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# The Effect of Mobile MMORPG Characteristics on Flow Experience and Performance\*

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## Abstract

**Purpose** - This study examines the changes in the mobile MMORPG market in recent years and the factors affecting the performance of mobile games through flow experience according to the characteristics of game content.

**Research design, data, and methodology** - This study focuses on the fact that the cause of game use behavior changes is the flow experience which influences the duration of mobile game continuation. The flow experience and the influencing factors are divided into the relationship between first, second-leading factors, and lagged factors.

**Results** - The user's sense of challenge, skillfulness, concentration, and reality influenced the flow experience as a leading factor influencing the performance of MMORPG games. On the other hand, fun and preference were found to be the outcomes of the flow experience. This is because the game content is experienced not through passive enjoyment but by intentionally enjoying the game content. The flow experience has a positive effect on the intention of continuous use as in the previous study.

**Conclusions** - This study found that the flow experience of game users is necessary for continuous use by organizing relationships of flow experience in mobile MMORPG users' gaming behavior.

**Keywords:** Mobile Game, MMORPG, Challenge, Skillfulness, Concentration, Reality, Fun, Preference, Flow Experience, Intent of Continuous Use.

**JEL Classifications:** L82, M31.

## 1. Introduction

According to the size and prospects of the game market, it is expected that all game markets except for the PC game market will become listed over the next few years. In particular, the mobile game and game ad market shows an annual average growth rate of 6.2%, with revenue of \$ 891.1 million by 2018. Demand for games is growing rapidly not only in Europe and the US but also in Asia, Latin America and the Middle East.

With the growth of mobile games, starting with Match Three Puzzle and Tycoon, the game's four traditional genre games have also begun to be introduced in rapid mobile

gaming. Among them, the mobilization of racing games, sports games, and action/casual games made rapid inroads in terms of speed, but relatively cautious and sustained inroads into the market for RPG games, especially MMORPG. The reason for this is that they are considered unsuitable for mobile devices because of the large amount of installed capacity required due to their vast content, complex operation methods and, above all, the nature of the game that always requires the "quest and hunt". MMORPGs with these limitations are mobilized and are striving to develop into games that take into account the characteristics of games such as Auto Play and the characteristics of users. The industry wants to introduce an aid or device that allows users to enjoy the games more and experience a flow to suit their situation needs.

Overall, the relationship between immersion and satisfaction in the gaming market has been studied a lot, but unlike research on consumer trends related to the smartphone environment, there is not much research on the impact of smartphone games on consumers. This study is meaningful in that it studies how such an environment affects the flow experience and performance of game users

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according to the characteristics of MMORPG, which has recently become an issue in many ways. In particular, few studies have been conducted to address the effects of flow-experience on users in real-life game situations.

Therefore, in this study, we want to look into the relationship between the 1st/2nd leading factors, the outcome factor and flow experience of Icarus M, an MMORPG game in the mobile environment. In addition, the results generated by the customer experience reach flow are utilized for continuous use, which is an action measure, to identify the effect of flow on behavior. Through this strategy, the company aims to derive strategic implications for how to increase user gaming time and increase their intention to re-use games.

Therefore, the purpose of this study is to:

First, study the characteristics of mobile MMORPGs to identify the impact relationship with users' flow experience. Second, discover how flow experiences of mobile MMORPG users affect their intent of continuous use.

## 2. Literature Review

### 2.1. Characteristics of Mobile MMORPG

Mobile games cannot simply be defined as platform extensions for PC games or additional features for mobile devices. Mobile games offer a completely different media experience, combining the medium of smartphones with entertainment. In addition, consumers seeking both individuality and entertainment have been able to gain new social and cultural experiences through mobile games.

The characteristics of mobile games are as follows: First, mobile games are relatively free from time and space constraints compared to other games. Second, mobile games are easier to manipulate than other games. Third, mobile games are available for many users because they are available for free or at lower prices than other games when downloading a single game. Fourth, mobile games are relatively less expensive than other games, and game development is carried out with less manpower over a short period of time. Fifth, the mobile game market has a lower entry barrier than other game markets. Sixth, mobile games are personalized media because users can download the game titles they want using their mobile devices.

