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The Effect of Privacy Concerns on the Purchasing Behavior among Malaysian Smartphone Users

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ABSTRACT

The rise of e-commerce and m-commerce has brought the intention to the privacy concerns among mobile buyers, and studies showed that it is an important factor that affect attitude and intention to buy products or services through smartphones. The objective of this paper is to investigate the issue of privacy concerns on the attitude and purchasing intention among Malaysian smartphone users. This was performed by investigating the relationships between privacy concerns and attitude towards purchase, as well as between the privacy concerns and the intention to purchase using smartphone apps. The paper provides significant insights on the issue of privacy concerns in the usage of smartphones which can help developers such as Google and Apple to improve their apps stores to provide better protection for users' privacy and security in Malaysia.

KEYWORDS

Attitude Towards Purchase, Concerns for Information Privacy, Intention to Purchase, M-Commerce, Privacy Concerns, Security, Smartphone Apps

INTRODUCTION

As more consumers embrace the rise of the Internet era, the online privacy concerns remains a top priority for every smartphone user (DMA, 2015). Many companies find it difficult to ensure privacy and security on their apps for their users to use and engage in a successful transaction, especially where cybercrimes are fast increasing. Privacy concerns naturally becomes an important issue as e-commerce makes it ascent into an important business aspect of most organizations. This is due to the fact that marketers are collecting more information on customers who are buying online to study not only their characteristics, but also their purchase preferences and behaviors. This concerns has proven to have negative consequences for the adoption of e-commerce (Sheehan and Hoy, 1999; Cho et al, 2009). In Malaysia alone, it was reported that it has 35% of smartphone penetration, resulting to more than 10 million smartphone users. McCann even predicted that smartphone penetration in Malaysia will rise to 60% by 2015. The statistics also reveals that Malaysia holds a 66% of Internet users from the population, with 60% internet penetration and 140% mobile penetration, with 47% of Malaysia own more than one mobile phone (MCMC, 2014, Euromonitor, 2014). The number of smartphone users showed a drastic increase as compared to 2011 and 2012 where the numbers

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of users for those years were only 14% and 12% respectively. Moreover, 64.6% of Malaysian users intend to change their hand phones to smartphones in the near future. Of the current smartphone users, 50.9% of them have installed 10 to 30 apps in their smartphone (MCMC, 2013). In other survey findings, The Wall Street Journal examined 101 popular smartphone apps and found out that, 56 apps transmitted the phone's unique identifiers to other companies without users' awareness, while about 47 apps transmitted the device's location to outsiders (Thurm & Kane, 2010; Angwin & Valentino Devries, 2011). Furthermore, the study revealed that both Apple iOS and Google Android mobile operating systems regularly record and transmit location data without the consent of phone owners. These findings represent a concerns, especially when MCMC state that most Malaysian smartphone users opt for "jailbreak" smartphones that allow the downloading of apps that have not been approved by app stores as these apps may impose security and data integrity risks. The increase number of smartphone users will only lead to increasing privacy risks (Al-Hadadi & Al Shidhani, 2013; De Cristofaro, 2011).

In addition to these alarming statistics, the lack of academic research on the influence of privacy concerns on consumers' intention to purchase smartphone apps still represent a significant gap, especially when including other influential factors that affect the decision to purchase apps such as the stimulus of social influences and one's own perceived ability to perform the behavior. Although there are significant number of theories and research on the effect of privacy concerns on purchase intention in the general concepts on information systems and e-commerce (Dai et al., 2014), there is little evidence if the results of those research still hold true in the mobile technology context (Lai & Lai, 2014).

On this regard, the objective of this paper it twofold. The first objective is to investigate the issue of privacy concerns on the purchase intention. More precisely, the aim is to give further insights on the issue of privacy concerns in the usage of smartphone apps stores which can help developers such as Google and Apple to improve their apps stores to provide better protection for users' privacy and security in Malaysia. Secondly, the paper aims to provide a better understanding on the role of privacy concerns and perception towards the purchase or usage behavior among Malaysian smartphone users. This is done by investigating the mediating effect of the attitude towards purchase using mobile apps. The findings of this research may provide better insights and guidelines for agencies to create more comprehensive awareness campaign among Malaysians on the importance of maintaining their privacy and cautiousness when purchasing or downloading apps from smartphone app stores. The remainder of this paper is as follows: The following sections provide a literature review. Then, the theoretical development of the research and the hypotheses are provided. Next, results of the research are presented and discussed. Finally, the paper concludes by discussing the findings and presents some recommendation for future research.

