

## **Satisfaction Survey of WeChat Mini Program Based on CCSI Model**

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### **Abstract**

At present, WeChat's Mini Program focuses on commercialization and new retail sales in China, but there is no related research in foreign countries. The research on customer satisfaction is blank. This paper adopts the literature analysis method and questionnaire survey method in the research method. Based on the user of WeChat's Mini Program, the related theory of user satisfaction and the Chinese Customer Satisfaction Model (CCSI) are applied. Background and status quo of WeChat's Mini Program development are analyzed first along with the user satisfaction survey analysis and SPSS 24.0 software to analyze and validate the collected data. Differences among the analysis dimensions of user satisfaction of the WeChat's Mini Program are found to modify the model, and suggestions are proposed thereafter.

**Keywords:** WeChat Mini Program, Customer Satisfaction, China Customer Satisfaction Model (CCSI)

### **1. Foreword**

WeChat Mini Program is an emerging concept formally proposed and launched in 2017 by Xiaolong Zhang, Senior Vice President of Tencent. After more than a year of development, as of April 2019, WeChat Mini Program has developed into one of the three pillars of WeChat. Benefits from and cooperation with various types of merchants have made the concept of "Internet plus" in-depth implementation of every aspect of WeChat.

Applications of the WeChat Mini Program can reach a wide range of industries. Any individual or organization can apply for registration and develop mini programs. Simultaneously, the application of mini programs also includes games, business, applications, and other aspects, which bring a variety of employment opportunities. The benefits of this cannot be ignored. WeChat Mini Program in China's future is obvious. The volume of WeChat user groups has rapidly transformed into that of the WeChat Mini Program, relying on WeChat's huge users. However, due to the short development time, current academic researches focus only on the "future changes" of the WeChat Mini Program, such as its impact on new retail, its impact on online integration interaction of the current enterprise, its possible bias future, or its focus on the direction of development. However, studies of the WeChat Mini Program in the customer satisfaction aspect are blank. Such a rapid development of the WeChat Mini Program should not rely only on the own flow of WeChat. There should be other aspects, such as user experience, worthy of researches, and discussion.

Academia has paid very little attention to the study of mini program satisfaction, but the pace of development in other fields is very rapid. As of April 2019, WeChat Mini Programs rely on WeChat's huge user base, quickly turned most of the WeChat users into

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real mini program users through the channel of early mini game publicity. The emergence and rapid capture of the market have made the WeChat Mini Programs monopoly of the consumer market because of insufficient similar competitors in the current market.

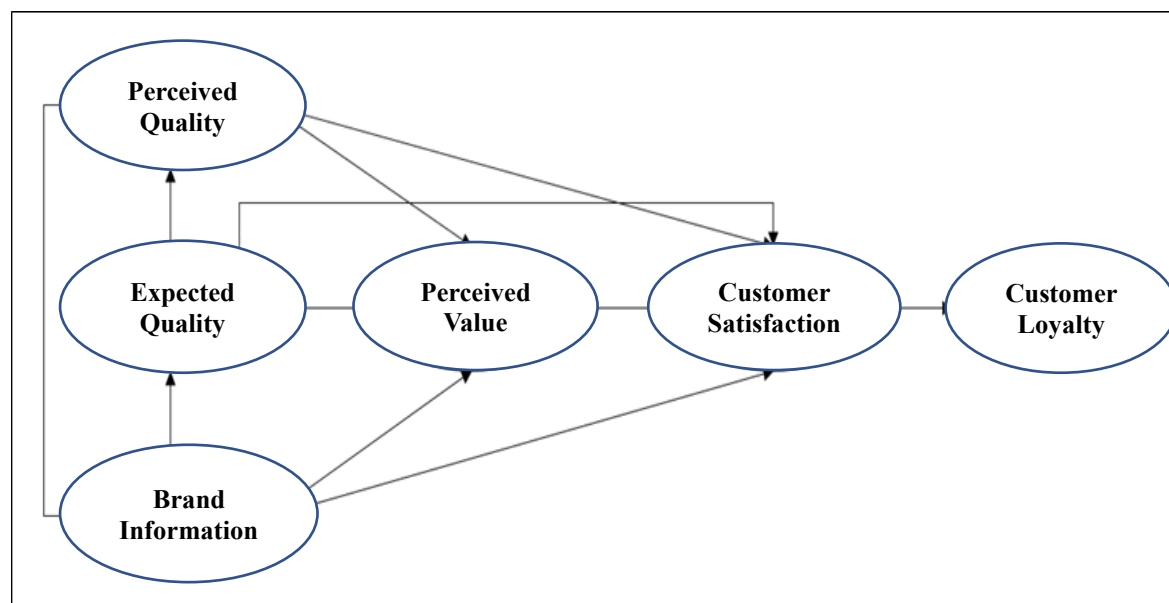
## 2. Literature Review

### 2.1 Models and Empirical Researches of Customer Satisfaction

#### 2.2.1 Relevant Theoretical Models of Customer Satisfaction

In June 2000, China began to study the topic of the satisfaction model belonging to our country. The China Customer Satisfaction Index (CCSI) model aligns with China's contemporary national conditions and has the world's advanced CCSI (Anonymous, 2005) (Figure 1).

The CCSI model is based on the CSD mechanism and possesses 6 structural variables, namely, expected quality, perceived value, perceived quality, brand information, customer satisfaction, and customer loyalty. Compared to the ACSI model, the CCSI model adds brand information and removes the customer complaint variable. According to the above analysis, the CCSI model integrates the U.S. user satisfaction index method, which is most suitable for the characteristics of various industries in China. The study area's characteristics and specific situation are the keys to the evaluation, whether for studying consumer behavior or marketing. This research mainly takes the CCSI model for verification basing on the above considerations.



Source: The authors, April 2019

Figure 1. Basic Model of Customer Satisfaction Index (CCSI) in China (Tang et al., 2009)

#### 2.2.2 Empirical Researches of China Customer Satisfaction Index Model (CCSI)

Due to the short research time of the China Customer Satisfaction Index Model (CCSI), the research application is still in the reference and reference stage, as shown in Table 1.

Table 1. Summary of empirical research literature

Empirical research	
Sun (2004)	Index system of customer satisfaction evaluation in the mobile phone industry based on CCSI
Jiang (2007)	Customer's focus on search engines (Baidu & Yahoo)
Jin (2009)	Analyzing the influence factors of passenger satisfaction using CCSI model
Wu (2012)	Building Subway Passenger Satisfaction Index MPSI based on CCSI
Yu (2012)	Chenxi Express customer satisfaction assessment index
Zhao (2014)	Establish the hotel cultural evaluation index system of 45 four-level indicators based on CCSI

Source: The authors, April 2019

### 3. Research Methodology

#### 3.1 Research Models and Research Assumptions

The China Customer Satisfaction Index Model (CCSI) is based on the psychological experience of consumer and purchase according to the causal relationship between satisfactions. Based on the CCSI, this paper verifies the customer loyalty of WeChat Mini Programs from the consumer's point of view, which includes six potential variables:

##### (1) WeChat Mini Program Brand Image

Brand image and brand complement each other, and the image reflects the strength and essence of the brand. Brand image is a user's perception of the known brand and association, which is each brand user's behavior. User's association with the brand can be obtained through a corporate-controlled channel or through a non-enterprise-controlled one (Li, 2006).

##### (2) WeChat Mini Program Expected Quality

WeChat Mini Program expected quality is the customer's expected satisfaction with the service provided by WeChat Mini Program. Before the users acquire or use a product, they will have a psychological expectation of the experience, service, or goal that the product can bring to the user. The expected quality of service is an important prerequisite that affects the customer's perception of the overall quality of service (Dong, 2013).

##### (3) WeChat Mini Program Perceived Quality

WeChat Mini Program perceived quality is the purpose to be achieved by the customer when using the WeChat Mini Program and a reflection of the demand situation to be met. Before purchasing or using a product, users will actively obtain information about the target product. The higher the value and the higher the price, the more information is needed, and vice versa. Therefore, the most important task of enterprise marketing activities is to improve the quality of consumer perception of products through different means (Wang et al., 2007).

