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Factors that Influence Mobile Application Usage among Undergraduates in Malaysian Public University

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Abstract

This study was designed to examine the antecedents of mobile app usage among smart phone users. An extended TAM, which included the additional factors of perceived enjoyment, perceived informative usefulness and perceived social usefulness, was applied to predict people's intention to use mobile apps. Overall, the hypothesized research model did a fairly good job explaining significant associations between the independent variables and the dependent variable. The findings had showed that perceived social usefulness, perceived enjoyment and attitude were significantly affect intention to use mobile apps. Meanwhile, perceived ease of use (PEOU) and perceived informative usefulness were not significantly effects attitude towards intention to use mobile apps. Therefore, mobile apps developers should develop mobile apps that are easier for the users to seek information. For the information available should be more precise and bringing more benefits to the users.

Keywords: Perceived Ease of Use, Perceived Informative Usefulness, Intention, Perceived social usefulness, Perceived Enjoyment, Attitude

INTRODUCTION

Mobile applications which are known as "Apps" that can be downloaded to smartphones are inventions that keep individuals connected to environment. They are computer program designed to run on smartphones, tablet computers and other mobile devices and were originally offered for general productivity and information retrieval, including email, calendar, contacts, stock market and weather information. The revolution of mobile apps happened when iPhone boosted the growth of mobile broadband applications by creating value added services that addresses the needs of mobile users, with the motto "whatever you want to do, there is an App for it" concept. High growth potential in the application market among consumers, especially among students has driven the conversion from traditional business model of the mobile industry into new avenues of mobile market opportunities.

Looking from the student users' point of view, smartphone social media applications give the user the ability to check their social media sites anywhere, anytime instead of having to sit in front of their computer screen. Peterson (2011) stated apps are a portable way to stay connected to social media and 97% of smartphone users use apps for social networking. Among the benefits of mobile applications are fast one-tap connection to your information, easy database collection and lead generation, rich data capture in real time, and many others.

Whether they use apps or not, most smart phone users install apps on the device because huge number of apps are free and then deleted easy without any deficit. Currently new launching apps are linked to the social networking site. Consumers are also able to use apps in the smartphone, tablet PC and smart TV simultaneously based on the Samsung and Apple's screen 3-distribution strategy where convergence is occurring more often among people who own multiple devices, including smartphones, televisions, gaming consoles and computers.

In the context of Malaysia, statistics by year 2014 indicates 35 per cent smartphone penetration but now, half in two adults in Malaysia are smartphone users according to Google's study. This number is expected to increase further, due to the development of smartphone technology, it make the old smart phone at a price which is affordable for user to buy. Other than that, the diversity of smartphone brand and the function itself make users more interested to change their old mobile phone feature to advance smartphone. Statistics in year 2014 also show, 7.35 per cent access the internet only via a smartphone. This group of people is what we call the pure "mobile only" group who are using only mobile rather than PC or tablet to access the internet. The smartphone functions that always run 24/7 day and supported by the ability to detect wireless, allows users to use the mobile application to browse the internet, and socialize online wherever and anytime. Smart phone application also make user save time and energy by avoiding action to start on computer and so on.

Smartphone being the strong interactive mobile device so that useful apps could get the good reputation easily and spread quickly in the market. Apps consumers generally get the new app related information through word of mouth (WOM), Internet searching, social media, and portal download and so on. Additionally, Social Network Service (SNS) helps mobile device users to purchase applications for the devices through automatic recommendation system such as websites like APPlyzer.com and Topappcharts.com provide the app rankings. Even iTunes.com supplies free and paid app ranking based on the category like education, entertainment, so that app consumers can access to the ranking information and then get help when they choose. Therefore, the app developer or distributor considers these mobile consumer and market characteristics, and utilizes the marketing and sales.

Statistics in 2014 also shows that about 10.13 million Malaysians are actively using mobile to access social media. That also means that 44 per cent of the populations are active social media users through mobile. Most smartphones allow users to install the preferred mobile application using wireless internet access. The diversity mobile application such as social media, read news, listen radio, location GPS and others make smartphone as an important tool to complement their daily lives.

Hence, the purpose of this study is to understand the determinants that influence the usage intention of mobile application among undergraduate students, namely perceived informative usefulness, perceived social usefulness, perceived ease of use, perceived enjoyment. The underlying research model, which is the Theory of Acceptance Model (TAM) which can predict the behavior in this research are also being studied. Through this study, the influence level of undergraduate students toward mobile application intention is being found out and a conceptual framework is being developed on how to increase the mobile application usage intention among undergraduate students. The present study will be suggestive and reliability as it provides a quantitative analysis to show how to increase the intention of mobile application among undergraduate students. Hence, by understanding the factor will help us to determine the relationship between of undergraduate student's behavioral toward behavioral intention while using mobile application. Therefore, app users' experience environment and the value of contents are becoming diverse and advanced. Because of this mobile market trend, various studies related to app development

have started to appear in the academic research field. However, only limited academic researches generally focused on the app development not the consumption. For filling this gap, this paper explores the customer's attitude toward mobile apps, and its usage intention. This paper will try to identify the antecedent of app usage intentions based on the customer's intrinsic users' characteristics. In addition, this paper tries to find the relationship between usage intentions toward apps.

