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Research Article

Which Gating System Can Prevent Addiction to Online Games?

Flobert Matheus and Riyanto Jayadi

Information Systems Management Department, BINUS Graduate Program-Master of Information Systems Management, Bina Nusantara University, Jakarta 11480, Indonesia

Correspondence should be addressed to Riyanto Jayadi; riyanto.jayadi@binus.edu

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The online game industry has increased time by time. Because of that, many addiction cases emerge in humans. In addition, some factors could make people addicted and mitigate or prevent the addiction. However, this addiction has already created some problems, such as skipping school (mild cases) to murder cases (huge cases). A gating system is a system that could prevent players from experiencing some content in the game after a specific limit has been reached. This study is aimed at identifying which gating systems in online games could make players more addicted and which systems are the most appropriate to mitigate or prevent addiction to online games. The study is done with a survey from online game communities with 458 samples in Indonesia. The result of the study shows that resource is the factor that affects addiction, and the stamina gating system is the one that affects resource as mitigation of addiction. This research shows that the stamina gating system will affect how players manage their resources in real life so that they will not be addicted to the game.

1. Introduction

The mobile game industry has been developing for more than a decade globally. One of the global targets is Indonesia, one of the biggest game markets. Since the pandemic began, Indonesia's players have increased twice as much because many people seek entertainment to kill their time [1, 2]. However, behind those fun entertainments, we could face some losses from playing games. People play the game longer than usual and more than it should be. Thus, pandemic situation creates addiction on gaming. Due to addiction, some cases could cause some losses due to the addiction. Some of the cases are mild, and some of the cases are huge [3], such as skipping school [4], money thief [5], or even massive crimes like burning a house [6]. This proved that addiction of playing game is causing bad impact on society.

To prevent such a thing, there needs to be a certain system inside the game that could prevent the players from having an addiction to the game without disrupting the business. This is called *gating system*. *A gating system* is a certain limitation that prevents the players from doing certain activities inside the game. Based on past research [7], with holistic approach to determine which system are the most popular among gating system existed [8], there are four gating systems that are more popular between others. They are stamina, where the players cannot do some activities when the stamina reaches zero; time-gate, where the players cannot do some activities when the time does not arrive yet; chapter gate, where the players cannot do certain activities when the stories have not been completed yet; and luck-based, where the players cannot get their items without luck [7, 9]. These gating systems, where the game developers could make the players become less addicted, are the keys to preventing addiction from the inside. This study proposes that gating systems could prevent gaming addiction from the product itself.

The aim of this study is to identify which gating system that could make players become more addicted to the game and which gating system could prevent the players become less addicted to the game [7] based on the two addiction factors [10, 11].

To make our measurement, first, we did 12 interviews with online game representatives. After that, the measurement is developed and utilizes five scales. In order to test

our model, we conducted a survey of online game communities on some social media (Facebook and Discord). Second, using that scale, 468 samples of Indonesian online game players were collected and input into partial least square (PLS) analysis. The result shows that some gating systems might affect players to become more addicted or less addicted, and it also explains that there is a difference in time for addiction factors (both motivation and mitigation).

The organization of this paper is as follows. Literature Review reviews some literature about the general of online games, gating system, general user behavior, online game addiction, and hypothesis development in this research. Method describes how we developed the survey and how we gathered the data. Analysis and Result provides information about the findings of this research. Discussion summarizes the result with the theoretical implication and practical implications and acknowledges limitations while providing information about future studies. Appendix provides information in detail regarding data and instruments.

2. Literature Review

2.1. Online Game. Gamers are considered one main point in the online game industry. Usually, gamers are divided into three types depending on how long they play the game [2].

(1) Committed Gamer. A player that often plays games. Usually, the player plays more than one game. These players tend to use most of their time playing games. Sometimes they play purely just for fun, and sometimes they play the game seriously until they become pro players

(2) Regular Gamer. A player that plays games accordingly to the situation they have. Usually, they play once a week, depending on their situation

(3) Occasional Gamer. A player that rarely plays the game. They play the game once a month and only play the game purely for fun

Furthermore, the main reason why people play games is mostly for entertainment and relaxation [1]. This has proven the previous research that entertainment and relaxation elements could create addiction like cocaine does to humans [12–14].

