

Identifying the Factors of Online Game Acceptance Using Technology Acceptance Model

F K S Dewi*¹, B Natalia²

^{1,2}Department of Informatics, Universitas Atma Jaya Yogyakarta, Indonesia

E-mail: findra.dewi@uajy.ac.id¹, bunganatalia94@gmail.com²

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Abstrak. Dalam dua dekade terakhir, banyak perusahaan yang membuat *game online*. *Game online* adalah sebuah permainan yang terhubung dengan internet, di mana pemainnya dapat bermain dan berkomunikasi dengan pemain lain di tempat yang berbeda, dan dalam waktu yang bersamaan. Ada banyak jenis permainan, di antaranya adalah petualangan, strategi, memasak, merias, dan lain sebagainya. Itulah mengapa banyak orang senang bermain *game online*. Penelitian ini mencoba mengidentifikasi faktor-faktor yang mendukung penerimaan *game online* oleh mahasiswa Universitas Atma Jaya Yogyakarta. Metode yang digunakan adalah *Technology Acceptance Model* yang memiliki konstruk utama yaitu *perceived ease-of-use* (PEOU), *perceived usefulness* (PU), *attitude against use* (ATU), *intention to use* (ITU) dan *actual use* (AU), dan tambahan variabel *social influence* (SI), *personal* (P) dan *excitement* (E). Data yang diperoleh untuk melakukan analisis ini menggunakan angket yang ditujukan kepada siswa. Terdapat sebelas hipotesis yang menjadi acuan dalam menganalisis hubungan antar variabel. Masing-masing variabel membuktikan bahwa masing-masing variabel tersebut memiliki hubungan yang signifikan terhadap penerimaan *game online*.

Kata kunci: *game online*, mahasiswa, *technology acceptance model*

Abstract. In the last two decades, many companies create online games. Online game is a game that is connected to the internet, where players can play and communicate with other players in different places at the same time. There are many types of games, such as adventure, strategy, cooking, make up, and so on. That is why a lot of people love to play online game. This study tries to identify the factors that support online game acceptance by students of Atma Jaya Yogyakarta University, because many students at this university play online games. The method used for this analysis is Technology Acceptance Model, which has main construction namely Perceived ease-of-use (PEOU), Perceived usefulness (PU), Attitude toward use (ATU), Intention to use (ITU) and Actual Use (AU), and additional variables of Social Influence (SI), Personal (P) and Excitement (E) added by the researchers. The data obtained to conduct this analysis used a questionnaire addressed to students. There are eleven hypotheses that serve as a reference in analysing the relationship between variables. The result shows that each variable has a significant relationship in online game acceptance.

Keywords: online games, students, technology acceptance model

1. Introduction

Online games are games that are connected to the internet network. Online games began to appear in Indonesia in 2001, with the launch of Nexia Online, an RPG game released by BolehGame with simple

2D-based graphics [1]. This Nexia online game became a pioneer in the entry of other online games. However, this Nexia online game could not last long along with the emergence of other new online games. Along with the number of online games that have sprung up, many people, including children and adults, like to play online games. According to Pokkt, Decision Lab and Mobile Marketing Association (MMA), the number of gamers in Indonesia has reached 60 million people. A survey by Decision Lab in August 2018 noted that players aged 16-24 and 25-34 were 27 percent on average, respectively, ranking the highest [2]. From these demographics, it can be said that most of the gamers are students, college students, and young people, who already understand the use of the internet, and are supported by their economic situation.

Universitas Atma Jaya Yogyakarta (UAJY) has provided the internet with a quota that is still sufficient for many purposes. Many students do not only use this internet access for academic purposes, but also for non-academic purposes, one of which is to play online games. Playing online games is a fun activity for many students. Apart from the various game genres, it looks attractive, and there are many other reasons, such as achievement, enjoyment, and social interaction [3]. This is the reason for the authors to research the acceptance of online games by students in a university and may be able to help the games company to identify aspects related to playing online games [4].

The model used for this analysis is the Technology Acceptance Model (TAM), which was introduced by Davis (1986) which is commonly used to model how users come to accept and use a technology [5]. The main aim of this model is that it emphasizes the potential of the users [6]. This research uses TAM's main variables, as well as additional variables to support the analysis, to be able to explain the relationship between variables from the acceptance of technology. The results of this study are expected to identify aspects that influence Atma Jaya Yogyakarta University students in playing online games. These results can be used by game companies to enhance their products' aspects and perspectives.

2. Literature Review

Early research on TAM was conducted by Davis (1986). This study proves that TAM can provide better predictions, explanations and increase user acceptance of technology. The prediction of user computer acceptance is measured from the intentions. The intentions are derived from attitudes, perceived usefulness, perceived ease of use, and other variables related to the system. In a subsequent study [7] subjective norm was included as an additional variable used to explain intention to use. However, subjective norms do not affect the intention to use. This is due to the weakness of the measurements used to measure the subjective norms of the informants. In addition, the researched application is an application that is personal and individual so it may get a little influence from the social environment. Research using the TAM method is a valid reference as a method of literature review in research [8].

