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Identification Analysis and Marketing Strategy of Mobile Game Users' Behavior Characteristics

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Abstract: *In recent years, the mobile game market has developed rapidly and became the largest market segment in the game industry in 2016. What matches this is that the discussion on mobile games on the Internet also occupies the center of public opinion. At the same time, with the change of consumption concept, the payment ability of mobile game players has been greatly improved. This paper explores the consumer behavior of mobile game users and analyzes their behavior in order to further improve the mobile game market.*

Keywords: *mobile game, consumer behavior, marketing strategy*

1. Introduction

As a segment market with the fastest growth and the fastest development, mobile game users' payment ability has been greatly improved as women, low-income earners, secondary players and other groups gradually become important users of mobile game, further transfer of end game users, and continuous increase of heavy players. Gao Yue [1] (2019) explored the popular phenomenon and reasons of the two-dimensional mobile games, and pointed out that the popularity of the two-dimensional mobile games such as Yin Yang Shi and Collapse 3 meant that the two-dimensional culture was slowly evolving into a new cultural trend. Previously, Wan Yi, Wang Yong and Li huaicang [2] (2021) analyzed the hot phenomenon of mobile games with the same name in movies and TV. Xiao Yue[3] (2020) mentioned when analyzing the phenomenon of plagiarism and infringement of domestic mobile games that the lack of domestic mobile games has led to unlimited similarities of mobile games types and endless plagiarism. The infringer does not care about the risk cost of infringement, but only focuses on making money.

2. Consumer behavior and willingness

Consumer behavior and willingness is undoubtedly one of the most concerned contents of mobile game companies. Many studies have analyzed potential users according to their behavior and willingness. Wang Xiaohui [4] (2019) focused on the rise of female players in the mobile game market, and pointed out that the proportion of male and female players in the current market has become increasingly close, and the proportion of female consumption in mobile games is also increasing year by year. Female users will become the mainstream market of mobile games. However, there is still a huge space for women's exclusive games, which deserves the attention of mobile game companies. Tian Xiaopei and Wang Yaxuan [5] (2018) explored the consumption potential of College Students' mobile games, and believed that the rapidly increasing smartphone possession rate, fragmentation of life time, collective living habits and other characteristics of college students mean that they have great mobile game consumption potential.

3. Characteristics of mobile game users

3.1. Binary selection model

In order to explore the influencing factors of residents' choice of mobile tourism, the logit model is established as follows:

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$$\begin{aligned}\ln(\frac{P_i}{1-P_i}) = {} & \beta_0 + \beta_1 gender + \beta_2 age18 + \beta_3 age24 + \beta_4 age35 + \beta_5 age50 \\ & + \beta_6 urban + \beta_7 student + \beta_8 finance + \beta_9 industry + \beta_{10} service \\ & + \beta_{11} information + \beta_{12} state\&busi\ staff + \beta_{13} income500 \\ & + \beta_{14} income1000 + \beta_{15} income3000 + \beta_{16} income5000 \\ & + \beta_{17} income10000 + \beta_{18} workinghours6 + \beta_{19} workinghours8 \\ & + \beta_{20} workinghours12 + \beta_{21} workinghours16 + \beta_{22} marriage \\ & + \beta_{23} nomarriage + \beta_{24} inlove + \beta_{25} usinghours1 + \beta_{26} usinghours3 \\ & + \beta_{27} usinghours6 + \beta_{28} usinghours8 + u_i\end{aligned} \quad (1)$$

We summarized the residents in the questionnaire and established a logistic regression model.

Bring the significant variables after regression into the model, fit the model and estimate the parameters to obtain the coefficient estimate, Z statistic and corresponding p value of each significant variable, as shown in Table 1.