A game developer is one of the most important roles in the online game industry. The developer is the main source where systems inside the game are created [15]. In online game production, especially in the online game ecosystem, the system part is in the production stage, which is the first stage of game development [16]. The production stage consists of the creation of the game, using the existing engine, adding some systems, doing the marketing strategy, dealing with publishers, creating the application of the game, and voicing via the studio.

The next stage of developing a game is about the distribution of the game. This is a stage where the game is already built and tested. So, the developer's job is to focus on the distribution of the game, which involves the player's data, the billing vendors, the server (Internet), and the sensors if any. And finally, as shown in Figure 1, the developer creates interaction between the end user (players) and the company, usually in the form of digital, such as client, device, or hardware/cloud system.

2.2. Gating System. A gating system is a certain system inside a game that could prevent the players from doing some activities when the features are being gated. Gating system becomes popular day by day in the online game industry [7]. The systems that are popular today are the following:

(1) Time-gate: some features are locked when the time that has been set by developers has not arrived yet. Sometimes, the time that has been set can be bypassed through another feature inside the game [7]. Time is an important concept when playing games that could be motivated or disrupted by tangible things. It shows that time inside the game is a matter that could make players become more addicted or could prevent/mitigate the addiction [17]. Meaning, it also shows that the time factor inside the game could whether drive addiction or prevent/mitigate the addiction element inside the game. Motivation factors are either the player's want to master everything in the game or the need to become related to other people in the community. At the same time, the prevention factors are either people being educated by external parties or having the resources (such as perceived cost, application management, or device management) being monitored [10]. Hence, the following are hypothesized:

(2) Stamina: some features are locked when the stamina gauge reaches zero. Stamina is one of the gating systems that could gate players to access a certain extent of content inside a game. It is a concept that gives players a limitation in the form of a gauge or number to limit the player's action when it reaches zero [7]. Even so, many games that have implemented a stamina gating system in their game, besides mitigating or preventing addiction in their game, could also drive more addiction to the game. Games such as Genshin Impact and Arknights have a feature that players can buy stamina so they can do more content in the game. Thus, it could also drive more addiction to the game. This also supports both addiction motivation and mitigation factors [10]. Hence, the following are hypothesized:

(3) Chapter gate: some features are locked when the players have not finished a certain story in the game. Chapter gate is one of the gating systems that could limit the player's action to play some content in the game. The limitation is story based. So when the players have not finished their story, they cannot

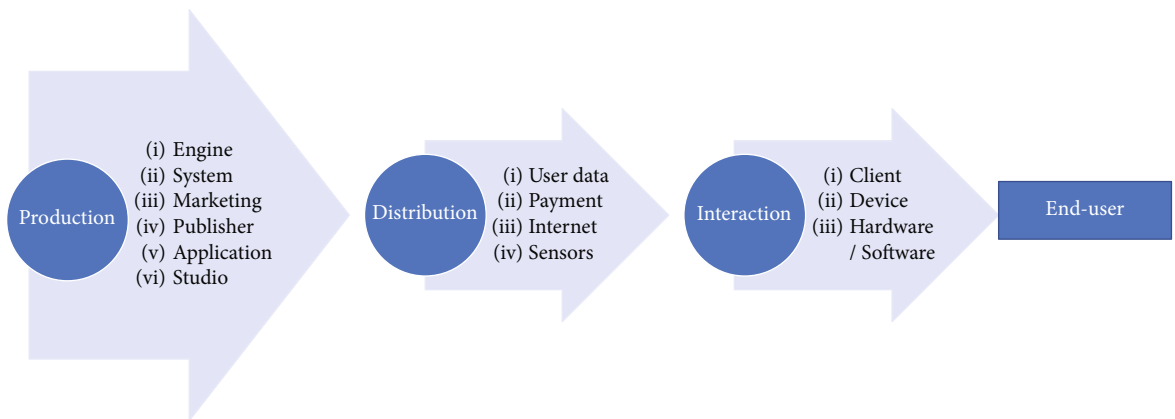

Figure 1: Mobile game ecosystem.

access some features in the game [7]. A story inside a game is one product that has been a favorite for many players. Thus, it has been discovered that the story component in the game excites some players to some extent that they want to play longer for the stories provided [18]. Thus, it is known that chapter gate is a gating system that could drive players to become more addicted to the game or mitigate/prevent the addiction to the game. Hence, the following are hypothesized:

