Research on Factors Influencing User Growth of Mini-program Games

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Abstract: This study adopts quantitative empirical research methods, collects data through questionnaires, uses SPSS for data analysis, and explores the factors affecting the growth of mini program game users. The research results show that values, perceived usefulness, and ease of use have a positive impact on user stickiness, user stickiness also has a positive impact on user satisfaction, and user stickiness plays a mediating effect between perceived value and user satisfaction. Among them, the mediating effect of user stickiness is 19%. The results of this study have important guiding significance for mini program game developers and provide new ideas and methods for research in related fields.

Keywords: User Growth, Mini-program Games, User Stickiness, User Satisfaction

1. Introduction

In the past few years, WeChat mini-program games have quickly gained the favor of many users due to their unique convenience and innovation. This type of game does not require downloading and installation. Users only need to scan the QR code or search for keywords to enter the game directly. However, although the number of WeChat mini-program game users continues to increase in Figure 1, the user growth rate is gradually slowing down. To better understand this phenomenon, the key factors affecting the growth of WeChat mini-program game users need to be explored in depth. In preliminary research, we found that the factors affecting the growth of users of WeChat mini-program games can be summarized into the following aspects: the attractiveness of the game itself, user experience, user reputation, promotion strategy, competitive environment, etc (Zhang & Li, 2020) [1]. Some studies also show that good user experience, innovative gameplay and exquisite screen design can significantly improve user retention and activity(Wang, Li & Liu, 2021) [2]. In addition, some successful promotion strategies, such as social media advertising, offline activities, etc., can also effectively attract new users (Zhou & Guo, 2019) [3].
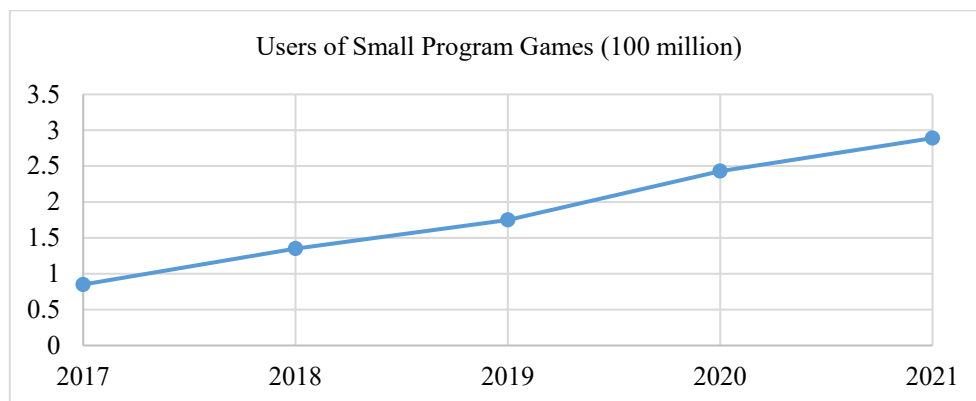

Figure 1: Users of Small Program Games (100 million).

This study aims to answer the following questions: What are the main factors affecting the growth of WeChat mini-program game users? How do these factors affect user growth? How to use these factors to increase the user growth of WeChat mini program games? This research can help game developers understand the factors influencing the growth of mini-program game users, to formulate more effective marketing strategies and product optimization plans to increase the number and activity of users. It can

further explore the psychological and behavioral characteristics of game users, provide theoretical support and practical guidance for game design and marketing; it can provide reference for the operation of small program game platforms, help the platform better understand user needs and market trends, and improve the platform's user base, satisfaction and market share.