On the other hand, many researchers define RPG as a large multi-user online role-playing game (MMORPG), but there is no significant difference between the two concepts. MMORPG is a combination of colorful graphics and sound in games and role-playing games based on multi-user online games (Park & Jeon, 2001). Connectivity over the Internet and large users are key elements of MMORPG. Major MMORPGs released in South Korea include Lineage, Icarus, MU, and WOW.

Board games are called P&P RPG (Pen & Paper RPG), where many people enjoy using dice, roll books, paper, and pens at a time when there were no computers or Internet access. In Korea and Japan, P&P RPG is sometimes called TRPG. After computers were created, people began to enjoy CRPG, which often involved playing a combat role during the game and developing characters. Many things changed when computers emerged and gaming evolved from TRPG to CRPG with the advent of new media. Instead of playing games with people offline, gamers used computers to play games, leaving no one to watch their roles and no one to play with them. Rather than creating an individual character and setting up a character to play a role accordingly, the gamer inhabits and plays the character assigned to the role, etc. (Ahn, Jeong, & Lyou, 2007).

Specifically, there are six characteristics of RPG: multi-user, non-endurance, virtual world, community, growth, and competition (Lee, 2005).

### 2.2. Flow experience

#### 2.2.1. Definition of Flow

There is a moment in our daily lives where we sometimes fall into one situation and become immersed in another. This condition is called flow and is defined by two things: commitment and flow. Commitment, which is mainly used in the fields of marketing and psychology, refers to loyalty that shows how committed an organization member is to his or her organization. Flow, in this context, is the concept first mentioned by Csikszentmihalyi. The most important part of flow theory is that the flow is natural and comfortable, similar to the flow of water flows from high to low, with the optimum experience of drawing out its extreme capabilities.

Common results have been found in studies by several scholars on flow theory, which can be defined as "an overall feeling in which, when doing one action, all of the limited peripheral focus is involved." Flow involves being content with the current situation and is intent on action, and prevents feelings related to being irritated or bored. Flow encourages voluntary participation, and as the flow continues, it becomes more satisfying in itself. This allows gamers to create strong characters full of confidence.

According to Csikszentmihalyi (1991), there are five characteristics involved in flow. First, flow is capable of strong attention. Second, there is a convergence of actions and perceptions. Third, in a flow state, a gamer forgets the passage of time. Fourth, the flow can involve a strong sense of control in its activities. Finally, flow itself is self-fulfilling. In other words, the higher the skills and challenge level, the more one experiences flow (Kwon, 2008).

**Table 1:** Pre-Study on Flow

Researcher	Flow Definition Content	research focus
Mannell and Kleiber(1997)	Optimal experience refers to a state of deep psychological involvement or concentration in a situation or activity	optimum experience
Csikszentmihalyi, (1977)	Flow experience should not be experienced in any situation or activity but should be accompanied by a reasonable selection of the situation or activity and appropriate conditions	Accurate selection, appropriate conditions
Mannell, Zuzanek, and Larson(1988)	It refers to being completely immersed in one's activities and measuring the perception of concentration, emotion, skill, influence, and balance of challenge.	perceived freedom, intrinsic motivation
Trevino and Webster(1992)	Flow means experiencing pleasure such as play, and when immersed in this experience, the activity itself is regarded as interesting and enjoyable, self-synchronizing, or inherently. Active without compensation	Experience pleasure, self-synchronization
Clarke and Haworth(1994)	Subjective experience when acting in situations where the challenge level of a given activity or task is consistent with one's own level of proficiency; this flow experience is a total satisfaction level that is more	Challenges, Skill Matches, Total Satisfaction
Hoffman and Novak(1996)	The condition in which an intrinsic reward leads to self-strengthening without pleasure or self-consciousness, with the characteristics of interacting and feedback as one feels when the optimal experience occurs.	optimum experience, self-discipline

source: revised from Kwon & Kim(2008)

