a significant positive impact on passenger loyalty.*

H8*: Reliability has a significant positive impact on passenger loyalty.*

H9*: Empathy has a significant positive impact on passenger loyalty.*

H10*: Responsiveness has a significant positive impact on passenger loyalty.*

H11*: Assurance has a significant positive impact on passenger loyalty.*

H12*: Comfort has a significant positive impact on passenger loyalty.*

Furthermore, Lu (2007) [5] chose automobile service industry as the research object to explore the formation mechanism of customer loyalty in this industry by observing the relationship between customer satisfaction, customer value, relationship trust, conversion cost and customer loyalty. Zhou (2017) [8] on the basis of SERBQUAL scale of the five attributes and customer satisfaction scale, in combination with the practical situation of drops of travel services, build the responsiveness, reliability, service quality, assurance, tangibles and caring 15 measurement and conversion cost, satisfaction and loyalty. Therefore, this study makes the following assumptions about the relationship between passenger satisfaction and passenger loyalty:

H13*: passenger satisfaction has a significant positive impact on passenger loyalty.*

3. *Questionnaire design and survey design*

SERVPERF scale was used in this paper, and the questionnaire was designed in combination with the characteristics of Fuzhou metro and previous studies. The questionnaire is divided into four parts. The first part measures the quality of service, with a total of 22 questions. The second part measures passenger satisfaction, which includes three questions. The third part measures passenger loyalty, with 5 questions. The fourth part is the basic information of the interviewees. Except for the fourth part, all questions in this questionnaire are measured by LIKERT five-point scale, and each question is given a quantitative score of 1-5.

The purpose of this study is to explore the impact of the quality of service on Fuzhou Metro Line 1 with passenger satisfaction and passenger loyalty. Based on this survey, this study defines the questionnaire as follows: This study is for passengers on the Fuzhou Metro Line 1. In order to ensure the impartiality and accuracy of the investigation, employees or family members of companies such as subways, buses, and taxis are excluded to avoid the true reliability of the survey data due to factors such as emotional bias and competition.

4. Data analysis

4.1 Descriptive statistical analysis

The questionnaire survey used online survey and on-site field distribution. A total of 547 questionnaires were distributed, and 523 questionnaires were actually collected, with a recovery rate of 95.61%. After the recycling, the accuracy of the questionnaire is checked and checked, such as whether there is any contradiction before and after, and whether the filling is complete. 79 questionnaires were excluded from the restricted population and more questions, and 444 valid questionnaires were obtained, accounting for 84.89% of the total sample size.

In the sample of this questionnaire survey, the age of questionnaire visitors is mainly 19-35 years old, accounting for 37.6%. The average monthly income of the questionnaire visitors is mainly 3000-6001 Yuan, accounting for 38.3% The occupation of interviewees is mainly employees of the company, accounting for 57.2%. The educational background of respondents to the questionnaire was mainly bachelor's degree, accounting for 27%. The purpose of respondents to the questionnaire to travel by subway is mainly to commute, accounting for 30.4%.

Table.1 Reliability analysis

	Clonbach Alpha	Number
The overall questionnaire	0.946	31

The greater the reliability coefficient is the greater the confidence of the measurement. We can see that the Clonbach Alpha coefficient is 0.962, indicating that the inherent consistency of the scale is very good.

Table.2 KMO and Bartlett spherical test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.926
Bartlett's Test of Sphericity	Approx. Chi-Square	10369.642
	df	465
	Sig.	0.000

First, the KMO measurement method and Bartlett's spherical test method are used to determine whether the data is suitable for factor analysis. The KMO value of 0.926 ≧ 0.90 is excellent. The Bartlett's spherical test card has a value of 10369.642, the degree of freedom is 465, and $p < 0.001$ is very significant, indicating that the scale is suitable for factor analysis.

4.2 Factor analysis

The service quality scale extracted a total of six factors with eigenvalues greater

than one including comfort, tangibility, reliability, responsiveness, assurance, and care. The cumulative variance explained by these six factors accounted for 78.083% of the total variance, which is greater than 50%, indicating that the six factors can reflect most of the information comprehensively. It is appropriate to extract these six factors.