Research on the acceptance of online games by students has been done by many researchers. Several studies on the acceptance of online games have used social influence variables [9]. This social influence can be divided into two parts, namely self-efficacy, and subjective norms [10]. Self-efficacy leads to oneself, while subjective norms lead to influences from outside oneself. Subjective norms affect perceived usefulness and behavioral intention in online games [11]. Many users respond positively to playing online games [12].

The acceptance factor of online games can be seen from several other external factors, such as enjoyment and trust [13]. The trust factor can affect the enjoyment of players in playing online games. When players have enjoyed and followed online games well, these players can spend a long time playing online games. These online game addicts also affect the loyalty of playing online games [14]. If they are addicted and loyal to playing online games, players are willing to buy some items or items contained in online games using real money [15]. Overall, the results show that perceived enjoyment is an important part, but perceived usefulness does not affect players' attitudes. Other results show that age is also a determining factor in the acceptance of online games [16].

Other researchers look at online games from the other side. Online games can be a part of learning, helping school students and college students learn and gain knowledge through online games [17]. This study can determine the perception of students in accepting online games for education [18]. The results show that many students enjoy online games for their education or learning media [17], [19]. This can help the university in increasing the knowledge of their students.

3. Research Methodology

3.1. Research Design

This study uses TAM to determine the variables needed in the analysis, both internal and external variables. Internal variables consist of Perceived ease-of-use (PEOU), Perceived usefulness (PU), Attitude toward use (ATU), Intention to use (ITU) and Actual Use (AU), and additional (external) variables consist of Social Influence (SI), Personal (P) and Enjoyment (E).

This research was conducted on certain representative populations and samples. In this study, the population was directed to Universitas Atma Jaya Yogyakarta (UAJY) that has 11,307 students. The sample in this study refers to UAJY students who actively play online games. This sampling used simple random sampling. The number of samples was calculated using the Slovin formula, with a critical value of 5%, and the results obtained were 386 people. This has met the sample size in the Structural Equation Model (SEM) with the estimation model using a minimum Maximum Likelihood (ML) of 386 samples.

3.2. Research Questionnaire

The statements for the questionnaire can be seen in Table 1. The questionnaire was compiled based on eight previously defined variables. Each variable consists of several statements, which later the respondent will give an opinion on the statement, whether they agree, neutral, or disagree.

Table 1. Questionnaire statements

Variable	Statements	References
Perceived ease-of-use (PEOU)	Online games are easy to play.	[20]
	Online games are easy to learn.	[12]
	It is easy for me to become proficient in playing online games.	[12]
Perceived usefulness (PU)	Playing online games helps me to improve my ability to play online games.	[10]
	Playing online games is very important in my life.	[20]
	I love to spend my free time playing online games.	[21]
	Online games are efficient to fulfill my needs.	[21]
Attitude toward use (ATU)	I responded positively about the existence of online games.	[10]
	I like playing online games.	[12]
	I think playing online games is a good idea.	[20]
Intention to use (ITU)	I will continue to play online games	[13]
	I intend to play online games	
	I will be playing online games for a long time	[21]
	I will recommend to others to play the online games I play	
Actual Use (AU)	Playing online games is a solution for me to get rid of boredom.	[20]
	I like the game in the online games.	[14]
	I like the services provided in online games.	
Social Influence (SI)	I am satisfied playing online games.	[12]
	My friends think that I should play online games.	
	My playmates think that I should play online games.	
Personal (P)	My college friends think that I should play online games.	[13]
	I am confident in my ability to play online games.	[10]
Enjoyment	I have the necessary skills in playing online games.	
	Playing online games is interesting to me.	[13]

- (E) I enjoy playing online games.
Playing online games gives me a lot of fun.

3.3. Research Model

Eight variables, consisting of Perceived ease-of-use (PEOU), Perceived usefulness (PU), Attitude toward use (ATU), Intention to use (ITU), Actual Use (AU), Social Influence (SI), Personal (P), and Enjoyment (E) are modeled to develop hypotheses. This model can be seen in Figure 1.

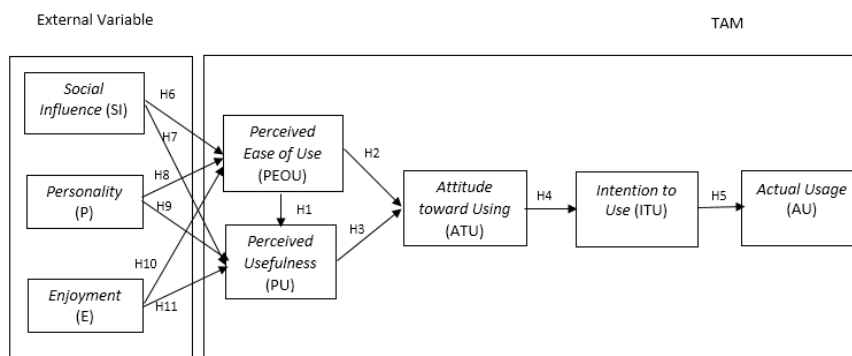


Figure 1. Research Model

The model in Figure 1 contains the mapping of the variables which are representations of the compiled hypotheses. The list of hypotheses can be seen in Table 2.