### 2.2.2. Antecedents of Flow Experience in Mobile Gaming Content

Flow is a phenomenon that plays an important aesthetic role in the history of visual media, from painting to photography, to motion pictures, and to games that involve user interaction. Flow is an experience of slipping into reality and other worlds, and it means an aesthetic experience that can be experienced by those who create or view all artworks, as well as the medium that delivers images. Csikszentmihalyi(1991), who presents the characteristics of flow phenomena, divided flow into the conditions under which it occurs, and the phenomena experienced after flow. The following are the conditions for the flow experience to occur in a game:

- ① The difficulty level of a game task should be adequate for the skill and ability level of the game.
- ② A clear goal must exist.
- ③ Clear and immediate feedback should be provided depending on the movement or behavior of the game user.

The experience that appears after the flow experience is summarized as follows:

- ① During the game, one's behavior and awareness are integrated without separation.
- ② One feels a sense of control and strong confidence in a given task.
- ③ One does not feel self-conscious, and one loses one's fear of fulfilling a given task.
- ④ Psychologically, time flies and becomes more focused.

As a result, post-flow phenomena in the game help one solve a given task quickly. That is, when the conditions of occurrence of flow phenomena are met, the user will experience them after flow, which will allow the user to

solve a given task in the game.

### 2.2.3. Characteristics of game content

According to the study by the PEW Internet & American Life Project (Jones, 2003), the reasons for respondents' preference for games with video and computer games were shown to be realistic graphics, exciting games, interactive games. These results could indicate the color of the background screen or the color and characteristics of the characters and elements of the game selection.

According to the ARC Group (2002), the greatest advantage of mobile content is that it can be directly accessed whenever and wherever needed, because of the miniaturization of mobile devices. However, games were not very complete because such miniaturization resulted in limited screen size and made button operation uncomfortable, and users who played games felt uncomfortable.

Currently, devices with suitable interfaces have been released to overcome the shortcomings of mobile devices, but they have yet to become significantly popular. As mobile game users also appear to be complaining about the lack of game performance and the difficulty of operation, lack of screen size, operation button functionality, and process execution speed, which are the limitations of mobile devices, may serve as important factors.

The liveliness and interactivity/speed in content variables can be called feedback in the context of the immersion factor. In particular, it is closely related to liveliness, which refers to the ability of each element to set up an environment that is richly textured. Instead of following the plot and watching the video taken by the camera in the original film, users can explore and experience places they haven't seen in the movie. In addition, feedback through interactivity and speediness is received by the same user through various interactions such as touching, swiping or

tilting the device in a mobile environment.

#### 2.2.4. Relationship between the Flow Experience and Characteristics

Among many studies covering flow experience, the relationship between leading-factor, outcome factor and flow experience is not consistently defined. Most of the early studies involved a number of studies on flow experiences on the Internet or in cyberspace, while Hoffman and Novak (1996) studied the variables of challenge, skill, attention, interaction, and telepresence. In the study by Schneider, Csikszentmihalyi, and Knauth (1995), challenge, skill, and compensation were studied as preceding variables.

Secondary antecedents such as work, challenge, and attention focus can be said to be distinct goals of immersion elements, for example, when a mobile game is based on a movie, users cannot focus on a story or goal that is already familiar from the movie. Therefore, it is essential to transform a movie's character or story to fit the game in order to give users a distinct goal based on new challenges that warrant their attention. Through this, users will be immersed in discovering hidden storylines and characters not found in the corresponding movie(s). There have been many studies and various results have been produced, which outlines studies that are a precursor to the flow experience. Factors affecting the flow experience of game users are also thought to have a significant impact on the flow experience of mobile games.