THEORETICAL DEVELOPMENT

The Concept of Privacy Concerns

Privacy has long been identified a moral right (Corlett, 2002). As far as technology is concerned, Laudon & Traver (2001) defined it as "the moral right of individuals to be left alone, free from surveillance or interference from other individuals or organizations, including the state". More specifically, it is the concerns of users on the collection, usage and manipulation of personal information by firms or entities due to the fear of loss or threat or breach of privacy. This definition is tailored toward its information aspects, rather than its physical, legal, and behavioral aspects (Sheng et al., 2008). On this regard, considerable attention has been paid to the issue of privacy concerns and

security on smartphones (De Cristofaro, 2011; Mylonas et al., 2013). It was found that many users who download applications (apps) from app stores such as Google Play and Apple's App Store have low concerns on privacy as they tend to disregard security alerts when they install apps from these app stores, with most of them unable to understand the risks and privacy issues associated with that installation (Felt et al., 2012; Mylonas et al., 2013). They suggested that users are more concerned about their privacy on their computers compared to their smartphones. They further concluded that users believed that smartphones and personal computers are different.

Smith et al. (1996) have identified four core measurements for dimension of individual privacy or "concerns for information privacy" (CFIP) where these dimensions have been widely used by researchers in general (Preibusch, (2013). The measurements for individual privacy presented are collection, improper access, errors and secondary use. Collection in the context of information privacy can be defined as the concerns related to the huge amount of personal information collected and stored in company's database. Similarly, improper access is the concerns related that the collected information becomes accessible to unauthorized people. Errors concerns are that personal information related to individuals may become incorrect due to unintentional or malicious alterations. Finally, secondary use is the concerns on the way personal information collected is used by a third party for other purpose other than initial intention. (Smith et al., 1996).

What makes smartphone users different is that they are exposed by considerable vulnerabilities and exposures through the traditional hacking, malwares and spywares, while also being vulnerable to collection and dissemination of personal information by smartphone apps (Gomez-Martin, 2012). Google for instance has led to this issue of privacy concerns on smartphone apps as it was reported that the company was providing Australian developers with customer's personal information which included e-mail addresses (Oreskovic & Sin, 2013). On the other hand, iPhone users are exposed to privacy breach threats as the smartphone's Unique Device Identifier (UDID) of the device can reveal user's behavioral patterns and information if exploited based on apps usage or the device itself (Smith, 2010). According to a recent study conducted by Pew Internet Project (Painter, 2013), more than half of smartphone users decided to uninstall apps from their smartphones due to the concerns of personal information with 54% deciding to forego apps installation while 30% of users uninstall apps when privacy became more of a concerns. Even more worryingly was the report made by Hewlett-Packard after it was found out that 9 out of 10 smartphone apps are vulnerable to privacy issues (Painter, 2013).

However, while there are some studies that can be considered a milestone in this trend, the literature still lack of research that attempt to investigate and examine the role of privacy concerns on smartphone apps purchase intention. Some studies have indeed used some theoretical models on mobile devices related topics. However, they have not explicitly studied the effect of privacy concerns on smartphone apps purchase intention (Aldas-Manzano et al., 2009; Swilley, 2007). Privacy concerns represents the factor affecting the smartphone apps purchase intention. The main drive of this paper is to explore the impact of privacy concerns through attitude towards the smartphone apps and purchase intention in the context of Malaysian users. The mediating role of attitude towards smartphone apps is also meant for investigating the effect of privacy concerns on smartphone apps purchase intention. Therefore, it is hoped that this paper will shed light on this trend and expand the research in this area.

Behavioral Intention and Attitude

Research on the behavioral intention and attitude is well established in the literature (Ajzen, 1985; Ajzen & Fishbein, 1980). This establishment also includes information systems and technology adoption (Davis, 1989; Venkatesh et al., 2003). These studies in the IT adoption context confirm the old notion that the relationship between attitudes and intentions is based on the human need to achieve cognitive consistency (Festinger, 1957).