Table 1: Regression results of Logit model for household groups

Variable	Coefficient	Std. Error	z-Statistic	Prob.
gender	0.5524	0.3777	1.4624	0.1436
age18	1.9643	0.7660	2.5643	0.0103**
age24	1.8927	0.5526	3.4252	0.0006**
age35	1.2456	0.3613	3.4478	0.0006**
age50	0.8388	0.4037	2.0775	0.0378**
urban	-0.5963	0.3234	-1.8441	0.0652*
student	-0.6388	0.7713	-0.8282	0.4076
finance	-0.4528	0.6613	-0.6846	0.4936
industy	0.6146	0.7718	0.7964	0.4258
service	-0.6808	0.5323	-1.2789	0.2009
information	1.2802	0.7153	1.7897	0.0735*
state&busi staff	-0.4287	0.6093	-0.7037	0.4816
income500	0.7244	0.6925	2.5799	0.0099**
income1000	2.2568	1.2066	1.8704	0.0614*
income3000	0.7062	0.7599	0.9294	0.3527
income5000	0.6794	0.7450	0.9119	0.3618
income10000	0.0945	0.7367	0.1283	0.8979
workinghours6	-0.4383	0.1857	-2.3606	0.0182**
workinghours8	0.1736	0.3335	0.5204	0.6028
workinghours12	0.2657	0.3724	0.7135	0.4756
workinghours16	-0.0260	0.6604	-0.0393	0.9686
marriage	-0.4372	0.4700	-0.9302	0.3523
nomarriage	0.9104	0.4853	1.8758	0.0607*
inlove	1.1822	0.5624	2.1019	0.0356**
usinghours1	-1.8389	0.8577	-2.1439	0.0320**
usinghours3	-0.9632	0.3213	-2.9977	0.0027**
usinghours6	0.1258	0.8528	0.1475	0.8828
usinghours8	-0.8151	0.6704	-1.2158	0.2241
c	0.1703	1.4378	0.1185	0.9057

Note 2: * indicates that the variable is significant under the significance condition of 0.1** Indicating that it is significant under the significance condition of 0.05.

It can be seen from the results that the factors that significantly affect whether residents play games are urban、age18、age24、age35、age50、information、income1000、workinghours6、nomarriage、inlove、usinghours 1、usinghours3.

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3.1.1. Gender

Gender has no significant effect on the residents' choice of playing mobile games, indicating that there is no significant difference between men and women in the choice of playing mobile games.

3.1.2. Age

The population playing mobile games in residential households is younger. Compared with the basic type of population over 50 years old, young people are more likely to choose to play mobile games. Young people under the age of 24 are more likely to play mobile games than those over the age of 50; However, people aged 25 to 35 also prefer games more than those over 50; People aged 36 to 50 still prefer mobile games more than those aged over 50.

3.1.3. Registered residence

Registered residence has a significant impact on whether residents play mobile games. Residents with urban household registration are more likely to play mobile games than those with rural household registration.

3.1.4. Work industry

The industry of residents also has a certain impact on the choice of playing mobile games. In the regression results, only the information industry has a significant impact on whether to play mobile games, and the regression coefficient is positive, indicating that the probability of people working in the information industry choosing to play mobile games is higher than that of residents in other industries. This may be because users in the information industry are more interested in electronic information and can contact many newly developed mobile games earlier and faster.

3.1.5. Monthly disposable income

In the regression results, the regression coefficients of monthly disposable income below 500 yuan and 501 to 1000 yuan are 0.7244 and 2.2568 respectively, and the P values are 0.0099 and 0.0614 respectively, which are significant. It shows that the residents with disposable income below 1000 yuan are more interested in mobile games than those with income above 10001 yuan. However, compared with the basic type with income above 10001 yuan, there is no significant difference in the level of disposable income in other months. It shows that low-income groups are easy to use mobile games.

3.1.6. Working hours

People with shorter working hours are more likely to choose to play mobile games. The analysis results show that for households, people who have enough free time will not choose to play mobile games.

3.1.7. Marital status

Unmarried people and married people have obvious differences in the choice of whether to play mobile games. Unmarried people have a higher choice probability of playing mobile games than married people. Combined with the fact that married people need to bear more family responsibilities and consider household chores, they will have less time to play mobile games for recreation, while unmarried people are more free, so they may choose to play mobile games more.

3.1.8. Service time of mobile equipment

People who do not often use mobile devices are less likely to choose mobile games. Compared with those who use mobile devices more than 8 hours a day, residents who use mobile devices less than 3 hours a day are more likely to choose not to play mobile games.

From the above conclusions, we can conclude that the characteristics of users who play mobile games among residents are: urban hukou, young, working in the information industry, low income, working more than six hours a day, unmarried and using mobile devices for more than three hours a day.

4. Depth impact analysis of mobile game users

As mentioned above, we learned what characteristics of people are more likely to play mobile games through the analysis of mobile game users, and obtained a reasonable positioning of mobile game users. In the following, we will further analyze in depth, consider several levels of user depth,

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and establish a ranking selection model to study the influencing factors that affect the different degree of dependence of users on hand games.