In this study, the theoretical model of Novak, Hoffman, and Yung (2000) follows the view that the flow experience is a 'cognitive state' in which users and computers interact as well as one in which users are completely immersed in the activities they are engaged in while experiencing internal enjoyment. Variables that affect the flow experience are largely divided into user background variables, content transformers, primary pre-requisites, and secondary pre-requisites, while key factors that are adopted to meet the criteria that are grouped together with the resulting factors. In particular, based on the characteristics of MMORPG discussed above and the preceding factors of flow experience, the six 1/2-way preceding and resulting factors are selected from the existing pre-requisites to better understand their relationships with flow experience. As the primary pre-requisite, the concentration and practicality of the second pre-requisite, and the affinity for fun and exploratory behavior as the resultant factors include six factors, with the resulting hypothesis set out as follows, depending on the causal relationship in the model of Novak et al. (2000). In the model of Novak et al. (2000), we are divided into primary and secondary leading agents. In this paper, we selected appropriate and investigated variables from several studies that compiled in order to address a study target called Mobile MMORPG.

- H 1:** The challenge will affect the flow experience.
- H 2:** Skillfulness will affect the flow experience.
- H 3:** Concentration will affect the flow experience.
- H 4:** Reality will affect the flow experience.
- H 5:** The flow experience will affect the fun.
- H 6:** The flow experience will affect the preference.

#### 2.3. Intent Related to Continuous Use of Mobile Games

The concept of comparing the quality of the services provided by the entity with the costs paid by the customer, and satisfaction when the services received are more significant, is the continuing use of the related products and services. In other words, continuing use is more likely when the user continues to use the product or service in the future (No & Jang, 2011).

According to a study by Bloemer and Kasper (1995), the concept of continuous availability is a frequently used concept in retail research, especially in retail stores, often used as a 'single-edged' concept. Frequentness is defined as a prerequisite for determining purchasing behavior, and because it is a characteristic of consumers based on preferences or intentions, it is an important indicator of consumers' future behavior. Seo, Won, and Hong (2010) shared the prior factors related to user satisfaction through empirical studies on the impact of quality factors on user satisfaction, continuous usage, and oral usage of websites, while Hwang and Seo (2006) shared the prior factors related to perception on the continued use of the mobile Internet.

In the study by Lee and Yang (2009), continuous use intent was analyzed for various types of information technology services such as mobile platforms, Internet sites, and portals, and user satisfaction was a major prerequisite for the user's intention to continue use. In social network games, the study of the intention of continuous use is also very important and calls for further study of the factors that make it more relevant. On the other hand, in the study by Um and Kim (2004), the intention of continuous use is generally described as loyalty and is also expressed by researchers as an important factor. Loyalty is manifested in use behavior, such as continuous use or recommendations to others, and future use. Based on this definition, users can define whether they intend to continue to use their favorite games on a gaming platform.

- H 7:** The user's fun in the game situation will affect his or her intention to continue using the game.
- H 8:** The user's preference within the context of the game will affect his or her intention to continue using the game.

Based on the hypothesis derived from this study, the research model in Figure 1 is constructed to demonstrate the following.

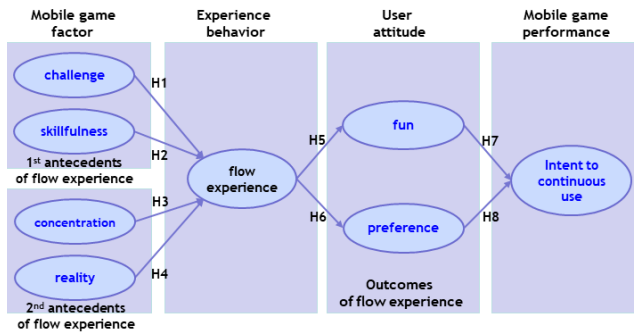


Figure 1: Study Model

### 3. Methodology

#### 3.1. Research methods

##### 3.1.1. Samples and data collection

The purpose of this study is to understand the impact of mobile game service characteristics on users' usage and their intention to purchase items in the game. In particular, by launching an existing PC game with IP from a MMORPG game on the mobile platform, the game is designated as a target for those in their 30s to 40s who previously enjoyed the game on the PC and who have considerable purchasing power.

To verify the hypothesis of this paper, 1,149 surveys were collected through in-app questionnaire for three hours from 6:28 p.m. to 9:24 p.m. on December 4, 2018, targeting users of the mobile game Icarus M. The users who responded to the survey were paid 400 red elun (worth 10,000 won in cash).