LITERATURE REVIEW

This study serves the objective to understand the impact of perceived information usefulness, perceived social usefulness, perceived easy to used, perceived enjoyment, attitude toward application usage and intention toward mobile application. Most of the literatures revealed that there was a significant and positive relationship between independent variables and dependent variable. In this research, the biggest contribution is to see the pattern of the user or the factors taken into account by the respondent from undergraduate USM in choosing, using and retaining existing mobile applications in their smartphone. Factors or variable that take action in this research are perceived information usefulness, perceived enjoyment, perceived social usefulness, perceived easy of used, attitude toward mobile apps and mobile applications. There are various literatures from scholars in abroad were reviewed on the subject of Theory of Acceptance Model (TAM). From observation, seems like the research and literature have been reviewed by previous research that support the variables of Theory of Acceptance Model (TAM).

THEORETICAL FRAMEWORK

THEORY OF TECHNOLOGY ACCEPTANCE MODEL (TAM)

Davis (1986) developed the Technology Acceptance Model (TAM) in studying the determinants of IT usage. The goal of TAM was "to provide an explanation of the determination of computer acceptance that is generally capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (Davis, 1989). TAM can be seen as an adaptation of the generic Fishbein and Ajzen's Theory of Reasoned Action (TRA) and was developed to explain individual system use in the workplace (Davis, 1989). TAM posits that perceived ease of use (PEOU) and perceived usefulness (PU) are important factors that determine the user's attitude toward his or her intention to use and actual usage of information systems (IS). According to TAM, usage behaviour is a direct function of behavioural intention which in turn a function of attitude toward usage reflect feelings of favourableness or unfavourableness toward using the technology and PU which reflect the belief that using the technology will enhance performance. TAM demonstrates that an individual's intention to adopt and use a new information technology is determined by both PU and EOU. Perceived social usefulness (PSU) as the degree to which a person believes a certain communication medium can facilitate social interaction with others. EOU refers to the cognitive effort that the individual puts forward in learning the technology. In this study, EOU is defined as the degree to which a consumer believes it easy to learn and use mobile apps. The TAM has been validated and expanded by many studies on adoption of mobile services. Perceived Enjoyment (PE) as an additional construct was among its most prominent modifications (e.g., Moon & Kim, 2001; Van der Heijden, 2004). It is defined as "the extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use" (Venkatesh, 2000, p. 351) and, thus, reflects the users' intrinsic motivations to use information technologies such as fun, enjoyment, and other positive experiences, which stem directly from the system-user interaction (Brief & Aldag, 1977; Van der Heijden, 2004; Venkatesh, Thong & Xu, 2012). Attitude (ATT) is determined jointly by PU and PEOU (Davis, 1989). Behavioral intention to use (INT) is about capture the motivational factors that influence a [person's] 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

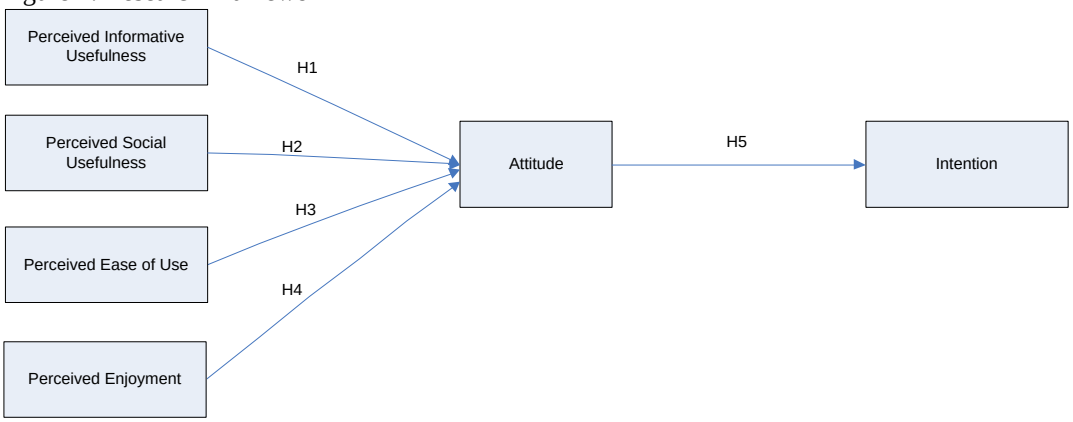
behavior" (Ajzen, 1991, p. 181). Furthermore, a key purpose of TAM is to provide a basis for discovering the impact of external variables on internal beliefs, attitudes, intentions, and usage.

