

Postprint: A Study on Factors Influencing Dropout Intention in Mobile Online Games from an SRO Perspective

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Abstract

[Purpose/Significance] This study explores the antecedents of discontinuation intention in mobile online games from the SOR perspective, extends the research scope of discontinuation theory, and offers recommendations for mobile game user retention. [Method/Process] Grounded in the SOR model, we construct a model of factors influencing discontinuation intention in mobile online games. An online questionnaire was administered to collect 251 valid responses, and the data were analyzed using SPSS and SmartPLS software (Structural Equation Modeling) to empirically validate the model. [Results/Conclusion] The findings indicate that information overload, (low) game quality, and (high) switching costs exert significant positive effects on emotional exhaustion, whereas social overload shows no significant impact; emotional exhaustion subsequently demonstrates a significant positive effect on discontinuation intention.

Full Text

Abstract

Purpose/Significance

From the perspective of SOR (Stimulus-Organism-Response), this study explores the causes of discontinuance intention in mobile online games, expands the research domain of discontinuance theory, and provides recommendations for mobile game user retention.

Method/Process

Based on the SOR model, this paper constructs a model of factors influencing mobile online game discontinuance intention. A total of 251 valid responses were collected through an online questionnaire and analyzed using SPSS and SmartPLS (structural equation modeling) to empirically test the model.

Results/Conclusion

The findings reveal that information overload, (low) game quality, and (high) switching cost significantly and positively affect emotional exhaustion, while social overload shows no significant effect on emotional exhaustion. Emotional exhaustion, in turn, significantly and positively influences discontinuance intention in mobile online games.

Keywords: mobile online games; discontinuance intention; influencing factors; Stimulus-Organism-Response

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1 Introduction

With the rapid development of domestic mobile networks and the accelerating proliferation of smartphones, mobile online games have gradually become an essential component of daily entertainment. According to the 45th “Statistical Report on China’s Internet Development” released by the China Internet Network Information Center (CNNIC) in March 2020, China’s mobile online game (hereinafter referred to as “mobile games”) user base reached 529 million, accounting for 59.0% of mobile internet users [1]. Jiguang Big Data’s “2019 Mobile Game Industry Research Report” indicates that mobile game installation penetration in China reached 73.4%, with mobile devices representing 80.8% of the most frequently used gaming platforms among players [2].

Despite the massive market scale, negative usage behaviors such as declining user stickiness, user churn, and discontinuance have attracted widespread attention. Jiguang Big Data’s “Research Report on Mobile Game User Churn” reveals that while Tencent’s two popular mobile games, *Honor of Kings* and *Peacekeeper Elite*, commanded market penetration rates of 17.0% and 11.2% respectively, their monthly churn rates in 2019 reached 11.0% and 15.8% [3]. Such widespread negative user behavior can cause substantial losses for game companies, making research on mobile online game users’ negative behaviors both necessary and valuable.

Discontinuance refers to “an individual’s behavior of rejecting or terminating the use of an innovation after having adopted and used it for a period of time” [4]. Intermittent discontinuance represents “the behavior where an individual stops using an innovation after adoption, but then re-adopts and uses it again after an extended period (more than several weeks but less than half a year), potentially cycling repeatedly between use and discontinuance” [5]. As a form of negative user behavior in the context of mobile online games, discontinuance marks a shift in attitude among “veteran players” who have played a particular mobile game for some time, potentially reflecting deficiencies discovered during subsequent gameplay experiences. What factors influence mobile online game

users' discontinuance intention? Investigating this question can help better understand mobile game user needs and improve user stickiness.