2. Literature Review

2.1. Theoretical model

The consumption value model shown in Figure 2 is an important tool for explaining consumer purchasing decisions and consumption behavior, and is widely used in marketing and economics. This model was proposed by Sheth, Neuse and Grace in 1991[4]. This model believes that when consumers purchase products or services, they will comprehensively consider factors such as functional value, emotional value, and social value. These factors influence consumers' purchasing decisions and consumption behaviors to varying degrees. Through the research and application of consumption value models, companies can better understand consumer needs and behaviors, formulate more precise marketing strategies, improve the perceived value and user stickiness of products or services, and thereby achieve user growth.
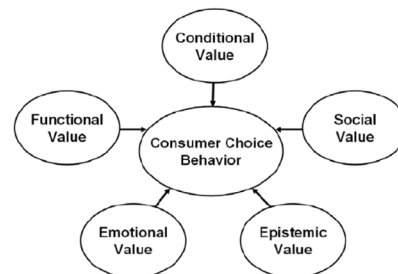

Figure 2: Consumption Value Model.

Technology Acceptance Model (TAM) shown in Figure 3 is a theoretical model that explains and predicts users' acceptance of information technology. This model was proposed by Davis in 1989 and aims to reveal the key factors that influence users' acceptance of information technology[5]. This model believes that users' acceptance of information technology is affected by two core factors: perceived usefulness and perceived ease of use. Among them, perceived usefulness refers to the degree to which users believe that using a certain technology can improve work performance or efficiency, and perceived ease of use refers to the degree to which users think it is difficult to use the technology.
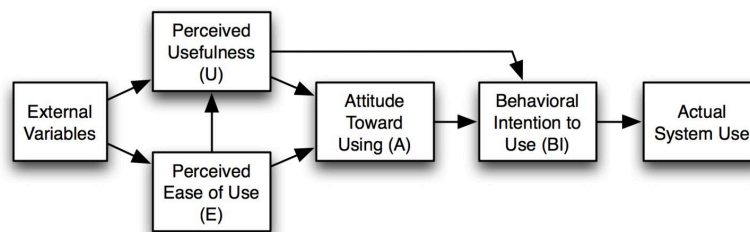

Figure 3: Technology Acceptance Model.

Research based on TAM shows that users' perceived usefulness and perceived ease of use of mini-program games have a significant impact on user acceptance and usage behavior. When users believe that games can provide useful functions or bring enjoyable experiences, they will be more likely to accept and use these games. At the same time, when users think that the game operation is simple and easy to use, their willingness to use it will also increase (Wang & Lu, 2020)[6]. By optimizing the game's interface design, interactive experience and game content, users' perceived usefulness and perceived ease of use can be improved, thereby increasing user stickiness and satisfaction(Zhang & Xu, 2021)[7]. Research on consumption value models shows that users' purchasing decisions are affected by factors such as product quality, price, brand image, and personal preferences. In the field of mini-program games, research points out that when the game is of high quality, reasonably priced, has a good brand image and meets personal preferences, user stickiness will be enhanced (Li & Wang, 2022)[8].

2.2. User Growth

User growth means that a company or product uses various strategies and measures to attract, acquire and retain more users, allowing the company, brand or product to achieve sustained growth in the market. User growth is an important goal pursued by enterprises and requires the development of comprehensive strategies, including product design, market research, channel expansion, data analysis and other aspects. Enterprises need to focus on user value and improve user satisfaction, loyalty and purchasing power to achieve sustained growth. This article selects user satisfaction as the key indicator of user growth.

3. Methodology

3.1. Variables and Data Collection

Based on theories and previous research results, this article selects perceived usefulness, perceived ease of use, functional value, social value, emotional value, cognitive value and conditional value as independent variables that affect user growth, and select user stickiness as the mediating variable. User satisfaction is selected as the key indicator of user growth. Figure 4 shows the research hypothesis framework of this passage.
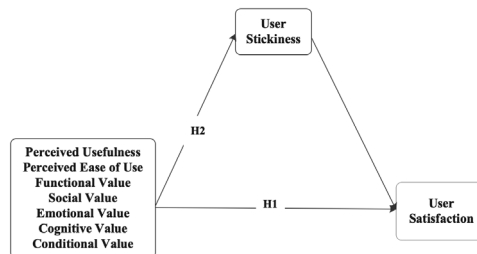

Figure 4: Research Hypothesis Framework.

Table 1: Variables and Questionnaire Design.