##### (4) WeChat Mini Program Perceived Value

Consumers want to realize their value during a transaction. The essence of consumer value is consumer perception, that is, the subjective perception of the process and results of interaction with the WeChat Mini Program. The latter refers to the value that an enterprise believes its service or product can provide to consumers. It belongs to the internal cognitive orientation. The former refers to the value judgment of the service or

product provided by the enterprise. It belongs to the external consumer's cognitive orientation (Han, 2015).

### **(5) WeChat Mini Program Customer Satisfaction**

WeChat Mini Program customer satisfaction is determined based on comparing the actual status of the product perceived by the users and the users' expectations. If the WeChat Mini Program's experience does not meet the user's requirements, the user will feel dissatisfied with it. If the experience is as expected, the user is satisfied. If the experience exceeds the user's initial assumptions, the user will be delighted.

### **(6) WeChat Mini Program Customer Loyalty**

WeChat Mini Program customer loyalty refers to the customer's attachment or love to WeChat Mini Program products or services. It is mainly through the user's preference, use condition, and perception preference of it. The preference is shown as the user's recognition of its image and uses in all aspects. The use condition is willing to use repeatedly and will not use other products of the same type. The perception preference is reflected in the user's expectation of its future update, version experience upgrade, etc. Therefore, the hypotheses recommended by this study are:

- H1: Brand image has a significant impact on perceived quality
- H2: Brand image has a significant impact on expected quality
- H3: Brand image has a significant impact on perceived value
- H4: Brand image has a significant impact on customer satisfaction
- H5: Expected quality has a significant impact on perceived value
- H6: Expected quality has a significant effect on perceived quality
- H7: Expected quality has a significant impact on customer satisfaction
- H8: Perceived mass has a significant impact on perceived value
- H9: Perceived quality has a significant impact on customer satisfaction
- H10: Perceived value has a significant impact on customer satisfaction
- H11: Customer satisfaction has a significant impact on customer loyalty

## **3.2 Questionnaire Design**

During the actual survey, the 5-level Likert scale was used to measure changes in attitude from 1 to 5 where 1 means very disagree, 2 means disagree, 3 means general, 4 means agree, 5 means very agree. To ensure the reasonable modification of the questionnaire-related items and the overall quality of the questionnaire, the statement is adjusted on the problem items that are not clearly expressed or difficult to understand through interviews and communication with WeChat Mini Programs users. The specific questions and contents of the scale are shown in Table 2.

## **3.3 Survey Program**

According to the research questionnaire designed by the CCSI model, the research group who has used WeChat Mini Program is given through online and offline distribution channels. An online questionnaire is distributed and collected mainly through the mini program of the Questionnaire Star. The specific implementation method is by referring to the questionnaires of Xiao (2016), Chen (2012), and Wang (2004) for repeated modification and publishing the final version of the revised questionnaire on the Questionnaire Star. The questionnaire was named "Research Questionnaire on The Impact Factors of WeChat Mini Program Satisfaction Based on CCSI Model," and the online

questionnaire was distributed through WeChat, QQ, and other online platforms.

Table 2. Questionnaire for WeChat Mini Program based on CCSI satisfaction factors

Dimensions	Questions
Brand image	1.Brand logo of WeChat Mini Program (i.e., WeChat) is easy to identify 2.The information service promised to the user can be accurately delivered 3.For protecting user's benefits, user information cannot be used without authorization 4.WeChat Mini Program brand image is trustworthy
Expected quality	1.Using WeChat Mini Program will give you more experience than expected 2.Using WeChat Mini Program is more convenient than previously expected 3.The quality of service provided by the WeChat Mini Program is very high 4.All the services provided by WeChat Mini Program are very good 5.Overall, your expectations of WeChat Mini Programs are basically met in the process of use
Perceived quality	1.The operation interface of the WeChat Mini Program is simple and smooth 2.The payment system of the WeChat Mini Program is convenient and perfect 3.Using WeChat Mini Program can make it easier for you to get the services you need 4.The process of obtaining the required services from using the WeChat Mini Program is generally safe 5.There is no flashback or software collapse when using WeChat Mini Program
Perceived value	1.WeChat Mini Program can make it easier for you to get the same service 2.WeChat Mini Program can let you spend the same money to get better service 3.WeChat Mini Program can make you more time-saving when you get the same service 4.WeChat Mini Program lets you spend less time finding your favorite products and services 5.You prefer to spend the same amount of time and money using WeChat Mini Programs than using other APP services
Customer satisfaction	1.You are generally satisfied with the WeChat Mini Program 2.Experience from using WeChat Mini Program meets your expectation 3.You are willing to give WeChat Mini Program a high rating
Customer loyalty	1.You will continue to use WeChat Mini Program 2.You will recommend WeChat Mini Program to your friends and family 3.You are willing to promote WeChat Mini Program to others

Source: The authors, April 2019

The questionnaire was conducted for the people interviewed by different occupations and ages throughout the region and was distributed online in late March 2019. We successfully collected 506 feedback questionnaires from all over the country, of which 506 were valid. Offline questionnaires were distributed in schools, Xiamen urban areas, and other places for respondents of different occupations and age groups. It was also issued in late March 2019. 34 feedback questionnaires were successfully collected, and all of them were valid. A total of 540 feedback questionnaires were received online and offline, of which 540 were valid questionnaires.

## 4. Analysis of Information

### 4.1 Descriptive Statistical Analysis

#### 4.1.1 Sample Distribution

This part mainly includes two parts: basic information of WeChat Mini Program users and descriptive statistical analysis of WeChat Mini Program use. The results of the first part of the analysis are shown in Table 3.

Table 3. Basic information statistics of the study sample

Demographic changes		Percentage valid %	N
Gender	Male	37.96%	205
	Female	62.04%	335
Age	Under 18	1.11%	6
	18-25	73.89%	339
	26-30	7.78%	42
	31-40	8.52%	46
	41-50	7.41%	40
	51-60	0.74%	4
	Over 60	0.56%	3
Occupation	Students	53.52%	289
	Corporate staff	12.59%	68
	Civil service	2.22%	12
	Institutions	13.70%	74
	Freelancer	5.74%	31
	Individual merchants	3.33%	18
	Unemployed/Retiree	2.04%	11
	Others	6.85%	37
Education	High school and below	10.93%	59
	Junior college	10.37%	56
	Undergraduate	74.44%	402
	Master	2.96%	16
	Ph.D. and above	1.30%	7
Personal monthly income	Under 2,000	40%	216
	2,001–4,000 yuan	26.11%	141
	4,001–6,000 yuan	19.81%	107
	6,001–8,000 yuan	7.59%	41
	8,001–10,000 yuan	2.96%	16
	Over 10,000	3.52%	19

Source: The authors, April 2019, N =540

The sample distribution in this study was 62.04% for females and 37.96% for males. In terms of age distribution, groups aged 18-25 accounted for 73.89% of the sample, which showed a younger trend like WeChat's 2018 user data. In terms of occupation and education level, the students' sample accounted for a relatively large proportion of the group because of the limitations of online questionnaire distribution. The population surveyed was generally higher educated, and the population below undergraduate degree only accounted for 21.3% of the sample. In terms of monthly personal income, most of the population was \$2,000 and below and \$2,001-\$4,000, with the two parts accounting for 66.11% of the total sample.

#### 4.1.2 Statistical Analysis of the Use of WeChat Mini Program

In addition to the problems related to demography characteristics, the study also set the question of the frequency of use of the WeChat Mini Program in the questionnaire, as shown in Table 4.

Data analysis from the collected questionnaires found that WeChat Mini Program users WeChat Mini Programs are in a more extreme state, with 42.78% occasionally temporarily using the program. In comparison, only 28.7% use it almost daily. But overall, 57.22% of people used at least 1-2 mini programs a week, which is optimistic from the sample. So the study of increases in satisfaction proceeds.

Table 4. User habits statistical analysis

Question	Question options	Frequency ( N )	Percentage
How often you use WeChat Mini Program per week	Occasional use	231	42.78%
	1-2 times per week on average	79	14.63%
	3-5 times per week on average	75	13.89%
	Almost every day	155	28.70%

Source: The authors, April 2019, N =540

#### 4.2 Reliability Analysis

There are six variables to be verified in this paper, namely, brand image, expected quality, perceived quality, perceived value, customer satisfaction, and customer loyalty. The overall confidence of the questionnaire is tested after the completion of six dimensions. The results of the analysis are as shown in Table 5.