Table 2. Hypotheses list

Hypotheses	References	Hypotheses	References
H1: PEOU affects PU	[10], [20]	H6: SI affects PEOU	[22], [23], [24].
H2: PEOU affects ATU		H7: SI affects PU	
H3: PU affects ATU		H8: P affects PEOU	[25], [26], [18], [27].
H4: ATU affects ITU		H9: P affects PU	
H5: ITU affects AU		H10: E affects PEOU	[28], [29], [30].
		H11: E affects PU	

3.4. Data Analysis

The data analysis technique used in this analysis is a quantitative analysis using the Structural Equation Model (SEM). SEM is a multivariate statistical analysis technique that analyzes structured relationships. This technique is a combination of factor analysis and multiple regression analysis [31]. In this analysis, there are several stages, namely the descriptive analysis stage, the measurement analysis stage, and the structural analysis stage. Descriptive analysis was carried out using SPSS Ver.20, useful for providing an overview to the reader so that it could be understood easily, while measurement analysis was carried out using AMOS Ver.20, useful for testing whether the model used was in accordance with the data obtained, and lastly, structural analysis was also carried out using AMOS Ver.20, useful for testing the relationship between the analyzed factors and proving the hypothesis.

4. Result and Discussion

4.1. Data Collection Result

Data collection was carried out by distributing questionnaires to UAJY students using online (32.4%) and offline media (67.6%). The questionnaire was distributed to all study programs at UAJY and successfully collected as many as 500 responses.

4.2. Data Cleaning Process Results

4.2.1. Screening Process Results

This screening process aims to filter the data and to avoid invalidity in data analysis. The first process is to check the standard deviation with the result of deleting thirteen data because these data have a standard deviation of zero and are interpreted to have the same value. The next process is checking for missing data. The results obtained in Table 3 indicate that no data is empty, which means that all data has been provided.

Table 3. Missing Data Screening Results

	N	Mean	Std. Deviation	Missing	
				Count	Percent
PEOU1	487	3.8789	.86049	0	.0
PEOU2	487	3.9610	.74017	0	.0
PEOU3	487	3.6016	.87808	0	.0
PU1	487	4.0144	.77632	0	.0
PU2	487	2.6920	1.06555	0	.0
PU3	487	3.2608	1.08855	0	.0
PU4	487	2.9097	1.01838	0	.0
ATU1	487	3.9815	.68318	0	.0
ATU2	487	3.7926	.93410	0	.0
ATU3	487	3.4559	.90358	0	.0
ITU1	487	2.9384	.98565	0	.0
ITU2	487	3.3593	.92753	0	.0
ITU3	487	2.7310	1.00999	0	.0
ITU4	487	3.4209	.96939	0	.0
AU1	487	3.9610	.87284	0	.0
AU2	487	3.9117	.78200	0	.0
AU3	487	3.6242	.80665	0	.0
AU4	487	3.6571	.84830	0	.0
SI1	487	2.9343	.92284	0	.0
SI2	487	3.0287	.92474	0	.0
SI3	487	3.0021	.93733	0	.0
P1	487	3.4702	.95292	0	.0
P2	487	3.3943	.93877	0	.0
E1	487			0	.0
E2	487			0	.0
E3	487			0	.0

4.2.2. Degree of Freedom Process Results

The relationship between the degree of freedom in this analysis before the model testing is carried out is the understanding of model identification. Identification of a model indicates whether there is sufficient information available to identify a solution from a structural understanding. The test result seen in Table 4 is showing positive result which indicates that the data can be used for the analysis.

Table 4. Degree of Freedom Process Results

Computation of degrees of freedom (Default model)	
Number of distinct sample moments:	351
Number of distinct parameters to be estimated:	80
Degrees of freedom (351 - 80):	271

4.2.3. Assessment and Estimation Process Results

The assessment is intended to determine the extent to which the data 'fit' with the model that has been made; whether the model is valid, and the sample data taken can show the strength of a model in explaining an event or phenomenon. Meanwhile, the estimation is used to see the strength of the relationships between variables in the model [31]. The assessment process is carried out using the Maximum Likelihood Estimation (MLE) technique, which is based on the covariance matrix of the sample with the population. The results obtained indicate that the relationship among the variables is quite close and the direction of some relationships is in the same direction, and some are different.

4.3. Outlier Test Results

Outlier test is a test on data that appears and has unique characteristics that are far different from the other data and appear in the form of extreme values. From the tests that have been carried out, there were 26 outlier data, so the researcher deleted the data. The results can be seen in Figure 2.

