

Conference Paper

The Technology Acceptance Model for Playing Mobile Games in Indonesia

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Abstract

Mobile games grew to account for one-third of the global games industry in 2015. They dominated Southeast Asia in 2015 with mobile revenues accounting for nearly half the \$1.4Bn Southeast Asian games market. In 2017, mobile revenues alone approached \$1.3Bn, growing at an impressive CAGR (2013–2017) of +56%. Underlying this growth is the fast-rising (mobile) Internet connectivity across the region. Among the South East Asian Countries, Indonesia dominates the total mobile game market with 30.7 million players, of which 49% are payers (mobile games in or out purchasers). Even Thailand and Singapore, two of the biggest contributors in game development, have a smaller number of players and payers compared to Indonesia. Unfortunately, Indonesian games are still left out of the competition with foreign games. The chart of both Play Store (for Android) and App Store (for Apple) show that the top 10 games are all foreign games. The Indonesian mobile game industry needs to compete and utilize the opportunity of the huge number of mobile users in the country and increase its market share. Through this study, we will find the main factors and behaviors that motivate Indonesian smartphone users to play mobile games. This study employed Technology Acceptance Model (TAM) to analyze and to find the main factors. The research method used is descriptive survey with a sample of 136 respondents. Data processing was done using SEM. The results of research are Perceived Usefulness, Perceived Ease of Use, Flow, Accessibility, and Attitude as affecting behavior in playing mobile games. However, Intention doesn't affect behavior in playing mobile games.

Keywords: game industry, mobile games, Technology Acceptance Model

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1. Introduction

Mobile games continue to grow in terms of players and revenues across all regions. Asia-Pacific (APAC) remains by far the largest mobile market in the world, in terms of both player and revenue numbers. The region's 760 million mobile gamers generated \$13.6Bn, or 55% of the total market, in 2014. As a part of APAC, Southeast Asia is growing beyond other similar regions, such as Latin America and Eastern Europe. Compared to Latin America and Eastern Europe, Southeast Asia's Compound Annual Growth Rate

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(CAGR) is the highest (+28.8%) following Eastern Europe (+14.7%) and Latin America (+14.2%) [8].

Mobile (smartphone and tablet) games dominated in Southeast Asia in 2015, with mobile revenues accounting for nearly half the \$1.4Bn Southeast Asian games market. In 2017, mobile revenues alone approached \$1.3Bn, growing at an impressive CAGR (2013–2017) of +56%. Underlying this growth is the fast-rising (mobile) Internet connectivity across the region (Newzoo Global Games Market Premium).

Among the South East Asian Countries, Indonesia dominates all of the mobile game market with 30.7 million players of whom 49% are payers (mobile games in or out purchasers). Even Thailand and Singapore, two of the biggest contributors in game development, have a smaller number of players and payers compared to Indonesia (Mobile Marketing Association).

In the market, based on age, Indonesia has the youngest mobile Internet user base in South East Asia. Users between 25–32 years old dominate, followed by users between 18–24 years old. According to mobile Internet users statistics, users tend to download a game and application content, which makes Indonesia the highest in South East Asia. The other content downloaded includes video, music and themes.

With such a huge number of players in Indonesia, Indonesia has great potential for many Indonesian creative entrepreneurs to start to build their own mobile game company. With the youngest and biggest mobile Internet users in Southeast Asia, a quarter of its mobile users prefer to download a game/app content to their phone; therefore, the mobile game industry needs to step up its game to utilize this market.

All of the games are dominated by foreign game developers from foreign countries (Supercell, HERO Game, Elex Wireless and im30.net). This shows that while Asia has already dominated the mobile game market, Indonesian games have yet to reach the competition. Similarly with Android games, iOS games are also still dominated by foreign countries' game developers in the top 5 chart.