RESEARCH METHODOLOGY

RESEARCH MODEL AND HYPOTHESIS

The research framework of this study is developed based on the Davis's (1989) TAM predicts users' attitudes toward using a piece of technology and their intentions to use it. TAM would be suitable as a theoretical framework for the aim of this study, which attempts to find multiple factors affecting the acceptance of a new media technology.

Figure 1: Research Framework



Relationship between perceived informative usefulness and attitude toward mobile application usage

Students' usage of smartphones apps is highly influenced by aspects of perceived usefulness. In a literature by Yusoff et al (2009) in Malaysian context, it is obvious that PU have a strong and positive relation. PU was also found to be positively related to actual usage of the e-library. It implies that if students feel that a system is useful; their usage level will be higher. This finding support prior research that has found a direct positive relationship between PU and actual usage. Based on literature by Hassan et al, it is apparent that Perceived usefulness (PU) is positively related to Intention to adopt Apps (IAA). In this literature which was conducted in Pakistan, showed that advanced understanding by the smartphone providers, manufacturers, application developers, and programmers to obtain empirical and actionable insights about the determinants of demand for smartphones and how to improve smartphone user experience and plan directions in the smartphone market (Ramayah et al., 2004; Ramayah & Aafaqi, 2004; Davis, 1989; Mathieson, 1991; Adams et al., 1992; Segars & Grover, 1993; Igbaria et al., 1995, 1997; Ndubisi et al., 2001; Ramayah, Ignatius, & Aafaqi, 2004; Ramayah, Jantan, & Aafaqi, 2003). It is commendable that individuals may perceive mobile devices as a constituent of their social status and try to use a device that is aligned with the social image they expect from themselves. This forms part of their expectations and needs from their mobile device. The results of our study also confirm this by showing that symbolic value of the device is an antecedent of individuals' perceived device-functionality fit.

Previous research in Indonesia determined that the biggest contributor among them in building perceived usefulness is overall usefulness of online transaction, whereas the least is its use in effort saving. It means that respondent believe that purchasing airlines ticket online provides effectiveness, better performance, and productivity (Davis, 1989), which are equivalent to perceived usefulness of TAM (Triandis, 1980). In this research perceived usefulness has however direct influence on intention to use. It is also the fact that behavioral intention influences the actual behavior. With these literatures, hypothesis 1 is derived as the following:-
H1: The PIU of mobile apps positively affects attitudes toward using mobile apps.

Relationship between Perceived Social Usefulness and Attitude

From social exchange theory which is a model for analyzing behavior and relationships to determine the complexity of social structures, perceived social usefulness is based on long-term relationship with and trust in sustainable IT. From the study by Kin & Kwon (2014) where the adoption of sustainable web technology from the pro-social behavior are measured based social exchange theory perspectives have concluded that social responsibility and social usability are essential for sustainability activities. In another study by Choi and Park (2015), perceived usefulness defined as the level that new technologies or systems are believed to increase the professional outcome of tasks. If the technologies are able to process and provide information and service that users wanted, the perceived usefulness will be more significant. According to Yang & Bradford (2015), social competence can be an essential factor in understanding the usefulness of social media. Their results showed that socially competent people have better performance in social interactions. They have better college adjustment in maintaining social connections. The use is associated with higher levels of psychosocial in order to enhance social relationships. The research study of Cheng & Ho (2015) indicated that social effects of a technology will affect the way people perceived its quality. If the level of trust is low, the social relationship between people will be weaker as perceived usefulness will increase if a technology consist of many functions. Individuals establish connections between each other based on the number of common interest. With these literatures, hypothesis 2 is derived as the following
H2: The PSU of mobile apps positively affects attitudes toward using mobile apps.

Relationship between Perceived Ease of Use and Attitude toward Mobile Apps Usage

According to Jen et al, in restaurant food ordering context, perceived ease of use is the degree to which the user believe that using those technologies should be free of effort that is easy to comprehend or operate. They indicated that PEOU should be positively influenced the intention to use mobile apps. In another research by Venkatesh et al. (2003) indicated that PEOU is an important predictor toward intention to use technology on a general basis. From the literature by Jun et al, the study was carried out to study the mobile applications in the hospitality industry.
The research of Winkler et al has developed to study the citizens' acceptance of a mobile reporting service. In this research, PEOU has a significant positive relationship to intention to use mobile reporting service. Based on the research done by Morosan (2014) on adoption of mobile phone to purchase ancillary service in air travel services, it is emphasized that PEOU of users affect PU indirectly strengthening their attitudes and intention to use the technology. The result of the literature can be concluded that PEOU will have positive influence to PU and attitude toward intention to use mobile phone to purchase ancillary service. With these literatures, hypothesis 3 is derived as the following
H3: The PEOU of mobile apps positively affects attitudes toward using mobile apps.

