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INVESTIGATING ROLES OF SELF-EFFICACY ON MOBILE GAMES ADOPTION IN INDONESIA

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ABSTRACT

The gaming industry has become one of the most promising markets, and playing a game is also has been considered as the best leisure and entertainment activities in the last few decades. Understanding how consumers within the market behave is important to decide the best marketing strategy to be applied to achieve a competitive advantage in the market. Technology Acceptance Model (TAM) has been widely used to examine the adoption of technology and/or information system-related products. This study's main purpose is to investigate player's intention to play games on a mobile platform in Indonesia. We predict self-efficacy as the keys determinant factor that could affect player's adoption of mobile games. Data calculation conducted by utilizing SmartPLS 3.2. The finding of this study proved that self-efficacy is a strong determinant of players' mobile game adoption. Besides, we found interesting results in which perceived ease of use and attitude toward use did not have a significant direct effect on players' intention to play mobile games. Theoretically, this study provides an integrated conceptual model to explain the role of self-efficacy on mobile game adoption. Strategically, this study results could help mobile game marketers to build the best marketing strategy for their targeted players.

Keywords: self-efficacy, attitude toward use, intention to use

JEL Classification: M31

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INTRODUCTION

Playing games has become one of the best leisure and entertainment activities in the last few decades. (Hamari and Keronen, 2017) pointed out that, "in addition to the increased penetration of games, the ways people play and utilize game have also become more varied". (Newzoo, 2019) predicted that the global games market would generate revenues of 152.1 billion USD on that year, with a +9.6% year-on-year increase. Mobile games are the best performing platform in the revenue-generating category with 68.5 billion USD or 45% of the total revenue of the global games market. The increasing revenue of mobile gaming platforms is not only due to the increase in the number of players in the market but also the switching of platform preferences from current players in the industry. Browser game is the most affected platform which its players are switching to mobile games. The revenue of browser game is predicted to continue decreasing by 15.1% year-on-year basis (Newzoo, 2019).

(Hamari and Keronen, 2017) describe a game as one of many system information products that are developed along with technological advances. Different types of games are available for different gaming needs and audiences (Hamari and Tuunanen, 2014; Hartmann et al., 2012; Koivisto and Hamari, 2014). There is also a wide variety of business model in gaming industries (Alha et al., 2014; Hamari and Keronen, 2017; Mäntymäki and Riemer, 2014). Identifying consumer behavior toward a product is essential for a company or marketer in order to create a valuable product that suits targeted customer needs and behavior. (Hawkins and Mothersbaugh, 2010) explained, "to survive in a competitive environment, an organization must provide its target customer more value than is provided to them by its competitors". Thus, customer value is considered as an important factor in determining marketing strategy to gain competitive advantages.

Consumer behavior on information system-related products widely observed using the Technology Acceptance Model (TAM). The model was first introduced by Fred D. Davis in 1989. Two variables from the model are considered the most determining factor of technology-related product adoption (S.-C. Chen et al., 2011). The first one is perceived ease of use which measures the user expectation of how easy for them to use the product. The second one is perceived usefulness which measures the user expectation of how the product will help their tasks or fulfill their needs. Users with a better perception of the product will most likely have a better attitude toward it and also increase their intention to use the product.

TAM itself has been extended by researchers in the last few decades with various external factors which considered could improve user's perceived ease of use and/or perceived usefulness toward a product. (Abdullah and Ward, 2016) suggested that a large number of factors have been used in TAM and called for a General Extended Technology Acceptance Model (GETAMEL). They analyzed 107 studies related to the extension of TAM and found the five most determining factors that could improve users perceived ease of use and/or perceived usefulness. These factors are self-efficacy, subjective norm/social influences, perceived enjoyment, computer anxiety, and experience. Besides the analyzed studies are focused on the adoption of e-learning technology or system, the results showed the principal role of external factors in building user's perceived ease of use and/or perceived usefulness of technology or system-related products.

(Bandura, 1977) explained that expectation of self-efficacy is one of the behavioral change determinant. (Bandura, 2006) defined self-efficacy or perceived self-efficacy as "people beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives". People with a higher level of self-efficacy facing difficult tasks as a challenge to improve their skills, rather than a threat that needs to avoid.