Data were filtered based on uniform responses or check-in questionnaires, resulting in 753 analyzed out of 1,149 data sets, excluding 396 surveys that were categorized as incompatible. As shown in the figure, inappropriate answers, such as answering high, appropriate, and low to all of the questions in the difficulty survey, were excluded.

##### 3.1.2. Measurements

In this study, the study model was validated using metrics that verified reliability and validity in previous studies. However, the details of the measurement items have been modified and used in accordance with the research context of the study. In this study, eight variables were used, including a sense of challenge, skill, fun, concentration, reality, preference, flow experience, and intent of continuous use.

###### 3.1.2.1. Challenge

According to Lee, Kim, and Seo (2003), the challenge

can be defined as an opportunity for possible actions to gamers in a computer-mediated environment. Csikszentmihalyi (1977) and Schneider et al. (1995) argued that in order to create an optimal experience, the sense of challenge must be increased. Achieving the goals in mobile games is also be a good opportunity to test the game's own capabilities, and the bigger the challenge, the more opportunities for an immersive experience.

###### 3.1.2.2. Skillfulness

Skill is an individual's perceived skills as they pertain to concepts such as technology, and how mobile game users evaluate their level of capability within a game. Webster, Trevino, and Ryan (1993) found that if a user has more than a certain level of skill with a gaming system, interaction with the system itself can be entertaining. In addition, Ghani, Supnick, and Rooney (1991) stated that proficiency affects flow experience, and flow experience only appears when proficiency is high.

###### 3.1.2.3. Concentration

Hoffman and Novak (1996) studied the variables of challenge, skill, attention, interaction, and telepresence. In a study by Csikszentmihalyi (1995), viscosity, skill, and compensation were studied as preceding variables. The flow of mobile games is so focused that gamers do not recognize the situation around them and the flow of time. Kim (2014) focused on mobile games and situations where people did not notice the changes around them due to the flow of mobile games.

###### 3.1.2.4. Reality

With the development of graphics technology, the experience provided by sports video games to users can be explained through a real sense of reality. Realism can be defined in any environment as a subjective sensation (Heeter, 1992). Lombard and Ditton (1997) described it as "non-mediated" or "perception that exists in a particular or understandable place" (Kim & Biocca, 1997). With the development of graphics technology, the experience provided by sports video games to users can be explained through a real sense of reality. Realism can be defined in any environment as a subjective sensation (Heeter, 1992).

###### 3.1.2.5. Fun

This study extracted keywords from existing research literature and stratified them by drawing keywords from key elements that affect the fun factor of computer games derived through a survey of Korean college student game users. Malone (1981) conducted a study on the design of games and the fun factor of games. The study targeted

**Table 2:** Composition of Questionnaire Measurement Items

	variable		measure	reference
1 <sup>st</sup> ante- cedents of flow experience	challenge	v27 v28 v29 v30	I feel a challenge playing this game. This game makes me do my best. This game provides me with a good test opportunity for my game ability. The goal of this game is clearly set for what I have to do.	Malone(1981)
	skillfulness	v41 v42 v43 v44	I am good at playing games I have knowledge of game technology I know how to acquire game skills. I have the skills necessary to use a game	Hoffman and Novak (1996), Kim(2014)
2 <sup>nd</sup> ante- cedents of flow experience	concentration	v80 v81 v82 v83	I'm completely fascinated when I play the game. I always fall in love when I play a game. Time seems to pass very fast when playing a game. When you play a game, you forget what to do.	Webster, Trevino and Ryan(1993) Ghani, Supnick, and Rooney(1991)
	reality	v92 v93 v94	I tend to forget where I am when I play the game. When you stop the game, you feel as if the virtual world suddenly disappears. When I play the game, I feel strongly that I belong to a virtual world.	Hoffman and Novak(1996)
outcome variables of flow experience	fun	v86 v87 v88 v89	I experience the best feeling of happiness when I play a game. You experience the greatest sense of ecstasy when you play the game. I experience the best satisfaction when I play the game. It is thought that there is joy during the game.	Lee et al.(2003) Csikszentmihalyi (1977, 1991)
	preference	v95 v96 v97 v98	The game provides me with an endless and amazing experience. When I played the game, I burned with curiosity. I have a unique experience when I play games. Using games stimulates my curiosity.	Heeter(1992), Lombard & Ditton(1997), Kim & Biocca(1997)
flow experience		v76 v77 v78 v79	When you play the game, you focus quite a bit on it. When you play, you pay a lot of attention to this game. I feel that I am reacting strongly to the game. I'm immersed in the goal of this game.	Webster, J., Trevino, L. K., & Ryan, L. (1993).
intent of continuous use		v114 v115 v116	Even if other games appear, I will continue to play the game I'm currently playing. I'm willing to recommend the game I'm playing to someone else. I intend to play a game whenever I have time.	Bhattacharjee et al(2004), Lee & Kim(2012)