Unfortunately, Indonesian games are still left out of the competition with foreign games. The charts of both Play Store (for Android) and App Store (for Apple) show that the top 10 games are all foreign games. The Indonesian mobile game industry needs to compete and utilize the opportunity of the huge number of mobile users in the country and increase its market share. To do that, it needs to identify the main factors and behaviors that motivate Indonesian people to play mobile games. In this study, we employed the Technology Acceptance Model (TAM) to analyze and to find the main factors. We set Perceived Usefulness, Perceived Ease of Use, Flow, Accessibility, Attitude and Intention as the main independent factors in the TAM model. Flow and

Accessibility are additional variables included in the model to involve various elements of mobile games in our result. We expect to find the main factors that motivate people to play mobile games through the results of this study.

2. Literature Review

2.1. Technology acceptance model (TAM)

Predicting behavior is a major objective of psychological theories. Predicting behavior can also be utilized by business to forecast demand and trend to keep up with their customers. One of the models that can be used to predict behavior is Theory of Reasoned Action (TRA). ([7]; Ajzen & Fishbein, 1980). Research has suggested that a person's actual behavior can be determined by considering his or her prior intention along with the beliefs that the person would have for the given behavior [5]. This is referred to as the intention that a person has prior to an actual behavior as the behavioral intention of that person, and is defined as a measure of one's intention to perform a behavior. Fishbein and Ajzen also proposed that behavioral intention could be determined by considering both the attitude that a person has toward the actual behavior, and the subjective norm associated with the behavior in question. The theory of Reasoned Action, thus, provides a useful model that can explain and predict the actual behavior of an individual.

One of the well-known models related to technology acceptance and use is the technology acceptance model (TAM), adapted from theory of reasoned action proposed by Ajzen and Fishbein (1980). TAM was proposed by Davis, Bagozzi, and Warshaw (1989) to explain why a user accepts or rejects information technology. TAM has proven to be a theoretical model in helping to explain and predict user behavior of information technology [9]. TAM provides a basis by which one traces how external variables influence belief, attitude, and intention to use. Two cognitive beliefs are posited by TAM: perceived usefulness and perceived ease of use. According to TAM, one's actual use of a technology system is influenced directly or indirectly by the user's behavioral intentions, attitude, perceived usefulness of the system and perceived ease of the system. TAM also proposes that external factors affect intention and actual use through mediated effects on perceived usefulness and perceived ease of use.

The technology acceptance model consists of six distinct yet causally related constructs, namely external variables, perceived ease of use, perceived usefulness, attitude toward using, behavioral intention to use and actual system use ([6]; Koh et al.,

2010). Perceived ease of use and perceived usefulness determine an individual's information system acceptance ([12]; Surendran, 2012) by determining their attitude toward using and subsequent behavioral intention to use, which culminates in actual system use (Wu & Wang, 2005). Perceived usefulness can be used as an independent or dependent variable, since it is predicted by perceived ease of use and, in turn, predicts attitude toward using and behavioral intention to use simultaneously ([6]; Koh et al., 2010; [12]). The rest of the variables, such as perceived ease of use, attitude toward using and behavioral intention to use components, represent the core functions of the technology acceptance model, where external variables and actual system use serve merely as input to and output from the model, respectively.

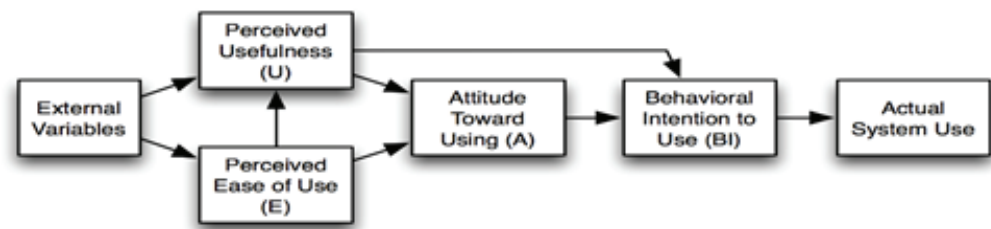


Figure 1: The Technology Acceptance Model, version 1 [6].