Literature review reveals abundant recent research on mobile online game user behavior. S. Okazaki constructed an online mobile gaming experiential value model encompassing seven variables including intrinsic enjoyment, escapism, and efficiency [6]. T. Zhou found that ease of use, connection quality, and content quality affect flow experience, while flow, social influence, and usage costs determine mobile game usage intention [7]. I. O. Pappas et al. discovered that price value, game content quality, emotion, gender, and gameplay time, in combination, can explain high download intention [8]. J. Balakrishnan and M. D. Griffiths found that mobile online game addiction significantly and positively affects both game loyalty and in-app purchase intention, with loyalty also significantly influencing in-app purchase behavior [9]. P. Choe and D. Schumacher demonstrated that incorporating physical vibrations in mobile games can significantly improve perceived ease of use, usefulness, and cognitive concentration [10]. K. Browne and C. Anand tested a scrolling shooter mobile game and found that accelerometer-based interfaces were the most preferred and delivered the best performance [11]. Dong Haojie found that enhanced emotional design in user interfaces helps bridge the gap between users and games [12]. Duan Feifei et al. discovered that flow experience is a crucial factor affecting mobile game user stickiness, with interactivity, telepresence, usefulness, and perceived control significantly influencing flow experience [13].

In recent years, discontinuance has gained increasing attention, particularly in social media and mobile app contexts. J. V. Chen et al. constructed a mobile consumer discontinuance model based on stress-coping theory, validating how factors such as perceived information overload and perceived rewards affect discontinuance behavior through user coping strategies [14]. S. Fu et al. found that system feature overload and information overload affect social media discontinuance behavior through the mediating effect of social media fatigue [15]. Z. Tang et al. discovered that information quality dissatisfaction, unmet expectations, interest shift, and brand-person mismatch significantly affect users' intention to unfollow brand fan pages [16]. Zhang Min et al. found that both technostress factors and usage gratification factors positively affect social network usage fatigue and social network switching fatigue, which in turn influence intermittent discontinuance among social network users [17]. Gan Chunmei et al. found that negative social comparison affects social network users' feelings of envy, anxiety, and burnout, with envy and burnout significantly influencing intermittent discontinuance [18].

These studies typically examine user attitudes and behaviors from a positive perspective, investigating users' positive intentions and behaviors toward mobile games, while research on factors directly causing negative user behaviors remains limited. This study focuses on factors influencing mobile online game users' discontinuance intention, attempting to explore the mechanisms underlying users' negative attitudes and discontinuance intentions from a more direct perspec-

tive to derive theoretical foundations for preventing declines in user stickiness and engagement. Additionally, this research introduces information overload and social overload factors to examine whether they exist in mobile games and exert similar effects on mobile game users as they do on social network users. Overall, this paper not only expands the application domain of discontinuance theory but also provides a basis for mobile game companies to improve their understanding of user behavioral intentions and optimize mobile game design, development, and operations.

2.1 Research Model

The Stimulus-Organism-Response (S-O-R) theoretical model primarily investigates how external environmental factors affect human organism responses and mechanisms, providing theoretical support for behavior generation and prediction. In recent years, the S-O-R model has been introduced into research on user behavior influencing factors for various software applications and platforms in online environments. A. Luqman et al. constructed and validated a Facebook discontinuance intention model based on SOR theory, with stimulus factors including excessive social use, excessive hedonic use, and excessive cognitive use, and organism factors including technostress and social network fatigue [19]. X. Z. Xie and N. C. Tsai used the SOR model to study the impact of information-related negative events on social media discontinuance intention, with advertising interference, rumor spreading, and information ambiguity as stimulus factors, and social media fatigue as an organism factor [20]. Zhu Guangting and Zhu Junxuan constructed a consumer behavior model in big data environments based on the SOR model, where the stimulus factor of website quality affects user purchase intention through the mediating effect of consumer attitude [21]. Zheng Meiyu constructed and validated a model of factors influencing continued use of mobile library users, where stimulus factors of system quality, service level, and usage cost affect system stickiness and continued use intention through organism factors of demand matching and perceived fun [22].

The mobile gaming context shares certain similarities with these research contexts, where various perceptions and experiences during gameplay serve as external stimuli that affect the user organism (including emotions), thereby leading to user responses. Drawing on these research patterns, this study proposes a conceptual model based on the S-O-R model. Information overload, social overload, game quality, and switching cost are factors perceived by users during gameplay that may generate negative feelings, and are therefore set as external stimulus factors. Emotional exhaustion can serve as a reflection of users' cognitive processing of these stimuli and is thus set as the internal organism factor. Discontinuance intention constitutes the response factor. The model structure is shown in Figure 1 [Figure 1: see original paper].