(4) Luck-based (gacha): some features are locked behind the luck-based category. So when the players are not lucky, those players cannot unlock certain content in the game (such as character or weapon). Gacha is a certain gating system that is based on luck. So when players have no luck, they cannot access some content in the game. Usually, this luck-based is implemented in the form of items or characters. Mostly luck-based gating system is implemented in free-to-play games, where their main source of income is from this gating system. So players tend to use their resources in the game in order to do the gacha [19]. Thus, people might become addicted to the game even further because they are not lucky enough. So they want to play more or even spend more in order to get more resources for gacha. Alternatively, people might become less addicted to the game because they are not lucky enough and become lazy to play. Hence, the following are hypothesized:

Hypothesis 1. Time-gate system could give the motivation to be more addicted to the game through the mastery concept.

Hypothesis 2. Time-gate system could give the motivation to be more addicted to the game through relationships.

Hypothesis 3. Time-gate system could mitigate or prevent addiction through education about the gating system.

Hypothesis 4. Time-gate system could mitigate or prevent addiction through the limitation of the resource.

Hypothesis 5. The stamina system could give the motivation to be more addicted to the game through the mastery concept.

Hypothesis 6. The stamina system could give the motivation to be more addicted to the game through relationships.

Hypothesis 7. The stamina system could mitigate or prevent addiction through education about the gating system.

Hypothesis 8. The stamina system could mitigate or prevent addiction through the limitation of the resource.

Hypothesis 9. The chapter gate system could give the motivation to be more addicted to the game through the mastery concept.

Hypothesis 10. The chapter gate system could give the motivation to be more addicted to the game through relationships.

Hypothesis 11. The chapter gate system could mitigate or prevent addiction through education about the gating system.

Hypothesis 12. The chapter gate system could mitigate or prevent addiction through the limitation of the resource.

Hypothesis 13. Gacha system could give the motivation to be more addicted to the game through the mastery concept.

Hypothesis 14. Gacha system could give the motivation to be more addicted to the game through relationships.

Hypothesis 15. Gacha system could mitigate or prevent addiction through education about the gating system.

Hypothesis 16. Gacha system could mitigate or prevent addiction through the limitation of the resource.

2.3. User Behavior. In the development of system information, one of the most important things that need to be noticed is user behavior [20]. The ease to access any information, including in a gaming environment, such as watching live streams or playing the game itself. Because of that, there is a negative impact that could make humans become addicted when they have easy access to something they like [21]. However, this negative impact could be prevented or at least mitigated by certain factors. Besides being prevented or mitigated, this negative impact also could be driven even further by some factors [10].

Mostly, teenagers are the ones who easily become addicted to online games [22]. This is caused by the ease of accessing the information [21]. Thus, that creates the feeling of having less motivation to do education, using most of the productive time to play games, having low grades, or even having sleep disturbance. So the players will think that when they play online games, they feel more rewarded than in real life, having more pride from the game, and thinking that rewards inside the online game are better than in real life [20, 23–25].

2.4. Addiction. Addiction is divided into two factors: the factors that could mitigate or prevent the addiction itself and the factors that could drive addiction [10, 11]. The factors that could mitigate or prevent addiction are as follows:

Education: people are less addicted to online games because they are being educated about gaming addiction. Usually, this is done by parents or school instances

Resource limitation: when people do not have a particular resource even to play the game itself, they tend not to have an addiction to the game

The factors that could drive addiction even further are as follows:

Mastery. Sometimes the player wants to be a master in the game, either they want the power, the prestige, knowing all the lore, or just getting wealthy inside the game. This could drive people to become more addicted because they tend to play longer than they should in order to master the skill in the game

Relationship: player tends to seek a certain relationship with other players in the game so they can bypass certain activities that have been locked by the gating system. Furthermore, relationship terms also cover actual relationships, like becoming friends or a girl/boyfriend

A study found that mastery and relationship factors can actually make players become addicted to the game in China. This means the study showed that players become more addicted to the game because they want to master a particular skill inside the game. And also, the players become more addicted because they want to socialize more inside the game [10]. While in Indonesia, the study found that instead of both mastery and relationship that could drive players into addiction, it is only the relationship factor that drives players to become addicted to the game [11]. It shows that relationship is one of the most affected factors that could drive addiction when playing an online game. Meanwhile, in China, the resource factor is the one that could mitigate or prevent addiction when playing online games [10], and in Indonesia, the education factor is the one that could mitigate or prevent addiction when playing online games [11]. Thus, this shows that those two factors could possibly prevent or at least mitigate the addiction element when people play online games.

