Identifying the Factors of Online Game Acceptance Using Technology Acceptance Model

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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.

| Variable                  | Statements                                                                 | References |
|---------------------------|-----------------------------------------------------------------------------|------------|
| Perceived ease-of-use (PEOU) | Online games are easy to play.                                               | [20]       |
|                           | Online games are easy to learn.                                             |            |
|                           | 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.                         |            |
|                           | I love to spend my free time playing online games.                         | [20]       |
|                           | Online games are efficient to fulfill my needs.                            |            |
| 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.                                       |            |
|                           | I like the services provided in online games.                              | [14]       |
|                           | I am satisfied playing online games.                                       |            |
| Social Influence (SI)     | My friends think that I should play online games.                          | [12]       |
|                           | My playmates think that I should play online games.                        |            |
|                           | My college friends think that I should play online games.                  | [13]       |
| Personal (P)              | I am confident in my ability to play online games.                         | [10]       |
|                           | I have the necessary skills in playing online games.                       |            |
| Enjoyment                 | Playing online games is interesting to me.                                 | [13]       |

Dewi, Natalia (Identifying the Factors of Online Game Acceptance Using Technology Acceptance Model)
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](image)

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.

| 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 | S11 | 0.000 |
| PEOU2 | 0.024 | ITU1 | 0.000 | S12 | 0.000 |

Dewi, Natalia (Identifying the Factors of Online Game Acceptance Using Technology Acceptance Model)
Dewi, Natalia (Identifying the Factors of Online Game Acceptance Using Technology Acceptance Model)

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            |

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|

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.

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](image)

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.

|                  | 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.
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.

![Figure 4. Hypothesis testing model](image)

**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

| Hypothesis | Significant Relation | Conclusion |
|------------|----------------------|------------|
| H1: PEOU affects PU | No | Rejected |
| H2: PEOU affects ATU | Yes | Accepted |
| H3: PU affects ATU | Yes | Accepted |
| H4: ATU affects ITU | Yes | Accepted |
| H5: ITU affects AU | Yes | Accepted |
| H6: SI affects PEOU | No | Rejected |
| H7: SI affects PU | Yes | Accepted |
| H8: P affects PEOU | Yes | Accepted |
| H9: P affects PU | No | Rejected |
| H10: E affects PEOU | Yes | Accepted |
| H11: E affects PU | Yes | Accepted |

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].

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].

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].

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]

Students' intention to play online games can help actual use to eliminate boredom [10].

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].

Friends sometimes play online games because of their usefulness that supports playing with other people at the same time in different places [12][36].

Students who have the necessary abilities and skills to play online games can help make it easier to play online games [19].

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].

Students who basically enjoy playing online games will be able to do it easily [13].

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.

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Dewi, Natalia (Identifying the Factors of Online Game Acceptance Using Technology Acceptance Model)
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.

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