Another theory that supports the theory of reasoned action is the theory of planned behavior. It is an extension of the theory of reasoned action ([7]; Ajzen & Fishbein, 1980) made necessary by the original model's limitations in dealing with behaviors in which people have incomplete volitional control. The main factor in the theory of planned behavior is the individual's intention to perform a given behavior (Ajzen, 1991). Intentions are assumed to capture motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior. The stronger the intention to engage in a behavior, the more likely should be its performance. TAM has been continuously upgraded and expanded into a major upgrade, which is TAM 2 [11].

Using TAM as the starting point, TAM2 incorporates additional theoretical constructs spanning social influence processes (subjective norm, voluntariness and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability and perceived ease of use).

Technology Acceptance Model variables consist of perceived usefulness and perceived ease of use as the TAM main variables. Flow, accessibility, attitude and intention are other external variables that can also be used to predict consumer acceptance behavior.

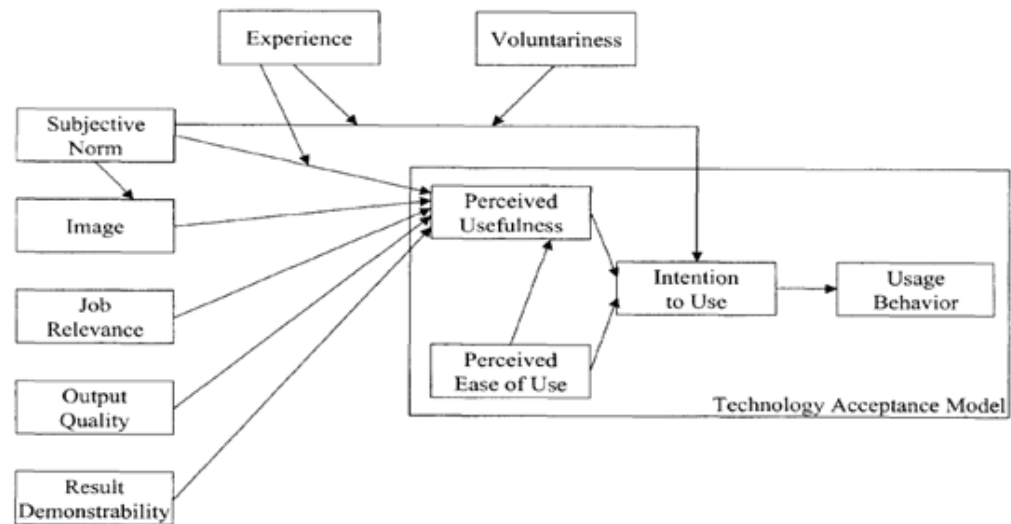


Figure 2: Proposed TAM2—Extension of the Technology Acceptance Model [11].

Perceived usefulness

Davis (1985), in his proposed model of technology acceptance, concluded that people tend to use or not to use a system to the extent that they believe it will help them perform their job better. More formally, he defined perceived usefulness as the degree to which an individual believes that using a particular system would enhance his or her job performance. Davis (1989) then referred the measurement for perceived usefulness using psychometric scales used in psychology.

Perceived ease of use

Davis (1985) also defined perceived ease of use as the degree to which an individual believes that using a particular system would be free of physical and mental effort flow

In the context of game acceptance, Shintaro et al. (2012) included flow experience as an as an additional TAM variable. Flow is the experience of doing something just because you enjoy doing it. In a flow state, time seems to fly by, as attention becomes effortlessly focused on the activity. Attention is so absorbed by the activity that no attention is left over to notice time passing and get bored, to worry about the future, or to worry about what others will think of us (Schaffer & Owen, 2013).

Accessibility

Accessibility means providing flexibility to accommodate each user's needs and preferences. In an Internet context, accessibility is making computer technology and Internet resources useful to more people than would otherwise be the case.

Attitude

In Technology Acceptance Mode, attitude toward using is determined by perceived ease of use and perceived usefulness (Guritno & Siringoringo, 2013), with attitude defined as an expression toward something, which can be a positive or negative, which can affect our decisions.

