A Study on Choosing effects of the Chinese Mobile Game users using Fuzzy AHP Method

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Abstract

Objectives: China is definitely an attractive market for games, but competition is getting more intense. So it is important to analyze what factors affecting game users choosing, and game companies want to succeed here should have an insight about the preferences and behaviors of the Chinese mobile game users. Methods/Statistical Analysis: This study utilized 250 questionnaires from undergraduates, graduates, and employees in Guangzhou city. Based on the established hierarchical structure, design a questionnaire that compares indicators to obtain respondents’ opinions of two indicators. We also used the triangular fuzzy number to express semantic judgment values. Findings: The results indicate that when game users choosing mobile games, more concerned that “Satisfaction”, “Cost”, and “Convenience”. While, mobile game users play games just for fun within the “Convenience” aspect, game users most concerned about timely update the game, and excessive advertising also could have negative effect on game users. Regarding “Price” aspect, game users should be provided benefits that exceed their expectations. While, “Trust” and “Security” aspect were less significant factors when game user selecting mobile games. Applications/Improvements: To improve operator’s business performance, should begin by improving user’s “Satisfaction”, especially to strengthen sustainable developing games and seeking for solution to overcome the commercial advertisement. This explains why the feedback of operators is important in stimulating game users intention.

Keywords: China, Choosing Effects, Fuzzy AHP, Mobile Game, User Behavior

1. Introduction

With the consecutively enhancing properties of smartphone, the rising population of smartphone users, and the emerging all kinds of mobile games, all of them laid down a foundation for the future development of mobile online game in China. In 2014, China mobile game market gained 27.6 billion Yuan revenue; mobile games captured 24.9% of online game market share, exceeding that of web game (19%) for the first time as shown in Figure 1. In¹ Global Mobile Game Confederation (GMGC) expects that in the next two years, China will surpass US to become the largest mobile game market in the world².

Meanwhile, card games are the most popular genre for Chinese mobile game users and publishers are scrambling to cater to this demand with over 2,500 card games now³. It is important to analyze what factors affecting game users choosing, and game companies want to succeed here should have an insight about the preferences and

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behaviors of the Chinese mobile game users. Therefore, this study is intended to utilize data from a questionnaire, analyzing the main cause of the behaviors of mobile game user in China using fuzzy analytic hierarchy process (fuzzy AHP) method. This paper is organized as follows: section 2 describes theoretical framework of fuzzy AHP method and data collection; section 3 explains the analysis results; section 4 presents our conclusions.

2. Research Method

2.1 Theoretical Framework

We used fuzzy AHP as the analysis tool in this study. Fuzzy AHP combines AHP and fuzzy theory, and requires additional steps for establishing fuzzy linguistics, defuzzification, and normalization. In the fuzzy AHP calculation process, we adopted Chang’s method.

A fuzzy number \( A \) on \( R \) to be a triangular fuzzy number if its membership function \( \mu_A(x) : R \rightarrow [0, 1] \) is equal to

\[
\mu_A(x) = \begin{cases} 
0 & \text{if } x \leq l \\
\frac{x - l}{m - l} & \text{if } l \leq x \leq m \\
\frac{u - x}{u - m} & \text{if } m < x \leq u \\
0 & \text{if } x > u 
\end{cases}
\]

Where \( S_i \) is the ith fuzzy weight in matrix \( m \) and \( M_{Cj} \) \((j = 1, 2, \ldots, m) \) is the triangular fuzzy number calculated after comparing the questionnaires.

\[
S_i = \sum_{j=1}^{m} M_{Cj} \left( \sum_{k=1}^{m} M_{Ck} \right)^{-1}
\]

After comparing each indicator, a minimum was generated for each group.

\[
W(M \succeq M_1, M_2, \ldots, M_k) = \min \{ W(M \succeq M_i) \}
\]