Table 5. Reliability test

Variables	Cronbach's Alpha	Number of questions
Brand image	0.827	4
Expected quality	0.934	5
Perceived quality	0.862	5
Perceived value	0.924	5
Customer satisfaction	0.932	3
Customer loyalty	0.884	3
Questionnaire overall	0.972	25

Source: The authors, April 2019

The results showed that the consistent Cronbach's alpha coefficients for the brand image, expected quality, perceived quality, perceived value, customer satisfaction, and customer loyalty of the questionnaire were very high (above 0.8). This is also true for the overall coefficient of the questionnaire. The brand image dimension has the lowest confidence (0.827), and the expected quality dimension has the highest confidence (0.934). The overall reliability of the questionnaire was also very high (0.972). It indicates that the reliability of each variable in this study and the overall reliability of the questionnaire were very good.

### 4.3 Validity Analysis

Validity analysis means that it is possible to obtain whether the result is suitable for factor analysis based on KMO values. Six parts of validity and factor analysis need to be tested in this paper.

#### 4.3.1 Analysis of Brand Image Factors

In this paper, the validity of the questionnaire is tested by factor analysis. As can be seen from Table 6, the brand image scale KMO is 0.789 ( $0.7 < \text{KMO} < 0.8$ ), and the Bartlett's spherical test  $\chi^2$  value also reached a significant level. The results of the analysis can be shown in Table 6.

Table 6. Brand image scale KMO and Bartlett's spherical test

KMO value	0.789	
Bartlett's spherical test	Approximate $\chi^2$ value	855.658
	Degree of Freedom	6
	P value	0.000

Source: The authors, April 2019

After conducting a factor analysis of the 4 topics of the brand image scale, the cumulative interpretation variation of "brand image" is 66.667% (>50%), indicating that the scale is highly explanatory.

Table 7. Analysis of brand image scale factors

Question	Factor loading
	1
1.Brand logo of WeChat Mini Program (i.e., WeChat) is easy to identify	0.741
2.The information service promised to the user can be accurately delivered	0.887
3.For protecting user's benefits, user information cannot be used without authorization	0.774
4.WeChat Mini Program brand image is trustworthy	0.856
Feature values	2.6670
Explain the amount of variation ( % )	66.667
Cumulative interpretation of the amount of variation ( % )	66.667

Source: The authors, April 2019



#### 4.3.2 Expected Quality Factor Analysis

In this paper, the validity of the questionnaire is tested by factor analysis. As shown in Table 8, the expected quality scale KMO is 0.877 ( $0.8 < \text{KMO} < 0.9$ ), and the Bartlett's spherical test  $\chi^2$  value also reached a significant level. The results of the analysis can be shown in Table 8.

Table 8. Expected quality scale KMO and Bartlett's spherical test

KMO value	0.877	
Bartlett's spherical test	Approximate $\chi^2$ value	2,336.335
	Degree of Freedom	10
	P value	0.000

Source: The authors, April 2019

After conducting a factor analysis of the 5 topics of the expected quality scale, the cumulative interpretation variation of "expected quality" is 79.336% ( $>50\%$ ), indicating that the scale is highly explanatory.

Table 9. Analysis of expected quality scale factors

Question	Factor loading
	1
1.Using WeChat Mini Program will give you more experience than expected	0.842
2.Using WeChat Mini Program is more convenient than previously expected	0.894
3.The quality of service provided by the WeChat Mini Program is very high	0.930
4.All the services provided by WeChat Mini Program are very good	0.892
5.Overall, your expectations of WeChat Mini Programs are basically met in the process of use	0.894
Feature values	3.9670
Explain the amount of variation ( % )	79.336
Cumulative interpretation of the amount of variation ( % )	79.336

Source: The authors, April 2019

#### 4.3.3 Perceived Quality Factor Analysis

In this paper, the validity of the questionnaire is tested by factor analysis. As can be seen from Table 10, the perception quality table KMO is 0.855 ( $0.8 < \text{KMO} < 0.9$ ), and Bartlett's spherical test  $\chi^2$  value also reached a significant level. The results of the analysis can be shown in Table 10.

Table 10. Perceived quality scale KMO and Bartlett's spherical test

KMO value	0.855	
Bartlett's spherical test	Approximate $\chi^2$ value	1,387.247
	Degree of Freedom	10
	P value	0.000

Source: The authors, April 2019

After conducting factor analysis of the 5 topics of the expected quality scale, the cumulative interpretation variation of “perceived quality” is 66.709% (>50%), indicating that the scale is highly explanatory.

Table 11. Analysis of perceived quality scale factors

Question	Factor loading
	1
1.The operation interface of the WeChat Mini Program is simple and smooth	0.849
2.The payment system of the WeChat Mini Program is convenient and perfect	0.856
3.Using WeChat Mini Program can make it easier for you to get the services you need	0.870
4.The process of obtaining the required services from using the WeChat Mini Program is generally safe	0.847
5.There is no flashback or software collapse when using WeChat Mini Program	0.638
Feature values	3.3350
Explain the amount of variation ( % )	66.709
Cumulative interpretation of the amount of variation ( % )	66.709

Source: The authors, April 2019

#### 4.3.4 Perceived Value Factor Analysis

In this paper, the validity of the questionnaire is tested by factor analysis. As can be seen from Table 12, the perception quality table KMO is 0.880 ( $0.8 < \text{KMO} < 0.9$ ), and Bartlett’s spherical test  $\chi^2$  value also reached a significant level. The results of the analysis can be shown in Table 12.

Table 12. Perceived value scale KMO and Bartlett’s spherical test

KMO value		0.880
Bartlett's spherical test	Approximate $\chi^2$ value	2,087.661
	Degree of Freedom	10
	P value	0.000

Source: The authors, April 2019

After conducting a factor analysis of the 5 topics of the expected quality scale, the cumulative interpretation variation of “perceived value” is 77.140% (>50%), indicating that the scale is highly explanatory.

Table 13. Analysis of perceived value scale factors

Question	Factor loading
	1
1.WeChat Mini Program can make it easier for you to get the same service	0.875
2.WeChat Mini Program can let you spend the same money to get better service	0.874
3.WeChat Mini Program can make you more time-saving when you get	0.919

the same service	
4.WeChat Mini Program lets you spend less time finding your favorite products and services	0.883
5.You prefer to spend the same amount of time and money using WeChat Mini Programs than using other APP services	0.838
Feature values	3.857
Explain the amount of variation ( % )	77.140
Cumulative interpretation of the amount of variation ( % )	77.140

Source: The authors, April 2019

#### 4.3.5 Customer Satisfaction Factor Analysis

In this paper, the validity of the questionnaire is tested by factor analysis. As shown in Table 14, the perception quality table KMO is 0.764 ( $0.7 < \text{KMO} < 0.8$ ), and Bartlett's spherical test  $\chi^2$  value also reached a significant level. The results of the analysis can be shown in Table 14.

Table 14. Customer satisfaction scale KMO and Bartlett's spherical test

KMO value		0.880
Bartlett's spherical test	Approximate $\chi^2$ value	1,347.085
	Degree of Freedom	3
	P value	0.000

Source: The authors, April 2019

After conducting factor analysis of the 3 topics of the expected quality scale, the cumulative interpretation variation of "customer satisfaction" is 88.173% ( $>50\%$ ), indicating that the scale is highly explanatory.

Table 15. Analysis of customer satisfaction scale factors

Question	Factor loading
	1
1.You are generally satisfied with the WeChat Mini Program	0.944
2.Experience from using WeChat Mini Program meets your expectation	0.944
3.You are willing to give WeChat Mini Program a high rating	0.929
Feature values	2.645
Explain the amount of variation ( % )	88.173
Cumulative interpretation of the amount of variation ( % )	88.173

Source: The authors, April 2019

#### 4.3.6 Customer Loyalty Factor Analysis

In this paper, the validity of the questionnaire is tested by factor analysis. As shown in Table 16, the perception quality table KMO is 0.719 ( $0.7 < \text{KMO} < 0.8$ ), and Bartlett's spherical test  $\chi^2$  value also reached a significant level. The results of the analysis can be shown in Table 16.