He argued that perceived self-efficacy is a keys determinant of intention. Several studies found that self-efficacy has a significant influence on TAM because it could improve users perceived ease of use and/or perceived usefulness (Ali et al., 2013; Chow et al., 2012; Hsia et al., 2014; D. Y. Lee and Lehto, 2013). However, there are still few studies examining the relationship between self-efficacy as a determinant factor of TAM in the gaming industry.

The purpose of this study is to examine the role of self-efficacy as a determinant factor of TAM in the gaming industry. The development of the gaming industry offers a great market potential, thus understanding how consumers in the market behave will provide a better insight toward the company to determine the best marketing strategy. To achieve the purpose, we choose browser PC game' players as our research object to measure their self-efficacy on playing browser PC games and how they perceived the ease of use and usefulness of mobile games before playing it. The results of this study are also engaging for future researchers to analyze the integrated model on different gaming platforms (e.g. console game, or Downloaded PC game).

LITERATURE REVIEW

Technology Acceptance Model

Technology Acceptance Model (TAM) was first introduced by Fred D. Davis in 1989. The model developed specifically to predict an individual's attitude concerning the use of an application. Two new variables introduced within the models are Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). These variables distinguished TAM from the Theory of Reasoned Action (TRA) which is popular in that time to examine an individual's behavior toward action. According to TAM, PEOU and PU are the determinants of an individual's attitude toward a technology-related product and this attitude could lead to the intention to use the product.

In the last few decades, TAM has been widely used to predict the acceptance, adoption, and use of information technologies (S.-C. Chen et al., 2011). Researchers have been used the model to study individual or organization behavior to accept, adopt, or use information technology and/or systems such as e-learning (H. R. Chen and Tseng, 2012; S. Y. Park et al., 2012), mobile/digital banking (Aboelmaged and Gebba, 2013; Le et al., 2020; Nguyen, 2020), social media (Dumpit and Fernandez, 2017; J. W. Lee et al., 2016; Rauniar et al., 2014), and games (E. Park et al., 2014; Wang and Goh, 2017; Zhu et al., 2012). There is a similarity among these researchers when using TAM as their research model: they use various external factors as determinants of PEOU and PU.

Adding external factors as the determinant of an individual's acceptance of technology information and/or system is defined as extended TAM. (Abdullah and Ward, 2016) collected 107 studies and analyzed the most generally used factors in determining TAM on extended TAM researches. The research found the five most used factors in determining TAM are: self-efficacy, subjective norm/social influences, perceived enjoyment, computer anxiety, and experience. Four out of five factors (self-efficacy, subjective norm/social influences, perceived enjoyment, and experience) have a significant positive effect on improving an individual's acceptance or adoption of technology information and/or systems. Computer anxiety is the only determinant that has a negative effect on TAM, despite the strong relationship between the factors and TAM. However, the limitation of the study is that it only analyzed general determinant factors of TAM on e-learning adoption.

Self Efficacy

Self-efficacy is defined as an individual's belief in their capabilities to perform any particular action that affects their lives. (Bandura, 1977) explained that expectation of self-efficacy is a keys determinant of an individual's behavioral change because it could determine the initial decision to perform a behavior, analyzed effort needed for the action, and their persistence to face an obstacle when doing an action. Individual's experiences of personal mastery could improve their self-efficacy toward future actions. (Shearer et al., 1982) described that "individuals with a varied history and many successful experiences expected to have positive self-efficacy expectancies in a greater variety of situations than individuals with limited access and failure experiences. These explanation suggests that an individual's experience could improve their self-efficacy, which could lead to future actions.

(Bandura, 1977) argued that an individual's success or failure toward an action could lead to a different level of self-efficacy. This argument leads to a suggestion that an individual's level of self-efficacy would be different in any situation. (Shearer et al., 1982) supported the idea and explained that "an individual's past experiences with success and failure in a variety of situations should result in a general set of expectations that the individual carries into new situations". These explanations suggest that an individual's self-efficacy developed differently, and it could affect an individual's future behavior toward a specific new situation based on the individual's experiences with success and/or failure.

