

## Applying Technology Acceptance Model to Investigate the Use of Smartphone Advertising in Malaysia

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**Abstract:** The rapid development of internet, mobile information technologies and communications keep offering unprecedented concepts in the way people use new technology and communicate information. This also applies to Malaysia where this study was performed. The main objective of this paper is to investigate which factors affect the use of smartphone advertising most. For this purpose, four main services providers, namely, U-mobile, Maxis, DiGi and Celcom, were selected for data collection. A self-administered questionnaire was distributed through a convenience sampling to 400 smartphone users in a pre-defined area of Malaysia. Three hundred and forty usable questionnaires were used for the purpose of the data analysis. First, descriptive analysis is undertaken followed by a reliability test and exploratory factor analysis. Second, a two-step structural equation modelling approach is adopted where confirmatory factor analysis (CFA) was conducted followed by hypotheses testing. The results indicate that perceived usefulness has a stronger impact on attitude towards smartphone advertising followed by subjective knowledge. Furthermore, attitude towards smartphone advertising also resulted in a significant influence on the use of smartphone advertising. The findings of this study not only contribute to the knowledge but could also assist policymakers with informed decisions about market penetration.

**Keywords:** *Smartphone advertising, TAM, SEM, young consumers, attitude, Malaysia.*

### 1. Introduction

The rapid advancement of internet and mobile information technologies and communications continues to offer unprecedented approaches in the way information is communicated. Limited advertising budgets have forced marketers to seek alternative marketing strategies. This has led online marketing to become among the most attractive channels of information distribution due to its sufficient content provision, good interactivity, precise targeting, and low operating cost. Mobile marketing utilises mobile mediums to encourage and construct a strong link between a company and its clients (Persaud & Azhar, 2012; Kotler & Keller, 2016; Ming, 2017). Sultan, Rohm and Gao (2009) define mobile marketing as the usage of wireless networks to deliver direct content through mobile devices. Kotler and Keller (2016) define mobile marketing as a form of interactive marketing by which marketers can use text messages, software applications and advertisements to connect with consumers via their tablets and smartphones.

This implies the utilisation of mobile telephones to deliver to clients individualized data that promote goods and services, regardless of location. Mobile marketing has managed to secure major global acceptance in a short period. It is regarded as a central utility that customers of all ages need in their everyday lives. Mobile marketing helps marketers to utilise and enhance product and service awareness and build connections between them and customers (Dehkordi, Rezvani, Rahman, Fouladivanda & Faramarzi Jouya, 2012; Tekkanat & Topaloglu, 2016). According to Coursaris, Sung and Swierenga (2010) there will be over 55 million mobile devices in 2020 in use, which will allow consumers besides making calls and sending messages to acquire products and services, at any time and any place. Because of the personal nature of a mobile device, it can function as a path to a strong relationship between the companies and their clients.

Nevertheless, mobile phones remain a place for secure and private communication and interaction. According to the Malaysian Communications and Multimedia Commission (MCMC), the penetration rate of mobile phones was 108.8% in 2010. In the period between June and December 2010, the overall number of short messages (SMS) sent in Malaysia was 89.4 million, which made Malaysia a great market in terms of advertising activities. With the fast-paced development of digital marketing, business will probably shift into this industry due to its strength and fast growth. In 2009, Malaysia was ranked fifth over the twenty-one emerging markets regarding mobile advertising receptivity from consumers (Rozana, 2009). Moriarty, Mitchell and Wells (2012) believe that targeting a specific individual who is most likely to make a purchase of the product, service, or idea is much

better than using traditional ways of advertising. With the advancement in wireless network technologies as well as the fast market penetration of smartphones, companies are trying to utilise this medium as a means of marketing communication.

The functionality and the flexibility of smartphone use allow marketers and practitioners to implement their marketing strategies in an efficient manner in order to accomplish the organisational objectives as well as to ensure customer services (Watson, McCarthy & Rowley, 2013; Kotler & Keller, 2016). In addition, there may be groups of consumers who would willingly act upon smartphone advertisements. It is because these groups use smartphones for socialising and information seeking at a very high level. Therefore, smartphone users in Malaysia might be an important target for mobile marketing. It is evident from the fact that, in Malaysia, even children as young as 12 years old have access to smartphones (MCMC, 2017). This research, therefore, is important in order to find those factors that really contribute to the use of smartphone advertising. The main objective of this study is to investigate the use of smartphone advertising by people in Malaysia, using the technology acceptance model (TAM). More specifically, the present research attempts to achieve the following secondary objectives:

- To examine the effect of perceived usefulness (PU) on attitude towards using smartphone advertising.
- To examine the effect of perceived ease of use (PEOU) on attitude toward smartphone advertising.
- To examine the effect of subjective knowledge on attitude towards smartphone advertising.
- To investigate the effect of attitude towards smartphone advertising on smartphone advertising use.