The context of this relationship in information privacy has also gained attention in the literature. Smith et al., (1996) has validated constructs of the use of behavioral intentions to measure individuals' tendencies to be skeptical in dealing with technology that could be used to gather, share their personal

information. This construct, which was mainly derived from Stone et al., (1983)'work, is being widely used in the literature to explain the user behaviors with technologies across various contexts (Van Slyke et al., 2006; Stewart & Segars, 2002; Boss et al., 2015). Previous researches in the information privacy suggest that individuals that exhibit high levels of concerns for information privacy take proactive steps to reduce their exposure to privacy. Behavioral intention for this study is conceptualized to refer to individuals' future intention to engage in apps purchase activities. These activities are highly related with privacy concerns as individuals are required to reveal some information to complete their processes. From this perspective, this research hypotheses that:

Attitude towards apps purchase intention mediates the relationship between privacy concerns and behavioral intention

Privacy Concerns and Attitude

The effect of privacy concerns on attitude or intention had been discussed in the literature and have resulted to some interesting findings (e.g. Cases et al., 2010; George, 2006). Phelps et al. (2001) for instance found that the attitude of consumers towards direct marketing is negatively associated with the degree of concerns on privacy. They concluded that the higher the privacy concerns, the lower the attitude of consumers towards direct marketing. This negative influence of privacy concerns over attitude was also confirmed by Cases et al. (2010) when they investigated consumers' attitude towards websites for e-mail campaigns. Similar findings were also observed by Schwaig et al., (2013) on the attitude towards safe information practices. Similarly, Chellappa & Sin (2005) have argued that individuals with stronger concerns about information privacy tend to exhibit negative attitudes about using a technology. Therefore, it is hypothesized that:

There is a significant relationship between privacy concerns and attitude towards smartphone apps purchase.

Privacy Concerns and Purchase Intention

The relationship between privacy concerns and behavioral intention has been quite vague in the literature in terms of the direction and the significance of relationship. The literature reports inconsistency of findings on whether privacy concerns has a relationship with the behavioral intention. Brown & Muchira (2004) for instance reported that a majority of the privacy concerns dimensions were found to have no relationship with consumers' intention to perform online purchasing act. Li (2014) did not find any significant relationship between an individual privacy concerns dimensions and the behavioral intention of disclosing personal information and performing purchasing activity on an online store.

On the other hand, Schwaig et al. (2013) supported the existence of a negative relationship between users' privacy concerns and intention to transact through online means. Liao et al. (2011) found a relationship which was negatively significant between privacy concern and intention to transact in an online environment. Consistent with prior research (Stewart & Segars, 2002; Korzaan & Boswell, 2008). Individuals who are concerned about their personal information privacy would refrain from keeping their personal identifiable information from their online transactions in order to protect their identity. Thus, it is hypothesized that:

There is a significant relationship between privacy concerns dimensions and smartphone apps purchase intention

METHOD

The respondents targeted for this research are consumers that have experienced purchasing and installing smartphone apps through apps stores or repositories such as Google Play Store and Apple Store. Thus, the unit of analysis for this research is individual consumers aged between 20 to 40 years old since these consumers have the capability to acquire not just free apps but also paid apps along with better experience in using smartphones. They also must have experienced purchasing and installing smartphone apps through app stores or repositories such as Google Play Store and Apple Store.

This study used survey instrument to test the research hypotheses in accordance to the practice in the information privacy literature (Smith et al., 1996). Measurement scales were adapted from prior research. This has been made to ensure the measurement are valid and reliable. Items measuring attitude towards app purchase were adopted from Cho (2004). The items are modified to measure consumers' attitude towards purchase through app stores. The measurement items for app store purchase intention were adopted from Yang (2012). Finally, measurement items for information privacy concerns was adapted from Smith et al., (1996). All items were measured using a five-point Likert scale from "Strongly disagree" = 1 to "Strongly agree" = 5.

After ensuring they meet the set criteria of this research, a Survey questionnaire sent to a pool of Malaysian customers in three different geographical locations in Malaysia. The capital Kuala Lumpur, the state of Selangor, and the state of Sabah. Both non-probability convenience sampling and snowball sampling were used to collect data as it has been widely used in investigating consumer behaviors on e-commerce related issues (Aldas-Manzano et al., 2009; George, 2006). Furthermore, those type of sampling technique were necessary to ensure the customer must fulfill the research criteria.