Based on the gating system we have seen, it shows that the gating system could not make players retain the game they played before. But, it also could make the players play longer or spend more than they should have [7]. Meanwhile, addiction also has two factors that could make players become more addicted to the game and mitigate the addiction to the game [10, 11]. Thus, these two pieces of research could be combined, where the gating system might affect the addiction of the players who play online games. So gating system could either make the players become more addicted to the game or mitigate/prevent the addiction.

A gating system could become a system that prevents players from becoming addicted to the game from the product (game) itself [7]. In the current pandemic situation, people tend to play the game longer because of the government rules to prevent COVID-19 spread [2, 26].

Hence, the following are hypothesized:

Hypothesis 17. Mastering everything inside the online game could drive addiction to the players.

Hypothesis 18. Relationship elements could drive addiction to the players.

Hypothesis 19. With education, players could have less addiction or prevent addiction when playing online games.

Hypothesis 20. Scarcity of resources (such as money, device, or Internet connection) could make players become less addicted or even prevent addiction when playing online games.

Based on those hypotheses, Figure 2 shows the constructed research model in this study. The model is based on Xu's research about addiction factors combined with gating systems. So, in this model, the four gating systems (chapter gate, time-gate, stamina, and gacha/luck-based) are hypothesized to affect the addiction factors (mastery, relationship, education, and resources), while the addiction variables are hypothesized to affect addiction variable.

In terms of online gaming addiction, it is really complex on the psychological side. The previous research is focused on the psychological side of the addiction to online gaming [9, 15, 16, 20, 23], while only one research did study the gating system, and it was studying customer retention [7]. This study proposes a combination of both types. So, game developers can optimize the best gating system to identify which gating system that drives players to become more addicted to the game and which system mitigates addiction from the game itself.

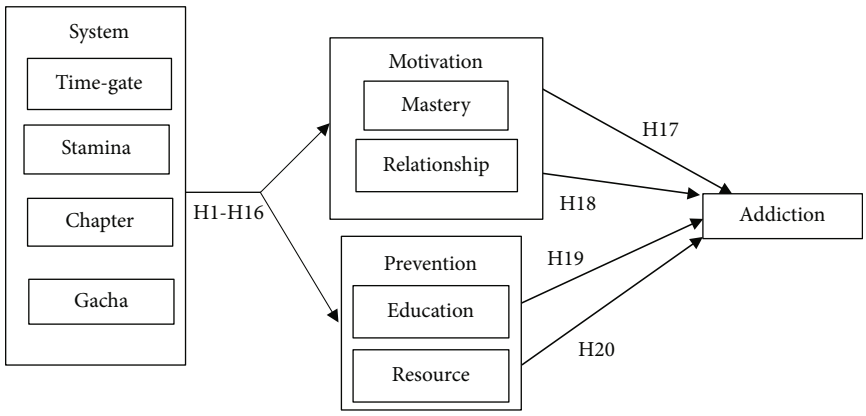

Figure 2: Research model.

3. Methodology

3.1. Indicator Measurement. This study method is partial least square structural equation modelling (PLS-SEM) [27, 28]. The gating system's indicators are developed through interviews with the triangulation method [29]. Table 1 shows the factors and variables which are adopted through previous studies [10, 11].

3.2. Data Gathering. The sample number of this research is 468 samples, above the minimum threshold of Israel's theory and Slovin's formula [28]. The data were gathered through an online survey on Facebook and Discord platforms. A random sampling technique and 5 Likert scale measurements are being used for this research [30].

3.3. Data Clarity. The data were gathered from different demography. From the age of the samples, majority who participate the survey are around 21-30 years old and live in West Java. This shows that the majority of online gamers in Indonesia are teenagers and live around West Java. For gating system questionnaire, first, the author did a small interview to build the survey questions. The author questioned some gamers in Indonesia who played online games that at least have certain gating system. And finally, the author matched the interview answers on previous research [7]. While the addiction part, the questionnaire questions are based on previous research as well [10, 11].