## 2. Literature Review

**Theoretical Background and Hypotheses Development:** In this section, the Technology Acceptance Model (TAM) is acknowledged as a departure for this study. However, the extended model developed and tested by Pikkariainen, Pikkariainen, Karjaluoto and Pahnla (2004) has eventually been adapted in the present study. According to Dass and Pall (2011), TAM implies that an individual's adoption of technological innovation is predicted by their intention to use the innovation which is alternatively defined by an individual's inherent beliefs about the innovation. The cognitive beliefs in TAM include Perceived ease of use (PEOU) and perceived usefulness (PU). These are integral in elucidating the variance in innovation adoption intention.

**Perceived Usefulness and Attitude towards Smartphone Advertising:** The Technology Accepting model (TAM) is based on the Theory of Reasoned Action that focuses on peoples' behaviour and intention particularly with regard to using technology (Davis, 1989; Ramayah & Jantan, 2004). Perceive usefulness (PU) is a key factor used by scholars in researching electronic and mobile commerce adoption or use (see, e.g., Hong et al., 2008). It is defined as, "the degree to which a person believes that using a particular system would enhance his or her job performance and is when individuals tend to use or not use an application or technology, to the extent they believe it will help them perform their job better" (Davis, 1989; Soroa-Koury & Yang, 2010). Perceived usefulness (hereafter, PU) has been found to significantly impact the attitude of consumers in mobile advertising (Chowdhury et al., 2005).

Further, Soroa-Koury and Yang (2010) highlight that consumers tend to accept commercial communications if it involves content that they might not have been able to access otherwise. It is due to the growth of smartphone technology that people carry their smart devices with them accessing all sort of mobile marketing along with valuable information that can be related to the perceived usefulness of mobile phones as an advertising channel (Soroa-Koury & Yang 2010). Marti Parreno, Sanz- Blas, Ruiz- Mafe and Aldas- Manzano (2013) found that mobile messaging is considered favourable compared to other kind of media messages by consumers because they are quick, easy, and cheap to use. Based on the above-mentioned literature, it is, therefore, hypothesised that:

**H1:** Perceived usefulness (PU) has a positive effect on attitude towards using smartphone advertising.

**Perceived Ease of Use and Attitude towards Smartphone Advertising:** The Perceived Ease of Use (PEOU) refers to the degree in which people think that using a particular system is easy and will save efforts (Venkatesh, 2000). Tan, Ooi, Chong and Hew (2014) contends that PEOU describes the degree to which the prospective user

believes that utilising the innovation will be free of effort while PU is the degree the which the user believes that utilising the innovation should enhance the performance of an assigned task. The extant literature supports the causal link between perceive ease of use and attitude, both directly and indirectly and is considered as a critical factor for the adoption and use of new technology (Jan & Haque, 2014; Mangin, 2011; Soroa-Koury & Yang, 2010). PEOU as an intrinsic attribute of technology had always played an inevitable role in the diffusion of innovation mainly due to the fact that the degree of complexity negatively impacts people's intention to adopt a particular technology (Singh & Agnihotri, 2015; Soroa-Koury & Yang, 2010). Furthermore, according to Davis (1989) PEOU is specified as "the degree to which a person believes that utilising a particular system would be free from effort".

Moreover, when technological applications have high perceived usefulness, users believe in the existence of a positive use-performance relationship (Soroa-Koury & Yang, 2010). The enhanced functionality of smartphones can presumably extend the scope and ease of use of smartphone advertising. Chun, Lee and Kim (2012) argue that the high degree of technicality significantly impacts the ease of use. This is because latest products with updated technology usually offer a pleasurable experience, hence signifying the role, ease of use. In a similar context, technologically advanced smartphones offers users a high level of ease of use due to the availability of important functions just a few taps away. Such functional attributes allow users to perceive smartphones intensively accessible, eventually contributing to positively affect people's attitude to use these devices (Shin, Shin & Choo, 2011). These findings from the literature clearly highlight the impact of perceived ease of use on consumer's attitude. It is, therefore, hypothesised:

**H2:** Perceive ease of use (PEOU) has a positive impact on attitude toward smartphone advertising.

**Subjective Knowledge and Attitude towards Smartphone Advertising:** The knowledge that a consumer possess is vital with regard to his/her behaviour. According to Flynn and Goldsmith (1999), there are three different methods in which a person's knowledge could be measured: objective knowledge, subjective knowledge, and experience. For the present study, subjective knowledge is selected, as it suites the scope of this research. It refers to an opinion about a certain topic, which can be either correct or incorrect. According to Engel, Blackwell and Miniard (1993), knowledge is the information stored within the memory. However, when it comes to product knowledge, Peter and Olson (1996) confirm that consumers are aware of product class, product form, brands and models. This is the result of the accumulations and associations that consumers acquire about the attributes, benefits and needs satisfied when consuming models, brands and forms that are the essence of customer's knowledge. The focus of this study is product class knowledge, which is the largest level of product knowledge. According to Peter and Olson (1996), subjective knowledge can be defined as consumers' perception of the amount of information they have stored in their memory.

The aforementioned definition is related not only to the knowledge that a consumer has with regard to the buying process but also the knowledge related to a particular product category. There are many informal definitions of subjective knowledge. For example, Engel, Blackwell and Miniard (1993) define subjective knowledge as the consumer's impression of the overall knowledge and familiarity. Furthermore, Brucks (1985) defines it as "what individuals perceive that they know". Furthermore, Park, Mothersbauch and Feick (1994) call it the state of people's perception of what or how much they know about a product class. Lastly, Raju, Lonial, and Mangold (1995) explain that subjective knowledge is the feeling of knowing or a consumer's belief about his or her previous objective knowledge (Spreng, 1990). Subjective knowledge affects consumer's ability to understand the features and usage of smartphone advertising. While smartphone advertising is not complicated once consumers have a certain amount of knowledge about this technology, consumers with a high perception of knowledge about smartphone advertising can be expected to present a positive attitude toward smartphone advertising. Therefore, it can be hypothesised that:

**H3:** Subjective knowledge has a positive impact on attitude towards smartphone advertising.

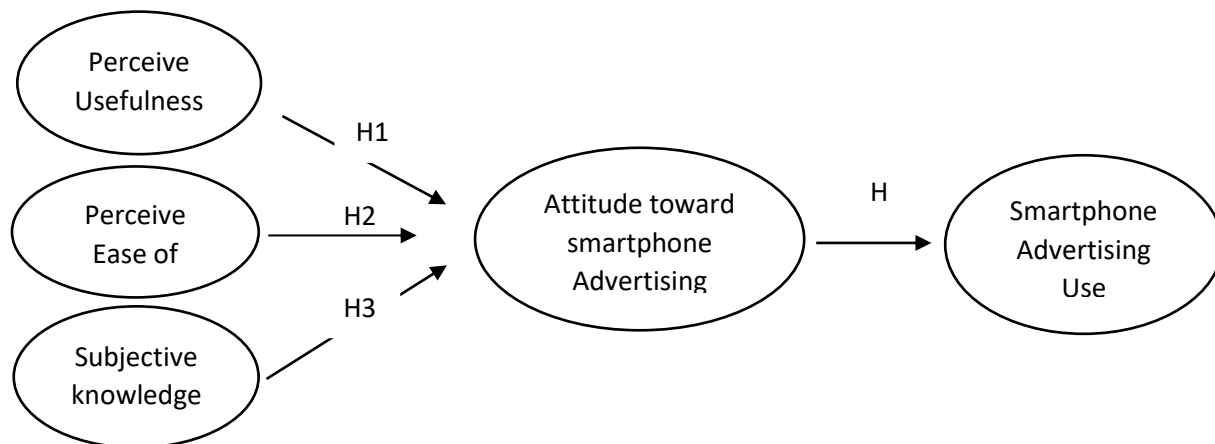
**Attitude towards Smartphone Advertising and Smartphone Advertising Use:** Attitude is a driving factor for people that impact their intention to use a particular thing. This is also true in the case of smartphone advertising. A consumer with a positive attitude toward smartphone advertising tends to positively accept these kinds of advertisements (see Tsang, Ho & Liang, 2004). In a similar manner, Okazaki (2004) argues that people's attitude towards an advertisement plays a pivotal role in their willingness to access advertisements and eventually positively impacting their intention to utilise these advertisements. Studies (see, e.g., Bauer, Barnes, Reichardt & Neumann, 2015) also attest the positive effect of attitude toward advertising on behavioural intention of consumers in mobile marketing. This means that the attitude towards mobile marketing strongly determines the consumers' intention to take part in mobile marketing services.