RESULTS

Respondents' Profile

Out of 1200 questionnaires sent, 457 respondents were received. After dropping 7 for incompletion, 450 usable respondents were used for the data analysis. The analysis of the respondents' demographics revealed that 54.7% of the respondents are male, while 45.3% are female. This indicates an adequate balance of the two genders. Table 1 shows the demographical profile of the respondents.

Smartphone Usage

This section provides statistical information on the smartphone usage of respondents who have participated in the study. The results of smartphone usage are illustrated in Table 2. The results indicate that the highest percentage of chosen app store is Google Play Store with 71.3% followed by the Apple Store with 20.0%. Google Play Store indicates that respondents use Android-based smartphones whereas Apple Store represents Apple's iPhone-based smartphones. The higher usage of Android-based smartphones among Malaysian coincides with MCMC findings of the Malaysia 2013 headphones survey where the majority of Malaysian use Android-based phone at 79.2%. The other 8.7% consists of BlackBerry World (Symbian-based), Window Stores (Windows Phone-based) and others.

Reliability Analysis

The Cronbach's alpha values for each of the four dimensions of privacy concerns construct are tabulated in Table 3 along with other variables of the attitude towards smartphone purchase and smartphone apps purchase intention. It can be seen that all values are above the recommended value 0.8 which show good reliability consistency (Sekaran, 2003).

Table 1. Demographical profile of respondents

Demographics	Categories	Frequency	Percentage
Age	18 to 20	62	14.0
	21 to 29	261	58.0
	30 to 39	87	19.3
	40 to 49	27	6.0
	50 and above	13	2.7
Gender	Male	246	54.7
	Female	204	45.3
Ethnic groups	Malay	63	14.0
	Chinese	51	12.3
	Indian	12	2.7
	Kadazan / Dusun	159	35.3
	Bajau	81	18.0
	Others	84	18.7
Education level	SPM and below	75	16.7
	STPM / Diploma	138	30.7
	Bachelors' degree	162	36.0
	Masters' degree	66	14.7
	Doctorate / PHD	9	2.0
Employment status	Public sector	102	22.7
	Private sector	123	27.3
	Self-employed	30	6.7
	Students	195	43.3

Table 2. Demographical profile of respondents

Demographics	Categories	Frequency	Percentage
Store type	Apple Store	90	20.0
	Google Play Store	321	71.3
	Windows Store	30	6.7
	BlackBerry World	6	1.3
	Others	3	0.7
Amount paid	Free	375	83.3
	RM1 to RM5	33	7.3
	RM6 to RM10	15	3.3
	RM10 and above	27	6.0
Info on apps	Media influence	90	20.0
	Personal effort	201	44.7
	Friends / colleague	129	28.7
	Family members	30	6.7
Type of apps	Game	138	30.7
	Entertainment	90	20.0
	Education	24	5.3
	Business	15	3.3
	Social media	171	38.0
	Others	12	2.7
Number of apps	1 – 10	219	48.7
	11 - 20	147	32.7
	21 - 30	51	11.3
	31 and above	33	7.3

Table 3. Reliability analysis

Construct	Variables	No of items	Cronbach's alpha
Privacy concerns	Secondary use Errors Unauthorized access Collection	4 4 3 4	0.93 0.88 0.85 0.82
Attitude	Attitude toward smartphone apps purchase	6	0.93
Intention	Smartphone apps purchase intention	3	0.87

Descriptive Analysis

The purpose of the descriptive analysis is to measure the mean and standard deviation for all the variables of the study. All items of variables in the study were measured using a five-point Likert scale that ranges from 1 (strongly disagree) to 5 (strongly agree). Based on the scale, these mean scores interpretation can be made: mean scores lower than 2 indicate low responses, mean scores from 2 to 4 show moderate responses while mean scores higher than 4 represent high responses.

The results compiled in Table 4 revealed that three variables have moderate mean scores ranging from the lowest to the highest respectively: smartphone apps purchase intention (2.99), attitude towards smartphone apps purchase (3.15) and errors (3.84). The rest of the variable showed high responses based on the mean scores that are higher than 4 which are collection (4.11), unauthorized access (4.40) and secondary use (4.47).