4.3 Regression analysis

The service quality, passenger satisfaction and passenger loyalty of Fuzhou Metro Line 1 have good reliability and validity. The relationship model between the service quality of Fuzhou Metro Line 1 and passengers' loyalty is transformed into a statistical model, as follows:

Model 1: Predictors are Empathy, Comfort, Responsiveness, Tangibles, Assurance, Reliability and dependent variables for Passenger Satisfaction.

Table.3 Regression coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.184	.125		-1.472	.142
	Comfort	.038	.022	.051	1.733	.084
	Reliability	.187	.027	.229	6.829	.000
	Responsiveness	.149	.021	.203	6.971	.000
	Tangibles	.207	.026	.243	7.875	.000
	Assurance	.242	.027	.282	9.060	.000
	Empathy	.172	.031	.177	5.531	.000
a. Dependent Variable: Passenger Satisfaction						

R is the overall relationship between the dependent variable and all independent variables, and can measure the fit of the regression equation. The Adjusted R Square is 0.703, indicating that the fit of the regression equation is acceptable. The F value is 175.594, and the significance is 0.000. Less than 0.001 indicates that the overall regression effect reaches a significant level, which means that all independent variables have a significant linear effect on the overall customer satisfaction, and the next step can be analyzed. The significance of comfort is greater than 0.05, and the significance test is not passed.

It can be seen from the coefficient size that the Assurance coefficient is the largest, so the Assurance the greatest impact on customer satisfaction, followed by Tangibles, Reliability and Empathy, and the least affected is Responsiveness.

Model 2: Predictors are Empathy, Comfort, Responsiveness, Tangibles, Assurance, Reliability and the dependent variable is Passenger Loyalty.

Table.4 Regression coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.354	.119		2.983	.003
	Comfort	.040	.021	.059	1.918	.056
	Reliability	.151	.026	.207	5.816	.000
	Responsiveness	.138	.020	.212	6.855	.000
	Tangibles	.218	.025	.286	8.756	.000
	Assurance	.133	.025	.173	5.254	.000
	Empathy	.192	.029	.221	6.523	.000
a. Dependent Variable: Passenger Loyalty						

R is the overall relationship between the dependent variable and all independent variables, and can measure the fit of the regression equation. The Adjusted R Square is 0.666, indicating that the fit of the regression equation is acceptable. The F value is 148.363, and the significance is 0.000. Less than 0.001 indicates that the overall regression effect reaches a significant level, which means that all independent variables have a significant linear effect on the overall customer satisfaction, and the next step can be analyzed. The significance of comfort is greater than 0.05, and the significance test is not passed.

It can be seen from the coefficient size that the Tangibles coefficient is the largest, so the Tangibles the greatest impact on customer satisfaction, followed by Empathy, Reliability and Responsiveness, and the least affected is Assurance.

Model 3: The predictor variable is Passenger Satisfaction and the dependent variable is Passenger Loyalty.

Table.5 Regression coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.362	.111		12.308	.000
	Passenger Satisfaction	.647	.029	.724	22.078	.000
a. Dependent Variable: Passenger Loyalty						

R is the overall relationship between the dependent variable and all independent variables, and can measure the fit of the regression equation. The Adjusted R Square is 0.523, indicating that the fit of the regression equation is acceptable. The F value is 487.422, and the significance is 0.000. Less than 0.001 indicates that the overall regression effect reaches a significant level, which means that passenger satisfaction has a significant linear effect on passenger loyalty, and the next step can be analyzed.

5. Results

Table.6 Model hypothesis test results

hypothesis	Test result	hypothesis	Test result	hypothesis	Test result
H1	Established	H6	Unestablished	H11 .	Established
H2	Established	H7 .	Established	H12 .	Unestablished
H3	Established	H8 .	Established	H13	Established
H4	Established	H9	Established		
H5	Established	H10 .	Established		

This paper takes Fuzhou Metro Line 1 as the research object, and based on the obtained data, using SPSS23.0 to analyze the data, it has certain scientific and realistic. By verifying the 13 hypotheses in the model and summarizing their hypothesis tests as shown in Table 9 below.