3.4. Validity Test. Data results are considered valid to be used for research when the data meets certain criteria [31]. Some indicators are being deleted because the result shows that they are invalid. Table 2 shows the average variance extracted (EVA) value for every variable. The variable is considered valid when the EVA value is more than 0,5. Two additional indicators that have the lowest value for each variable were deleted because it was invalid. For discriminant validity, another criterion that needs to be fulfilled in order to make sure a variable is valid is to observe the cross-loading result. The cross-loading value needs to be more than the constructed value in order to be considered a valid variable. Table 3 shows the result of cross-loading.

3.5. Reliability Test. For reliability testing, we are observing the value of Cronbach's alpha and composite reliability value. The variable that has more than 0,5 on both indicators can be considered reliable [28]. In this study, all variables are considered reliable because both results are more than 0,5, as shown in Table 4.

3.6. Result and Discussion. Table 5 shows the results of the hypotheses tested in this study. It shows the path for each variable and the P value and the hypothesis decision. Meanwhile, Table 6 shows the R -squared result for addiction factor variables and addiction variables.

3.7. Theoretical Implication. This research proposed a deeper analysis of the new online game addiction model that could drive players to become more addicted or mitigate/prevent players from becoming addicted through the in-game system that can lock players to a certain extent (gated). With those two topics combined, this study could make game development become closer to CSR strategy [20] in the future. Additionally, this study also shows that addiction is not only from external sources (outside the game). But addiction can also be raised from inside the game itself, even though it was intended to mitigate addiction. So instead of doing the correct CSR strategy, it will increase players' addiction.

Furthermore, this study also contributes to previous findings, where in Indonesia, the need to master everything in the game would drive players to become addicted to the game [11], and a chapter gate system could make people have longer play time [7]. This study finds that both factors are not making players become addicted to the game. Instead, what players have, and a stamina gating system is a key to mitigating or preventing the players from becoming addicted. The context of this resource factor is all about what players have. So when the player does not even have enough resources, such as the Internet or proper device, to play the online game, they will not be addicted to the game. Additionally, even though they barely have enough resources to play the game, their gameplay usually is locked from stamina gating system.

Table 1: Variable and indicator measurement.

Variable	Initial	Indicator
Chapter gate	CG 1	Locked feature
	CG 2	Story aspect
	CG 3	Story duration
	CG 4	Story completion
	CG 5	Story intensity
Stamina	ST 1	The system
	ST 2	Refill's convenience
	ST 3	Stamina regeneration
	ST 4	Number of stamina
	ST 5	Gaming enjoyment
Time-gate	TG 1	Range between contents
	TG 2	The gist of contents
	TG 3	Content continuation
	TG 4	The system
	TG 5	Dead week range
Gacha	GC 1	Luck element
	GC 2	Finance capability
	GC 3	The prices
	GC 4	Gacha intensity
	GC 5	Gacha's rate
Age	G 1	Respondent's age
Domicile	G 2	Respondent's domicile
Mastery	MAS 1	Leveling speed
	MAS 2	Resource gathering
	MAS 3	Rare items
	MAS 4	Self-popularity
	MAS 5	Character's power
	MAS 6	Character's role
	MAS 7	In-game formulation
	MAS 8	In-game rules
Relationship	REL 1	Communication
	REL 2	In-depth communication
	REL 3	Relationship
	REL 4	Community
	REL 5	Mutual cooperation
Education	EDU 1	News
	EDU 2	Teacher/parent's role
	EDU 3	Education contents
Resource	RES 1	Internet
	RES 2	Device
	RES 3	Time to play
Addiction	ADD 1	Social life
	ADD 2	Job/education
	ADD 3	Sleep time
	ADD 4	Anxiety

Table 2: Average variance extracted (AVE).

Variables	Average variance extracted (AVE) value
Chapter gate	0,651
Time-gate	0,591
Stamina	0,707
Gacha	0,533
Mastery	0,578
Relationship	0,582
Resource	0,767
Education	0,777
Addiction	0,605

For future studies, additional factors (for both motivation/drivers and mitigation/prevention) to addiction and gating systems could be done. Because when game developer focuses on a gating system, sometimes it could ruin their game when the developer has the wrong strategy. Sometimes, it will make the players become bored and have lower customer (player) retention. Some additional gating systems that need to be developed might be useful for future studies.

It is recommended to focus on the mastery variable and education variable for future studies regarding addiction factors because the addiction factors may vary at different times. This study's findings, relationships, education, and resource have different results than in previous studies (Chandra, 2014). Thus, future studies need to keep researching this kind of topic.