Multiple Regression Analysis

Multiple regression analysis was used to identify the direct relationship between the dimensions of privacy concerns with attitude towards smartphone apps purchase, as well as to examine the direct relationship between the dimensions of privacy concerns and attitude towards smartphone apps purchase with smartphone apps purchase intention.

The relationship between dimensions of privacy concerns (collection, secondary use, unauthorized access and errors) and attitude towards smartphone apps purchase

The first hypothesis attempts to examine whether there is a significant relationship between privacy concerns dimensions and the attitude towards smartphone apps purchase. The result in Table 5 indicates that 5.0% of variances in attitude towards smartphone apps purchase can be explained by privacy concerns ($R^2 = 0.05$, $p < 0.01$). Multicollinearity does not exist as the tolerance level and

Table 4. Means and standard deviations

Variables	Mean	Standard deviation
Collection	4.11	0.70
Unauthorized access	4.40	0.59
Secondary use	4.47	0.58
Errors	3.84	0.87
Attitude towards smartphone apps purchase	3.15	0.97
Smartphone apps purchase intention	2.99	0.93

Table 5. Regression Analysis of privacy concerns (collection, unauthorized access, secondary use errors) and attitude towards smartphone apps purchase

Dependent variable	Independent variables		Standard Coefficient Beta (β)
Attitude towards smartphone apps purchase	Privacy concerns:		
	Collection		0.11
	Unauthorized access		-0.252*
	Secondary use		0.187
	Errors		0.06
	R^2	*0.05*	
	Adjusted R^2	*0.02*	
	Significant F	*0.11*	

Note: Significant levels: **p < 0.01, *p < 0.05

VIF were higher than 0.1 and below 10 respectively. The significance value is 0.11 which shows that the study does not reach statistical significance.

Out of the four dimensions of privacy concerns, only unauthorized access dimension is found to have a negative influence on the attitude of respondents ($\beta = -0.252$, $p < 0.05$). The unauthorized access dimension has the largest unique contribution to explaining attitudes towards smartphone apps purchase as the part correlation value of -0.186 of the dimension suggests that the dimension contributed to 3.4% of variance in attitude. The rest of the dimensions (collection, secondary use and errors) are not significant at level below 0.5. Therefore, this hypothesis is partially supported.

The relationship between dimensions of privacy concerns (collection, secondary use, unauthorized access and errors) and smartphone apps purchase intention

The second hypothesis attempts to examine whether there is a significant relationship between privacy concerns dimensions and smartphone apps purchase intention. The result in Table 6 indicates that 6.0% of variances in smartphone apps purchase intention can be explained by privacy concerns ($R^2 = 0.06$, $p < 0.01$). Multicollinearity does not exist as the tolerance level and VIF were higher than 0.1 and below 10 respectively. The significance value is 0.07 which shows no statistical significance.

Table 6. Regression analysis of privacy concerns (collection, unauthorized access, secondary use errors) and smartphone apps purchase intention

Dependent variable	Independent variables		Standard Coefficient Beta (β)
Smartphone apps purchase intention	Privacy concerns:		
	Collection		0.067
	Unauthorized access		-0.078
	Secondary use		-0.054
	Errors		0.244**
	R^2	*0.06*	
	Adjusted R^2	*0.02*	
	Significant F	*0.11*	

Note: Significant levels: **p < 0.01, *p < 0.05

Only the errors dimension is found to have a significance influence on the intention of respondents ($\beta = 0.244$, $p < 0.01$). The error dimension has the largest unique contribution to explaining smartphone apps purchase intention as the part correlation value of 0.218 of the dimension suggests that the dimension contributed to 4.7% of variance in intention. The rest of the dimensions (collection, secondary use and errors) are not significant at level below 0.5. Therefore, this hypothesis is partially supported.

Mediation Effect Analysis

In order to test the mediating role of attitude towards smartphone apps purchase on the relationship between privacy concerns dimensions and smartphone apps purchase intention, a mediation analysis process suggested by Preacher & Hayes (2004) is employed within this study. The method proposed by the authors attempt to look at the values of Lower Level Confidence Interval (LLCI) and Upper Level Confidence Interval (ULCI) to establish mediation effect of a variable. If there is no zero in between of the two values, mediation effect is established. The indirect effects of all four dimensions of privacy concerns will be included in the mediation analysis.