Albert Bandura in 2006 continued his work and defined the term perceived self-efficacy as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives". Self-efficacy predicted could determine how people feel, think, motivate themself, and behave (Bandura, 1994). A high level of self-efficacy could drive an individual to perform any particular task easily because

of assurance in their capabilities. The most effective way to improve a high level of self-efficacy is through skill mastery and experiences. Success and failure also considered as a determinant of self-efficacy level of an individual.

(Bandura, 1994) add three additional ways to improve the self-efficacy of an individual. The individual's self-efficacy improves if they have a social model. If a social model could achieve success with capabilities in which the observer's belief they also possess, these observer's self-efficacy improved. Social persuasion is another way to "strengthening" an individual's self-efficacy. An individual who is persuaded or encouraged that he/she possesses the capabilities to complete any particular task will is more likely to perform the greater effort to complete the task. Finally, positive moods are also considered as a way to improve an individual's self-efficacy. Positive moods could reduce an individual's stress concerning the completion of any particular task.

(Bandura, 2006) illustrate perceived self-efficacy should be phrased in terms of can do rather than will do. The separation of terms is essential to distinguish self-efficacy and behavioral intention, in which the relationship between the two variables is that self-efficacy is a keys determinant of intention. Perceived self-efficacy also needs to be distinguished from self-esteem, in which self-efficacy is a judgment of capabilities, and the latter is a judgment of self-worth. (Bandura, 2006) argued that efficacy beliefs could affect an individual way of thinking, whether it is erratically or strategically and optimistically or pessimistically. Self-efficacy could also influence an individual's course of actions to pursue, an individual's set up for challenges and life goals, and their resilience toward adversity and/or obstacle. He suggested that the "self-efficacy belief system is not a global trait but a differentiated set of self-beliefs linked to distinct realms of functioning". This suggestion leads to a tailored scale to measure an individual's self-efficacy toward a particular domain of functioning that is the object of interest.

Relationship between Browser PC Games Player Self-Efficacy and Mobile Game Perceived Ease of Use

The purpose of this study is to investigate the roles of self-efficacy on mobile game adoption. To achieve the goal, we adopted the Technology Acceptance Model (TAM) and extended it with self-efficacy as external factors that could determine the adoption of mobile games. Self-efficacy is defined as an individual's belief of their capabilities to perform any particular action that affects their lives (Bandura, 1977; Shearer et al., 1982). Adopting a new gaming platform is seen as a new challenge for a player because it will force them to learn a new configuration before finally playing the game (e.g when players are first playing a mobile game, they must master the game mechanics before playing the game itself). Higher self-

efficacy on their capabilities on playing a game on a new platform predicted to have a significant effect on their perceived ease of use of the new platform (Ariff et al., 2012; Faqih, 2013; S. Y. Park et al., 2012). Perceived Ease of Use (PEOU) is defined as an individual's belief that using any particular technology and/or system information is effortless (Davis, 1989). For this study, we redefined the term self-efficacy as an individual's belief of their capabilities to play a browser PC game and PEOU as an individual's belief that they could easily master any mobile games. The hypothesis to examine the relationship between these two variables are as follow:

H_1: Browser PC games player self-efficacy has a significant positive effect on mobile game perceived ease of use.

Relationship between Browser PC Games Player Self-Efficacy and Mobile Game Perceived Usefulness

Self-efficacy also predicted to have a significant effect on perceived usefulness (Ariff et al., 2012; Faqih, 2013; Gbongli et al., 2019). As explained by (Shearer et al., 1982), the experience of individual success may lead to a high self-efficacy. We predict players that have a good experience on any gaming platform could measure the usefulness of a new gaming platform before playing games on the new platform. Whether the experiences are good or bad, this measurement is highly affected their self-efficacy before playing the new platform. For the purpose of the study, we limited our observation only to the relationship between self-efficacy and perceived usefulness. We suspected that a higher level of self-efficacy could improve the player's perceived usefulness. Perceived Usefulness (PU) is described as the degree of an individual's belief that any particular technology and/or system information could improve his/her performance (Davis, 1989). (E. Park et al., 2014) hinted that the term "individual' performance" used by (Davis, 1989) on defining PU has a broader meaning than just a job and/or task performance, thus the concept of PU could be applied to all kinds of performances. Following this hint, we redefine PU as the degree of player's belief that mobile games have a benefit to improve their playing performance. The hypothesis to examine the relationship between these two variables are as follow:

H_2: Browser PC games player self-efficacy has a significant positive effect on mobile game perceived usefullness.