educational games but provides a lot of insight into the fun factor of computer games, offering suggestions to make them more fun. However, while the idea of redundancy is found in a somewhat heuristic way, which relies on experience rather than judgment through logical analysis, and lacks systematicity, such findings have inspired many researchers and have been used as data to develop research related to the fun factor of games.

### 3.1.2.6. Preference

This is a feature that responds to and provides feedback to what one feels when it comes to optimal experience but does not in and of itself feel pleasant or self-conscious, and an inherent reward that leads to self-strengthening confidence. Hoffman and Novak (1996) largely divide the variables that affect this immersion into user background variables, content transformations, primary leading transformations, and looks at two games that are exemplars of immersion.

### 3.1.2.7. Flow Experience

The experience of computer immersion and human interaction was one of the major research tasks before the web became popularized. Research has been conducted mainly on theoretical conceptions and measuring instruments for flow, for example, Trevino and Webster divided flow dimensions into control, curiosity, concentration, and intrinsic interest, viewing it as a precursor to attitudes toward information technology. In this study, we define flow experience as "the degree to which you can feel the most positive about the gaming experience, the optimal experience derived through the game, and the degree to which you can control/control the use of games through the enjoyment of the game."

### 3.1.2.8. The Intent of Continuous Use

Bhattacharjee and Premkumar (2004) carried out the final study based on the expected consistency theory and technology acceptance model and found that belief and

attitude in the pre-use and use phases change, and that expected consistency and satisfaction affect the intention for continuous use. In fact, if users are satisfied with the target technology that they are already using, they will continue to use that technology (Lee & Kim, 2012). Existing prior studies also show that user satisfaction has a positive effect on the intention for continuous use (Oliver, 1980; Bhattacharjee, 2001). In addition, Lee, Kim, and Seo (2003) defined satisfaction as a success factor for customer loyalty, and customer loyalty as repeated use based on the customer's past experience and expectations for the future.

A preceding study on the scale of measurement problems is shown in Table 2. Questionnaires for each item have been modified and supplemented for the purpose of this study.

## 4. Data and Results

### 4.1. Reliability and Validity Assessment

To verify the reliability of the measures used in this study, exploratory factor analysis was performed, and internal validity was verified in Table 3. In addition, composite reliability (CR) and mean extraction variances (AVE) were used to verify the validity of measurements measured on multiple items. First, the search factor analysis confirmed the intrinsic adequacy of the measurement item by verifying that the factorial load of the measurement item was 0.6 or higher and that the Cronbach- $\alpha$  values were all 0.7 or higher.

Verification factor analysis was performed using AMOS 21.0. Results of a positive factor analysis of the constitutive concepts and measurement items  $\chi^2=744.634$ ,  $df=194$  ( $p=.000$ ),  $CFI=.961$ ,  $TLI=.954$ ,  $IFI=.961$ ,  $GFI=.908$ ,  $RMSEA=.061$  has been shown to be suitable for the study (Bagozi & Yi, 1988). In addition, Table 4 confirmed that the composite reliability (CR) is greater than or equal to 0.60, and the mean estimate variance value is greater than .50 (Bagozi & Yi, 1988) to ensure verification of convergence transients.