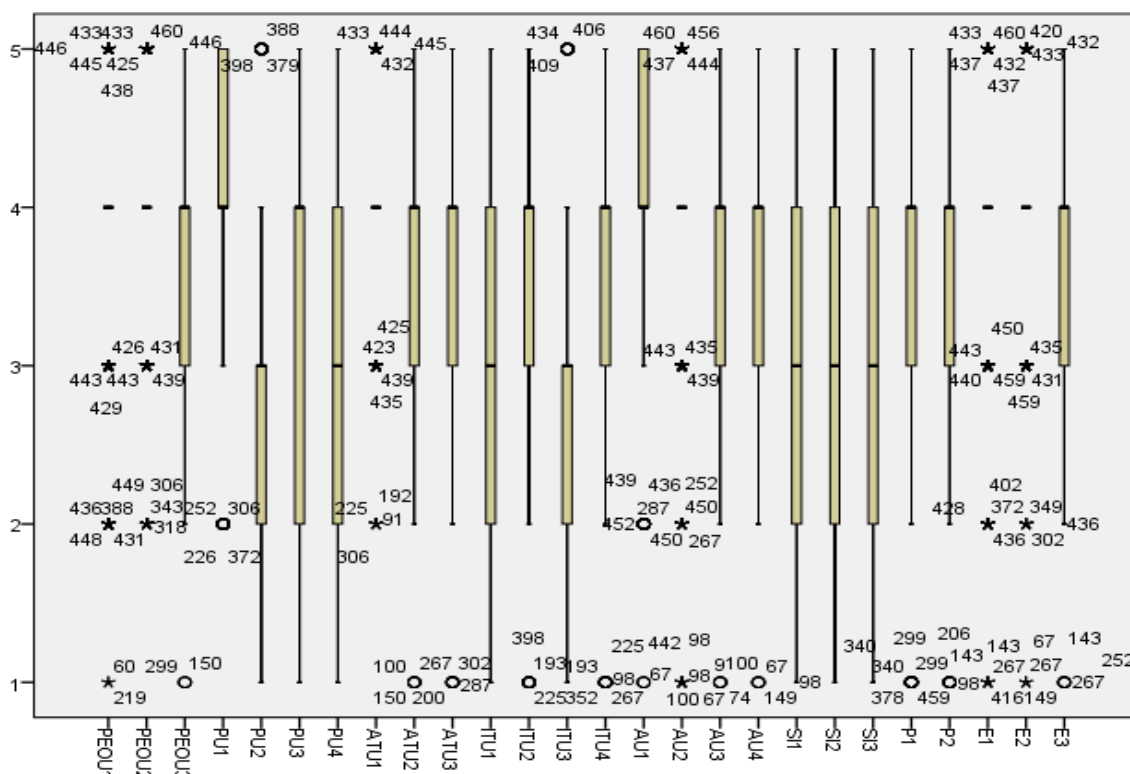


Figure 2. Outlier Test Results

4.4. Validity and Reliability Test Results

This test is done by testing the validity and reliability of each instrument. The purpose of testing the validity and reliability is to ensure that the questionnaire that has been compiled will be able to measure symptoms and produce valid data. The results obtained from this validity test (Table 5) are valid because it has a significance value less than 0.05 and for reliability testing (Table 6) it has a Cronbach's alpha value greater than 0.6.

Table 5. Validity Test Results

Item	Sig. (2-tailed)	Item	Sig. (2-tailed)	Item	Sig. (2-tailed)
PEOU1	0.000	ATU3	0.000	SI1	0.000
PEOU2	0.024	ITU1	0.000	SI2	0.000

Item	Sig. (2-tailed)	Item	Sig. (2-tailed)	Item	Sig. (2-tailed)
PEOU3	0.041	ITU2	0.000	SI3	0.000
PU1	0.000	ITU3	0.000	P1	0.000
PU2	0.000	ITU4	0.018	P2	0.000
PU3	0.005	AU1	0.000	E1	0.000
PU4	0.017	AU2	0.000	E2	0.000
ATU1	0.000	AU3	0.001	E3	0.000
ATU2	0.000	AU4	0.000		

Table 6. Reliability Test Results

Variable	Cronbach's Alpha
Perceived Ease of Use	0.712
Perceived Usefulness	0.862
Attitude Toward Using	0.822
Behavioral Intention to Use	0.836
Actual Usage	0.915
Social Influence	0.879
Personality	0.878
Enjoyment	0.894

4.5. Measurement Model Analysis Results

A measurement model measures the goodness of fit of the model. This measurement was carried out using Cmin/df, RMR, RMSEA, GFI, AGFI, NFI, and CFI (Table 7). This measurement is carried out to ensure that the measurement model meets the criteria of goodness of fit. In previous studies [32], RMSEA and RMR values below 0.08 were said to be sufficient to proceed to hypothesis testing.