Relationship between perceived enjoyments of students toward application usage

Enjoyment refers to an individual's subjective experience of a human–computer interaction, defined as the extent to which an individual believes that the activity of using a product or service is perceived as enjoyable in its own right, apart from any performance consequences that may be anticipated (L. Zhang, Zhu, & Liu, 2012). Hence, perceived enjoyment is argued to be a direct determinant of attitude and intentions toward technologies (L. Zhang et al., 2012; Nysveen, Pedersen, & Thorbjornsen, 2005). Since enjoyment of the Internet is often used not only for work but also for entertainment and pleasures; it can be argued that entertaining features should play an important role in its adoption and use.
Different studies have consistently demonstrated that employing dimensions of entertainment to TAM seems to add a significant predictor to the intention to use as well as attitude towards the adoption of a technology (Zhang & Mao, 2008). Study in China defined perceived playfulness as users' subjective experience of human-computer interaction and found that perceived playfulness greatly influenced users' behavioral intention to use the internet. In Spain, Anton, Carmen Camarero, and Javier Rodr ´ ıguez (2013) found out that the greater the perceived enjoyment in using e-book readers, the more favorable the attitude toward these devices and the greater the intention to adopt this technology. Technological devices are used not only because of the advantages they afford, but because of the pleasure and perceived enjoyment involved in their use. With these literatures, hypothesis 4 is derived as the following
H4: The PE of mobile apps positively affects attitudes toward using mobile apps.

Relationship between Attitudes towards Behavioral Intention

Based on the research of *Juho (2015), a*ttitude is regarded as a major determinant for behavioral outcomes including purchase intentions (van der Heijden et al., 2003). Their results showed that attitude was positively associated with purchase intentions. Their suggestion to future research is that they should combine survey data with actual usage data to diminish the effects of self-reported and selected data.
From the journal of *Maghnati and Ling (2013),* attitude defined as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour (Birgelen et al. 2003). Attitude is a summary of appraisal of an object, people have different beliefs in different objects and usually their beliefs lead them to the objects and change their attitude which can form positive or negative reaction (Malhotra 2005). Attitudes have demonstrated their efficacies as a predictor of behaviours and behavioural intentions in a variety of contexts including work related behaviours (Morris et al., 2009).
Based on Venkatesh et al. (2003), it is suggested that behavioural intention strongly influences use behaviour. Behavioural intention refers to the intention of an end-user to make use of the new technology. In support, (Amaoko-Gyampah & Salam, 2004) believe it appropriate to examine behavioural intention to use a technology even when usage might be mandatory. They argue that use of an ERP system includes both mandatory and voluntary usage. While, mandatory use represents the level of use needed to perform minimal job functions; usage beyond that might become voluntary. Venkatesh et al. (2003) believe that all independent variables except for facilitating conditions influence use behaviour indirectly through behavioural intention and in testing their model, only the direct effects on intention were modelled.
However the research performed by Rawstorne, Jayasuriya and Caputi (1998) and by Brown et al. (2002) concluded that the behavioural intention construct may not be suitable for measuring acceptance in a mandatory environment because the results obtained provided were contradicting and limited in terms of the explanations of end users behaviour. The questions that define behavioural intention in the research instrument used by Venkatesh et al. (2003) indicate the appropriateness of using behavioural intention as a dependant variable since use of continuance of a technology is voluntary (Seymour et al, 2007). Consistent with the underlying theory for all the intention models discussed, it is expected that behavioral intention will have a significant positive influence on broadband subscription. With these literatures, hypothesis 5 is derived as the following

H5: Attitude toward using mobile apps positively affects behavioural intention to use mobile apps.
This study is collection study which we carried out the study by doing survey among undergraduate students of Universiti Sains Malaysia (USM). The hypothesis testing were taken to explain the relationship between the dependent variable which is behavioural intention and independent variables which are perceived informative usefulness, perceived social usefulness, perceived ease of use, perceived ease of use and attitude toward mobile apps usage.