2.2 Research Hypotheses

Information Overload (IO) refers to the phenomenon where the amount of information exceeds an individual's information processing capacity [23]. Scholars including W. Chaouali [24], M. Wang and D. Li [25], and Gan Chunmei [26] have found that information overload significantly affects social network fatigue. Users expend substantial time and energy processing redundant information on social networks, easily leading to exhaustion. Similar situations exist in the mobile online game context. In today's mobile game market, various games tend to design rich and diverse content to attract players, filling games with large amounts of text, images, animations, music, and sound effects. Mobile games also typically feature regular daily and weekly activities and intermittent special events that require extensive player operations. Mobile game players often receive and process substantial information (including game content and operations) within games, which may cause them to experience fatigue, boredom, and other negative emotions. Based on this, the following hypothesis is proposed:

H1: Information overload significantly affects mobile game users' emotional exhaustion.

Social Overload (SO) occurs when social network users, out of a sense of responsibility, provide social support to others but feel they need to provide excessive social support [27]. X. Xiao and T. N. Wang [28], J. Lo [29], and Gan Chunmei [26] found that social overload significantly affects social network fatigue. Users provide and receive social support on social networking platforms, and when the required social support becomes excessive and consumes too much time and energy, users experience exhaustion. Mobile online games often feature rich social functions such as friend systems, guild systems, and cooperative battles. These social functions also entail potential demands for social support that may lead to negative user emotions. Based on this, the following hypothesis is proposed:

H2: Social overload significantly affects mobile game users' emotional exhaustion.

Game Quality (GQ) refers to users' overall evaluation of game design quality and operational service quality. I. O. Pappas found that game content quality, in combination with other factors, can explain high mobile game download rates [8]. Zhang Di found that game factors (including service quality and game design) significantly affect user organisms [30]. Zhang Guohua and Lei Li found that perceived online game quality indirectly affects online game addiction through the mediating effect of attitude [31]. Zhou Tao and Chen Kexin found that service quality indirectly affects social commerce users' usage and sharing behaviors through the mediating effect of virtual community perception [32]. Based on this, the following hypothesis is proposed:

H3: Game quality significantly affects mobile game users' emotional exhaustion.

Switching Cost (SC) refers to the total economic and temporal costs incurred

when a user abandons one supplier and switches to another for a product or service requiring repeated purchases [33]. Ma Lixing and Jiang Fu identified switching cost as an important factor affecting customer loyalty [34]. Zhang Chubing's research demonstrated that in online shopping contexts, financial switching costs and procedural switching costs significantly and positively affect customer regret [35]. In the mobile online game context, switching cost refers to the time and money players have invested in a previously played mobile game, as well as the time and money costs required to switch to a new game. Excessively high switching costs may cause negative emotions among mobile game players. Based on this, the following hypothesis is proposed:

H4: Switching cost significantly affects mobile game users' emotional exhaustion.

Emotional Exhaustion (EE) refers to an individual's perceived emotional overextension [27]. C. Maier found that in social network contexts, users' extreme emotions such as burnout, fatigue, and irritability lead to negative attitudes and behaviors [27]. X. Cao and J. Sun found that emotional exhaustion positively affects social media users' discontinuance intention [36]. W. Gao et al. found that social network exhaustion significantly and positively affects users' discontinuance intention [37]. This phenomenon may also exist in the mobile online game context, where negative emotions toward mobile games may lead to reduced engagement or complete cessation of gameplay. Based on this, the following hypothesis is proposed:

H5: High levels of emotional exhaustion significantly affect mobile game users' discontinuance intention.

The research hypotheses are illustrated in Figure 2 [Figure 2: see original paper].

3.1 Scale Design

To ensure scale reliability and validity, all measurement items were adapted from existing research and modified according to the mobile online game user research context. Information overload items were adapted from P. Karr-Wisniewski et al. [38]; social overload and discontinuance intention scales from C. Maier [27]; game quality items from A. Parasuraman et al. [39], P. Karr-Wisniewski et al. [38], and Zhang Di [30]; switching cost items from R. A. Ping [40]; and emotional exhaustion items from Cheng Ji [41] and R. Ayyagari et al. [42]. All items used a 7-point Likert scale, where "1" indicated "strongly disagree," "4" indicated "neutral," and "7" indicated "strongly agree."