3.8. Practical Implication. Our findings could provide a certain solution to online gaming addiction, where the solution for Indonesia's online gaming addiction problem is inside the game itself. First of all, even though Indonesia is one of the biggest online game markets in the world, Indonesia tends to have a lower capability for high-end devices. Second, even though Indonesia's players tend to master some games to a certain extent, they will not be so addicted that it will negatively affect their lives.

So when we are focusing on mitigation or prevention of addiction factors, we need to focus on Indonesia's resources on device or Internet capability. This could be done by a certain degree of budgeting for devices or the Internet for children. For instance, the parent should increase the perceived cost of playing online games, such as controlling their allowance, monitoring the online payment, monitoring the device uses, or limiting the usage of the Internet from children's devices with a certain application.

While from a game developer's perspective, to do a CSR strategy (mitigate or prevent addiction to their product) without ruining their business, they need to build a proper *stamina system* that could gate the player based on their resources. Usually, game developers tend to add additional purchases to the stamina system they implement into the game. To further mitigate or prevent addiction to their product, they need to increase the perceived cost of refilling the *stamina system*. So, when the player wants to play longer, they tend to think more. Instead, the game developer should

Table 3: Cross-loading.

Initial	Cross-loading value
CG 2	0,883
CG 3	0,719
CG 5	0,811
ST 2	0,855
ST 3	0,854
ST 4	0,812
TG 2	0,838
TG 3	0,827
TG 5	0,623
GC 1	0,689
GC 4	0,747
GC 5	0,753
MAS 1	0,711
MAS 2	0,838
MAS 3	0,799
MAS 5	0,675
MAS 6	0,766
REL 1	0,806
REL 2	0,654
REL 4	0,811
REL 5	0,768
EDU 1	0,888
EDU 2	0,865
EDU 3	0,892
RES 1	0,832
RES 2	0,917
ADD 1	0,853
ADD 2	0,856
ADD 3	0,757
ADD 4	0,620

Table 4: Reliability test.

Variable	Cronbach's alpha	Composite reliability
Chapter gate	0,734	0,848
Time-gate	0,644	0,664
Stamina	0,793	0,796
Gacha	0,564	0,774
Mastery	0,816	0,872
Relationship	0,767	0,847
Resource	0,703	0,868
Education	0,858	0,913
Addiction	0,781	0,858

find another way to develop their game so the player will not get bored so easily when they run out of stamina. Like this study's findings, the developer could develop certain multiplayer content to keep the player in touch with their product.

Table 5: Hypothesis testing.

Hypotheses	*P* value	Result
Time-gate → mastery (Hypothesis 1)	0,003*	Accepted
Time-gate → relationship (Hypothesis 2)	0,592**	Rejected
Time-gate → education (Hypothesis 3)	0,812**	Rejected
Time-gate → resource (Hypothesis4)	0,626**	Rejected
Stamina → mastery (Hypothesis 5)	0,000*	Accepted
Stamina → relationship (Hypothesis 6)	0,583**	Rejected
Stamina → education (Hypothesis 7)	0,031*	Accepted
Stamina → resource (Hypothesis 8)	0,001*	Accepted
Chapter gate → mastery (Hypothesis 9)	0,001*	Accepted
Chapter gate → relationship (Hypothesis 9)	0,007*	Accepted
Time-gate → education (Hypothesis 10)	0,812**	Rejected
Chapter gate → resource (Hypothesis 11)	0,836**	Rejected
Gacha → mastery (Hypothesis 13)	0,000*	Accepted
Gacha → relationship (Hypothesis 14)	0,000*	Accepted
Gacha → education (Hypothesis 15)	0,001*	Accepted
Gacha → resource (Hypothesis 16)	0,604**	Rejected
Mastery → addiction (Hypothesis 17)	0,062**	Rejected
Relationship → addiction (Hypothesis 18)	0,976**	Rejected
Education → addiction (Hypothesis 19)	0,185**	Rejected
Resource → addiction (Hypothesis 20)	0,000*	Accepted

*P value $< 0,05$. **P value $> 0,05$.

Table 6: R-squared value.