Table 16. Customer loyalty scale KMO and Bartlett's spherical test

KMO value	0.880	
Bartlett's spherical test	Approximate $\chi^2$ value	955.483
	Degree of Freedom	3
	P value	0.000

Source: The authors, April 2019

After conducting factor analysis of the 3 topics of the expected quality scale, the cumulative interpretation variation of "customer loyalty" is 81.299% (>50%), indicating that the scale is highly explanatory.

Table 17. Analysis of customer loyalty scale factors

Question	Factor loading
	1
1.You will continue to use WeChat Mini Program	0.858
2.You will recommend WeChat Mini Program to your friends and family	0.925
3.You are willing to promote WeChat Mini Program to others	0.920
Feature values	2.439
Explain the amount of variation ( % )	81.299
Cumulative interpretation of the amount of variation ( % )	81.299

Source: The authors, April 2019

#### 4.4 Correlation Analysis

Correlation analysis is mainly to study whether there is a significant correlation between variables. The determining range of correlation coefficient values is between -1 (significant negative correlation) and 1 (significant positive correlation). This study uses the relevant analysis method to study the correlation between brand image, expected quality, perceived quality, perceived value, customer satisfaction, and customer loyalty embodied by WeChat Mini Programs users. The results of the analysis are shown in Table 18.

Brand image is significantly positively correlated with expected quality ( $r=0.691$ ,  $p<0.01$ ), brand image and perceived quality are positively correlated ( $r=0.668$ ,  $p<0.01$ ), brand image is positively correlated with perceived value ( $r=0.672$ ,  $p<0.01$ ), brand image and customer satisfaction are positively correlated ( $r=0.689$ ,  $p<0.01$ ) the brand image is positively correlated with customer loyalty ( $r=0.649$ ,  $p<0.01$ ), the expected quality is positively correlated with the perceived quality ( $r=0.815$ ,  $p<0.01$ ), and the expected quality is positively correlated with the perceived value ( $r=0.816$ ,  $p<0.01$ ), positive correlation between expected quality and customer satisfaction ( $r=0.841$ ,  $p<0.01$ ), positive correlation between expected quality and customer loyalty ( $r=0.785$ ,  $p<0.01$ ), positive correlation between perceived quality and perceived value ( $r=0.837$ ,  $p<0.01$ ), perceived quality is positively correlated with customer satisfaction ( $r=0.809$ ,  $p<0.01$ ), perceived quality is positively correlated with customer loyalty ( $r=0.762$ ,  $p<0.01$ ), perceived value is positively correlated with customer satisfaction presentation ( $r=0.855$ ,  $p<0.01$ ), perceived value is positively correlated with customer loyalty ( $r=0.829$ ,  $p<0.01$ ), and customer satisfaction is positively correlated with customer loyalty ( $r=0.864$ ,  $p<0.01$ ).

Table 18. Correlation analysis of variables

Variables	Mean	Standard deviation	Brand image	Expected quality	Perceived quality	Perceived value	Customer satisfaction	Customer loyalty
Brand image	3.6292	0.8613	1					
Expected quality	3.5159	0.8333	0.691**	1				
Perceived quality	3.5952	0.7819	0.668**	0.815**	1			
Perceived value	3.5519	0.8083	0.672**	0.816**	0.837**	1		
Customer satisfaction	3.5840	0.8171	0.689**	0.841**	0.809**	0.855**	1	
Customer loyalty	3.5673	0.8601	0.649**	0.785**	0.762**	0.829**	0.864**	1

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

## 4.5 Multi-regression Analysis

### 4.5.1 Regression Analysis of Perceived Quality of Brand Image

As shown in Table 19, the F-statistic value of model 2 has reached a significant level, indicating that the overall regression effect of model 2 is good. The standardized regression coefficient in model 2 is 0.591, and the t value is 19.867, which has a significant level. It follows that H1 is true.

Table 19. Regression analysis of the brand image to perceived quality

Dependent variable	Perceived quality					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	-0.550	-0.779	0.437	-0.410	-0.770	0.442
Age	0.129	3.364	0.010*	0.066	2.278	0.023*
Occupation	-0.019	-1.004	0.316	-0.011	-0.793	0.428
Education	-0.156	-3.147	0.002**	-0.040	-1.040	0.299
Personal income	-0.029	-0.941	0.347	-0.016	-0.702	0.483
Independent variable						
Brand image				0.591	19.867	0.000***
R <sup>2</sup>		0.050			0.454	
Adjusted R <sup>2</sup>		0.041			0.448	
R <sup>2</sup> Change		0.050			0.404	
F Value		5.566			0.000	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

### 4.5.2 Regression Analysis of Brand Image to Expected Quality

As shown in Table 20, the F-statistic value of model 2 has reached a significant level, indicating that the overall regression effect of model 2 is good. The standardized regression coefficient in model 2 is 0.655, and the t value is 21.286, which has a significant level. It follows that H2 is true.

Table 20. Regression analysis of the brand image to the expected quality

Dependent variable	Expected quality					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	0.040	0.538	0.591	0.056	1.006	0.315
Age	0.141	3.464	0.001**	0.072	2.397	0.017*
Occupation	-0.025	-1.273	0.203	-0.017	-1.162	0.246
Education	-0.165	-3.113	0.002**	-0.036	-0.903	0.367
Personal income	-0.024	-0.741	0.459	-0.010	-0.430	0.667
Independent variable						
Brand image				0.655	21.286	0.000***
R <sup>2</sup>		0.050			0.486	
Adjusted R <sup>2</sup>		0.041			0.481	
R <sup>2</sup> Change		0.050			0.437	
F Value		5.608			0.000	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

#### 4.5.3 Regression Analysis of Brand Image to Perceived Value

As shown in Table 21, the F statistics of model 2 reached a significant level, indicating that the overall regression effect of model 2 is good. The standardized regression coefficient in model 2 is 0.605, and the t value is 19.973, which has a significant level. It follows that H3 is true.

Table 21. Regression analysis of the brand image to perceived value

Dependent variable	Perceived value					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	0.030	0.414	0.679	0.044	0.804	0.421
Age	0.152	3.887	0.000***	0.088	2.964	0.003**
Occupation	-0.029	-1.506	0.133	-0.021	-1.456	0.146
Education	-0.211	-4.168	0.000***	-0.092	-2.365	0.018*
Personal income	-0.013	-0.415	0.678	0.000	-0.007	0.995
Independent variable						
Brand image				0.605	19.973	0.000***
R <sup>2</sup>		0.073			0.470	
Adjusted R <sup>2</sup>		0.065			0.464	
R <sup>2</sup> Change		0.073			0.397	
F Value		8.451			0.000	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

#### 4.5.4 Regression Analysis of Brand Image to Customer Satisfaction

As shown in Table 22, the F statistics of model 2 reached a significant level, indicating that the overall regression effect of model 2 is good. The standardized regression coefficient in model 2 is 0.633, and the t value is 21.083, which has a significant level. It follows that H4 is true.

Table 22. Regression analysis of the brand image to customer satisfaction

Dependent variable	Customer satisfaction					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	0.078	1.061	0.289	0.092	1.707	0.088
Age	0.126	3.194	0.001**	0.060	2.035	0.042*
Occupation	-0.032	-1.669	0.096	-0.024	-1.695	0.091
Education	-0.223	-4.340	0.000***	-0.098	-2.556	0.011*
Personal income	-0.006	-0.172	0.863	0.008	0.338	0.736
Independent variable						
Brand image				0.633	21.083	0.000***
R <sup>2</sup>		0.066			0.491	
Adjusted R <sup>2</sup>		0.057			0.485	
R <sup>2</sup> Change		0.066			0.425	
F Value		7.546			0.000	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

#### 4.5.5 Regression Analysis of Expected Quality to Perceived Value

As shown in Table 23, F statistics of model 2 reached a significant level, indicating that the overall regression effect of model 2 is good. The standardized regression coefficient in model 2 is 0.772, and the t value is 31.413, which has a significant level. It follows that H5 is true.