Table 7. Goodness of fit test result

	Cmin/df	RMR	RMSEA	GFI	AGFI	NFI	CFI
Initial CFA	2.226	0.032	0.052	0.909	0.882	0.916	0.951
Reference	1-3	<0.08	0.08	>0.90	>0.90	>0.90	>0.95

The convergent validity test aims to ensure that the indicators that are theoretically related to a factor have a high correlation. In this study, the validity test was proven by looking at the Average Variance Extracted (AVE) value and the loading instrument value for each factor. The criterion for achieving convergent validity is that the AVE value of each factor exceeds 0.5. For the loading factor value, all indicators have a value of more than 0.5 and are significant [33]. The results obtained indicate that the loading and AVE factor values have met the criteria. Then proceed with the discriminant validity test by looking at the square root value of the AVE which is greater than the latent factor. The results obtained indicate that the values of several variables have the square root value of AVE greater than the latent factor, but several variables show numbers greater than 0.5. This is still acceptable and if it is squared it is still below the value of the square root of the AVE and proves that each variable is indeed different from one another [31].

The next process is reliability testing. This test uses composite reliability and Cronbach's alpha as testing methods. The value of most composite reliability has exceeded the recommended value, which is 0.7 [33]. However, the limit value cannot be applied explicitly, but must also consider several aspects [34].

4.6. Structural Analysis Results

Structural analysis is useful for seeing the relationship between the dependent variable and the independent variable. However, before conducting a structural test, there are initial assumptions that must

be met. These assumptions are the assumptions of normality, multicollinearity, and homoscedasticity. The normality assumption aims to find out that the data is close to the normal assumption by looking at the range of values from -2.58 to +2.58 and the results obtained indicate that the data is normally distributed. Then multicollinearity aims to determine the relationship between the independent variables by looking at the VIF value of less than ten and tolerance of more than 0.1 and the results show that there is no multicollinearity in the data. Next is the homoscedasticity test using a graph and the results show that the points are spread out and do not form a certain pattern which means that each indicator group is in the same variance among the members of the group.

This structural analysis resulted in a better goodness of fit value, after improvements were made from the previous model. The refined model can be seen in Figure 3. The structural model that has been refined connects external factors, namely social influence (SI), personal (P), and enjoyment (E).

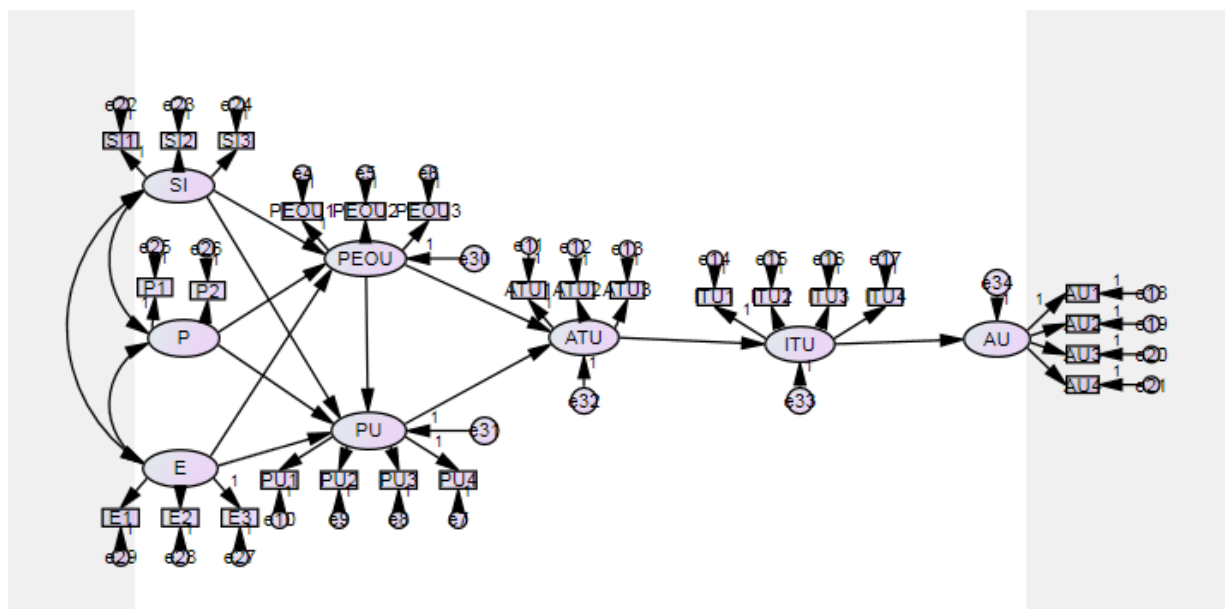


Figure 3. Structural Model

After the model is refined, there is an increase in the goodness of fit value from the initial to the final model. The RMR and RMSEA values are getting smaller and the GFI, AGFI, and NFI numbers are getting closer to 1 which indicates that the model is 'fit'. These values can be seen in Table 8.