In addition, a study conducted in Malaysia by Noor, Screenivasan and Ismail (2013) found that a consumer's attitude towards mobile advertisements significantly relates to the intention to buy a product or a service. This is congruent with previous research (see Amen, 2010) where a positive attitude towards mobile advertising is reported for those consumers who are exposed to other forms of advertisements on a daily basis. The positive impact of attitude toward smartphone advertisements on actual use is also true for young consumers due to their usage behaviour, which with the passage of time is getting intense (Dickinger & Kleijnen, 2008; Rettie, Grandcolas & Deakins, 2005). Based on the above discussion, it is hypothesised that:

**H4:** Positive attitude towards smartphone advertising has a positive effect on smartphone advertising use.

**The Conceptual Model:** The model developed and tested by Pikkarainen, Pikkarainen, Karjaluoto and Pahnla (2004) has been replicated in the present study. However, it is important to note that many new linkages were tested in the research and some interesting finding also emerged. Basically, in the extended TAM, there are 3 main constructs, namely, perceived usefulness, perceived ease of use, and subjective knowledge, impacting smartphone advertising. In addition, this research also investigates the impact of "attitude towards smartphone advertising" on "smartphone advertising use" (see figure 1).

**Figure 1: Research Framework**



**Objectives of the Study:** Based on the aforementioned, the main objective of the study is to investigate which factors affect the use of smartphone advertising most. For this purpose, four main services providers in Malaysia, namely, U-mobile, Maxis, DiGi and Celcom, were selected for data collection.

### 3. Research Method

**Data Collection and Research Instrument:** A self-administrated questionnaire was developed to collect data from the users of smartphone in Klang valley located in Malaysia. The questionnaire for this study has been adapted from previous established studies with various sections related to all the variables of the study. In this case, items for perceived usefulness (5 items) were taken from Marti Parreno et al. (2013), perceived ease of use (8 items) were adapted from Davis (1989), subjective knowledge (8 items) were adapted from Ronald and

Elizabeth (2006), attitude toward smartphone advertising (8 items) were taken from Noor, Sreenivasan and Ismail (2013) and smartphone advertising use (8 items) were adopted from Noor et al. (2013).

**Sampling and Response Rate:** The convenience sampling method was used in order to obtain a large number of accomplished questionnaires rapidly and efficiently. Information concerning smartphone advertising use was collected from the smartphone users in the Klang Valley of Malaysia who is generally availing telecommunication services of 4 Malaysian service providers; Maxis, U-mobile, DiGi and Celcom. A total of 400 questionnaires were distributed and 355 have been returned out of which 340 completed questionnaires were used for data analysis purposes. The overall response rate was 82%. This high response rate was due to the huge penetration rate of internet and number of smartphone users in Malaysia.

#### 4. Results and Discussion

**Demographic Profile:** Of the total usable responses, 51.5% males and 49.4% female, 39.1% are availing Celcom services, followed up by Maxis with 25.6%, then Digi and U-mobile with 22.9% and 12.4% respectively. A total of 74.7% of respondents indicated that their monthly income is less than RM 2000 followed by 17.9% that earn between RM 2001 and RM 4000. Out of 340 respondents, 223 are Malaysian (65.6%) while the remaining 34.4% are foreigners. Followed by descriptive analysis, Cronbach's alpha has been calculated for the instrument in order to analyse the reliability of the questionnaire. The results showed Cronbach's alpha of 0.726%, and this to ensure the instrument's stability.

**Exploratory Factor Analysis:** After analysing the demographic profile of the respondents, exploratory factor analysis (hereafter, EFA) was undertaken in order to find out the factors underlying the data. For this purpose, first; Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) tests were analysed. The results revealed the KMO of 0.731 and Bartlett's Sphericity test significant at  $p < 0.001$ , indicating the appropriateness of proceeding with EFA. Second, EFA was conducted with the Varimax rotation method along with factors loading greater than 0.5 and eigenvalues greater than 1.0. EFA resulted in five clean factors with 61.02% of the total variance.