Table 23. Regression analysis of expected quality to perceived value

Dependent variable	Perceived value					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	0.030	0.414	0.679	-0.001	-0.033	0.974
Age	0.152	3.887	0.000***	0.043	1.829	0.068
Occupation	-0.029	-1.506	0.133	-0.009	-0.809	0.419
Education	-0.211	-4.168	0.000***	-0.084	-2.773	0.006**
Personal income	-0.013	-0.415	0.678	0.006	0.308	0.758
Independent variable						
Expected quality				0.772	31.413	0.000***
R <sup>2</sup>		0.073			0.675	
Adjusted R <sup>2</sup>		0.065			0.671	
R <sup>2</sup> Change		0.073			0.602	

F Value	8.451	0.000
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Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

#### 4.5.6 Regression Analysis of Expected Quality to Perceived Quality

As shown in Table 24, the F-statistic value of model 2 has reached a significant level, indicating that the overall regression effect of model 2 is good. The standardized regression coefficient in model 2 is 0.757, and the t value is 31.560, which has a significant level. It follows that H6 is true.

Table 24. Regression analysis of expected quality to perceived quality

Dependent variable	Perceived quality					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	-0.055	-0.079	0.437	-0.086	-2.052	0.041*
Age	0.129	3.364	0.001**	0.022	0.952	0.342
Occupation	-0.019	-1.004	0.316	0.000	0.040	0.968
Education	-0.156	-3.147	0.002**	-0.032	-1.063	0.288
Personal income	-0.029	-0.941	0.347	-0.011	-0.579	0.563
Independent variable						
Expected quality				0.757	31.560	0.000***
R <sup>2</sup>		0.050			0.669	
Adjusted R <sup>2</sup>		0.041			0.665	
R <sup>2</sup> Change		0.050			0.619	
F Value		5.566			0.000	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

#### 4.5.7 Regression Analysis of Expected Quality to Customer Satisfaction

As shown in Table 25, the F-statistic value of model 2 has reached a significant level, indicating that the overall regression effect of model 2 is good. The standardized regression coefficient in model 2 is 0.810, and the t value is 34.754, which has a significant level. It follows that H7 is true.

Table 25. Regression analysis of expected quality to customer satisfaction

Dependent variable	Customer satisfaction					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	0.078	1.061	0.289	0.045	1.106	0.269
Age	0.126	3.194	0.001**	0.012	0.551	0.582
Occupation	-0.032	-1.669	0.096	-0.012	-1.097	0.273
Education	-0.223	-4.340	0.000***	-0.090	-3.125	0.002**
Personal income	-0.006	-0.172	0.863	0.014	0.803	0.422



Independent variable				
Expected quality		0.810	34.754	0.000***
R <sup>2</sup>	0.066		0.714	
Adjusted R <sup>2</sup>	0.057		0.711	
R <sup>2</sup> Change	0.066		0.648	
F Value	7.546		0.000	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

#### 4.5.8 Regression Analysis of Perceived Quality to Perceived Value

As shown in Table 26, the F statistics of model 2 reached a significant level, indicating that the overall regression result of model 2 is good. The standardized regression coefficient in model 2 is 0.847, and the t value is 34.287, which has a significant level. It follows that H8 is true.

Table 26. Regression analysis of perceived quality to perceived value

Dependent variable	Perceived value					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	0.030	0.414	0.679	0.076	1.895	0.059
Age	0.152	3.887	0.000***	0.043	1.941	0.053
Occupation	-0.029	-1.506	0.133	-0.013	-1.203	0.229
Education	-0.211	-4.168	0.000***	-0.079	-2.760	0.006**
Personal income	0.013	-0.415	0.678	0.012	0.654	0.514
Independent variable						
Perceived quality				0.847	34.287	0.000***
R <sup>2</sup>		0.073			0.711	
Adjusted R <sup>2</sup>		0.065			0.708	
R <sup>2</sup> Change		0.073			0.638	
F Value		8.451			0.000	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

#### 4.5.9 Regression Analysis of Perceived Quality to Customer Satisfaction

As shown in Table 27, the F-statistic value of model 2 has reached a significant level, indicating that the overall regression effect of model 2 is good. The standardized regression coefficient in model 2 is 0.831, and the t value is 30.973, which has a significant level. It follows that H9 is true.

#### 4.5.10 Regression Analysis of Perceived Value to Customer Satisfaction

As can be seen from Table 28, through F-test, the F-statistic value of model 2 has reached a significant level, indicating that the overall regression effect of model 2 is good. The standardized regression coefficient in model 2 is 0.858, and the t value is 36.505, which has a significant level. It follows that H10 is true.

Table 27. Regression analysis of perceived quality to customer satisfaction

Dependent variable	Customer satisfaction					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	0.078	1.061	0.289	0.123	2.816	0.005**
Age	0.126	3.194	0.001**	0.020	0.821	0.412
Occupation	-0.032	-1.669	0.096	-0.017	-1.443	0.150
Education	-0.223	-4.340	0.000***	-0.094	-3.009	0.003**
Personal income	-0.006	-0.172	0.863	0.019	0.972	0.331
Independent variable						
Perceived quality				0.831	30.973	0.000***
R <sup>2</sup>		0.066			0.666	
Adjusted R <sup>2</sup>		0.057			0.663	
R <sup>2</sup> Change		0.066			0.600	
F Value		7.546			0.000	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

Table 28. Regression analysis of perceived value to customer satisfaction

Dependent variable	Customer satisfaction					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	0.078	1.061	0.289	0.052	1.329	0.184
Age	0.126	3.194	0.001**	-0.004	-0.169	0.866
Occupation	-0.032	-1.669	0.096	-0.008	-0.739	0.460
Education	-0.223	-4.340	0.000***	-0.042	-1.504	0.133
Personal income	-0.006	0.172	0.863	0.006	0.333	0.739
Independent variable						
Perceived value				0.858	36.505	0.000***
R <sup>2</sup>		0.066			0.733	
Adjusted R <sup>2</sup>		0.057			0.730	
R <sup>2</sup> Change		0.066			0.667	
F Value		7.546			0.000	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

#### 4.5.11 Regression Analysis of Customer Satisfaction to Customer Loyalty

As shown in Table 29, through F-test, the F-statistic value of model 2 has reached a significant level, indicating that the overall regression effect of model 2 is good. The standardized regression coefficient in model 2 is 0.904, and the t value is 38.161, which has a significant level. It follows that it is assumed that H11 is true.

Table 29. Regression analysis of customer satisfaction to customer loyalty

Dependent variable	Customer loyalty					
	Model 1			Model 2		
	B	t	Sig.	B	t	Sig.
Control variables						
Gender	0.115	1.497	0.135	0.045	1.135	0.257
Age	0.142	3.384	0.001**	0.027	1.245	0.214
Occupation	-0.038	-1.854	0.064	-0.009	-0.820	0.413
Education	-0.201	-3.692	0.000***	0.001	0.041	0.967
Personal income	-0.011	-0.332	0.740	-0.006	-0.357	0.721
Independent variable						
Customer satisfaction				0.904	38.161	0.000***
R <sup>2</sup>		0.059			0.748	
Adjusted R <sup>2</sup>		0.051			0.745	
R <sup>2</sup> Change		0.059			0.689	
F Value		6.745			0.000	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

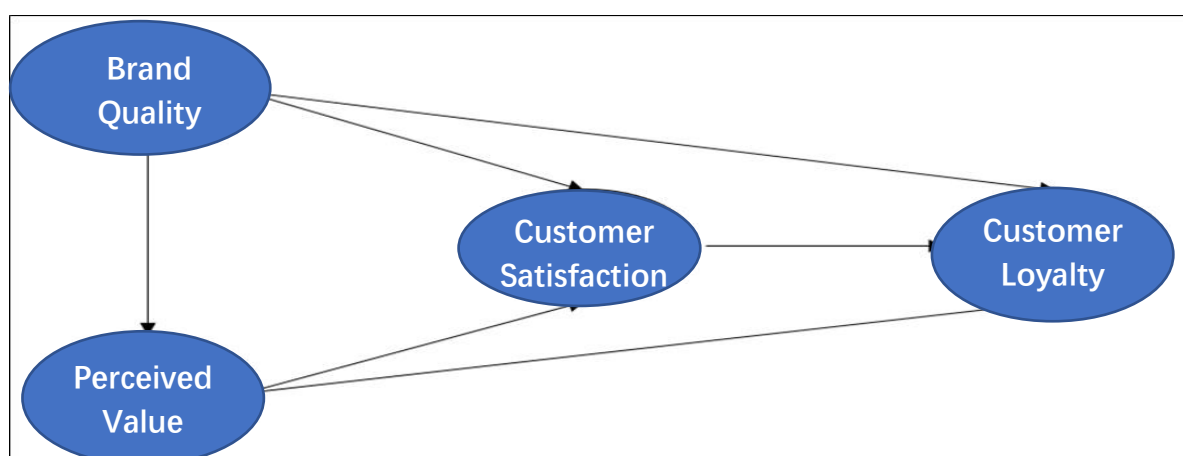
\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