Table 8. Structural Model Goodness of Fit Result

	RMR	GFI	AGFI	NFI	RMSEA	PClose
Initial	0.139	0.594	0.139	0.652	0.462	0.000
Final	0.040	0.879	0.851	0.887	0.063	0.000

4.7. Hypothesis Test

Hypothesis testing was carried out using the AMOS version 20 application. This test assessed the relationship between factors by looking at p as significance. The hypothesis test model can be seen in Figure 4.

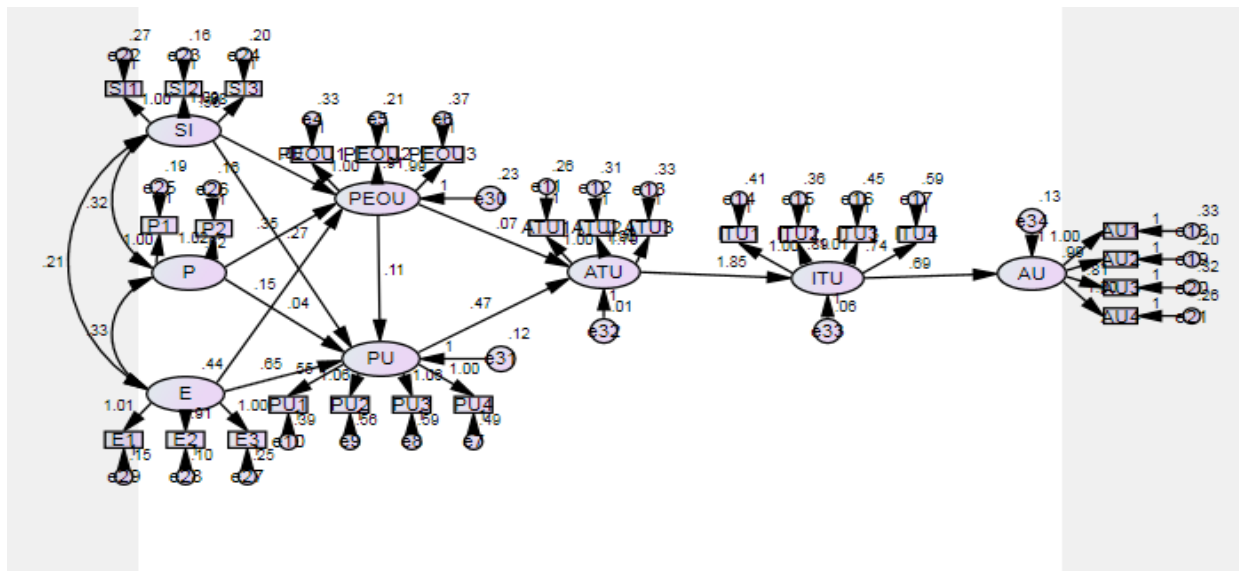


Figure 4. Hypothesis testing model

Hypothesis testing is done by looking at the significant value less than 0.05 and the CR value more than 1.96. After knowing the relationship between variables, then proceed with finding out the strength of the relationship between these variables. Numbers above 0.7 or above 0.5 are generally used as a reference for the closeness between two variables [31]. In addition to the analysis of the relationship between constructs, the researcher also added testing of the relationship between exogenous variables. In the model, there are three exogenous variables, namely social influence (SI), personal (P), and enjoyment (E). This relationship has a significance value of less than 0.5, so there is a significant relationship between these exogenous variables. Then proceed with the test of the strength of the relationship between exogenous variables. Each variable has a close relationship. However, the relationship between the social influence (SI) and the enjoyment (E) variable, is still said to be less close because it has a correlation value of less than 0.5. After conducting several tests to see the relationship between variables, it can be concluded that the overall hypothesis test results can be seen in Table 9 and Table 10.

Table 9. Hypothesis Testing Results

Hypothesis		Estimate	S.E.	C.R.	P	Result
PEOU	<--- SI	0.004	0.048	0.081	0.936	Rejected
PEOU	<--- P	0.354	0.059	6.001	***	Accepted
PEOU	<--- E	0.152	0.061	2.499	0.012	Accepted
PU	<--- SI	0.272	0.041	6.62	***	Accepted
PU	<--- P	0.042	0.05	0.839	0.402	Rejected
PU	<--- E	0.647	0.062	10.454	***	Accepted
PU	<--- PEOU	0.113	0.063	1.785	0.074	Rejected
ATU	<--- PEOU	0.073	0.028	2.588	0.01	Accepted
ATU	<--- PU	0.474	0.044	10.898	***	Accepted
ITU	<--- ATU	1.851	0.156	11.831	***	Accepted
AU	<--- ITU	0.686	0.053	12.878	***	Accepted