Relationship Between User's Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude Toward Usage (ATU), and Intention To Use (ITU)

The original TAM examines the relationship between user's PEOU, PU, Attitude toward Usage (ATU), and Intention to Use (ITU) on any particular technology and/or system information. ATU is described as the reflection of a person's belief that any particular behavior could lead to certain results, in which the results could be favorable or unfavorable (Aboelmaged and

Gebba, 2013). Favorable and/or positive attitude toward the results could be determined by individual PEOU (Aboelmaged and Gebba, 2013). Favorable and/or positive attitude toward the results could be determined by individual PEOU (Gbongli et al., 2019; E. Park et al., 2014; Zhu et al., 2012) and/or their PU (Aboelmaged and Gebba, 2013; Gbongli et al., 2019; E. Park et al., 2014). If a player finds the new gaming platform easy to use and can improve their game performance, this perception can lead to a favorable attitude towards the new gaming platform. This positive attitude is considered a key factor before the player finally develop the intention to use the new gaming platform. ITU is described as an individual's intention of using any particular technology and/or system information. Following the illustration of (Bandura, 2006) which separate self-efficacy and individual's intention, we conclude the keys difference between the two variable is on the word can and will. Self-efficacy predicted as a keys determinant of an individual's intention (Bandura, 2006; Shearer et al., 1982). Also, we examined the relationship between PEOU, PU, ATU, and ITU within our integrated TAM. This relationship simplified into the following hypotheses:

H_3: Browser PC game player's self-efficacy has a significant positive effect on their intention to use mobile games.

H_4: Player's mobile games perceived ease of use has a significant positive effect on their attitude toward mobile games.

H_5: Player's mobile games perceived ease of use has a significant positive effect on their intention to play mobile games.

H_6: Player's mobile games perceived usefulness has a significant positive effect on their attitude toward mobile games.

H_7: Player's mobile games perceived usefulness has a significant positive effect on their intention to play mobile games.

H_8: Player's attitude toward mobile games has a significant positive effect on their intention to plat mobile games.

The Mediating Effect of User's Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude Toward Usage (ATU), And Intention To Use (ITU)

To fully examine the relationship between variables as an integrated model, we also build hypotheses to illustrate the mediating effect of PEOU, PU, and ATU. First, the mediating effect of PEOU and PU on the relationship between self-efficacy toward ITU built following results of the following researches: Ariff et al., 2012; Bandura, 1977; Faqih, 2013. We predict that even a player has a high self-efficacy toward their gaming capabilities on a prior platform, they might not interested to adopt a new gaming platform if they think the new platform is not easy to use or could improve their gaming performance and experience. Thus, PEOU and PU could have a mediating effect to develop the intention to use a new gaming platform. Second, the mediating effect of ATU on the relationship between PEOU and PU toward ITU

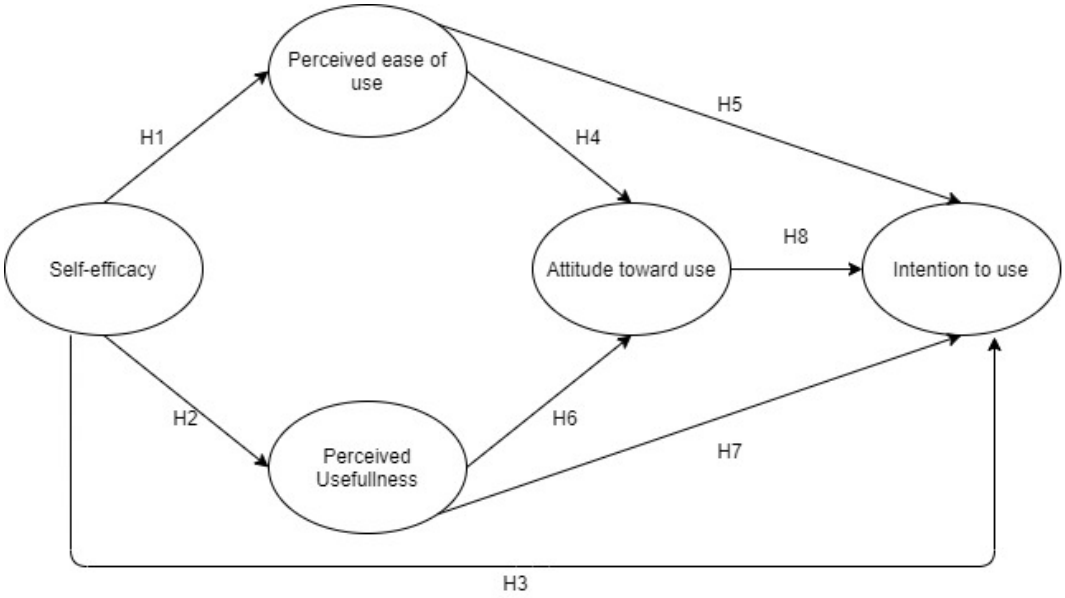
was built under the following results of researches: Gbongli et al., 2019; E. Park et al., 2014; Zhu et al., 2012. We believe that the relationship between perceived ease of use and perceived usefulness on the developed model could be explained better if we examine the role of favorable and/or positive attitude as a mediating variable between PEOU and PU. The hypotheses built to examine these predicted mediating effect are as follow:

H_9: player's perceived ease of use could mediate the relationship between self-efficacy and intention to use.

H_{10}: player's perceived usefulness could mediate the relationship between self-efficacy and intention to use.

H_{11}: player's attitude toward usage could mediate the relationship between perceived ease of use and intention of use.

H_{12}: player's attitude toward usage could mediate the relationship between perceived usefulness and intention of use.



H9 : Perceived ease of use mediates self-efficay toward intention to use

H10 : Perceived usefulness mediates self-efficay toward intention to use

H11 : Attitude toward use mediates perceived ease toward intention to use

H12 : Attitude toward use mediates perceived usefulness toward intention to use

Figure 1.

Conceptual Model

RESEARCH METHODS

Research Respondent

According to the purpose of this study, we carefully selected our respondents by adding two criteria that needed to meet before the participant is selected as the respondent. The first criteria are that each participant needs to have experience in playing any genre of browser PC games. Browser PC games are games that could be played on casual game websites or social networks. The second criteria are that each participant must never play any genre of mobile games before. There are two types of mobile games: smartphone and tablet games, in which they offer mobility to their player to play games anywhere and anywhen they want. We used a physical and digital self-administered questionnaire to collect the data, however, most of the data are collected via digital self-administered questionnaires due to the lockdowns and social distancing regulations following the pandemic issues. The location of the study is in Indonesia. 292 out of 300 questionnaires distributed for this study were returned and provided useable data for further analysis. Respondent's demographic overview show in Table 1.

Table 1.

Demographic Overview of Respondents

Characteristics	N	%
Gender		
Male	178	60.96
Female	114	39.04
Age (years)		
Under 20	12	4.11
21-25	168	57.53
26-30	58	19.86
Over 30	54	18.49
Playing experiences (years)		
Under 1	213	72.95
1-2	55	18.84
2-3	23	7.88
3	1	0.34
Education		
High School	43	14.73
College	236	80.82
Graduate	13	4.45
Daily play duration (hours)		
Under 1	215	73.63
1-2	14	4.79
2-3	58	19.86
3	5	1.71

(N = 292)

Variable Scales and Measurement

There are five variables within the integrated model built for this study. They are Self-efficacy, Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude toward Usage (ATU), and Intention to Use (ITU). Measurement of self-efficacy scales on browser PC game' players adopted from Park, et al. (2012). Player's PEOU, PU, ATU, and ITU scales on mobile games adopted from Park, et al. (2014). We use five points-Likert scales on each variable, starting on one (1) that refers to strongly disagree; to five (5) that refers to strongly agree. Questionnaire items to measure items from each variable shown in Table 2.