	Variable	Question Number	Survey Item
Dependent Variable	Perceived Usefulness	A1	To what extent are you willing to use mini-program games to relieve stress?
		A2	To what extent are you willing to use mini-program games to pass your leisure time?
	Perceived Ease of Use	B1	How easy do you think mini program games are to use?
		B2	How clear do you think the rules of mini-program games are?
	Functional Value	C1	How lightweight do you think mini-program games are?
	Social Value	D1	To what extent does the competition among game mini- program stimulate your sense of personal honor?
	Sentimental Value	E1	To what extent does playing mini-program games arouse your desire to win?
		E2	When playing mini-program games, how willing are you to share socially?
		E3	When playing mini-program games, to what extent do you want to share your victory?
	Conditional Value	F1	The pass rate is low. Are you curious to what extent you can pass the level if you play it seriously?
		F2	To what extent do you get satisfaction from playing mini-program games?
	Cognitive Value	G1	To what extent do recommendations from family, friends and anchors attract you to play mini-program games?
Mediating Variable	User Stickiness	H1	How willing are you to click on mini-program games multiple times?
Dependent Variable	User Satisfaction	I1	How satisfied are you with mini-program games?

The main research object of this article is WeChat mini-program game players. The article collects data through a Likert scale questionnaire survey, the main source of data is questionnaires issued to mini program game users through online and offline channels. Table 1 shows the variables and questionnaire design. Finally, there are 480 valid samples obtained in total.

3.2. Analysis Method

The article uses SPSS software for data analysis, including data cleaning, data conversion and data statistical analysis, and then builds a data model to test hypotheses and evaluate the significance and actual impact of influencing factors. This article mainly uses two analysis methods: correlation and regression analysis. In the correlation analysis, bivariate correlation analysis is used to analyze the correlation between each influencing factor and user growth. In the mediation regression analysis, we adopted the mediation analysis method of bootstrap method to evaluate the mediating effect of user stickiness by constructing three regression equations.

4. Findings

4.1. Reliability and Validity Test

Table 2: Reliability and Validity Test Result.

Reliability Statistics		
Cronbach's alpha	Number of terms	
0.928	14	
KMO and Bartlett Tests		
KMO sample appropriateness measure.		0.952
Bartlett Sphericity Test	Approximate Chi-square	2846.34
	Degree of Freedom	66
	Significance	0.000

Table 2 shows that the Cronbach's alpha coefficient of this article is 0.928, indicating that the questions in the questionnaire are highly consistent. This shows that the questionnaire has high internal consistency reliability; in the structural validity test, the KMO value was 0.952, indicating that there is a strong correlation between the variables in the sample data set and is suitable for further factor analysis.

4.2. Correlation Analysis

Table 3: Correlation Analysis Result.

	A1	A2	B1	B2	C1	D1	E1	E2	E3	F1	F2	G1	H1	I1
A1	1													
A2	.619**	1												
B1	.455**	.421**	1											
B2	.315**	.392**	.345**	1										
C1	.352**	.379**	.417**	.492**	1									
D1	.480**	.503**	.395**	.396**	.462**	1								
E1	.454**	.507**	.379**	.407**	.468**	.550**	1							
E2	.504**	.591**	.380**	.429**	.432**	.527**	.576**	1						
E3	.481**	.510**	.456**	.420**	.467**	.588**	.591**	.570**	1					
F1	.450**	.549**	.396**	.412**	.492**	.549**	.576**	.537**	.622**	1				
F2	.417**	.432**	.400**	.438**	.491**	.505**	.481**	.507**	.556**	.544**	1			
G1	.527**	.578**	.443**	.390**	.442**	.567**	.540**	.597**	.614**	.595**	.536**	1		
H1	.544**	.566**	.456**	.370**	.440**	.537**	.531**	.571**	.547**	.512**	.496**	.558**	1	
I1	.441**	.425**	.317**	.296**	.347**	.466**	.461**	.483**	.471**	.465**	.410**	.542**	.514**	1

The correlation analysis results in Table 3 show that there is a significant correlation between the independent variables, the mediating variable (user stickiness), and the dependent variable (user satisfaction), indicating that the independent variables can effectively predict the values of user stickiness and user satisfaction, but There is a high degree of correlation between independent variables, and methods such as principal component analysis need to be further used to reduce the dimensions of independent variables.