Table 10. Hypothesis Testing Conclusion

	Significant Relation	Conclusion
H1: PEOU affects PU	No	Rejected
The level of ability in playing online games is different so that a person's ability to play online games does not significantly affect the usefulness of online games. A person's ability to use technology is influenced by that person's experience [35].		
H2: PEOU affects ATU	Yes	Accepted
The ease of playing online games can affect students' attitudes towards existing online games, such as responding positively and if playing online games is a good idea [21].		
H3: PU affects ATU	Yes	Accepted
Students need something they might not be able to achieve in real life, such as building a city or building an empire. The game can be used to realize these needs. Thus, students responded positively to the existence of online games [21].		
H4: ATU affects ITU	Yes	Accepted
Students who like to play online games can spend their free time playing online games. They can play online games for quite a long time. [7]		
H5: ITU affects AU	Yes	Accepted
Students' intention to play online games can help actual use to eliminate boredom [10].		
H6: SI affects PEOU	No	Rejected
If a friend or colleague plays an online game and there are students who are interested or persuaded to play the online game, not necessarily the student can play the online game easily. It also depends on the ability or experience of the student [18].		
H7: SI affects PU	Yes	Accepted
Friends sometimes play online games because of their usefulness that supports playing with other people at the same time in different places [12] [36].		
H8: P affects PEOU	Yes	Accepted
Students who have the necessary abilities and skills to play online games can help make it easier to play online games [19]		
H9: P affects PU	No	Rejected
Student plays an online game related to fighting because he is influenced by friends, but because the student does not understand or does not have the ability or experience in playing the fighting game, the use or usability of the online game is not used optimally [35].		
H10: E affects PEOU	Yes	Accepted
Students who basically enjoy playing online games will be able to do it easily [13].		
H11: E affects PU	Yes	Accepted
Student likes to play online games because one of the features of online games is that it allows direct communication with opponents, so the enjoyment factor indirectly has a significant relationship with the usefulness of online games [17].		

5. Conclusions and Suggestions

5.1. Conclusions

This research has succeeded in identifying the factors of acceptance of online games by the students of Universitas Atma Jaya Yogyakarta. Through the TAM method, the variables of Perceived ease-of-use (PEOU), Perceived usefulness (PU), Attitude toward use (ATU), Intention to use (ITU) and Actual Use (AU), and additional variables of Social Influence (SI), Personal (P) and Enjoyment (E) can influence students in accepting online games.

Eleven hypotheses serve as a reference in analyzing the relationship among the variables. The results proves that each variable has a significant relationship in online game acceptance. However, there are three relationships, namely, the relationship between SI and PEOU, P and PU, and PEOU and PU, which do not have a significant relationship that supports acceptance of online games.

5.2. Suggestions

This study finds out several variables that prove why students play online games. However, this study has not been supported by research investigating what factors can make students interested in playing an online game. Further research is expected to examine the acceptance factor of online games in terms of system functionality so that online games can help students in the learning process.

References

- [1] Giandi, A. F. & Arifin, H. S. (2012). Perilaku Komunikasi Pecandu Game Online dengan Menggunakan Game Online. *eJurnal Mahasiswa Universitas Padjadjaran*, 1(1), 1-39.
- [2] Decision Lab. (2018). Pemain game online menurut usia, Retrieved from <https://lokadata.beritagar.id/chart/preview/pemain-game-online-menurut-usia-2018-1579509362>.
- [3] Wei, P. S., & Lu, H. P. (2014). Why do people play mobile social games? An examination of network externalities and of uses and gratifications. *Internet research*.
- [4] Yang, D. J., Chiu, J. Z., & Chen, Y. K. (2011). Examining The Social Influence on College Studies for Playing Online Game: Gender Differences and Implications. *The Turkish Online Journal of Educational Technology*, 10(3), 115-122.
- [5] Davis, F. D. (1986). A Technology Acceptance Model for Empirically Testing New End-User Information. *Massachusetts Institute*. Retrieved from <http://en.scientificcommons.org/7894517>
- [6] Ibrahim, R., Leng, N. S., Yusoff, R. C. M., Samy, G. N., Masrom, S., & Rizman, Z. I. (2017). E-learning acceptance based on technology acceptance model (TAM). *Journal of Fundamental and Applied Sciences*, 9(4S), 871-889.
- [7] Davis, F. D., Bagozzi, R. P., & Warshaw, P. W. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35(8), 982-1003.
- [8] Šumak, B., Heričko, M., & Pušnik, M. (2011). A meta-analysis of e-learning technology acceptance: The role of user types and e-learning technology types. *Computers in human behavior*, 27(6), 2067-2077.
- [9] Nguyen, P., & Nguyen, L. (2021). A study on game consumer behavior. *Management Science Letters*, 11(9), 2323-2330.
- [10] Park, S. Y., Nam, M. W., & Cha, S. B. (2012). University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model. *British journal of educational technology*, 43(4), 592-605.
- [11] Wang, X., & Goh, D. H. L. (2017). Video game acceptance: a meta-analysis of the extended technology acceptance model. *Cyberpsychology, Behavior, and Social Networking*, 20(11), 662-671.
- [12] Chang, C. C. (2013). Examining users' intention to continue using social network games: A flow experience perspective. *Telematics and Informatics*, 30(4), 311-321.
- [13] Erturkoglu, Z., Zhang, J., & Mao, E. (2015). Pressing the play button: What drives the intention to play social mobile games?. *International Journal of E-Business Research (IJEER)*, 11(3), 54-71.
- [14] Widjaja, S. (2014). Pengaruh Perceived Behavioral Control, Descriptive Norms, Perceived Playfulness Terhadap Satisfaction dan Loyalty Melalui Online Game Addiction Pemain Online Game Clash Of Clans Di Surabaya. *Jurnal Ilmiah Mahasiswa*, 3(2), 1-19.
- [15] Mäntymäki, M., & Salo, J. (2015). Why do teens spend real money in virtual worlds? A consumption values and developmental psychology perspective on virtual consumption. *International Journal of Information Management*, 35(1), 124-134.
- [16] Tan, G. W. H., Ooi, K. B., Sim, J. J., & Phusavat, K. (2012). Determinants of mobile learning adoption: An empirical analysis. *Journal of Computer Information Systems*, 52(3), 82-91.
- [17] Giannakos, M. N. (2013). Enjoy and Learn With Educational Games: Examining Factors Affecting Learning Performance. *Computers and Education*, 68, 429-439.