## 5. Path Analysis

### 5.1 Model Corrections

CCSI model has been used in this study as the basis. The research hypothesis on WeChat Mini Program satisfaction factors has been proved that the six dimensions reliability based on the CCSI model are all greater than 0.8, and the questionnaire's overall reliability is greater than 0.9. The questionnaire is good in reliability, and the correlation between the dimensions is also very good. The CCSI model is then modified on this basis. The specific embodiment is to combine the perceived quality, expected quality, and brand image into one independent variable, namely brand quality. We maintain the perceived value, customer satisfaction, customer loyalty unchanged, and verify customer loyalty as the final variable. The paths of satisfaction factors are further analyzed with the new model shown in Figure 2.



Source: The authors, April 2019

Figure 2. WeChat Mini Program path analysis model

## 5.2 Assumptions Proposed

According to the model designed for the path analysis, the independent variable is brand image. The intermediary variables are perceived value and customer satisfaction, and the dependent variable is customer loyalty. This path analysis is mainly to study the relationship between brand quality, perceived value, customer satisfaction, and customer loyalty to affect the satisfaction of WeChat Mini Program, so the path analysis is recommended as the following assumptions:

H<sub>I</sub>: Brand quality has a significant impact on customer loyalty

H<sub>II</sub>: Brand quality has a significant impact on customer loyalty through customer satisfaction

H<sub>III</sub>: Brand quality has a significant impact on customer loyalty through perceived value and customer satisfaction

H<sub>IV</sub>: Brand quality has a significant impact on customer loyalty through perceived value

H<sub>V</sub>: Perceived value has a significant impact on customer loyalty through customer satisfaction

H<sub>VI</sub>: Perceived value has a significant impact on customer loyalty

H<sub>VII</sub>: Customer satisfaction has a significant impact on customer loyalty

## 5.3 Data Analysis

Because the descriptive statistics, reliability, validity, correlation, multi-regression analysis, and other analysis have been conducted, we will not repeat and directly go into the most direct verification hypothesis analysis of the path analysis: mutual regression analysis. The mutual regression is divided into three times to verify the hypothesis on the model basis because of the path analysis. The independent and dependent variables will change in each mutual regression analysis. The residual coefficient formula used in this regression is as follows:

$$\text{Residual coefficient} = \sqrt{1 - R^2} \quad (1)$$

### 5.3.1 Regression Analysis of Brand Quality, Perceived Value, and Customer Satisfaction as the Independent Variables

Brand quality, perceived value, and customer satisfaction are regressed on customer loyalty. From Table 30, all three independent variables (brand quality, perceived value, and customer satisfaction) have a significant impact on the dependent variable (customer loyalty), and the residual coefficient of the overall mutual regression is 0.47. In the model, the standardized regression coefficient of brand quality is 0.144, t value is 2.722, which reaches a significant level; the standardized regression coefficient of perceived value is 0.297, t value is 6.320; the standardized regression coefficient of customer satisfaction is 0.544, t value is 11.483, which reaches a significant level. Among them, the B value of the brand quality is the lowest (0.144), B value of customer satisfaction is the highest (0.544), B value of the perceived value is good (0.297). The three independent variables correspond to higher significance levels to the dependent variable (all less than 0.01) with the lowest on brand quality (0.007).

Table 30. Analysis of the regression model for customer loyalty as the dependent variable

Dependent variable	Model		
Customer loyalty	B	t	Sig.
Independent variables			
Brand quality	0.144	2.722	0.007**
Perceived value	0.297	6.320	0.000***
Customer satisfaction	0.544	11.483	0.000***
R <sup>2</sup>		0.779	
Adjusted R <sup>2</sup>		0.778	
R <sup>2</sup> Change		0.779	
F Value		631.337	
Residual coefficient		0.470	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

### 5.3.2 Regression Analysis of Brand Quality and Perceived Value as the Independent Variables

Brand quality and perceived value are regressed on customer satisfaction. From Table 31, two independent variables (brand quality and perceived value) have a significant impact on the dependent variable (customer satisfaction), and the residual coefficient of the overall mutual regression is 0.450. In the model, the standardized regression coefficient of brand quality is 0.552, t value is 13.160, which reaches a significant level; the standardized regression coefficient of perceived value is 0.426, t value is 10.993. B value of the brand quality is 0.552, B value of the perceived value is 0.426. The two independent variables correspond to higher significance levels to the dependent variable (all less than 0.01).

Table 31. Analysis of the regression model for customer satisfaction as the dependent variable

Dependent variable	Model		
Customer satisfaction	B	t	Sig.
Independent variables			
Brand quality	0.552	13.160	0.000***
Perceived value	0.426	10.993	0.000***
R <sup>2</sup>		0.797	
Adjusted R <sup>2</sup>		0.796	
R <sup>2</sup> Change		0.797	
F Value		1052.456	
Residual coefficient		0.450	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

### 5.3.3 Regression Analysis of Brand Quality as the Independent Variables

Brand quality and perceived value are regressed on customer satisfaction. Table 32 shows that brand quality has a significant impact on the dependent variable (perceived value), and the residual coefficient of the overall mutual regression is 0.508. In the model,

the standardized regression coefficient of brand quality is 0.934, the t value is 39.327, which reaches a significant level. Among them, the B value of the brand quality is 0.934. The independent variable corresponds to a higher significance level to the dependent variable (less than 0.001).

Table 32. Analysis of the regression model for perceived value as the dependent variable

Dependent variable	Model		
Perceived value	B	t	Sig.
Independent variable			
Brand quality	0.934	39.327	0.000***
R <sup>2</sup>		0.742	
Adjusted R <sup>2</sup>		0.741	
R <sup>2</sup> Change		0.742	
F Value		1,546.631	
Residual coefficient		0.508	

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

## 6. Summary and Outlook on Research Results

### 6.1 Review of Research Results

#### 6.1.1 Review of CCSI Research Results

This paper adopts the WeChat Mini Program as the research object to verify the customer satisfaction index model (CCSI) through survey data collection and analyzation. The verification results of the hypotheses are organized in Table 33.

Table 33. Verification results of hypotheses of CCSI study

No	Research hypotheses	Verification results
H1	Brand image has a significant impact on perceived quality	Found
H2	Brand image has a significant impact on expected quality	Found
H3	Brand image has a significant impact on perceived value	Found
H4	Brand image has a significant impact on customer satisfaction	Found
H5	Expected quality has a significant impact on perceived value	Found
H6	Expected quality has a significant impact on perceived quality	Found
H7	Expected quality has a significant impact on customer satisfaction	Found
H8	Perceived quality has a significant impact on perceived value	Found
H9	Perceived quality has a significant impact on customer satisfaction	Found
H10	Perceived value has a significant impact on customer satisfaction	Found
H11	Customer satisfaction has a significant impact on customer loyalty	Found

Source: The authors, April 2019

H1 analysis results: Brand image has a significant impact on perceived quality. The results show that the brand image of the WeChat Mini Program has a positive influence on the user's understanding of the value of the WeChat Mini Program. The higher the market

brand image of the WeChat Mini Program, the higher the quality recognition of users in the WeChat Mini Program. Therefore, WeChat Mini Program-related enterprises should focus on improving the market brand image of the software. Market brand image is the guarantee of the quality of its products and services. The quality assurance brought about by this brand influence can have a positive impact on users. Users often enhance their evaluation of quality based on the brand quality's trust when evaluating a higher market brand image of Mini Program-related software and thus enhance their perception of its quality.