POPULATION AND SAMPLING

The methodology mainly describes the progress and steps that need to take in our study research problems. In this chapter, it will cover several discussions, including research framework, summary of hypotheses, research design and procedure, variables and measurement, data collection method, questionnaire design and data analysis. The research framework of this study is developed based on the Davis's (1989) TAM predicts users' attitudes toward using a piece of technology and their intentions to use it. TAM would be suitable as a theoretical framework for the aim of this study, which attempts to find multiple factors affecting the acceptance of a new media technology.
This study is collection study which we carried out the study by doing survey among undergraduate students of Universiti Sains Malaysia (USM). The hypothesis testing were taken to explain the relationship between the dependent variable which is behavioural intention and independent variables which are perceived informative usefulness, perceived social usefulness, perceived ease of use, perceived ease of use and attitude toward mobile apps usage. The unit for this study analysis is individuals, which are from the USM undergraduate students.
The population focuses on all the undergraduate students about the recycling intention. We are required to have a ratio of 1 to 25, 1 to 25 and 1 to 30, which is 1 person has to distribute 25 or 30 questionnaire papers to the target respondents. Hence, the sample size will be 80 respondents being selected in our research as we have 3 persons. We collect the data inside the campus of USM within 2 week. This is a non-probability purposive convenient sampling method was used as time constraints and convenience in order to obtain enough respondents. Due to the behavioural intention cannot be obtained therefore probability sampling could not be done. The survey form is divided into two sections which are interval scale of measurement and demographic part. The question of interval scale of measurement is applied in first section. However, demographic variables are measured by using nominal scale in second section. The respondents are asked and required to respond each of the statement with their opinion designed at first section in the survey form by using 7- point scale. The opinion ratings of respondents for this section are {strongly disagree= 1, Disagree= 2, somewhat disagree = 3, Neutral = 4, somewhat agree=5, Agree=6, Strongly agree = 7}. Refer to Table 1.

Table 1: Source of Questionnaire Items

Item code	Variable name	Source	No. of Items
PIU1 to PIU3	Perceived Informative Usefulness	S.C. Kim et al (2015).	3
PSU1 to PSU3	Perceived Social Usefulness	S.C. Kim et al (2015).	3
PEOU1 to PEOU3	Perceived Ease Of Use	S.C. Kim et al (2015).	3
PE1 to PE3	Perceived Enjoyment	S.C. Kim et al (2015).	3
ATT1 to ATT3	Attitude Toward App Usage	S.C. Kim et al (2015).	3
INT1 to INT3	Behavioral Intention To Use Mobile Apps	S.C. Kim et al (2015).	3

FINDINGS

The measurement questions in the questionnaire served to collect undergraduate students' behavioural intention. The questionnaires were distributed to undergraduate students through online. Data were collected from different ages, genders and ethnicity of undergraduate students. The participation of undergraduate students in this survey is voluntary. The SPSS statistical analysis package and Partial Least Squares with SmartPLS 3.0 were used for data analysis and hypothesis testing. The SPSS statistical analysis was used for data entry, data cleaning, missing value imputation analysis and descriptive analysis. To assess the model, this study has used the SmartPLS 3.0 software (Ringle et al., 2015) to estimate the parameters in the outer and inner models.

PROFILE OF RESPONDENT

The demographic profile of respondents is presented in Table 2. A total of 80 responses were received at the end of the data collection process. However, 60 were valid respondents who must be mobile application user. The success rate is 75%. Out of 60 respondents, 47 or 78.3% is female and 13 or 21.7% is male. 57 (94.9%) respondents aged within 20 to 23 years old while 2(3.4%) aged between 24 to 26 years old. Only 1(1.7%) below aged 20. On the ethnic distribution, 29 (48.3%) respondents are Chinese, 27 (45%) Malay, and the remaining 4 (6.7%) is under the ethnic group of others.
The education year of the respondents is: 44 (73.3%) second year, 9 (15%) is first year student, 5 (8.3%) is third year students and 2 (3.3%) is final year students. Majority of the respondents are from School of Management 19 (31.7%), follow by School of Industrial Technology 11 (18.3%) and School of Physics 11 (18.3%). And the remaining respondents are from School of Biological Sciences, School of Communication, School of Housing, Building and Planning, School of Humanities, School of Mathematical Sciences and School of Social Sciences.

TABLE 2: Respondent Profile

Profile	Description	Number of Respondents	Percentage (%)
Gender	Male	13	21.7
	Female	47	78.3
Age	below 20	1	1.7
	20-23	57	94.9
	24-26	2	3.4
Race	Malay	27	45.0
	Chinese	29	48.3
	Others	4	6.7
Nationality	Malaysian	59	98.3
	Saudi	1	1.7
Religion	Buddhism	22	36.7
	Christianity	8	13.3
	Islam	30	50.0
Year of Study	First year	9	15.0
	Second year	44	73.3
	Third year	5	8.3

	Fourth year	2	3.3
School are you from	School of Biological Sciences	3	5.0
	School of Communication	1	1.7
	School of Housing, Building and Planning	3	5.0
	School of Humanities	4	6.7
	School of Industrial Technology	11	18.3
	School of Management	19	31.7
	School of Mathematical Sciences	7	11.7
	School of Physics	11	18.3
	School of Social Sciences	1	1.7

ASSESSMENT OF MEASUREMENT MODEL

Construct validity testifies to how well the results obtained from the use of the measure fit the theories around which the test is designed (Sekaran and Bougie, 2010). The loadings for all the items exceeded the recommended value of 0.5 (Hair et al., 2010). Refer to Table 3. First, the convergent validity, which is the degree to which the multiple items that are used to measure the same concept are in agreement, was tested. As suggested by Hair et al. (2010), the factor loadings, composite reliability and average variance extracted were the indicators used to assess the convergent validity. The loadings for all the items exceeded the recommended value of 0.5. The composite reliability values (see Table 3), which depict the degree to which the construct indicators indicate the latent construct, ranged from 0.873 to 0.937, which exceeded the recommended value of 0.7 (Hair et al. 2010). The average variance extracted, which reflects the overall amount of variance in the indicators accounted for by the latent construct, were in the range of 0.697 to 0.833, which exceeded the recommended value of 0.5 (Hair et al. 2010). Table 3 depicts the result of convergent validity.