**Table 3:** Factor loading & Cronbach- $\alpha$

Construct	variable	Factor loading	Cronbach- $\alpha$
challenge	v27	.754	.896
	v28	.845	
	v29	.779	
	v30	.707	
skillfulness	v41	.722	.908
	v42	.839	
	v43	.824	
	v44	.786	
concentration	v80	.783	.871
	v81	.799	
	v82	.696	
	v83	.634	

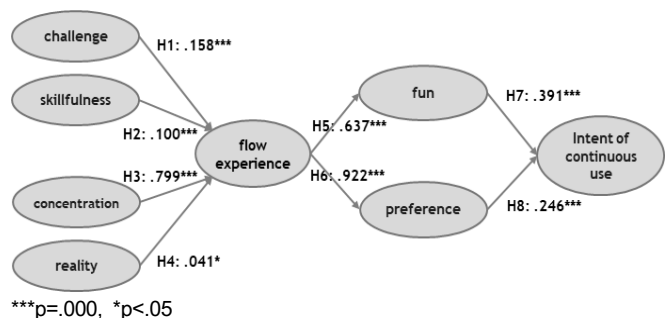
reality	v92	.849	.937
	v93	.876	
	v94	.883	
fun	v86	.854	.907
	v87	.830	
	v88	.867	
	v89	.617	
preference	v95	.798	.921
	v96	.815	
	v97	.821	
flow experience	v76	.778	.905
	v77	.815	
	v78	.773	
	v79	.783	
intent of continuous use	v114	.793	.871
	v115	.783	
	v116	.690	

**Table 4:** Convergent Validity Test Result

Construct	C.R.	AVE
challenge	.801	.502
skillfulness	.824	.541
concentration	.823	.540
reality	.860	.671
fun	.810	.520
preference	.806	.509
flow experience	.880	.755
intent of continuous use	.907	.738

### 4.2. Results of the Hypothesis Testing

To verify the hypothesis of this study, a covariate structural model equation analysis was performed using the AMOS 21.0 program. According to the analysis, the adequacy of the research model is  $\chi^2=2134.728$ , and  $df=391$  ( $p=.000$ ),  $CFI=.910$ ,  $TLI=.900$ ,  $IFI=.910$ ,  $NFI=.892$ ,  $RMSEA=.077$  to confirm compliance with the appropriate levels required (Bagozi & Yi, 1988).



**Figure 2:** Structural Model Test Results

**Table 5:** Hypothesis Verification Results

Hypothesis	Path	Path coefficient	Sig.	Result
H1	challenge → flow experience	.158	p=.000	sig.
H2	skillfulness → flow experience	.100	p=.000	sig.
H3	concentration → flow experience	.799	p=.000	sig.
H4	reality → flow experience	.041	p<.05	sig.
H5	flow experience → fun	.637	p=.000	sig.
H6	flow experience → preference	.922	p=.000	sig.
H7	fun → intent of continuous use	.391	p=.000	sig.
H8	preference → intent of continuous use	.246	p=.000	sig.

Furthermore, detailed hypotheses were tested based on the values and significance of the coefficients of each path, and the results are shown in Figure 2. The structural model test showed that all hypotheses were significant. We looked at the details of hypothesis testing in Table 5.

## 5. Conclusion

### 5.1. Findings and Discussions

This study deals with the process from mobile MMORPG's use to continuous use through users' flow experience, with the antecedent/consequent factors following existing theory related to flow. The focus is on the need for flow experience as a necessary prerequisite for continuing to use game services. It also deals with processes that affect whether a flow experience is experienced or not depending on the challenge, skillfulness, and content itself as the main factors of the linear progression/reaction leading up to flow theory for the flow experience. First and foremost, we wanted to deduce through responses from users when the actual game was being used as an app, not by assuming a particular situation or in an experimental context. The main findings are that, first, two main factors can serve as the primary prerequisite for the flow experience: when a user's attitude plays a large role directly, such as in a game. That is, how much effort is required to complete the goal, and how much skill is acquired to complete the goal. This study has shown that both the challenge and skillfulness level have a short-term positive effect on the flow experience. The more challenging and more skilled one is, the more skilled one is in a situation where the gamer desires to conquer new levels. This simultaneous process continues to have a positive effect on the flow experience, thus positively influencing gameplay.