Before formal data collection, feedback was solicited from one library and information science expert to revise questionnaire format, content, and item sequence. Subsequently, 18 mobile game players participated in a small-scale pilot survey to preliminarily test scale reliability and validity, followed by further modifications to finalize the formal scale.

3.2 Data Collection

Young populations were selected as the primary research sample. Younger individuals typically embrace new technologies and have extensive, in-depth exposure to various types of mobile online games. Additionally, Jiguang Big Data's "2019 Mobile Game Industry Research Report" [2] shows that young populations constitute a large proportion of users across major popular mobile games: users aged 25 or younger account for 74.1%, 65.0%, and 52.3% of *Honor of Kings*, *Peacekeeper Elite*, and *Slither.io* respectively. Therefore, the selected sample possesses adequate representativeness. An electronic questionnaire was distributed through social media platforms, yielding 280 responses. After eliminating questionnaires with uniform or near-uniform answers, 251 valid responses remained, representing an 89.6% validity rate. Demographically, males comprised 47.4% and females 52.6% of the sample—a smaller gender difference than the traditional perception of male-dominated gaming. The sample was predominantly young, with 92.8% aged 19-24. In terms of education, 84.9% held bachelor's degrees and 8.4% held master's degrees or higher, indicating a relatively well-educated sample. Regarding occupation, 93.2% were students, consistent with the age distribution. Monthly disposable income was under 2,000 RMB for 54.6% of respondents and 2,001-3,000 RMB for 31.1%, reflecting the student-majority sample. Detailed characteristics are presented in Table 1.

4.1 Reliability and Validity Analysis

Cronbach's α coefficient was used as the reliability analysis criterion, with $\alpha > 0.7$ indicating high reliability and values > 0.6 generally considered acceptable [43]. Validity analysis primarily examined factor loadings, CR (composite reliability), and AVE (average variance extracted) [44]. Factor loadings and CR values > 0.7 are generally considered to indicate high validity, while the AVE threshold is 0.5. As shown in Table 2, the scale demonstrates good reliability and validity. When the square root of each variable's AVE exceeds its correlation coefficients with other variables, good discriminant validity can be established [45]. Table 2 indicates satisfactory overall discriminant validity.

4.2 Model Testing

Path analysis using SmartPLS software yielded the path coefficients shown in Table 3. The results indicate that information overload significantly and positively affects emotional exhaustion ($\beta = 0.176$, $p < 0.001$); social overload shows no significant effect on emotional exhaustion; game quality significantly and positively affects emotional exhaustion ($\beta = 0.267$, $p < 0.001$); switching cost significantly and positively affects emotional exhaustion ($\beta = 0.243$, $p < 0.001$); and emotional exhaustion significantly and positively affects discontinuance intention ($\beta = 0.476$, $p < 0.001$). Thus, hypotheses H1, H3, H4, and H5 are supported, while H2 is not supported.

The model path diagram based on SmartPLS analysis results is shown in Figure

3 [Figure 3: see original paper]. The variance explained for emotional exhaustion and discontinuance intention are 19.6% and 22.7% respectively, indicating acceptable explanatory power.

5.1 Research Conclusions

Based on the S-O-R (Stimulus-Organism-Response) framework, this study constructed a model of factors influencing mobile online game discontinuance intention, examining the effects of information overload, social overload, game quality, switching cost, and emotional exhaustion on mobile online game users' discontinuance intention. The main conclusions are:

- (1) **Information overload significantly and positively affects mobile game users' emotional exhaustion.** This result aligns with Gan Chunmei's [26] research in social media contexts. It first demonstrates that information overload exists not only in websites and social networking platforms but also in mobile games, where it can be clearly perceived and significantly negatively impacts users' psychological emotions. In mobile games, information overload manifests not only as excessive text, images, and music but also as overwhelming game content and operations. Some mobile game operators, aiming to occupy players' time, design daily content and operations to be excessively complex and lengthy, causing players to experience information overload and subsequently develop feelings of boredom and fatigue. Therefore, mobile game companies should appropriately control the amount of information within games to reduce information overload.
- (2) **Social overload shows no significant effect on emotional exhaustion.** While existing research has demonstrated that social overload exists in social networking platforms and applications and negatively affects user emotions and behaviors [26], this phenomenon did not emerge in the current study. This may be because mobile games are highly entertaining with relatively low social pressure, and people do not impose excessively high demands on social relationships within games or feel pressured by friends' virtual achievements. Even when some friends' social requests or needs cannot be met, individuals do not experience excessively high negative emotions.
- (3) **Low game quality significantly and positively affects emotional exhaustion.** This result aligns with Zhang Di's [30] findings. The game quality variable in this study includes two dimensions: game design and service quality. Multiple mobile game players in the pilot survey mentioned that issues with game design or service quality led to discontinuance intentions or behaviors. Game design is the soul of game quality and the foundation determining overall quality, while service quality is essential for user retention and serves as the guarantee of game quality. When players decide to play a mobile game but subsequently discover

problems with game design or service quality—such as unfair rule design or excessively high in-app purchase prices—their emotions are negatively affected. Therefore, mobile game companies must thoroughly understand player needs regarding game design and service quality to improve game quality, for instance by strengthening balance testing to provide fairer gaming experiences or carefully controlling in-app purchase prices to avoid negative player reactions.

- (4) **Switching cost significantly and positively affects emotional exhaustion.** This result resembles R. A. Ping's [40] conclusion in the retail sector, which found significant correlation between switching cost and user satisfaction. The positive effect of increased switching cost on mobile game users' emotional exhaustion may occur because excessively high cost investments cause players to reflect on whether their time and monetary investments are worthwhile, thereby generating negative psychological emotions. Alternatively, when other negative feedback emerges, high switching costs may amplify users' negative emotions. Therefore, mobile game companies should not blindly increase players' switching costs to retain them.
- (5) **Emotional exhaustion significantly and positively affects discontinuance intention.** This result aligns with X. Cao and J. Sun's [36] findings. When mobile game players feel bored or fatigued, they are more likely to develop discontinuance intentions. Consequently, mobile game companies must control factors such as information overload, game quality, and switching cost to reduce the occurrence of emotional exhaustion.

5.2 Research Significance

Theoretically, this study introduces information overload, social overload, and discontinuance intention into mobile online game user research, extending their research domains to some extent. The research verifies the effect of information overload on mobile online game user behavior, identifying its significant impact on organism-level emotional exhaustion in the mobile game discontinuance intention model. Although social overload shows no significant effect in the model, a reasonable explanation is provided. The study also confirms that discontinuance intention and behavior exist in the mobile game context, and by approaching from the perspective of users' negative attitudes, it partially fills the gap in previous research that primarily focused on positive behaviors (e.g., user stickiness, purchase intention) among mobile game users.

Practically, the findings provide theoretical guidance for mobile online game companies regarding post-launch operations and user retention strategies. First, even as mobile games become increasingly sophisticated with more diverse content and formats, companies must consider users' information processing limits, ensuring information is concise rather than relying on abundant complexity to occupy user time. Second, in-app purchase designs must be scientifically sound;

blindly increasing prices or forcing player purchases to raise switching costs does not improve user stickiness but instead generates negative effects. Additionally, post-launch design updates and service quality levels must be maintained to avoid psychological gaps, with regular user surveys ensuring that design and services align with actual player needs. Strategies must consider the sustainable development of mobile games.

5.3 Research Limitations

This study has several limitations. First, the surveyed population is concentrated among young student groups, failing to comprehensively reflect the overall behavior of mobile game players. Second, other potential factors influencing discontinuance intention were not considered, such as player personality traits and flow experience. Finally, this study addresses all types of mobile online games collectively, yet mobile game genres are diverse, and the influencing factors and their effects on player discontinuance intention may vary across different game types.

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