Assume that \( d(X) \) is the minimum for each group, and create a set with the minimums of each group Equation 4, and create a set with the minimums of each group Equation 5.

\[
\hat{d}(X_i) = \min V(S_i \succeq S_k)
\]

\[
\hat{W} = [\hat{d}(X_1), \hat{d}(X_2), \ldots, \hat{d}(X_k)]^T
\]

Standardize the minimums after comparison to obtain the defuzzification weights for each indicator is given by:

\[
W = [d(X_1), d(X_2), \ldots, d(X_k)]^T
\]

2.2 Data Collection and Consistency Test

According to iResearch, the Chinese users of mobile game mainly are young people. Thus, most of the questionnaires come from undergraduates, graduates, and employees in Guangzhou city. 250 questionnaires were sent from May 18, 2015 to June 5, 2015, and we obtained 208 valid responses. Demographics show that 60.5% were male, the ages of 78% range from 19 to 32 years old.

Based on the established hierarchical structure, design a questionnaire that compares indicators to obtain respondents’ opinions of two indicators. We also used the triangular fuzzy number to express semantic judgment values. A 9-point Likert scale was used in the questionnaire, as shown in Table 1.

In order to ensure the reliability of this study, we used the consistency ratio which demonstrated the accuracy of the questionnaires. All consistency ratio indexes were lower than 10%, shows that passed through verification.

<table>
<thead>
<tr>
<th>Numerical value</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equally preferred</td>
</tr>
<tr>
<td>3</td>
<td>Moderately preferred</td>
</tr>
<tr>
<td>5</td>
<td>Strongly preferred</td>
</tr>
<tr>
<td>7</td>
<td>Very strongly preferred</td>
</tr>
<tr>
<td>9</td>
<td>Extremely preferred</td>
</tr>
</tbody>
</table>

Source: Satty (1980)

3. Empirical Results

The weights of the aspects and indicators obtained using fuzzy AHP approach are shown in Table 2. The results indicate that when game users choosing mobile games, more concerned that “Satisfaction”, “Cost”, and “Convenience”, and its weights are 0.382, 0.274, and 0.231 respectively. While, mobile game users play games just for fun (0.382), within the “Convenience” aspect, game users most concerned about timely update the game, and excessive advertising also could have negative effect on game users. Regarding “Price” aspect, game users should be provided benefits that exceed their expectations. While, “Trust” and “Security” aspect were less significant factors when game user selecting mobile games. Its weights are 0.075 and 0.038 respectively.
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Table 2. Empirical test results

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Weights</th>
<th>Indicators</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>0.382</td>
<td>Fun</td>
<td>0.391</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Advertising</td>
<td>0.317</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Story layout</td>
<td>0.292</td>
</tr>
<tr>
<td>Convenience</td>
<td>0.231</td>
<td>Size</td>
<td>0.244</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Update</td>
<td>0.461</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Function</td>
<td>0.295</td>
</tr>
<tr>
<td>Security</td>
<td>0.038</td>
<td>Payment</td>
<td>0.722</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Swindle</td>
<td>0.278</td>
</tr>
<tr>
<td>Trust</td>
<td>0.075</td>
<td>Reputation</td>
<td>0.617</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brand</td>
<td>0.383</td>
</tr>
<tr>
<td>Cost</td>
<td>0.274</td>
<td>Free game</td>
<td>0.794</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time cost</td>
<td>0.206</td>
</tr>
</tbody>
</table>

4. Conclusions

In this study, we used fuzzy AHP to analyze the weights of the decision-making aspects and indicators considered by game users when selecting mobile games. The results indicate that the sequence of the three aspects with the highest weights of all the aspects were “Satisfaction”, “Cost”, and “Convenience”. To improve operator's business performance, should begin by improving user's “Satisfaction”, especially to strengthen sustainable developing games and seeking for solution to overcome the commercial advertisement. This explains why the feedback of operators is important in stimulating game users intention.

5. Acknowledgment

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6. References