4.3. Factor Analysis

Table 4: Factor Analysis Result.

	Values	Easy to Use	Perceived Usefulness and Ease of Use
E1	0.723		
F1	0.719		
E2	0.714		
E3	0.701		
G1	0.699		
D1	0.681		
A2	0.609		0.56
F2	0.552	0.503	
C1		0.755	
B2		0.751	
B1			0.766
A1			0.718

To reduce the dimensions of independent variables before conducting regression analysis, this paper conducted factor analysis on 12 dimensions of variables. As shown in Table 4 , A2 (0.567, 0.562) and F2 (0.6, 0.61) have high loadings on both factors, which may make the analysis difficult to interpret the results, so these items should be removed. This article finally extracted Values, Easy to Use, and Perceived Usefulness and Ease of Use as three new components.

4.4. Mediated regression

Table 5: Mediation Model Test of User Stickiness

	I1		I1		H1	
	t	β	t	β	t	β
Values	9.2926	1.3030	14.3886	1.6021	17.0386	1.6040
Easy to Use	3.5497	0.4068	4.9032	0.5484	7.8785	0.7417
Perceived Usefulness and Ease of Use	3.4619	0.5271	6.6125	0.7396	11.8205	1.1128
H1	4.1935	0.1910				
Constant	13.7788	4.5087	50.1388	5.6021	60.8770	5.7250
R-sq	0.3824		0.3660		0.5083	
F	73.5238***		91.5992***		164.0366***	

This article uses the bootstrap method to regress Values, Easy to Use, Perceived Usefulness and Ease of Use, User Stickiness and User Satisfaction simultaneously. In table 5, the P value of User Stickiness is 0.0000 (much less than 0.05), which is very significant, so the intermediate effect is established preliminarily. But their confidence interval needs to be further checked.

Table 6: Decomposition Table of Overall Effect, Direct Effect and Mediating Effect

	Effect	BootSE	BootLLCI	BootULCI	Relative Effect Proportion
Mediating Effect	0.3064	0.0902	0.1301	0.4855	0.19039334
Direct Effect	1.3030	0.1402	1.0275	1.5785	0.80960666
Total Effect	1.6093	0.1118	1.3896	1.8291	

As shown in table 6, the lower limit and upper limit of the 95% confidence interval of the mediation effect of brand interaction are 0.1301 and 0.4855 respectively (excluding 0), indicating that the mediation effect is significant, and it is regarded as partial mediation (19%)according to the results. The regression equation of the mediating effect is   User Satisfaction = 4.5087 + 1.3030 Values + 0.4060 Easy to Use + 0.5271 Perceived Usefulness and Ease of Use + 0.1910 User Stickiness.
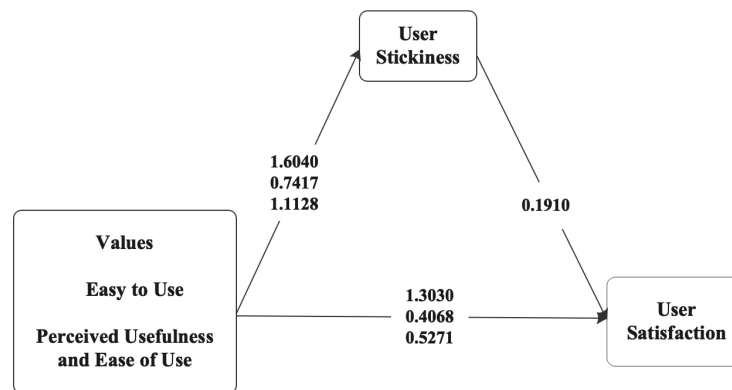
5. Discussion

Figure 5: Research Result Framework.