Variable	R square
Addiction	0,106
Education	0,080
Mastery	0,333
Relationship	0,135
Resource	0,035

3.9. Limitation. Some limitations should be acknowledged for this paper. First, this research is done by adopting some of the addiction factors (for both motivation and mitigation) and only some relevant gating systems that are being used [7, 10, 11]. So, additional factors for addiction and additional systems for gating systems should be considered for future studies, such as gamer's psychology, gaming business, and gating system for future games.

Second, this study is also being done in Indonesia. Meaning, it only covers one country. So to increase the generalizability, future studies could start research on other different countries.

Third, even though in our findings, some gating systems are not making players become addicted, game developers should stay in touch and keep having CSR strategies for their costumer's health (mentally and financially). Different research methods and theories could have different results for gaming addiction based on the gating system.

Finally, even though education is not making players become less addicted based on our findings, caution needs to be exercised. Education can be one of the foundations to keep people become addicted to certain things, including online games. Future study also needs to focus on education for the gating system in the game to keep game developers doing CSR and keep having profits.

3.10. Implementation Cost. This proposed research has cost around $34 for giveaway reward to five random people after they finished filling the questionnaire. For the implementation cost of this proposed research result, it may vary. Especially when we are talking about opportunity cost for player's purchase when they ran out of stamina (game developer's perspective), the behavior of government towards gaming industry and the effect of addiction, and finally, about the application that can help to mitigate gaming addiction, some developers also could develop a certain application. This will be discussed in future research.

4. Conclusion

This study proposed that with a gating system, people could not become addicted to the game. The key finding is to monitor the player's resources so the players will not become addicted to the game, such as monitoring Internet usage, budgeting the allowance or learning about budgeting, increasing the perceived cost of the game's product, and monitoring device usage. Given the huge growth of the online game industry, more future studies about gaming addiction and gating systems are needed.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

[1] Seluler, *Garena: Indonesia ranks 17th with the most number of mobile gamers*, Seluler, 2019, https://selular.id/2019/07/garena-indonesia-duduki-peringkat-ke-17-dengan-jumlah-mobile-gamer-terbanyak/.

[2] Inmobi, *Everyone's Gaming Among Us*, Inmobi, 2021.

[3] D. J. Cho, H. T. Kim, J. Lee, and S. H. Park, "Economic cost–benefit analysis of the addictive digital game industry," *Applied Economics Letters*, vol. 25, no. 9, pp. 638–642, 2018.

[4] M. Alfons, "Skipping school, 20 students raided while playing games at the internet cafe," 2019, https://news.detik.com/berita/d-4428563/bolos-sekolah-20-pelajar-dirazia-saat-asyik-main-game-di-warnet.

[5] S. Harianto, "Addicted to online games, 2 students in Madiun stole up to 102 million rupiah," 2021, https://news.detik.com/berita-jawa-timur/d-5674139/kecanduan-game-online-2-pelajar-di-madiun-curi-uang-hingga-rp-102-juta.

[6] Suparno, "Addicted to online games, junior high school student burnt neigbor's house," 2021, https://news.detik.com/berita-jawa-timur/d-5565282/kecanduan-game-online-bocah-smp-di-sidoarjo-bakar-rumah-tetangga.

[7] T. Debeauvais, C. V. Lopes, and U. C. Irvine, *Gate me if you can: the impact of gating mechanics on retention and revenues in jelly splash*, Foundations of Digital Games 2015 organized in 22-06-2015 at Pacific Grove, USA, 2015.

[8] E. Stai, S. Kafetzoglou, E. E. Tsiropoulou, and S. Papavassiliou, "A holistic approach for personalization, relevance feedback & recommendation in enriched multimedia content," *Multimedia Tools and Applications*, vol. 77, no. 1, pp. 283–326, 2018.

[9] G. A. Marlatt, "Harm reduction: come as you are," *Addictive Behaviors*, vol. 21, no. 6, pp. 779–788, 1996.

[10] Z. Xu, O. Turel, and Y. Yuan, "Online game addiction among adolescents: motivation and prevention factors," *European Journal of Information Systems*, vol. 21, no. 3, pp. 321–340, 2012.

[11] C. Edwin, *Online Game Addiction among Undergraduate and High School Students: Motivation and Prevention Factors*, Bina Nusantara University, 2014.

[12] G. Maté, "Addiction: childhood trauma, stress and the biology of addiction," *Journal of Restorative Medicine*, vol. 1, no. 1, pp. 56–63, 2012.