4.1. Establishment of ranking selection model

We integrate the survey data of college students and residents, and explore the impact of each variable on the depth of users from the aspects of personal characteristics, consumption habits, disposable income (living expenses of college students), loyalty to games (average time of playing a game), working and learning time, time of using mobile devices and types of playing games. The sorting selection model is established as follows:

$$Y_i = \begin{cases} 1 & y^* \le \gamma_1 \\ 2 & \gamma_1 \le y^* \le \gamma_2 \\ 3 & y^* > \gamma_2 \end{cases} \quad (2)$$

Potential regression model to be estimated:

$$Y^* = X\beta + u \quad (3)$$

Where, $\beta, \gamma_1, \gamma_2$ is the parameter to be evaluated.

4.2. Model estimation and analysis

4.2.1. Model estimation

The parameters of the ranking selection model are estimated, and the estimation results are shown in Table 2.

Table 2: Parameter estimation results of ranking selection model

Variable	Coefficient	Std. Error	Z-Statistic	Prob.
consume	1.7208	0.3854	4.4651	0.0000**
consume *consumption100	-1.3198	0.3714	-3.5528	0.0004**
urban	0.4809	0.2273	2.1154	0.0344**
gender	0.0523	0.2460	0.2126	0.8316
expenses1000	-1.5010	0.8405	-1.7859	0.0741*
expenses3000	-1.4326	0.8357	-1.7143	0.0865*
expenses5000	-1.1941	0.8188	-1.4583	0.1447
expenses10000	-0.9500	0.8535	-1.1132	0.2656
averagetime1	-1.8244	0.4159	-4.3862	0.0000**
averagetime2	-0.0618	0.3787	-0.1631	0.8704
averagetime3	0.3969	0.3969	1.0002	0.3172
averagetime4	0.0184	0.4345	0.0423	0.9662
averagetime5	0.0559	0.4327	0.1291	0.8973
workinghours6	0.1913	0.7234	0.2645	0.7914
workinghours9	0.2101	0.7063	0.2975	0.7661
workinghours12	-0.0317	0.7454	-0.0426	0.9660
usinghours3	-2.4234	0.3558	-6.8114	0.0000**
usinghours6	-1.2821	0.3066	-4.1816	0.0000**
usinghours8	-0.1820	0.3470	-0.5246	0.5999
c1	0.9831	0.2196	4.4760	0.0000**
c2	0.3507	0.2148	1.6326	0.1026
c3	-0.2748	0.3280	-0.8377	0.4022
c4	0.6965	0.2147	3.2441	0.0012**
c5	0.2380	0.3072	0.7748	0.4385
c6	0.7597	0.3144	2.4161	0.0157**
c7	-0.5986	0.4108	-1.4571	0.1451
c8	-0.1163	0.1977	-0.5885	0.5562

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workinghours6 * consume	1.5844	0.5623	2.8175	0.0048**
workinghours9 * consume	1.6266	0.4046	4.0199	0.0001**
workinghours12 * consume	1.2699	0.5948	2.1350	0.0328**
workinghours6 * consumption100	-1.4334	0.4701	-3.0494	0.0023**
workinghours9 * consumption100	-0.6272	0.6629	-0.9461	0.3441
workinghours12 * consumption100	-0.6449	0.7002	-0.9210	0.3570
c	0.1070	0.2516	0.4254	0.6706
		Limit Points		
LIMIT_2	-1.5448	0.7926	-1.9489	0.0513
LIMIT_3	1.7369	0.9569	1.8152	0.0695

4.2.2. Parallel regression hypothesis test

Using the data collected by the questionnaire, we conducted LR likelihood ratio test on the parallel regression hypothesis, and the test results are shown in Table 3.

Table 3: parallel regression hypothesis test

Model	-2log likelihood	χ^2	Freedom	P value
Original hypothesis	626.811			
Routine	608.830	17.981	42	1.000

If the p value is greater than the significance level, the original hypothesis cannot be rejected, that is, the effect of the independent variable coefficient among the models in each group is consistent.

4.2.3. Model result analysis

4.2.3.1. Consumption habits

We use whether to consume and the amount of consumption as two indicators of consumption habits. For consumption indicator, set a virtual variable. In the test results, whether the consumption variable is significant, the p value of the regression result is less than 0.0001, and the coefficient is 1.7208. This indicates that the depth of player users who consume in the game is higher than that of free players. The consumption amount variable is also significant, with a p value of 0.0004 and a coefficient of -1.3198. It indicates that the user depth of low consumption players is lower than that of players with higher consumption amount.