Intention

The last in the Technology Acceptance Model framework, behavioral intention to use is determined by attitude toward using. It can be also determined by attitude toward using and perceived usefulness or attitude toward using, perceived usefulness, and perceived ease of use. Intention is defined as the state that we commit to take an action.

All of the aforementioned variables are mainly based on the framework proposed by Davis and also other psychological factors that are important in game acceptance.

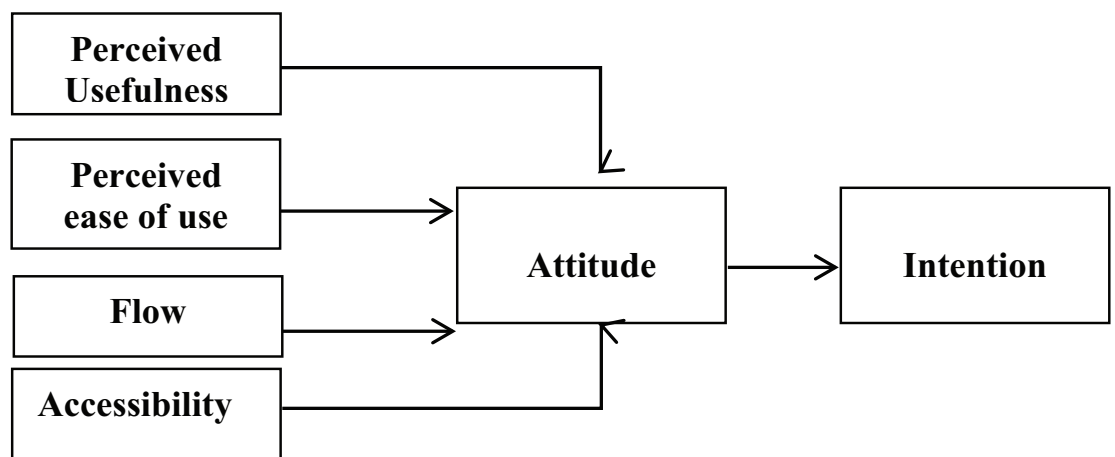


Figure 3: Research framework.

Hypothesis

- H1:** There is a positive relationship between perceived usefulness and attitude toward mobile games
- H2:** There is a positive relationship between perceived ease of use and attitude toward mobile games
- H3:** There is a positive relationship between flow and attitude toward mobile games
- H4:** There is a positive relationship between accessibility and attitude toward mobile games
- H5:** There is a positive relationship between attitude and intention

3. Methods

The research method is descriptive survey. The population in this research will be Indonesian mobile game users in the age range of 18–25. The sample will be specifically 325 people between 18–25 years old who have played a mobile game in their phone (in any OS, Android, iOS, Windows, etc.) at least more than twice in Indonesia in order to see their behavior of playing a mobile game. The sampling technique that will be used in this research will be convenience sampling. To answer the problem statements, it is required to use both primary data and secondary data whereby primary data are obtained through questionnaires to respondents who already have an experience as mobile game users and secondary data are obtained through citing journals, books and websites related to the research. Testing the model is done using Structural Equation Modelling (SEM). The variable operationalization is as in the following table.

4. Results and Discussion

A mobile game is a video game played on a smartphone, smartwatch, tablet computer, portable media, or even calculator. It is usually downloaded through an app store or other mobile operator portals. It consists of many genres including action, action-adventure, adventure, role-playing, simulation, strategy, puzzle, casual, shooting, and massive online multiplayer. Based on download statistics on Google Play and app store, Indonesian mobile gamers tend to play RPG and casual games because they are more compatible to a compact smartphone while other platforms, like consoles or PC,

TABLE 1: Variable Operationalization.