[13] I. Maze and E. J. Nestler, "The Epigenetic Landscape of Addiction," *Annals of the New York Academy of Sciences*, vol. 1216, pp. 99–113, 2011.

[14] A. J. Robison and E. J. Nestler, "Transcriptional and epigenic mechanism of addiction," *Molecular and Cellular Biochemistry*, vol. 23, no. 1, pp. 1–7, 2012.

[15] A. Fung, "The impact of the rise of mobile games on the creativity and structure of the games industry in China," *Mobile Communication in Asia: Local Insights, Global Implications*, pp. 91–103, 2017.

[16] C. A. F. Gonzalez, S. R. Villaverde, J. L. G. Barroso, and J. M. Aguado, "Mobile gaming: industry challenges and policy implications," *Telecommunications Policy*, vol. 36, no. 3, pp. 212–221, 2012.

[17] F. D. Buono, M. D. Griffiths, M. E. Sprong, D. P. Lloyd, R. M. Sullivan, and T. D. Upton, "Measures of behavioral function predict duration of video game play: utilization of the video game functional assessment - revised," *Journal of Behavioral Addictions*, vol. 6, no. 4, pp. 572–578, 2017.

[18] I. E. Espinosa-Curiel, E. E. Pozas-Bogarin, J. Martínez-Miranda, and H. Pérez-Espinosa, "Relationship between children's enjoyment, user experience satisfaction, and learning in a serious video game for nutrition education: empirical pilot study," *JMIR Serious Games*, vol. 8, no. 3, article e21813, 2020.

[19] M. Koeder, E. Tanaka, and M. Hitoshi, "Exploring the game-of-chance elements in Japanese F2P mobile games," *DHU Journal*, vol. 5, pp. 16–28, 2018.

[20] J. C. Manuputty, S. A. S. Sekeon, G. D. Kandou, F. Kesehatan, M. Universitas, and S. Ratulangi, "The relationship between online game addiction and sleep quality in online gamers computer users at M2G internet cafes Supernova Malalayang," *Kesmas*, vol. 8, no. 7, pp. 61–66, 2019.

[21] L. J. Cabeza-Ramírez, G. A. Muñoz-Fernández, and L. Santos-Roldán, "Video game streaming in young people and teenagers: uptake, user groups, dangers, and opportunities," *Healthcare*, vol. 9, no. 2, p. 192, 2021.

[22] Y. C. Pan, Y. C. Chiu, and Y. H. Lin, "Development of the problematic mobile gaming questionnaire and prevalence of

mobile gaming addiction among adolescents in Taiwan," *Cyberpsychology, Behavior, and Social Networking*, vol. 22, no. 10, pp. 662–669, 2019.

[23] D. L. King and P. H. Delfabbro, *Internet gaming disorder: theory, assessment, treatment, and prevention*, Academic Press/Elsevier, 2019.

[24] N. Jannah, M. Mudjiran, and H. Nirwana, "The relationship between game addiction and student learning motivation and its implications for guidance and counseling," *Konselor*, vol. 4, no. 4, p. 200, 2016.

[25] L. T. Lam, "Internet gaming addiction, problematic use of the internet, and sleep problems: a systematic review," *Current Psychiatry Reports*, vol. 16, no. 4, p. 444, 2014.

[26] M. Barr and A. Copeland-Stewart, "Playing video games during the COVID-19 pandemic and effects on players' well-being," *Games and Culture*, pp. 122–139, 2022.

[27] J. B. Grace, *Structural Equation Modelling and Natural Systems*, Cambridge University Press, 2009.

[28] I. Steven, *Affecting User Getting Intangible Rewards and Re-Using the Whatsapp Chat Applications in Indonesia*, 2020.

[29] C. Buschle, H. Reiter, and A. Bethmann, "The qualitative pretest interview for questionnaire development: outline of programme and practice," *Quality and Quantity*, vol. 56, pp. 823–842, 2022.

[30] T. Jap, S. Tiatri, E. S. Jaya, and M. S. Suteja, "The development of Indonesian online game addiction questionnaire," *PLoS One*, vol. 8, no. 4, article e61098, 2013.

[31] M. R. Ab Hamid, W. Sami, and M. H. Mohmad Sidek, "Discriminant validity assessment: use of Fornell & Larcker criterion versus HTMT criterion," *Journal of Physics Conference Series*, vol. 890, no. 1, article 012163, 2017.