- [18] Ibrahim, R., Wahab, S., Yusoff, R. C., Khalil, K., & Jaafar, A. (2011). Student Perceptions of Educational Games in Higher Education: An Empirical Study. *Issues in Information System*, 12(1), 120-133.
- [19] Abidin, H. Z., & Zaman, F. K. (2017, November). Students' perceptions on game-based classroom response system in a computer programming course. In *2017 IEEE 9th International Conference on Engineering Education (ICEED)* (pp. 254-259). IEEE.
- [20] Kim, G., Choe, D., Lee, J., Park, S., Jun, S., & Jang, D. (2013). The Technology Acceptance Model for Playing Console Game in Korea. *International Journal of Computer Science and Network*, 13(5), 9-12.
- [21] Zhu, D.-S. (2012). Using The Technology Acceptance Model to Evaluate User Attitude and Intention of Use for Online Games. *Total Quality Management*, 23(8), 965-980.
- [22] Tokel, S. T., & İslar, V. (2015). Acceptance of virtual worlds as learning space. *Innovations in Education and Teaching International*, 52(3), 254-264.
- [23] Alzahrani, A. I., Mahmud, I., Ramayah, T., Alfarraj, O., & Alalwan, N. (2017). Extending the theory of planned behavior (TPB) to explain online game playing among Malaysian undergraduate students. *Telematics and Informatics*, 34(4), 239-251.
- [24] Fan, L., Gu, J. C., & Lee, S. C. (2012). How to Attract Chinese Online Game Users: An Empirical Study on The Determinants Affecting Intention to Use Chinese Online Games. *13(1)*, 7-21.
- [25] Procci, K., Bohnsack, J., & Bowers, C. (2011). Patterns of Gaming Preference and Serious Game Effectiveness. 1-6.
- [26] Birk, M., & Mandryk, R. L. (2013, April). Control your game-self: effects of controller type on enjoyment, motivation, and personality in game. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 685-694).
- [27] Knight, J. F. (2013). Acceptability of Video Games Technology for Medical Emergency Training. *5(4)*, 86-99.
- [28] Chen, H., Rong, W., Ma, X., Qu, Y., & Xiong, Z. (2017). An Extended Technology Acceptance Model for Mobile Social Gaming Service Popularity Analysis. *Mobile Information System*, 1-13.
- [29] Black, W., & Babin, B. J. (2019). *Multivariate data analysis: Its approach, evolution, and impact*. In *The great facilitator* (pp. 121-130). Springer, Cham.
- [30] Aziz, B. G., & Lei, S. (2016). Yan'an Mobile Game Player's Consumption Concept of Donghua University Campus. (9), 292-302.
- [31] Santoso, S. (2015). *AMOS 22 untuk Structural Equation Modelling*. PT Elex Media Komputindo.
- [32] Park, S. Y., Nam, M. W., & Cha, S. B. (2012). University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model. *British journal of educational technology*, 43(4), 592-605.
- [33] Thoemmes, F., Rosseel, Y., & Textor, J. (2018). Local fit evaluation of structural equation models using graphical criteria. *Psychological methods*, 23(1), 27.
- [34] Bagozzi, R. P., & Yi, Y. (2012). Specification, evaluation, and interpretation of structural equation models. *Journal of the academy of marketing science*, 40(1), 8-34.
- [35] Marangunić, N., & Granić, A. (2015). Technology acceptance model: a literature review from 1986 to 2013. *Universal access in the information society*, 14(1), 81-95.
- [36] Park, S., Hong, J., Ohk, K., & Yoon, T. (2015). The Moderating Effect of Reference Group on Online Game Loyalty : Focused on Hedonic Information System. *International Journal of Ubiquitous Engineering*, 10(1), 59-70.