This relationship postulates that attitude towards smartphone purchase would mediate the relationship between the dimensions of privacy (collection, unauthorized access, secondary use and errors) and the intention to purchase apps. Table 7 summarizes the values of LLCI and ULCI for all four dimensions of privacy when attitude is given the role of the mediating variable.

It can be seen that only the unauthorized access dimension of privacy concerns that does not have a zero in between the value of both LLCI (-.0.444) and ULCI (-0.406) which shows that attitude does mediate the effect of this dimension on smartphone apps purchase intention. For the rest of dimensions, there are zeroes in between their values which prove that there is no mediation effect of attitude.

DISCUSSION

The main aim of this paper was to examine and identify the smartphone apps purchase intention among smartphone users in Malaysia. It is important to note that this paper investigated both the relationship between privacy concerns and attitude towards app purchase and the relationship between privacy concern elements and apps purchase intention, which is one of the significance of this research. While many studies investigated app purchase intention instead of attitude, many of these studies found that attitude toward technology and intention to use IT are positively related (Rivera et al., 2015). Moreover, traditional technology adoption antecedents were proven to explain the intention to use either directly or indirectly. In addition, Kobsa et al., (2016) cautioned about the importance of the multidimensional nature of information disclosure behavior.

The relationship found between privacy concerns and attitude towards smartphone app purchase is consistent with previous findings. The concerns for information privacy (CFIP) instrument (Smith et

Table 7. Mediating effect of attitude towards smartphone apps purchase on the relationship between dimensions of privacy concerns and purchase intention

Items	Effect	Standard Error	t-value	LLCI	ULCI
Collection	0.087	0.075	1.16	-0.367	.2538
Unauthorized access	-0.239	0.103	-2.321	-.4441	-.0406
Secondary use	0.181	0.110	1.645	-.0371	.4130
Errors	0.039	0.062	0.629	-.0878	.1560

Independent variables: Collection, unauthorized access, secondary use, errors
Mediating variable: Attitude towards smartphone apps purchase
Dependent variable: Smartphone apps purchase intention

al., 1996; Stewart & Segars, 2004; Schwaig et al., 2013) was found to have a significant manifestation of privacy concerns in the mobile context. However, in this study, only unauthorized access was found to have a negative influence on the attitude of respondents. External unauthorized describes the use of personal information captured from a legitimate transaction by a third party without the consent of either the user or the organization (Smith et al., 1996). Similarly, the privacy concern's significant relationship with purchase intention only accounts for one dimension of the concerns for information privacy (CFIP), which is errors, while the others were found not significant. This is consistent with previous research which used The CFIP dimensions to mediate the relationship between computer anxiety and behavioral intentions (Korzaan et al., 2009).

These findings were not expected if looking at the trend of previous research (Stewart & Segars, 2002; Osatuyi, 2015). However, these findings need to be taken with caution for two reasons: The first reason is because attitude is modified as individuals obtain and process information regarding attitude objects (Eagly & Chaiken 1993). This suggests that information privacy should be examined within different contexts to fully understand attitudes of individuals towards any business practice (Culnan, 1993; Stewart & Segars, 2002). Attitude in this sense is too delicate to catch the actual behavior of information privacy, especially when the technology is not well formed as the case for app purchase. Angst &Agarwal (2009) suggested to expand attitude to incorporate the concept of persuasion and ability, a sequence of changes occur in attitude. The second reason for looking at the results with caution is the nature of the information privacy dimensions themselves. The CFIP components are developed to capture the information privacy as reflective construct that may be more accurately modeled as a second-order factor rather than first-order dimensions (Culnan, 1993; Stewart & Segars, 2002). Moreover, the question whether a directional change in one construct of the whole dimension imply similar directional shift in other constructs which rose by Chin (1998) is applied in this dimensions.

Nevertheless, such findings on attitude are consistent with some previous research. Kumar et al., (2008) found no significant relationship between users' concern for information privacy and their attitude towards using firewall protection for their electronic devices such as computers, although attitude was found to mediate the impact of perceived usefulness on behavioral intention.