Variable	Concept	Indicator	Scale
Perceived Usefulness	The degree to which an individual believes that using a particular system would enhance his or her job performance	<ul style="list-style-type: none"> Relationship builder Stress reliever Eliminates boredom 	Interval
Perceived Ease of Use	The degree to which an individual believes that using a particular system would be free of physical and mental effort	<ul style="list-style-type: none"> Clear instructions or manual Easy to operate Simple platform 	Interval
Flow	The holistic experience that people feel when they act with total involvement	<ul style="list-style-type: none"> Time waster High interest Trigger curiosity 	Interval
Accessibility	Accessibility means providing flexibility to accommodate each user's needs and preferences.	<ul style="list-style-type: none"> Easy to obtain Easy access to information Compatible to various platform 	Interval
Attitude	Expression toward something, positive or negative, that can affect our decisions	<ul style="list-style-type: none"> Feelings Viewpoint Perception 	Interval
Intention	Intention is the state that we commit to take an action.	<ul style="list-style-type: none"> Continuity Persistency Up to date 	Interval

are more compatible to the action and adventure genre because of their visuals and story.

The following section will explain the results of validity and reliability testing using LISREL 8.8o software.

4.1. Technology acceptance model using structural equation modeling

The following section explains the structural analysis for the technology acceptance model for playing mobile games in Indonesia.

Based on the Goodness of fit model in this article, overall results indicate that the model is marginally fit. Hence, results can be interpreted or analyzed deeper.

The hypothesis test using LISREL 8.8o yields results as follows:

T-value PerUse to Attitu is 5.64; this value is higher than t -table ($t_{0.05,243}$), which is 1.96. It means that there is **a positive relationship** and significance between perceived usefulness and attitude toward mobile games. Coefficient for Perceived Usefulness to Attitude is 0.72, which means that, when Perceived Usefulness is increased by one, it will affect attitude by 0.72.

T-value PerEase to Attitu is -2.711 this value is lower than t -table ($t_{0.05,243}$) | which is 1.96. It means that there is **no relationship** between perceived ease of use and attitude

