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The Effect of Technology Trust on Customer E-Loyalty in Online Shopping and The Mediating Effect of Trustworthiness

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ABSTRACT

Ubiquity of technology in present day living is reflected by the increasing number of savvy consumers worldwide, who can now shop online from the convenience of their homes. This study, therefore, endeavored to: (1) investigate the relationship between technology trust (security and privacy), trustworthiness, and customer e-loyalty in the context of Malaysia, as a leading developing country, and (2) determine the mediating effect of trustworthiness on the relationship between technology trust and e-loyalty. It employed a quantitative research method using a survey with 395 respondents, who had conducted at least one online transaction in the past three months. SmartPLS, which runs a variance-based structural equation modeling was used as the analytical tool to test the research model. Findings revealed that security, privacy, and trustworthiness are positively related to customers' e-loyalty. This study also highlighted the critical role of trustworthiness as mediator of the relationships. Further discussions on theoretical and practical implications, limitations, and future research directions are presented.

Keywords: Technology trust, Security, Privacy, Trustworthiness, e-Loyalty

INTRODUCTION

In the present information age where global online services expand rapidly, online retailing in Malaysia has shown continuous growth. It has opened new opportunities where organizations can conduct business over the cyberspace and expand their footprints beyond geographical limitations, unlike a brick-and-mortar outlet. Moreover, the evolution of cyberspace has further improved the utilitarian and hedonic aspects of using the internet. The cyberspace environment has become more interactive and entertaining that fulfils not only consumers' needs to obtain goods and services, but to satisfy their emotional needs as well. In turn, this increases purchases and enhances relationships online retailers have with consumers (Lee, Balaji, & Khong, 2015).

Stemming from this, it is not surprising that the latest report by Euromonitor International showed that online retailing in Malaysia has increased from RM1.29 billion in 2012 to RM5.09 billion in 2017 (Surendran, 2018). This is a three-fold increase and the amount

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reported includes both direct purchase from e-commerce websites and those operate by store-based retailers (Surendran, 2018). Collectively speaking, the growing popularity of online shopping has become a topic of interest among practitioners and scholars in recent years, laying rich theoretical foundation towards understanding the motivations and inhibitions that encourage or dissuading consumers in adopting online shopping.

Despite the burgeoning research, gaps remain. First, Malaysia has demonstrated a low adoption of e-shopping due to several factors such as poor infrastructure, awareness, and support (Kamarulzaman, 2011). A World Bank report echoed this view, revealing that insufficient network infrastructure in Malaysia has resulted in uneven penetration rate among the states (World Bank, 2018). Besides, the Malaysian Communications and Multimedia Commission (MCMC) showed that only a mere 46.8% of internet users made purchases online (MCMC, 2017). This is pale in comparison to other developed countries such as Sweden, Switzerland and Germany where close to 84% of their internet users perform online shopping (Forbes, 2018). Of the 18 online activities listed in the report, online shopping is ranked 9th place, with lack of trust in security and privacy concerns being one of the top three concerns among Malaysian internet consumers' aversion to online shopping (MCMC, 2017).

Second, studies into determinants of e-loyalty have been limited and sparse. Many of the existing studies focus largely on purchase intention (Zendehdel, Paim, Osman, & Wright, 2015). However, the key determinant leading to the formation of intent to purchase, regardless whether in an online setting or in a brick-and-mortar outfit, is nonetheless loyalty. From this perspective, this study advances the body of knowledge by investigating the strength of relationship between technology trust, trustworthiness, and consumer e-loyalty. Besides investigating the relationship among the three facets of online consumer behaviors, this study also attempts to determine the mediating effect of trustworthiness on technology trust and e-loyalty - an area that is under-represented.

In sum, this backdrop clearly gravitates an imperativeness to determine and enrich the knowledge of online consumer behaviour within the Malaysian context, specifically the level of consumer e-loyalty and its influence on Malaysian online consumers. Other than advancing the body knowledge, outcomes of this study will generate practical recommendations to complement online retailers' strategies in fostering e-loyalty between them and the consumers.