5.1 Suggestions for the promotion of Fuzhou Metro Line 1

(1) Strengthen the visual construction of the subway and optimize the guiding logo

It is suggested that in the future construction of the subway in the future, combined with the actual location of each site, the special culture will be integrated into each site to enhance the spread of traditional culture. It is recommended to optimize the dressing of subway service personnel, introduce advanced facilities and equipment, and increase the passenger service experience. It is recommended to optimize the signage. The subway service personnel should regularly inspect the signs and report the problem signs in time.

It is suggested to continuously optimize the guidance sign, provide clear, easy to understand, correct guidance system and use guidance for commission, and reduce the blindness of passengers.

(2) Improve the efficiency of the gate and optimize the surrounding environmental information

It is suggested to optimize and upgrade the sensitivity of the ticket gate to shorten the waiting distance in and out of the ticket gate.It is suggested to abandon non-mainstream payment methods and cooperate with Internet enterprises with mainstream payment methods to improve the efficiency of ticket gate

(3) Strengthen personnel training and optimize security inspection process

It is recommended that Fuzhou Metro strengthen the management of outsourced service personnel. The outsourcing company that should supervise cooperation should regularly train responsible personnel and implement a performance appraisal system to constrain the behavior of security personnel. It is recommended to unify the safety standards of articles in the security inspection process, publicize the

prohibited items that are prohibited from being carried, and strictly control the prohibited items. It is recommended to have a small basket in the security inspection process to place valuables for passengers and avoid unnecessary disputes.

(4) Responding to passenger inquiries in a timely manner and improving passenger complaints

It is recommended that Fuzhou Metro should focus on the observation ability and adaptability of the selection of personnel in the selection of personnel, and promptly respond to passengers' inquiries to meet the needs of passengers. It is recommended to improve the passenger complaint mechanism, classify the complaints of passengers, answer them by professional personnel, and handle complaints in a timely and effective manner.

(5) Reasonably planning vehicle connections and trying to meet passenger demand

In the future route design, Fuzhou Metro is recommended to rationally plan the interior design of the subway, transfer hub, design passenger transfer route, and construct fenced bicycle and electric vehicle parking points of a certain scale to improve traffic density and facilitate passenger travel. It is recommended that subway service personnel provide timely assistance to special passengers, follow up on passenger complaints and properly handle and feedback, continuously improve services, and improve passenger satisfaction with Fuzhou Metro. Conclusion Sixth. Conclusion

6. Conclusion

From the research results of this paper, it can be seen that all dimensions of service quality, in addition to comfort, have a significant positive impact on passenger satisfaction and passenger loyalty. According to the results of empirical research, the improvement suggestions of Fuzhou Metro service quality are proposed from five aspects: Empathy, Responsiveness, Tangibles, Assurance, Reliability. However, this study is limited by the process of sending out the questionnaire, because the subjects are more inclined to select young passengers to carry out the questionnaire survey, so it will cause some deviation to the results of the survey.

References

[1] J.Y. Jiang(2018). A study on the satisfaction of Service quality in Colleges and Universities in the New era-taking an empirical Survey of a University in Central China as an example. Forum on Contemporary Education, vol.21, no.4, p.93-99.

[2] X. Jin, Y. Wang, T.Y. Ma, et al (2018). Study on the relationship between Job stress, Medical Service quality and Job satisfaction of Medical staff in Public Hospitals in China. Health management in China, vol.35, no.9, p.705-709.

[3] J.J. Cronin, S.A. Taylor (1992), Measuring Service Quality: A Reexamination and Extension. Journal of Marketing, vol.56, p.55-68.
[4] T.Y. Ma(2018). Empirical study on the factors influencing customer loyalty of DiDi taxing. Henan Normal University.
[5] J.H. Lu(2007). Research on Customer Loyalty to Automotive Dealer. Wuhan University of Technology.
[6] Y.W. Tang (2013). An empirical study on the impact of supermarket service quality on customer loyalty. Hunan University.
[7] Y.H. Zhou (2017). Research on the Impact of Online Shopping Return Service Quality on Customer Loyalty. China Collective Economy, vol.36, p.58-59.
[8] X.G. Zhou, X. Chen, Y.M. Liu, et al (2017). Empirical Study on the Impact of Service Quality on Customer Satisfaction and Loyalty in Drip Travel. Journal of Statistics & Information Technology, vol.32, no.8, p.117-122.