Second, through the literature study on the secondary precursors of a flow experience of mobile MMORPG users, concentration and reality were considered representative factors in flow experience. Depending on how much of the

game is available in distinct environmental, mental and physical situations, analysis has shown significant results related to the flow of game use situations. Above all, it seems clear that the mental attitude toward concentration will affect flow experience depending on the situation. Thus, in the context of playing games in a mobile environment, in addition to user factors, factor management in terms of content factors is needed in situations where games can be played intermittently or simultaneously in daily life. On the other hand, in the case of the real world, the graphics that constitute the content itself, the composition of the characters, missions, sound effects, and music, etc. were shown to make the user feel that the flow experience was real. It is only when one experiences flow through the content that make up the game within the game situation that the game feels real. Instead of enjoying the content itself passively, users experience flow as they actively play the game and feel the game is really as if immersed in the game world at that very moment. Therefore, significant path analysis results were derived for the path between reality and flow experience.

Third, fun, and preference factors were also found to be significant as a result of the flow experience of mobile MMORPG users. The fact that the direction of results is identical to previous research outcomes is attributed to the nature of the content. Gamers do not simply use content to read, listen, view, and so on, as with other existing content. In fact, the results show that how content is used can increase the enjoyment of the gaming activity through various senses in the process of manipulating the game. Moreover, MMORPGs consist of large gaming space and missions to accomplish various tasks. The associated search behavior depends largely on whether or not the content itself is well-liked. This affects the user's flow experience depending on how much the gaming space, characters, and task configuration make the user want to explore the game world. Therefore, how much the user likes the game as shown in the factors associated with the flow experience can be considered that the path that affects the fun factor of the game, whether or not the user experiences the flow experience in real game conditions.



Fourth, the fun factor and preference were addressed in the preceding study as important factors in improving the sustained use of PCs and the Internet. Under real game conditions in mobile games, and MMORPG, among other things, users' flow experience had a positive effect on the actual intention for continuous use. The fun factor is, in some ways, the most essential and obvious thing that makes one want to keep using the game. In addition, the user's affinity for the suitability of the content through navigation, or the user's opinion that 'It is tempting to wander around the game world and the game whets my appetite for adventure,' strongly motivated the game to be played or re-played.

## 5.2. Limitations and Future Research Directions

Based on Novak et al. (2000)'s flow theory, which was developed from Csikszentmihalyi's flow experience theory, this study found that the flow experience of game users is necessary for continuous use by organizing the precursors of flow experience in mobile MMORPG users' game conditions. In addition, among the many antecedents of flow experience, the influence of selected factors in line with advanced flow theory was revealed. However, the following points of view indicate that supplemental research is needed from a revised perspective in future studies.

First, it is necessary to discover the differences that stem from the nature of the content in the context of a post-production relationship between the fun factor and flow experience. Depending on the various factors that make up the context of the use of the content, such as configuration, use situation, and users, the effects of flow experience may vary.

Second, in the case of game challenges and game proficiency, it has been found that any increase in such variables is more conducive to the flow experience if it does not deviate sharply from normal levels in the short term. However, in the long term or in the short term, there may be situations of imbalance when there is a level of challenge or skill above or below the level over which control is possible. Under challenging circumstances beyond what the gamer can handle, the gamer may give up on further gaming, depending on individual characteristics. Similarly, if one's skills are too high and the current stage of progress falls far short of expected ability, a gamer may fall into boredom and not want to play anymore. Therefore, it is necessary to ensure that the level of challenge and skill can change depending on the characteristics of the gamer and the corresponding balance of challenge and skill.

Third, among the leading and trailing factors of flow experience, only a few were applied, and other performance factors, such as item purchase intent, need to be considered as a performance variable. Future studies also need to consider how much such intention is actually realized. Consideration should be given to practical considerations,

such as to what channels a customer's actual purchases through reference to actual purchase data to determine how much difference the actual purchase rate differs from the intended actual purchase rate of the product or service.

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