TABLE 3: Measurement model

Construct	Item	Loading	AVE[a]	CR[b]
Perceived Informative Usefulness	PIU1	0.868	0.790	0.919
	PIU2	0.918		
	PIU3	0.880		
Perceived Social Usefulness	PSU1	0.808	0.763	0.906
	PSU2	0.861		
	PSU3	0.947		
Perceived Ease of Use	PEOU1	0.899	0.699	0.874
	PEOU2	0.749		
	PEOU3	0.853		
Perceived Enjoyment	PE1	0.769	0.697	0.873
	PE2	0.828		
	PE3	0.903		
Attitude	ATT1	0.851	0.801	0.923
	ATT2	0.928		

	ATT3	0.904		
Intention	INT1	0.895	0.833	0.937
	INT2	0.930		
	INT3	0.913		

[a] Average variance extracted (AVE) = (summation of the square of the factor loadings)/{(summation of the square of the factor loadings) + (summation of the error variances)}
[b] Composite reliability (CR) = (square of the summation of the factor loadings)/{(square of the summation of the factor loadings) + (square of the summation of the error variances)}

Many prior studies have used the Fornell and Larcker (1981) criterion to test for discriminant validity. There has been recent criticism that the Fornell-Larcker (1981) criterion does not reliably detect the lack of discriminant validity in common research situations (Henseler et al., 2015). An alternative approach has been suggested based on the multitrait-multimethod matrix to assess discriminant validity. The approach, heterotrait-monotrait (HTMT) ratio of correlations, has been demonstrated by Henseler et al. (2015) through a Monte Carlo simulation study to have superior results. As such, the discriminant validity values of this study have been calculated using this new method and the results are shown in Table 4. A problem of discriminant validity is found when the HTMT value is greater than $HTMT_{.85}$ (HTMT value of 0.85) (Kline 2011), or $HTMT_{.90}$ (HTMT value of 0.90) (Gold et al. 2001). As shown in Table 4, all values passed both the $HTMT_{.90}$ (Gold et al. 2001) and $HTMT_{.85}$ (Kline, 2011) thresholds, indicating that discriminant validity was achieved.

TABLE 4: Heterotrait-Monotrait Ratio (HTMT) of correlations test for Discriminant Validity

Construct	1	2	3	4	5	6
1.Attitude						
2. Intention to Use Mobile Apps	0.797					
3. Perceived Ease of Use	0.387	0.458				
4. Perceived Enjoyment	0.752	0.621	0.561			
5. Perceived Informative Usefulness	0.446	0.589	0.435	0.635		
6. Perceived Social Usefulness	0.600	0.698	0.592	0.392	0.489	

ASSESSMENT OF STRUCTURAL MODEL

Table 5 presents the results of the hypotheses testing. The structural model testing showed that Perceived Social Usefulness was positively related ($\beta = 0.374$, $p< 0.01$) to Attitude, Perceived Enjoyment was positively related ($\beta = 0.564$, $p< 0.01$) to Attitude while Perceived Informative Usefulness was not significantly ($\beta = 0$, $p> 0.05$) related and Perceived Ease of Use was not significantly ($\beta = -0.08$, $p> 0.05$) related explaining 53.2% of the variance. Attitude was positively related ($\beta = 0.726$, $p< 0.01$) to Intention to Use explaining 52.7% of the variance. Thus, H2, H4 and H5 were supported while H1 and H3 were not supported. The predictive relevance (Q^2) values were higher than 0 as suggested by Fornell and Cha

(1994) with Attitude having a Q^2 value of 0.38 and Intention to Use with a Q^2 value of 0.396. The f^2 result indicates that Perceived Informative Usefulness (0) and Perceived Ease of Use (0.009) have a small effect in producing the R^2 for Attitude. In contrast, the result also indicates that Perceived Social Usefulness (0.202) has close to medium effect in producing the R^2 for Attitude. However, Perceived Enjoyment (0.467) has close to large effect in producing the R^2 for Attitude. Lastly, 1.116 indicates that Attitude has a larger effect in producing the R^2 for Intention (Cohen, 1988). Further investigation was conducted to assess whether multicollinearity would be an issue however all VIF values were found to be less than 5 as suggested by Hair et al. (2014).