The findings of this study also confirm previous conclusions that individuals are concerned about information privacy as a general case and at an aggregate level, while the way in which individuals are concerned about collection, unauthorized secondary use, improper access, and errors require expanded consideration at the micro level of each dimensions (Nguyen et al., 2011). This argument was also observed and justified by Bellman et al., (2004) where they observed the influence of cultural values of 38 countries including Malaysia in only errors and unauthorized secondary use, rather than the all dimensions the concerns for information privacy (CFIP). Similarly, Rose (2006) confirmed significant differences between the concerns for information privacy (CFIP) in New Zealand and previous research of Stewart & Segars (2004).

The current status of CFIP dimension may also justify the findings of this research to a great extent. Although the CFIP measurement was validated (Stewart & Segars, 2004; Malhotra et al., 2004; Van Slyke et al., 2006), The acknowledgement of Smith et al. (1996) that the dimensionality of the scale has yet to be proven to absolute or static still hold true.

Nevertheless, this research significantly contributes to the proposal of Stewart & Segars, (2002) that the theoretical and operational assumptions of the concerns for information privacy should be reinvestigated in light of new technology and practice. The purchase behavior using apps is considered an emerging technology where such investigate may provide a better understanding on the dimension (Xu et al., 2012).

In sum, certain hypotheses are supported by past literatures and studies while other hypotheses were not consistent with previous findings. The supported findings should be included in future researches that are geared towards exploring the smartphone apps privacy sphere. The intention to purchase smartphone apps is essential as it gives an indication to the privacy concerns level of users

to a certain degree (Osatuyi, 2015). A privacy concerns is not a new phenomenon as it has been extensively researched in the literatures. Nevertheless, the privacy concerns on smartphone apps is still relatively new as smartphone apps was only introduced in 2007, while the e-commerce view on privacy concerns has been around for two decades.

MANAGERIAL IMPLICATIONS AND RECOMMENDATIONS

The paper provides further insights to the knowledge concerning smartphone apps privacy concerns from the consumers' intention and attitude in Malaysia. This was done by investigating the concerns for information privacy dimensions. Some recommendations may be provided.

Firstly, this study can assist the responsible government agencies and ministries in smartphone users' privacy security, concerns and consumer-related fields such as The Malaysian Communication and Multimedia Commission. Privacy awareness campaigns should be more prevalent in the Malaysian context as it is confirmed that the privacy concerns in Asian countries such as Malaysia is low and worrying. Thus, this paper suggests that some guidelines and recommendations should be implemented to increase privacy awareness where these suggestions may include organizations maintaining solid security policies, assessing security awareness in regular periods, develop easy to access and understand information security learning sessions and establishing long term implementation to get users involved in security training. These recommendations, in hindsight can also be applied to the general public.

As for the study's implication on the role of smartphone app stores administrators such as Google Play Store and Apple Store as well as smartphone app developers, the current policies and standards set forth by these parties with accountability may not be sufficient in ensuring safe and reliable information practices. It is recommended that certain actions to be considered by them for better data protection and integrity; these actions and guidelines may include:

Government may also intervene or act by asking app stores and developers to stop collecting smartphone users' personal information, investing in cybercrime and infrastructure and creating standard and guidelines for data collection in smartphone devices. Important government agencies such as the Malaysian Communication and Multimedia may collaborate with foreign agencies to establish an intricate network of cooperation in sharing information and practices that can enhance security measures for the smartphone realm.

FUTURE RESEARCH

Future studies that intend to adopt this studies relationship may want to consider using other privacy constructs, instead of the privacy concerns dimension construct of Smith et al. (2010). Preibusch (2013) recommended other privacy measurement constructs guidelines such as developing new scales based on Braunstein et al., (2011) construct of privacy, modernized version of Smith's concerns for information privacy (CFIP) by Malhotra et al., (2004) or the broader measurement of privacy by Earp et al., (2005)

Other factors that may affect intention such as trust can also be considered. Using privacy concerns, demographic or smartphone usage as a moderator between the relationship of other independent variables and intention could be explored (Smith et al., 1996; Smith, 2010). For example, Liu and Marchewka (2005) found support for the use of the trust construct as a mediator between privacy and intention. As for the possible role of privacy concerns as a moderator variable has been done so by Angst & Agarwal (2006) where privacy concerns moderated the relationship between attitude changes. Finally, price has been shown to be an indicator for users' intention to purchase apps by Egelman et al. (2013), and can be investigated in future studies.

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