**Table 1: Exploratory Factor Analysis Results**

Items	Factors				
	Perceived Usefulness	Perceived Ease of Use	Subjective Knowledge	Attitude toward Smartphone	Smartphone Advertising Use
PU1	0.870				
PU2	0.912				
PU3	0.903				
PU4	0.721				
PEU1		0.854			
PEU2		0.665			
PEU4		0.737			
PEU5		0.800			
PEU7		0.683			
SK1				0.857	
SK2				0.641	
SK5				0.751	
SK6				0.651	
SK7				0.647	
ATS1					0.761
ATS4					0.756
ATS5					0.716
ATS7					0.871
SAU1			0.773		
SAU4			0.749		
SAU5			0.781		
SAU7			0.871		



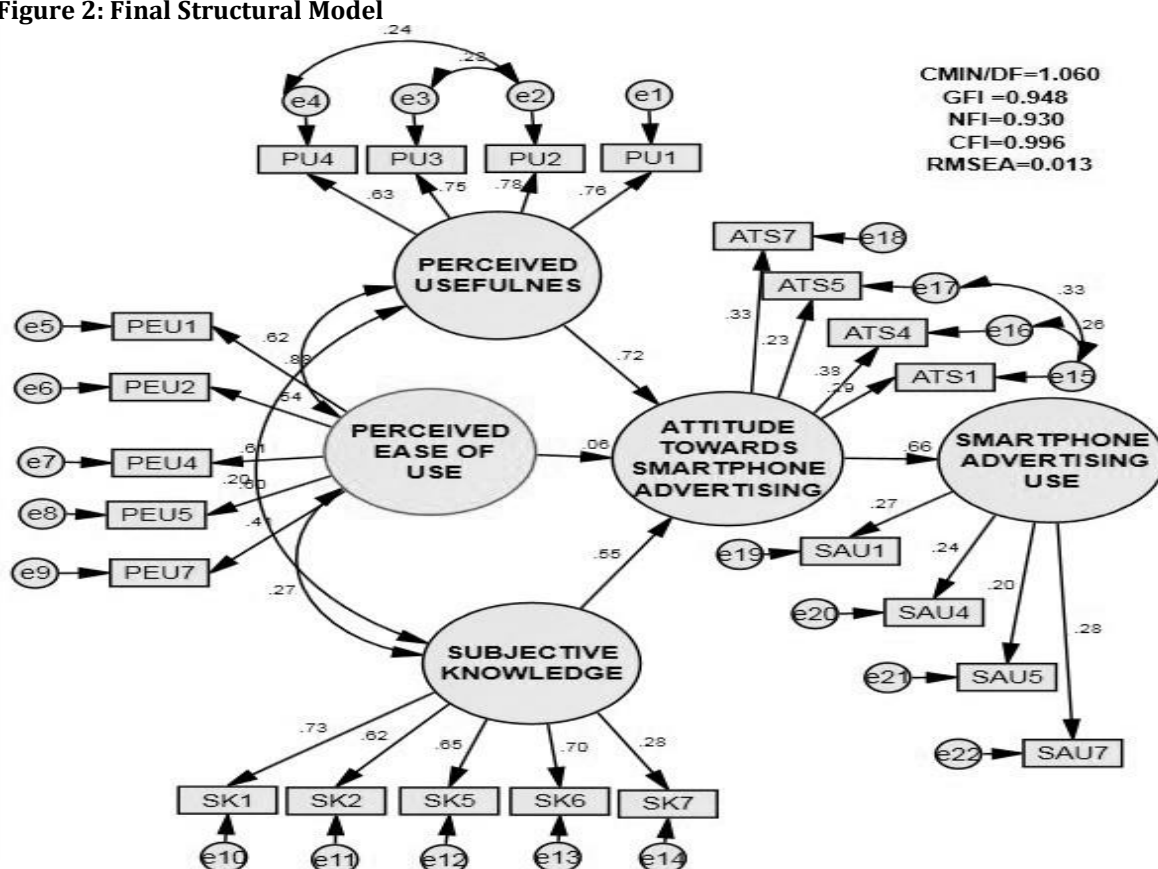
<b>Initial eigenvalues</b>	<b>3.188</b>	<b>2.800</b>	<b>2.656</b>	<b>2.533</b>	<b>2.249</b>
<b>% of variance</b>	14.491	12.727	12.075	11.514	10.222
<b>Cumulative%</b>	<b>14.491</b>	<b>27.218</b>	<b>39.292</b>	<b>50.807</b>	<b>61.028</b>

These extracted variables, as envisaged were perceived usefulness, perceived ease of use, subjective knowledge, attitude towards smartphone advertising, and smartphone advertising use. The results of EFA depict that all the items suggested originally for each construct loaded on their respective factor. In addition, all of the factor loadings were greater than the cut-off value of (0.5), attesting strong reliability and validity of the scale. After the data collection, it was analysed using Statistical Package for Social Science (SPSS) and Analysis of Moment Structure (AMOS) computer software.