Table 2

Questionnaire Items Conducted in The Main Survey

Variables	Items	Descriptions	
Self-efficacy	SE1	I have the necessary skills to play any browser PC game	Park, et al. (2012)
	SE2	I am a generally skillfull player on various genre of browser PC game	
	SE3	I am confident I can complete any objectives on any browser PC game	
	SE4	In general, I understand the gameplay of various browser pc games.	
Perceived ease of use	PEOU1	I belief playing mobile games does not require a lot of effort.	Park, et al. (2014)
	PEOU2	Generally, I find mobile games are easy to play	
	PEOU3	I belief it is easy to play mobile games anywhere or anywhen	
Perceived usefullness	PU1	I think mobile games are usefull for me	Park, et al. (2014)
	PU2	It would be very comfortable for me to play mobile games	
	PU3	I find mobile games to be enjoyable and fascinating	
Attitude toward use	ATU1	I think it would be a good idea to play mobile games	Park, et al. (2014)
	ATU2	In general, I have a positive feeling toward mobile games	
	ATU3	It would be very easy to me to start playing mobile games compared to games on another platform	
Intention to Use	ITU1	I will play mobile games in near future	Park, et al. (2014)
	ITU2	I will play mobile games as much as possible	
	ITU3	I would prefer to play mobile games rather than games on another platform	

Data Analysis

There are three steps of analysis that we carried out in this study to analyze the data. First, we evaluate the outer model that included: convergent validity test; discriminant validity test; and unidimensionality test (Hair et al., 2014). Second, we conducted the inner model evaluation that included: coefficient of determination analysis; and predictive relevance measurement (In Vinzi, V.E, Chin, W.W., Henseler, J. and Wang, 2010). Finally, we conducted the hypothesis testing that included: direct path evaluation and Sobel's test to analyze the mediating effect (Baron and Kenny, 1986). All of these analyses were conducted by using Partial Least Squares (PLS) with SmartPLS 3.2 software.

RESULTS AND DISCUSSION

Outer Model Evaluation

We examine the outer model to measure the scale and measurement items in this study. This evaluation consists of three indicators: convergent validity test, discriminant validity test, and unidimensionality test. The convergent validity test was used to test the Average of Variance Extracted (AVE) value of each variable. Each variable must have at least an AVE value of 0.5 to pass the convergent validity test. The discriminant validity test was used to examine the Heterotrait-Monotrait (HTMT) value of each variable, to pass the evaluation, there are no variables that should have an HTMT value above 0.9 (Hair et al., 2014). Finally, the unidimensionality test was examined by measuring the composite reliability value of each variable. Each variable should have a composite reliability value above 0.7 to pass the unidimensionality test (In Vinzi, V.E, Chin, W.W., Henseler, J. and Wang, 2010).

Table 3

Outer Loading Evaluation

Variables	Items	AVE	Composite Reliability	Heterotrait-Monotrait (HTMT)				
				SE	PEOU	PU	ATU	ITU
Self-efficacy	SE1 SE2 SE3 SE4	0.729	0.879		0.515	0.539	0.638	0.874
Perceived ease of use	PEOU1 PEOU2 PEOU3	0.777	0.913				0.651	0.495
Perceived usefullness	PU1 PU2 PU3	0.737	0.892		0.652		0.694	0.614
Attitude toward use	ATU1 ATU2 ATU3	0.707	0.879					
Intention to use	ITU1 ITU2 ITU3	0.760	0.905				0.553	

The data collected from this research questionnaire passed the outer model evaluation because each variable passed the three tests. The results of the outer model evaluation in this study shown in Table 3.

Inner Model Evaluation

We examine the inner model evaluation to measure the robustness of the structural model made for the study. There is no comparable value to analyze the robustness of the structural model. However, the value generated from the data analysis software (SmartPLS 3.2) could be used to determine the level of robustness of the constructed model. Two indicators used on inner model evaluation are coefficient determination (R^2) value and predictive relevance (Q^2) value (In Vinzi, V.E, Chin, W.W., Henseler, J. and Wang, 2010). The coefficient determination (R^2) value generated from the data varies from 0.204 to 0.611. These numbers show the determination level of independent variables toward their dependent variable (e.g. the R^2 of Perceived Ease of Use is 0.204, this mean that the variable is determined only 20.4% by self-efficacy, meanwhile 79.6% of the variable are determined by additional variable in which did not include on the model).

The predictive relevance (Q^2) value from the data analyzed is 0.862. The value is between 0 and 1, if the value is closer to 1 it indicates that the model has strong predictive relevance to observed the relationship between the variables within the model (Götz et al., 2010). They also suggested there are three categories of predictive relevance, they are: Q2 lower or equal to one is considered weak; Q2 higher than 1 but lower than 0.36 is considered medium, and Q2 equal or higher than 0.36 is considered strong. Thus, the Q2 value of the model constructed in this study is strong to predict and observe the variables within the model. The results of the inner model evaluation of this study shown in Table 4.