4.2.3.2. Registered residence

In the registered residence variable, we divided the registered residence into rural and urban areas and set a virtual variable. In the test results, the coefficient of registered residence is significant. The p value of the final regression result is 0.0344 and the coefficient is 0.480899. It shows that the players with registered residence in rural areas play games for a longer time than the players with registered residence in urban areas.

4.2.3.3. Gender

A dummy variable is set for gender. In the test result, the p value of gender variable is 0.8316, indicating that gender has no significant impact on user depth. There is no obvious difference in the user depth of different gender players, and female players may also become heavy users.

4.2.3.4. User loyalty

We use the average time spent playing a game as an indicator to measure user loyalty. Six different time options are set for the user loyalty indicator, namely: less than two weeks, two weeks to one month, one month to three months, three months to six months, six months to one year and more than one year. Five virtual variables are set. In the test results, only the variable that the average time of playing a game is less than two weeks is significant, and the p value is less than 0.0001. The coefficient of the variable is -1.8244, indicating that the user depth of the mobile game of the users with low loyalty is lower than that of the players who have played a game for more than one year on average,

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while there is no obvious difference between the depth of other loyal players and the users with the highest loyalty.

4.2.3.5. Working and learning time

The working time is divided into four time periods, namely: less than 6 hours, 6 to 9 hours, 9 to 12 hours and more than 12 hours. Three virtual variables are set. In the test results, the three variables are not significant, indicating that the length of working and learning time of mobile game players has no significant impact on whether they become heavy players.

4.2.3.6. Mobile device usage time

Four options are set for the use time of mobile devices such as mobile phones. They are: use for less than 3 hours, use for 4 to 6 hours, use for 7 to 8 hours, and use for more than 8 hours. Three virtual variables are set. In the regression results, the two variables of less than 3 hours of use and 4 to 6 hours of use were significant, P values were less than 0.0001, and the regression coefficients were -2.4234 and -1.2821, respectively. It indicates that the user depth of players who use mobile devices for less than 6 hours is significantly lower than that of players who use mobile devices for more than 8 hours.

4.2.3.7. Game type

There are nine options for game types, namely card games, board games, simulation games, strategy games, action games, role-playing, sports games, leisure games and music games. A total of 8 virtual variables are set, with music games as the basic category. The coefficient of C1 variable is 0.9831, indicating that the user depth of the game is significantly higher than that of the player playing card games and music games. The coefficient of the C4 variable is 0.6966, and the coefficient of the C6 variable is 0.7597, indicating that the user depth of players playing strategy games and role-playing games is higher than that of players playing music games.

5. Conclusions and strategic suggestions

5.1. Young unmarried groups are more inclined to play mobile games

According to the results of the binary selection model, unmarried people aged 19-24 are most likely to play mobile games. Although the preference of people aged 25-35 for mobile games is lower than that of young people under 24, it is still much higher than other groups. In combination with the field survey, we understand that students with higher living cost have more discretionary funds and are more inclined to rich outdoor entertainment activities, while students with lower living cost are restricted by funds and prefer mobile games, which are not limited by location and have high consumption degree.

5.2. The possibility of playing mobile games tends to be the same due to different genders

According to the binary selection model, whether for college students or community residents, gender has no significant impact on whether to play mobile games. There is no significant difference in the proportion of men and women who play mobile games. It can be seen that the current mobile game market is no longer dominated by male players, and the possibility of female groups playing mobile games has converged with that of male groups. According to the ranking selection model, the influence of gender on the user's playing time is not limited. Therefore, not only male players are heavy users, but female players may also become heavy users.

5.3. Game type affects user depth

According to the ranking selection model, we find that the user depth of players playing cards, strategies and role-playing games is higher than that of players playing other types of games. In combination with expert interviews, we learned that strategy games and role-playing games are heavy games, which require users to invest more energy and time. They are also favored by heavy users.

5.4. Low price and discount attract most players to pay

According to the survey results, we found that most mobile game paying players showed the behavior characteristics of low consumption (less than 100 yuan) and preference for preferential activities. They will not invest too much money in mobile games. When there are preferential activities

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or low-priced props in the game, they are likely to spend.

5.5. Pay attention to public praise and be loyal to the official

The survey results show that friend recommendation is the most important reason for mobile device users to try a new game, followed by the application ranking of the game and the production level of the game team. In contrast, the early publicity of a game is less attractive to new users. Friend recommendation and application ranking both reflect the reputation of the game. Therefore, a good reputation is not as good as a good advertisement. The quality of the game is the most concerned by users. In addition, the official channel is the main choice for users to download games and recharge games.

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