Table 5: Hypotheses Testing

Hypothesis		Std. Beta	Std. Error	t-value	Decision	f^2	Q^2	R^2	VIF
H1	PIU-> ATT	0	0.096	0.005	Not Supported	0			1.468
H2	PSU -> ATT	0.374	0.108	3.465**	Supported	0.202			1.484
H3	PEU -> ATT	-0.08	0.11	0.725	Not Supported	0.009			1.513
H4	PE -> ATT	0.564	0.114	4.951**	Supported	0.467	0.40	0.532	1.453
H5	ATT-> INT	0.726	0.067	10.785**	Supported	1.116	0.415	0.527	1.000

**p< 0.01, *p< 0.05

DISCUSSION AND CONCLUSION

The purpose of this study is to understand the determinants that influence the usage intention of mobile application among undergraduate students. Through this study, the influence level of undergraduate students toward mobile application intention is being found that Perceived Social Usefulness, Perceived Enjoyment were positively significant influence the attitude towards intention. Users can check today's weather by using weather-related apps. Users can strengthen knowledge about major league baseball players from baseball-related apps. Users can play almost all kinds of game apps, can listen to music wherever and whenever they want, and can watch TV programs. Such entertaining components are likely to make users stay longer at the app and increase their return visits.

Attitude was significantly influence the Intention of mobile application. As expected, users' attitude toward mobile apps was positively related to their behavioral intention to use mobile apps. However, Perceived Informativeness Usefulness and Perceived Ease of Use were not significant influence the attitude towards intention. In terms of PEOU, users are likely to find it easy to search for, download, and use mobile apps. They found it already common to use and no big issue about it. Therefore, this factor was not important to them.

For mobile app practitioners, the findings imply that the appropriate combination of information and entertainment is likely to be the best fit for app users' needs. Apps that satisfy these different types of needs may be the most successful. Of course these apps should be easy to use.

SUGGESTIONS FOR FUTURE RESEARCH

There is opportunity for future research to expand the sample size and investigate in different geographical areas in order to enhance the understanding regarding usage of mobile application. Further research could enhance by widened the age group of respondents. This is to hear more views from the other group of respondents, such as elder or younger respondents other than the current age group of respondents.

REFERENCES

AJZEN, I.(N.D.). (1991) The Theory of Planned Behavior.Organizational Behavior Journal of Human Decision Processes, 179-211.

AMOAKO-GYAMPAH, K., & SALAM, A. F. (2004). An extension of the technology acceptance model in an ERP implementation environment. Information & Management, 41, 731-745.

BIRGELEN, M. J. H., WETZELS, M. G. M., & DOLEN, W. M. (2008). Effectiveness of corporate employment websites: How content and form influences intention to apply. International Journal of Manpower, 29(8), 731–751.

BRIEF, A. P. AND ALDAG, R. J. The intrinsic-extrinsic dichotomy: Toward conceptual clarity. Academy of Management Review, 1977, 2, 496-500.

CARMEN ANTON, CARMEN CAMARERO, & RODR J´ IGUEZ, (2013) Usefulness, Enjoyment, And Self-Image Congruence: The Adoption Of E-Book Readers, Journal Of Psychology & Marketing Volume 30, Issue 4, 372–384

COHEN, J. (1988). *Statistical power analysis for the behavioral science (*2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

CRISTIAN, M. (2014). "Toward an integrated model of adoption of mobile phones for purchasing ancillary services in air travel", International Journal of Contemporary Hospitality Management, Vol. 26 Iss: 2, pp.246 - 271

DAVIS, F.D. (1989), ‘‘Perceived usefulness, perceived ease of use, and user acceptance of information technology’’, MIS Quarterly, Vol. 13 No. 3, pp. 319-39.

FORNELL, C, LARCKE,R D.F. (1981) Evaluating structural equation models with unobservable variables and measurement error. Journal of marketing research 18(1): 39-50.

FORNELL, C., & CHA. J. (1994) Partial least squares. Advanced methods of marketing research 407: 52-78.

GOLD, A.H., MALHOTRA, A., & SEGARS, A.H. (2001) Knowledge management: an organizational capabilities perspective. Journal of Management Information Systems 18(1): 185–214.

HAIR, J.F., BLACK, W.C., BABIN. B.J., ANDERSON. R. E. (2010) Multivariate data analysis. Englewood Cliffs, Prentice Hall.

HAIR, J.F., SARSTEDT, M., HOPKINS, L., KUPPELWIESER, V.G. (2014) Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. European Business Review *2*6(2): 106-121.

HENSELER, J., RINGLE C.M., & SARSTEDT, M. (2015) A new criterion for assessing discriminant validity in variance-based structural equation modelling. Journal of the Academy of Marketing Science 43(1): 115-135.