Table 4

Inner Model Evaluation

Variables	**R^2**
Self-efficacy	-
Perceived ease of use	0.204
Perceived usefullness	0.262
Attitude toward use	0.396
Intention to use	0.611
$Q^2 = 1 – (1-0.204)*(1-0.262)*(1-0.396)*(1-0.611)$	
$Q^2 = 0.862$	

Hypothesis Testing

We constructed 12 hypotheses to examine the relationship between the variables in the model. We conducted 8 out of 12 hypotheses to analyze the direct effect between variables. Meanwhile, we conducted 4 hypotheses to examine the mediating role of

perceived ease of use, perceived usefulness, and attitude toward usage. Table 5 summarizes the hypothesis test results of this study.

Table 5

Hypothesis Test

Hypothesis	Path	P values	t-statistic	Mark
H_1	SE → PEOU	0.000	7.568	Supported
H_2	SE → PU	0.000	10.332	Supported
H_3	SE → ITU	0.000	10.538	Supported
H_4	PEOU → ATU	0.000	5.319	Supported
H_5	PEOU → ITU	0.482	0.704	Not Supported
H_6	PU → ATU	0.000	6.295	Supported
H_7	PU → ITU	0.007	2.698	Supported
H_8	ATU → ITU	0.834	0.210	Not Supported
H_9	SE → PEOU → ITU	0.459	0.740	Not Supported
H_{10}	SE → PU → ITU	0.000	4.798	Supported
H_{11}	PEOU → ATU → ITU	0.840	0.202	Not Supported
H_{12}	PU → ATU → ITU	0.835	0.208	Not Supported

According to hypothesis testing results, we conclude that browser PC games player's self-efficacy has a significant positive effect on their perceived ease of use, perceived usefulness, and intention to use mobile games. Perceived ease of use and perceived usefulness have a significant positive effect on attitude toward usage. However, only perceived usefulness has a significant positive effect on the intention to use. Interestingly, attitude toward usage has no significant effect on the intention to use.

Besides, the mediating effect was shown by perceived usefulness on the relationship between self-efficacy and intention to use. The moderating effect is considered as partially mediated as self-efficacy itself could affect intention to use directly. Attitude toward usage has no mediating effect on the relationship between perceived ease of use, perceived usefulness, and intention to use. Discussion regarding these results presented in the next section.

Discussion

The purpose of this study is to investigate the roles of self-efficacy on mobile game adoption. To achieve those goals, we extended and modified the Technology Acceptance Model (TAM). We choose browser PC games' players as our research respondents to observed how their self-efficacy could improve their intention to use mobile games. The results of the outer model evaluation showed the questionnaire used in this study has a good measurement

scale and items to observed the variables within the model. The constructed model we built for this study also proved to be a strong instrument to observed the relationship between variables within the study.

The hypotheses testing showed several interesting and surprising results concerning the role of self-efficacy on mobile games adoption by browser PC games' players. Following the data on (Newzoo, 2019), we suspected there is a keys factor that affected the shifting behavior of browser PC games' players to the mobile platform such as smartphones and/or tablets. We follow previous studies that suggested that self-efficacy is one of five keys determinants of TAM (Abdullah and Ward, 2016). The hypothesis test results of this study show that self-efficacy is indeed a keys determinant of TAM. We found that self-efficacy is not only affecting players' perceived ease of use and perceived usefulness but also could directly affect their intention to use mobile games. These results support previous studies (Ariff et al., 2012; Faqih, 2013; S. Y. Park et al., 2012) and provide a new theoretical concept on the adoption of games by a player.