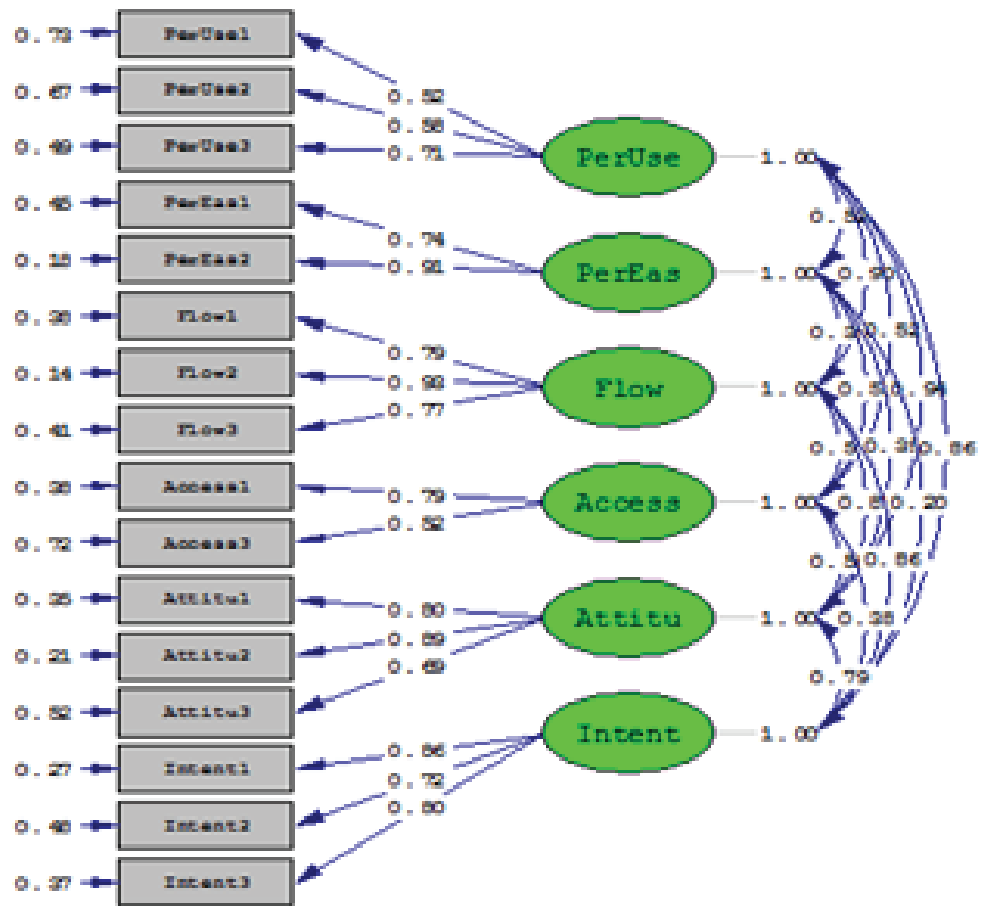


Figure 4: Standardized loading factors of manifest variable toward their latent.

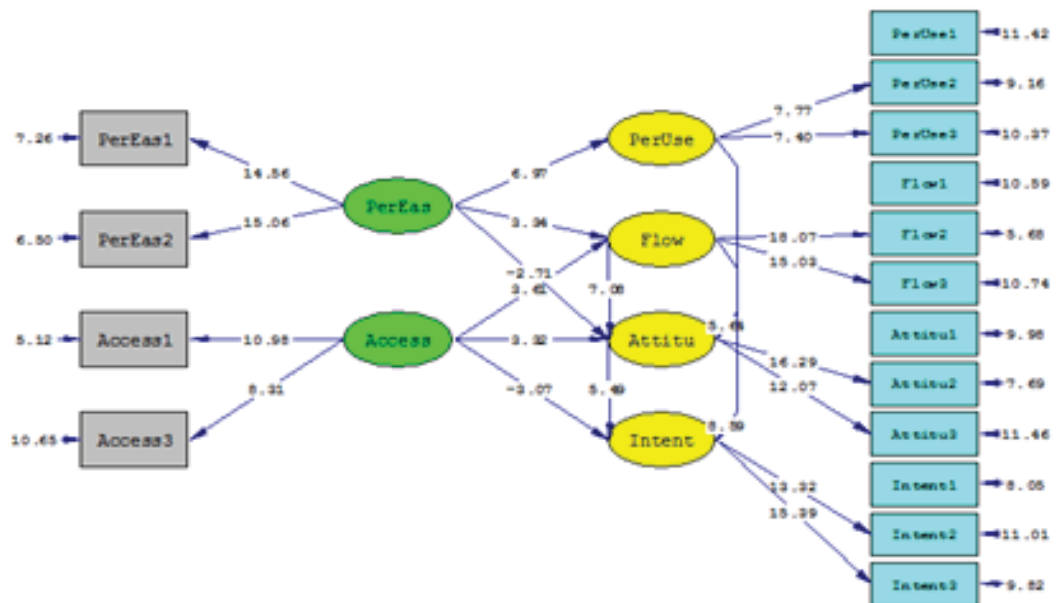


Figure 5: T-values Structural Mode.

toward mobile games. Coefficient for Perceived Ease of Use to Attitude is -0.30, which

TABLE 2: Reliability of measurement model.

Variable	Indicator	Factor Loading	Error	CR	VE
Perceived Usefulness	PerUse1	0.52	0.73	0.6342	0.7774
	PerUse2	0.58	0.67		
	PerUse3	0.71	0.49		
Perceived Ease of Use	PerEas1	0.74	0.45	0.8121	0.8030
	PerEas2	0.91	0.18		
Flow	Flow1	0.79	0.38	0.8696	0.8015
	Flow2	0.93	0.14		
	Flow3	0.77	0.41		
Accessibility	Access1	0.79	0.38	0.6094	0.7808
	Access2	0.52	0.72		
Attitude	Attitu1	0.8	0.35	0.8399	0.7848
	Attitu2	0.89	0.21		
	Attitu3	0.69	0.52		
Intention	Intent1	0.86	0.27	0.8349	0.7748
	Intent2	0.72	0.48		
	Intent3	0.8	0.37		

TABLE 3: Goodness of Fit Structural Model.