THEORETICAL FRAMEWORK

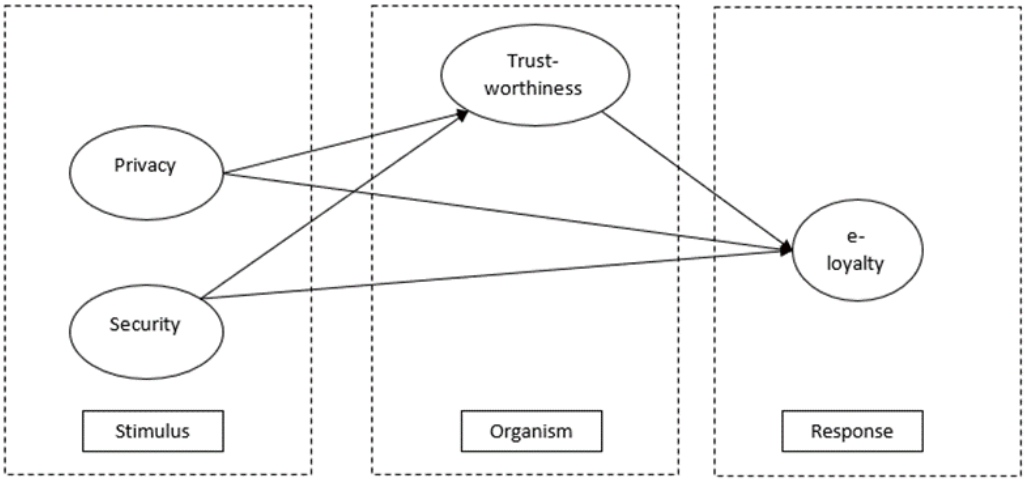
To better understand the phenomenon under investigation, this study anchored against the stimulus-organism-response (S-O-R) framework. According to Mehrabian and Russell (1974), the stimulus function as an influencing agent that initiate changes within an individual. Organism represents the cognitive, affective or emotional change that one will experience as a result of being exposed to the stimulus. As a result of organism, one will respond with changes to behavior, which can either take the form of an approach or avoidance.

The S-O-R framework has been widely deployed in studies involving consumer behaviour. For instance, Eroglu, Machleit, and Davis (2001) used the S-O-R framework to examine the mediating effect of shoppers' level of involvement on the relationship between environmental cues and shopping outcomes. Similarly, McKinney (2004) used the S-O-R framework to explain the internal motivations for internet shopping and how it affects the consumers' level

of satisfaction. In the same vein, study also pointed out that hedonic and utilitarian shopping values are the key determinants in consumer behaviour (O'brien, 2010), as well as aesthetic stimuli plays a role in invoking online shoppers' cognitive, emotional and conative outcomes (Wang, Hernandez, & Minor, 2010).

Along the same line of thoughts, this study develops a model based on the S-O-R framework (Figure 1). Consistent with the extant studies, the model examines the role of online security and enhancement of privacy in the stimulus stage. The endogenous variables of trust take the role as the intermediary variable representing "organism", with the outcome (responding behavior) as e-loyalty.

Figure 1. Conceptual framework



LITERATURE REVIEW

Online Customer Loyalty

In the virtual domain, loyalty is a significant factor to harness business success and long-term profits, particularly in a turbulent business environment. This is substantiated by a study indicating that the ability to retain customers increases profits within the range of 25% to 95% (Gallo, 2014). Drawing from this, one can surmised that loyal customers are precious assets to a company, with their capabilities extending beyond merely generating company profits (Ganesh, Arnold, & Reynolds, 2000). They exhibit a strong positive attitude, which is often demonstrated by their repurchase of products or services (Wahab, Hassan, Shahid, & Maon, 2016). As a strategy to retain ongoing customer loyalty to a company, e-retailers need to engage or interact, either online or offline, with true loyal customers and maintain the relationship.

Security and Privacy

Despite being an essential part of present living, technology poses various forms of common threats, such as spam, cookies, and clickstream to e-users. A recent report by the United Nations Conference on Trade and Development (UNCTAD) shows that 60% of the internet users in the Asia Pacific countries are concerned with security and privacy issues in 2017 (UNCTAD, 2018). The same report highlighted that security and privacy are two vital

elements that prevent consumers from procuring goods and services online (UNCTAD, 2018). From these, we can infer that security and trust are key determinants that can potentially reduce consumer perceived risk in e-shopping.

Online security, also known as web security in general, includes the processes of (1) authenticating business transactions, (2) controlling access to resources such as web pages for registered or selected users, encrypting communications, and (3) ensuring the privacy and transactional effectiveness (Kamarulzaman, 2011). Among the different concerns in using web services, web security has been a perennial concern among online Malaysian shoppers. This is further exacerbated by high profile cases of data breaches such as personal details of close to 220,000 Malaysian organ donors and next-of-kin were leaked since September 2016 (Malaymail, 2018). Drawing from these incidents, we can conclude that the lack of security and fear of hackers is becoming a major influence on their attitudes and e-purchasing intentions (Yong-Man, 2002). In view of these crucial factors, e-store or e-retailers must augment the importance of security on their websites and ensure the consumers' data are appropriately stored and protected.