From the research results in Figure 5, value, perceived usefulness and ease of use have a positive impact on user stickiness, which means that when users think that mini program games have high perceived value, high perceived usefulness and high ease of use, they are more likely to Generate continued interest and loyalty in the game, thereby forming high user stickiness. User stickiness also has a positive impact on user satisfaction, meaning that when users have high stickiness to mini program games, they are more likely to be satisfied with the game. User stickiness plays a mediating effect between perceived value and user satisfaction, which means that value, perceived usefulness, and ease of use affect user satisfaction by affecting user stickiness. The size of this mediation effect is 19%, indicating that 19% of the direct impact of perceived value on user satisfaction is achieved through user stickiness. For mini program game developers, improving the perceived value, perceived usefulness and ease of use of the game is the key to attracting and retaining users.

In the process of using mini program games, users will have a certain understanding and evaluation of the game based on their own needs and experience. This understanding and evaluation form the user's perceived value, perceived usefulness and ease of use. When users believe that a game has high perceived value, high perceived usefulness and high ease of use, they will have positive emotions and attitudes toward the game, thereby forming higher user stickiness. User stickiness reflects users' continued interest and loyalty in mini program games. When users have high stickiness to a game, they are more likely to be satisfied with the game. This is because user stickiness means that users have continued fun and satisfaction in the game, and this satisfaction will prompt them to continue using the game and recommend it to others. Value affects user satisfaction by affecting user stickiness. This is because perceived value, perceived usefulness and ease of use are users' cognition and evaluation of the game. These cognitions and evaluations will affect the user's emotion and attitude towards the game, and in turn affect the user's stickiness. The mediating effect of user stickiness shows that a certain proportion of the direct impact of perceived value on user satisfaction is realized through user stickiness.

To sum up, mini program game developers should start by improving the perceived value, perceived usefulness and ease of use of the game to cultivate user stickiness, thereby improving user satisfaction. At the same time, these factors should also be considered as important marketing variables when formulating marketing strategies to promote continued use and dissemination of users. Here are some optimization suggestions:

Users' perceived value and perceived usefulness can be improved by optimizing game design, providing interesting gameplay and content, and improving the social nature of the game. At the same time, measures such as simplifying the game operation process and optimizing the user experience can also improve the ease of use of the game.

Developers should pay attention to the cultivation of user stickiness. By increasing user stickiness, users' loyalty and satisfaction with the game can be enhanced, thereby promoting users' continued use and dissemination. For example, user stickiness can be improved by providing a personalized game experience, adding game social functions, setting up a points system, etc.

When formulating marketing strategies, you can consider perceived value, perceived usefulness, and ease of use as important marketing variables to promote user stickiness and satisfaction by increasing the values of these variables. For example, advertising and word-of-mouth marketing can be used to increase

users' awareness of the game's perceived value and usefulness. At the same time, the game's ease of use and stickiness can also be improved by providing high-quality customer service and enhancing user experience.

6. Conclusion

This study uses quantitative empirical research methods, collects data through questionnaires, and uses SPSS for data analysis to explore the factors affecting the growth of mini program game users. The research results show that value, perceived usefulness and ease of use have a positive impact on user stickiness, and user stickiness also has a positive impact on user satisfaction. User stickiness plays a mediating role between independent variables and user satisfaction, among which user stickiness The intermediary role is 19%. The results of this study have important guiding significance for mini program game developers and provide new ideas and methods for research in related fields.

This study reveals the key factors affecting user growth of mini-program games, which helps developers better understand user needs and behaviors, thereby optimizing game design and marketing strategies. Secondly, operators can evaluate the operating effects of games by monitoring indicators such as user stickiness and adjust strategies in a timely manner. In addition, this study can also provide a reference for governments and cultural institutions to formulate more scientific and reasonable mini program game policies and regulations.

Although this study achieved some meaningful findings, there are still some limitations. First of all, this study only focused on the key factors that affect the growth of mini program game users, but there may be other factors that have not been considered. Future research could further explore these factors to gain a more comprehensive understanding of factors influencing user growth. Second, the sample in this study was only from China, so the findings may be culturally specific. Future research can expand the sample scope to compare the influencing factors of user growth in different cultural backgrounds. In addition, future research can further explore how these factors affect users' continued use behavior.

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