GOF measurement	Value	Fit rate
Absolute Fit		
Chi-Square (χ^2)	526.24 (<i>p-value</i> = 0.000)	Poor fit
Root Mean Square Error of Approximation (RMSEA)	0.12	Marginal fit
Goodness of Fit Index (GFI)	0.83	Good fit
Incremental Fit		
Normed Fit Index (NFI)	0.92	Good fit
Comparative Fit Index (CFI)	0.94	Good fit
Parsimony Fit Indices		
Parsimony Goodness of Fit Index (PGFI)	0.57	Marginal fit

means that, when Perceived Ease of Use is decreased by one, it will affect attitude by 0.30.

T-value Flow to Attitu is 7.08; this value is higher than *t*-table ($t_{0.05,243}$), which is 1.96. It means that there is a **positive relationship** and significance between flow and attitude toward mobile games. Coefficient for Flow to Attitude is 0.45, which means that, when Flow increased by one, it will affect attitude by 0.45.

T-value Access to Attitu is 3.32; this value is higher than *t*-table ($t_{0.05,243}$), which is 1.96. It means that there is a **positive relationship** and significance between accessibility and attitude toward mobile games. Coefficient for Access to Attitude is 0.27, which means that, when Access is increased by one, it will affect attitude by 0.27.

T-value Attitu to Intent is 8.49; this value is higher than *t*-table ($t_{0.05,243}$), which is 1.96. It means that there is a **positive relationship** and significance between attitude and intention. Coefficient for Attitude to Intention is 0.44, which means that, when Attitude is increased by one, it will affect Intention by 0.44.

4.2. Discussion

1. Mobile game developers need to create a good design and game play in a mobile game so that people will attracted to play mobile games more than other consoles. Mobile game developers should put more effort into creating a good user experience and interface that is attractive and simple so that people can dedicate themselves to playing mobile games and choose to spend a lot of time and money playing them rather than other consoles. One of the bottlenecks in many mobile games is the control of the game, which is difficult, resulting in breaking people's flow when playing a mobile game. Thus, to improve, those part need to be concerned more by Indonesian game developers.
2. To compete with other foreign mobile game developers, Indonesian mobile game developers need to be ahead of the curve in updating the trend in gaming for other consoles, not only mobile games. Gamers will always be updated and in search for the next interesting game to play; thus, Indonesian mobile gamers can utilize that moment to offer a different and unique mobile game that hasn't been made by other foreign mobile game developers. Indonesian mobile game developers also need to put effort into creating good attraction points and promotional tools (like teasers, demos or trials) to make people curious about the game. Indonesian mobile game developers still have a lot to learn and need to catch up to be in a same position as foreign mobile game developers. Hence, by being always aware of the needs of mobile gamers and continuing to innovate, we can compete and represent our local games to the world
3. This research is not perfect, thus, it is suggested for the next researcher to define more specific mobile game genres or types to find out about the behavior of accepting the technology in Indonesia.

5. Conclusion

Based on the result of the research that the author conduct regarding the Technology Acceptance Model of playing mobile game in Indonesia, there are three conclusions.

1. Perceived Usefulness, Perceived Ease of Use, Flow, and Accessibility affect Attitude in playing mobile games, whereas Perceived Ease of Use does not. This means that to increase mobile game players' attitude, you must improve the Perceived Usefulness, Flow and Accessibility of a mobile game. Meanwhile, the Perceived Ease of Use does not affect attitude because, for the increasingly difficult mobile gamers, it will increasingly challenge them in playing mobile games
2. Attitude affects Intention of Indonesian gamers in playing mobile games.
3. The Perceived Usefulness, Perceived Ease of Use, Flow and Accessibility affect Attitude of Indonesian gamers in playing mobile games.

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