We found a surprising result on the relationship between perceived ease of use, perceived usefulness, attitude toward use, and intention to use. First, we found that players' perceived ease of use could improve their attitude toward mobile games usage. These results supported several previous studies (Gbongli et al., 2019; E. Park et al., 2014; Zhu et al., 2012). However, perceived ease of use has no significant effect on players' intention to use mobile games. This result is in contrast to the results of previous studies (Ariff et al., 2012; Dumpit and Fernandez, 2017; Faqih, 2013). The result concluded that player's perceived ease of use could improve their attitude toward mobile games. However, this perception is not a determinant of their intention to use it. We suspected usefulness provided by mobile games found to be less challenging for browser PC games players. Thus, they refuse to play a mobile game. Several players might seek a new challenge to improve their gaming performance and experience, and these research results have shown that player's self-efficacy has a significant effect on determining their perceived ease of use and perceived usefulness of the game. If the player aims to get better at gaming, they will seek a new and challenging platform that could help them to achieve the goals. Thus, the usefulness of playing provided by the mobile platform is considered less challenging and might demotivated players who seek to improve their gaming performance if asked to switch on a new gaming platform.

Perceived usefulness on the other hand has a significant positive effect on both attitudes toward usage and intention to use. These results support previous studies (Aboelmaged and Gebba, 2013; Faqih, 2013; Gbongli et al., 2019). If browser PC players perceived that mobile games offer various uses for them, they will have a higher level of attitude toward the game

and will most likely play on a mobile platform. Following the relationship between perceived ease of use, we could also conclude that perceived ease of use and perceived usefulness have a different role in shaping a player's intention to play games on a mobile platform. Browser PC players might refuse to play games on a mobile platform if they found the available games are less challenging than browser PC games. However, if they perceived that playing games on the mobile platform offer various benefits they could consider playing it shortly in a regular basis.

We found interesting results on attitude toward usage and intention to use relationship, in which there are no significant effects of attitude toward use on the intention to use. This result is not only in contrast to previous studies (Aboelmaged and Gebba, 2013; Gbongli et al., 2019; E. Park et al., 2014) but also with the original construct of TAM itself. According to this result, we conclude that the browser PC player's attitude level toward mobile games is not a determinant of their intention to play games on a mobile platform. This leads to a prediction that in the gaming industry, player's attitude levels play a small role in determining their intention of playing any particular game and/or platform.

Finally, the mediating effect tested in this study showed that only perceived usefulness has a mediating effect on the constructed model. Perceived usefulness is predicted to have a mediating effect on the relationship between self-efficacy and intention to use. However, the mediating effect levels are only partially mediated since self-efficacy could affect intention to use directly. Two additional variables tested for mediating effects are perceived ease of use and attitude toward use. However, the hypothesis tests shown that these two variables are having no mediating effect on the constructed model. Following these results, we conclude that self-efficacy has a keys role in determining a player's intention to play games on a new gaming platform. Player's self-efficacy level could determine their intention of whether to play games on a new gaming platform or not. This intention is also highly affected by their perceived ease of use and perceived usefulness toward the new gaming platform, in which these two perceptions are highly affected by their self-efficacy toward prior gaming platform.

CONCLUSION

This study's main goal is to investigate the roles of self-efficacy on mobile game adoption. We reviewed previous research and built a research model according to the extended Technology Acceptance Model (TAM). To achieve the goal, we conducted causal research with PC Browser' Players in Indonesia as our research object. All of the data calculations were conducted on SmartPLS 3.2. Following the results of this study, we conclude that player's self-efficacy is a strong determinant of their intention to play mobile games. Players

with high levels of confidence in their capabilities of playing games on a particular platform play a keys role in their perceived ease of use, perceived usefulness, and intention to play games on another platform. In addition to these results, we found interesting results on the relationship between perceived ease of use, attitude toward usage, and intention to use. In contrast to the original TAM model, attitude toward use has no significant effect on the intention to use in the context of mobile game adoption. We predict there are reasons why positive and high-level attitude toward mobile games could not lead directly to the player's intention to play a game on that platform. Thus, we strongly suggest future researchers investigate this relationship further.

There are two limitations to our study. First, this research was designed to collect data with a physical self-administered questionnaire. The purpose of the utilization of a physical questionnaire was to observe the behavior of PC Browser Players in Indonesia directly and getting information on how they perceived the gaming industry development. Due to the several lockdowns and social distancing regulations, we have to switch the data collection method to a digital self-administered questionnaire and we can't collect additional information we previously planned. Second, the number of coefficient determination on perceived ease of use and perceived usefulness shows that there is a large percentage of the two variables determinant that not observed in our model. Thus, we also encourage future researchers to add more independent variables to our model.

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