HERBJØRN NYSVEEN, PER E. PEDERSEN, HELGE THORBJØRNSEN, (2005) "Explaining intention to use mobile chat services: moderating effects of gender", Journal of Consumer Marketing, Vol. 22 Iss: 5, pp.247 – 256

JUHO HAMARI. (2015). Why do people buy virtual goods? Attitude toward virtual good purchases versus game enjoyment. *International Journal of Information Management,* Vol. 35 pp. 299-308.

KLINE, R.B. (2011) Principles and practice of structural equation modeling. New York, Guilford Press.

MAGHNATI, F., & LING, K. (2013). Exploring the Relationship between Experiential Value and Usage Attitude towards Mobile Apps among the Smartphone Users. *International Journal of Business and Management,* Vol. 8, No. 4

MATHIESON, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. Information Systems Research, 2(3), 173–191.

MOON, J. & KIM, Y. (2001). Extending the TAM for a World-Wide-Web context. Information and Management, 38, 217-230.

MORRIS, C. D., WAXMONSKY, J. A., MAY, M. G., & GIESE, A. A. (2009b). What do persons with mental illnesses need to quit smoking? Mental health consumer and provider perspectives. Psychiatric Rehabilitation Journal, 32(4), 276–284.

NYSVEEN, H., PEDERSEN, P., & THORBJØRNSEN, H. (N.D.). Explaining intention to use mobile chat services: Moderating effects of gender. Journal of Consumer Marketing, 247-256.

PETERSON, D. (2011, November 10). Stats on College Students & their cellphones. Retrieved March 15, 2014, from Generation Mobile: http://thedrewpeterson.com/2011/11/10/stats-on-college-students-their-cell-phones/

RAMAYAH, T. & AAFAQI, B. (2004). Role of self-efficacy in e-library usage among student of a public university in Malaysia. Malaysia Journal of Library and Information Science, .9(1), 39-57.

RAMAYAH, T., IGNATIUS, J, & AAFAQI, B. (2004). PC Usage Among Students in a Private Institution of Higher Learning: The Moderating Role of Prior Experience, Jurnal Bisnis Strategi forthcoming.

RAMAYAH, T., JANTAN, M. & AAFACQI, B. (2003). Internet usage among students of Institutions of higher learning: The role of motivational variables. The Proceedings of the 1st International Conference on Asian Academy of Applied Business Conference, Sabah, Malaysia, 10-12th July, 2003.

RAWSTORNE, P., JAYASURIYA, R., & CAPUTI, (1998). An integrative model of information systems use in mandatory environments. Paper Presented at the International Conference on Information Systems, Helsinki, Finland.

RINGLE C. M., WENDE, S., & BECKER, J.M. (2015) Smart PLS 3. Boenningstedt, SmartPLS GmbH.

SEKARAN, U,. & BOUGIE, R. (2010) Research methods for business: a skill building approach. Wiley, UK.

SEYMOUR, L., MAKANYA, W. AND BERRANGE, S. (2007), ‘‘End-users’ acceptance of enterprise resource planning systems: an investigation of antecedents’’, Proceedings of the 6th Annual isoneworld Conference, Las Vegas, NV, available at: www.information-quarterly.org/isowproc/2007ISOWCD/pdfs/ 26.pdf.

TILL J. WINKLER, HENRY HIRSCH, GUILLAUME TROUVILLIEZ, & OLIVER GÜNTHER (2012). Participatory Urban Sensing: Citizens’ Acceptance of a Mobile Reporting Service

VAN DER HEIJDEN, H. (2004). User acceptance of hedonic information systems. MIS Quarterly, 28, 695–704.

VENKATESH, VISWANATH; MORRIS, MICHAEL G.; DAVIS, GORDON B.; AND DAVIS, FRED D. (2003). "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly*, (27: 3).

VENKATESH, VISWANATH; THONG, JAMES Y.L.; AND XU, XIN. (2012). "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," *MIS Quarterly*, (36: 1) pp.157-178.

YANG, C. & BRADFORD, B. (2015). Factors involved in associations between Facebook use and college adjustment: Social competence, perceived usefulness, and use patterns. *Journal of Computers in Human Behavior*, Vol. 46 pp.245-253

YI-HSIU CHENG AND HUI-YI HO (2015). Social influence's impact on reader perceptions of online reviews. *Journal of Business Research*, Vol. 68 pp. 883–887

YUSLIZA MOHD.YUSOFF, (2009) Individual Differences, Perceived Ease of Use, and Perceived Usefulness in the E-Library Usage, Journal Of Computer and Science, Vol. 2, No 1

ZHANG, J., & MAO, E. (2008). Understanding the acceptance of mobile SMS advertising among Young Chinese consumers. Psychology and Marketing, 25(8): 787-805 doi: 10.1002/mar.20239 .

ZHANG, L.; ZHU, J., & LIU, Q. (2012). A meta-analysis of mobile commerce adoption and the moderating effect of culture. Computers in Human Behavior, 28(5): 1902-1911 doi: 10.1016/j.chb.2012.05.008 .