**Confirmatory Factor Analysis:** Next step after EFA is to confirm the extracted factors. For this purpose, a two-stage structural equation modelling (hereafter, SEM) approach was used. In this approach, the first stage is confirmatory factor analysis (hereafter, CFA) followed by hypotheses testing. The results of the CFA were based on various fit indices as recommended by many scholars (see Bayne, 2010; Hair & Anderson, 2010; Kline, 2011). These indices include reporting the Normed Chi-Square (CMIN/DF) value, the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA) to evaluate the model (Hair & Anderson, 2010). The threshold values for all the aforementioned fit indices were kept in mind based on the cut-off value of 0.90 for CFI, NFI and GFI and <0.08 for RMSEA and <5 for CMIN/DF. Overall, the measurement model resulted in acceptable fit giving a green signal to proceed with full-fledged modelling and hypotheses testing.

**Structural Equation Modelling:** After a good fit of the measurement model, full structural modelling was conducted, as depicted in Figure 2. The results reveal that the model fit the data well, with a normed Chi-square (CMIN/DF) value of 1.060, GFI value of 0.948, NFI value of 0.930 and CFI value of 0.996. RMSEA also resulted in a value of 0.013 which is below the cut-off value of 0.08, indicating also a good fit of the model (see Fig. 2).

**Figure 2: Final Structural Model**



During the process to test the full-fledged model, hypotheses were also tested using Maximum Likelihood Estimates (MLE) method. The result of hypotheses testing is presented in table 2.

**Table 2: Testing the Structural Research Model**

Hypotheses	Estimate	S.E.	C.R.	P
Perceived usefulness → Attitude toward smartphone advertising	0.257	0.052	4.919	***
Perceived ease of use → Attitude toward smartphone advertising	0.005	0.037	0.137	0.891
Subjective knowledge → Attitude toward smartphone advertising	0.373	0.070	5.359	***
Attitude toward smartphone advertising → Smartphone advertising use	0.668	0.194	3.447	***

**Note:**

S.E.: Standard error of regression weight

C.R.: Critical ratio of regression weight

P: Level of significance of regression weight, \*\*\*Significant at  $p < 0.01$

According to the result, 3 out of 4 hypotheses are supported. The 3 supported hypotheses are: H1, H3 and H4 while not enough evidence was found to support H2.

**5. Conclusion and Recommendations**

This study examined those factors that impact online advertising, particularly, smartphone advertising. In this case, the impact of perceived usefulness, perceived ease of use, subjective knowledge on attitude towards smartphone advertising and attitude towards smartphone advertising on smartphone advertising use among smartphone users in a selected area of Malaysia were measured. The majority of smartphone users in Malaysia are ready to use Smartphone advertising due to several benefits they may get from its usage. Descriptive statistics revealed that Malaysians and foreigners are availing the services of Celcom, Maxis, Digi and U-mobile which means that they are attracted to use smartphone advertising. Based on the results, this research provides evidence that there is a direct relationship between perceived usefulness, and subjective knowledge on attitude towards smartphone advertising, and also a direct link between attitude toward smartphone advertising and smartphone advertising use. These findings are of prime import for the telecommunication industry and also for the policy-makers. The aforementioned bodies have to make sure that if they want the consumers' attitude to be positive towards their ads, they should provide useful information in those ads.

It is because, if the consumers perceive that using smartphone advertising is useful for them, their attitude will positively be influenced. Further, based on the results of the present study, the knowledge that consumers possess about smartphone advertisements also positively influence their attitude and eventually their actual use. Therefore, it is recommended that the players in telecommunication industry focus more on providing and enhancing their customers' knowledge with regard to smartphone advertisements. Future studies conducted in the same milieu should not only consider the direct effect of the model presented in this study but also the indirect effects, particularly, the mediating effect of attitude in the relationship between the independent variables of this study and the actual use. Moreover, future researchers should consider testing the same model with some moderators, e.g., age, gender, income and ethnic groups, as Malaysia has many ethnic groups. Lastly, future studies should expand the scope of the study by using representative samples from the thirteen states and not only one state.

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