H2 results analysis: Brand image has a significant impact on the expected quality. The results show that the brand image of the WeChat Mini Program has a great relationship with the user's psychological expectation of its quality. The good market brand image of the WeChat Mini Program is the intangible assets of its enterprises and can therefore increase the added value of products and services. The added value of this product and service enhances the quality of products and services as well as deepens the quality of the user's trust in WeChat Mini Program. The result fully illustrates the importance of brand image to the market competitiveness of the enterprises. Therefore, the Mini Program should actively optimize the brand image, expand brand awareness and influence, and achieve resource integration and brand value enhancement through media advertising, public service activities, promotional activities, and business combination.

H3 results analysis: Brand image has a significant impact on perceived value. The results show that the brand image of the WeChat Mini Program has a direct relationship with the value recognition of its users. When the Mini Program has a high impact on the market, strong competitiveness, and high user recognition, users will consider the cost to be worthy when obtaining the brand's products or services. Therefore, WeChat Mini Program-related enterprises should start from the promotion of brand image. Only by improving the brand image can we enhance the added value of products or services, following by enhancing sales profits and business efficiency, and ultimately achieving comprehensive competitive strength.

H4 results analysis: Brand image has a significant impact on customer satisfaction. The results show a direct relationship between the brand image of the Mini Program and customer satisfaction. Developing Mini Program depends on enhancing the brand image, and the promotion of brand image has a positive correlation with customer satisfaction. The establishment of brand image is related to the user's perceived value and related to the level of user satisfaction. User satisfaction evaluation is higher to the Mini Program software with a higher market brand image, which fully confirms the role of intangible assets and value-added products to enhance user experience. To gain the respect and trust of the market, Mini Programs must enhance the brand image and establish a wide range of brand influence.

H5 results analysis: Expected quality has a significant impact on perceived value. The results show that the expected quality of WeChat Mini Program users influences consumer value perception after consumer consumption. The user's expected quality is the user's psychological expectation of the product or service before consumption. The perceived value is the user's value recognition of the product or service after consumption. The phenomena show that the value of consumer recognition can correspondingly be improved when the user has high expectations on the quality of the WeChat Mini Program, and vice versa. Therefore, WeChat Mini Program-related enterprises should pay attention to enhance the expected quality of WeChat Mini Program users, enhance their own brand influence and market share, expand service content, improve market reputation and enhance the user's psychological expectations to improve the recognition of users.

H6 results analysis: Expected quality has a significant impact on perceived quality. The results show that in the process of consumption, the psychological expectation of quality significantly affects the perception of its quality after consumption. Before using WeChat Mini Program, the user's expected quality of its products and services is higher, and the psychological activities of consumption are positive. If using WeChat Mini Program can meet the user's expectations, then the quality perception will be higher after actual consumption. Therefore, Mini Program-related enterprises should enhance the market influence of products and services, create product quality expectations, and pay more attention to the target users' consumption needs. It is better to enrich product performance and optimize consumer services focusing on user's consumption and fundamentally increase customer satisfaction of the WeChat Mini Program user.

H7 results analysis: Expected quality has a significant impact on customer satisfaction. The results show that the psychological expectation of the products and services of WeChat Mini Program users has an important influence on the final evaluation of consumer satisfaction. Expected quality is the psychological expectations of the service and product quality of WeChat Mini Program users, which is the user's potential quality requirements of the embodiment. For customer satisfaction, a product or service will produce satisfaction when it meets the need of user, which means that customer satisfaction is directly related to expectations. It is true in the consumption of the WeChat Mini Program that the user's quality expectation is directly correlated with customer satisfaction. Therefore, WeChat Mini Program-related enterprises should focus on improving the psychological quality of WeChat Mini Program users to improve customer satisfaction, increase product promotion and information, and achieve the quality commitment in its publicity. It is necessary to build trust between users and businesses and to improve customer satisfaction.

H8 analysis results: Perceived quality has a significant effect on perceived value. The results show that the value of the WeChat Mini Program is closely related to its quality, which shows that the higher the quality of the WeChat Mini Program, the higher the user's perception of its value. It also shows that in using WeChat Mini Program, the better the quality of service, the higher the user's recognition of its value. Therefore, WeChat Mini Program-related enterprises should improve the quality of the WeChat Mini Program itself, improve the user's perceived quality, and improve customer satisfaction.

H9 analysis results: Perceived quality has a significant impact on customer satisfaction. The results show that the higher the user's perceived value, the higher the satisfaction of the WeChat Mini Program. That is to say, the more the user recognizes the value of the WeChat Mini Program, the more they are satisfied with WeChat Mini Program products and services. Therefore, WeChat Mini Program-related enterprises should increase the quality of software development, after-sales service, operation management, and user services, and effectively enhance the recognition value of the WeChat Mini Program, thereby enhancing their software satisfaction.

H10 results analysis: Perceived value has a significant impact on customer satisfaction. The results show that the value recognition of the WeChat Mini Program user is closely related to customer satisfaction. When users recognize the value of WeChat Mini Program, they believe that the cost is worthwhile while enjoying the products or services offered by WeChat Mini Program. When he or she is satisfied with the price of products and services, the user is more satisfied with WeChat Mini Program. Therefore, WeChat Mini Program-related enterprises should focus on users' perceived value, strengthen the target market analysis, and enhance the user group analysis. The user's value perception of products and services can affect their purchasing decision, affect the user's subjective



judgment of consumer activities, and then affect the market influence and core competitiveness of enterprises. It is more targeted to improve customer satisfaction by improving the perceived value of products and services.

H11 results analysis: Customer satisfaction has a significant impact on customer loyalty. The study shows that the user's satisfaction with WeChat Mini Program can affect the user's loyalty to WeChat Mini Program. Users' intuitive feeling and subjective experience of the products or services of the WeChat Mini Program can affect their actual purchase behaviors. Therefore, WeChat Mini Program-related enterprises should strive to enhance the user's satisfaction with their products and services, maintain market share, and stabilize customer groups' balance. On this basis, they can increase market influence and enhance overall competitiveness.

## 6.2 Overview of the Results of Path Analysis

In this study method, based on the CCSI model, the modified hypothesis of the CCSI model is made. Taking WeChat Mini Program as the research object, we organize and analyze the data collected in the questionnaire, verify the assumptions of the path analysis model, and assume that the results of the verification are organized as shown in Table 34 and Figure 3.

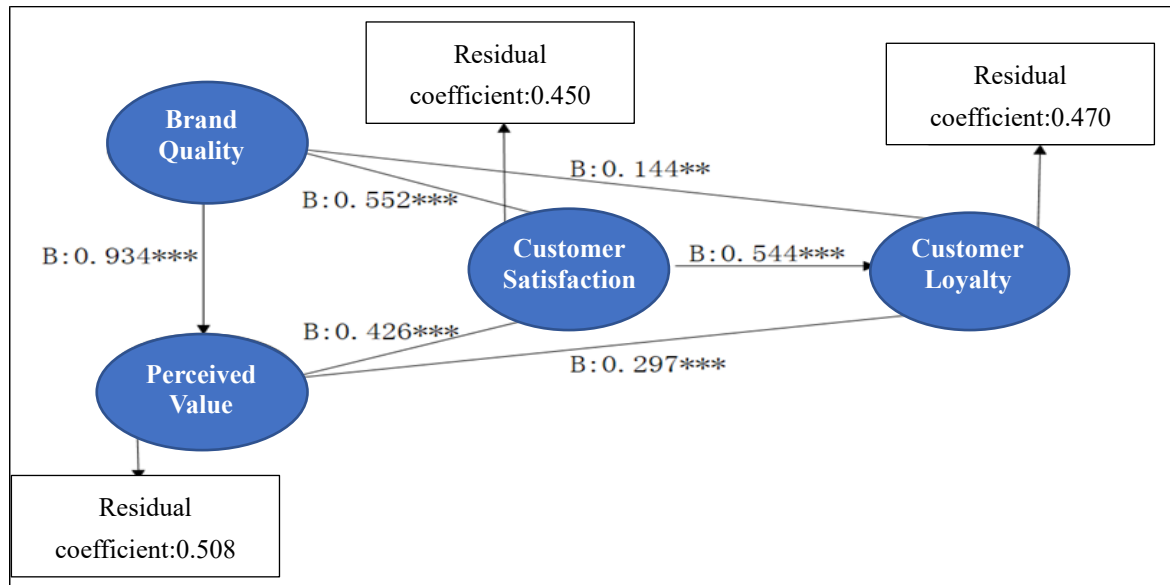
Table 34. Verification results of hypotheses of path analysis

No	Research hypotheses	Verification results
H <sub>I</sub>	Brand quality has a significant impact on customer loyalty	Found
H <sub>II</sub>	Brand quality has a significant impact on customer loyalty through customer satisfaction	Found
H <sub>III</sub>	Brand quality has a significant impact on customer loyalty through perceived value and customer satisfaction	Found
H <sub>IV</sub>	Brand quality has a significant impact on customer loyalty through perceived value	Found
H <sub>V</sub>	Perceived value has a significant impact on customer loyalty through customer satisfaction	Found
H <sub>VI</sub>	Perceived value has a significant impact on customer loyalty	Found
H <sub>VII</sub>	Customer satisfaction has a significant impact on customer loyalty	Found

Source: The authors, April 2019

H<sub>I</sub> results analysis: Brand quality has a significant impact on customer loyalty. The result of the path analysis of brand quality to customer loyalty is B value = 0.144, P value = 0.007 (less than 0.01). Therefore, the brand quality of the WeChat Mini Program has a positive impact on customer loyalty. Final value of path B is 0.144, P < 0.01, and residual value is 0.470.

H<sub>II</sub> results analysis: Brand quality has a significant impact on customer loyalty through customer satisfaction. The result of the path analysis of brand quality to customer satisfaction is B value = 0.552, P value = 0.00 (less than 0.001). The result of the path analysis of customer satisfaction to customer loyalty is B value = 0.544, P value = 0.00 (less than 0.001). Final value of the path B value is  $0.552 \times 0.544 = 0.300$ , P < 0.001.



Source: The authors, April 2019

Figure 3. Research results of path analysis

**H<sub>III</sub> results analysis:** Brand quality has a significant impact on customer loyalty through perceived value and customer satisfaction. The result of the path analysis of brand quality to perceived value is B value = 0.934, P value = 0.00 (less than 0.01). The result of the path analysis of perceived value to customer satisfaction is B value = 0.426, P value = 0.00 (less than 0.01). The result of the path analysis of customer satisfaction to customer loyalty is B value = 0.544, P value = 0.00 (less than 0.01). Final value of path B is  $0.934 \times 0.426 \times 0.544 = 0.216$ ,  $P < 0.001$ .

**H<sub>IV</sub> results analysis:** Brand quality has a significant impact on customer loyalty through perceived value. The result of the path analysis of brand quality to perceived value is B value = 0.934, P value = 0.00 (less than 0.001). The result of the path analysis of perceived value to customer loyalty is B value = 0.297, P value = 0.00 (less than 0.001). Final value of the path B value is  $0.934 \times 0.297 = 0.277$ ,  $P < 0.001$ .

**H<sub>V</sub> results analysis:** Perceived value has a significant impact on customer loyalty through customer satisfaction. The result of the path analysis of perceived value to customer satisfaction is B value = 0.426, P value = 0.00 (less than 0.01). The result of the path analysis of customer satisfaction to customer loyalty is B value = 0.544, P value = 0.00 (less than 0.01). Final value of path B is  $0.426 \times 0.544 = 0.232$ ,  $P < 0.001$ .

**H<sub>VI</sub> results analysis:** Perceived value has a significant impact on customer loyalty. The result of the path analysis of perceived value to customer loyalty is B value = 0.297, P value = 0.00 (less than 0.01). Final value of path B is 0.297,  $P < 0.001$ , and residual value is 0.508.

**H<sub>VII</sub> results analysis:** Customer satisfaction has a significant impact on customer loyalty. The result of the path analysis of customer satisfaction to customer loyalty is B value = 0.544, P value = 0.00 (less than 0.01). Final value of path B is 0.544,  $P < 0.001$ , and residual value is 0.450.

In summary, B value results of path analysis are organized as Table 35.

Table 35. B value results of path analysis

Path hypothesis	B Value	Residuals
H <sub>I</sub> (Brand quality→ Customer loyalty)	0.144**	0.470
H <sub>II</sub> (Brand quality→ Customer satisfaction→ Customer loyalty)	0.300***	—
H <sub>III</sub> (Brand quality→ Perceived value→ Customer satisfaction→ Customer loyalty)	0.216***	—
H <sub>IV</sub> (Brand quality→ Perceived value→ Customer loyalty)	0.277***	—
H <sub>V</sub> (Perceived value→ Customer satisfaction→ Customer loyalty)	0.232***	—
H <sub>VI</sub> (Perceived value→ Customer loyalty)	0.297***	0.508
H <sub>VII</sub> (Customer satisfaction→ Customer loyalty)	0.544***	0.450

Source: The authors, April 2019

\*\*\*Significant correlation on 0.001 level (two sides)

\*\*Significant correlation on 0.01 level (two sides)

\*Significant correlation on 0.05 level (two sides)

As can be seen from Table 35, the B value of H<sub>I</sub> path is the lowest (0.144) in the path study, and the significance is two stars ( $0.001 < P < 0.01$ ). It is also the least significant compared to other paths. The B value of H<sub>VII</sub> path is the highest (0.544) in the path study, and the significance is three stars ( $0.001 < P < 0.01$ ). The effect of the direct path of brand quality on customer loyalty is insufficient, and the description is not enough. The effect of the direct path of customer satisfaction on customer loyalty is enough, and the description is higher. The B values of other paths are between 0.2 and 0.3, indicating that the description is relatively high.

### 6.3 Recommendations

WeChat Mini Program has developed only two years and three months as of April 2019. Relying on its own huge user base of WeChat, WeChat Mini Program achieved explosive user growth and development. In this process, there is still room for improvement of WeChat Mini Programs for all aspects of user experience. This study provides some reference for the development managers of the WeChat Mini Program:

#### (1) Segmenting the User Base

According to basic statistical analysis, the demographic aspects of the user have little impact, but the frequency of use is more extreme. For Mini Programs, it is appropriate to improve the viscosity of users because there is no specific user group division relying on WeChat.

#### (2) Controlling User Preference Changes

Improving overall satisfaction is conducive to the loyalty of Mini Program users. More satisfaction-related researches are suitable to fill the current research gaps of Mini Program and are conducive to Mini Programs in the competition with timely response, quick reaction, and specific design for businesses and small groups.

#### (3) Providing More Drainage Guidance

WeChat Mini Program is currently comprehensive, including enterprises or merchant groups in various aspects, such as games, merchants, platforms, etc. But as far as the current situation, most mini program merchants rely only on their own design to create and promote. Many users are looking for and using related mini programs when they need them. They usually do not find interesting and practical mini programs by themselves.

This is reflected in this study. The developers and managers of mini programs should consider the specific use time, expand the base of mini programs user, and improve the user experience. It is a performance to expand the market and to improve competitiveness.

#### **6.4 Summary**

WeChat Mini Program is a brand-new thing in the fast-growing Internet era. It is well developed in the perfect foundation and development environment within the two-year and three-month period online. As a complement to APP, WeChat Mini Program should seize the opportunity when there is no competitor in the current environment and develop rapidly into a giant to frighten the potential opponents.

In the satisfaction survey of WeChat Mini Program based on the CCSI model, this study found that all the assumptions are valid in which customer satisfaction has the most significant positive effect on customer loyalty, the brand image has the weakest positive influence on perceived quality, and other related influences are all strong. Therefore, based on the conclusion of CCSI model research, the future development of the WeChat Mini Program should consider all the influence factors, improve customer satisfaction, and thereby enhance customer loyalty.

In the verification of path analysis, this study found that all the hypotheses were established. Customer satisfaction shows the most significant positive impact on customer loyalty. Brand quality has the weakest positive effect on customer loyalty, and other paths have a weak influence. Therefore, based on the revised path analysis of the model, the path analysis conclusion shows that the future development of the WeChat Mini Program should be biased towards the overall development of the overall factors, improve customer satisfaction, and therefore enhance customer loyalty.

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