Privacy concern is another core issue that is rampant amongst e-shoppers. Internet users typically need to feel that their privacy is protected. Privacy is the control over an individual's personal information and it involves individual protection and appropriate online use of personal information (Mohammed & Tejay, 2017). In earlier studies, privacy is related to the activities of transferring private information and the use of customer information. The Harris Poll study indicates that approximately 40 percent of online shoppers were highly concerned about the use of their personal data, while about 57 percent of e-shoppers were keen to know the method used and purposes of collecting personal information among the e-stores (Ackerman & Davis, 2016). Most online customers are willing to maximise the amount of privacy in an e-business transaction (Liang & Shiau, 2018). In order to protect privacy, public education efforts and legislative frameworks such as introducing privacy laws to e-store or promoting stringent privacy laws, encouraging self-regulation among e-companies, establishing an independent privacy commissions to manage and educate consumers on privacy because these efforts can contribute to online shopping growth.

Trustworthiness

Consumer trust is generally a vital element in the virtual environment and lays the foundation in e-commerce (Tsai & Yeh, 2010). Trust is one of the major reasons Malaysians rarely shop online (Liu & Tang, 2018). Thus, if online consumers are unable to secure confidence in an e-retailer's competence, benevolence, and integrity, they would refrain from shopping online and consequently seek a more trustworthy alternative (Liu & Tang, 2018). Similarly, study exhibited that a large number of e-customers are reluctant to deal with e-commerce due to mistrust of their disclosed information on websites (Lee, Ahn, Song, & Ahn, 2018). It is therefore a valid inference that a trusted interaction is highly important because it forms the underlying requisite between users and providers.

In general, internet transactions have geographical barriers to direct interaction or physical touch, which collectively lead to significant risks for e-consumers. Therefore, e-marketers and e-retailers must strive to build trust among online customers. Establishing trust results in increased confidence and credibility towards e-retailers which further strengthens existing user-provider relationships by reducing transactional costs and risk perceptions (Matehan & Yasemin, 2011). As e-consumers' confidence grows, they simultaneously expect e-vendors to

provide accurate information, timely and fast delivery services, and high accessibility to their websites.

Putting the constructs of security and privacy together, earlier studies have shown that addressing the major concerns of security and privacy on a website increases the level of e-trust (Chang, Chou, Liou, & Tu, 2016; Martin, 2018; Wu, Huang, Yen, & Popova, 2012). That is to say, e-retailers who perform due diligence to ensure that any e-payments are secure and successfully completed by consumers with a proper authorisation policy will ultimately contribute to e-consumer trust.

Hypotheses Development

Given the large number of study outcomes in this area, it is reasonable to conclude that e-security and privacy leads to an increase of trustworthiness within customers. As highlighted earlier, such inferences are supported by existing studies (Martin, 2018). Similarly, we postulate that the perception of e-security and privacy will also result in an increase of customer e-loyalty. This inference is supported in earlier studies spotlighting that that security is a predictor of customer intention to shop online (Belanger, Hiller, & Smith, 2002; Elliot & Fowell, 2000). Similarly, security and information privacy influence customers' purchase intentions (Ranganathan & Ganapathy, 2002). Privacy also enhances personalization due to the relation of privacy to customers' perceptions (Dixit & Datta, 2010). Drawing from these evidences, we postulate that elements of technology trust, that are, e-security and privacy, may contribute to a positive relationship with trustworthiness and customer e-loyalty, leading to the first set of hypotheses:

H1: *Security is positively related to trustworthiness in online shopping.*

H2: *Privacy is positively related to trustworthiness in online shopping.*

H3: *Security is positively related to customer e-loyalty in online shopping.*

H4: *Privacy is positively related to customer e-loyalty in online shopping.*

As trust is considered a key determinant of relationship development, the role of trust is paramount in this study. Trust, increasingly has been used as an efficient marketing tool to attract more customers to engage in future buying behaviours (Gefen, 2000) and influence their e-purchasing intentions (Pennington, Wilcox, & Grover, 2003). At the same time, trust minimises an individual's perceived risks in e-transactions whereby e-consumers or e-shoppers have had no direct interaction with the e-retailers (Lee et al., 2018). Align with the above literature, we operationalise e-trust as consisting of e-customers' confidence and assumes that e-retailers are dependable in delivering their promises. From the evidences, we believe that e-trust is an imperative element in the e-environment and positively impacts customer e-loyalty. Liu and Tang (2018) leading us to the following hypothesis:

H5: *Trustworthiness is positively related to customer e-loyalty in online shopping.*

We have earlier postulated that security and privacy positively influences trustworthiness. At the same time, we have also established that past literature supports our postulations that e-loyalty may has a positive relationship with trustworthiness. Taken together, it is therefore logical to assume that trustworthiness could function as a mediator in this study as well. This

postulation aligns with the SOR theory where trustworthiness acts as a form of organism which the presence of security and privacy triggers a change in behaviour, via the variable of trustworthiness. This postulation is in line with the study whereby privacy and security are the major factors that influence customer trust in online shopping experience (Dixit & Datta, 2010). A similar study conducted by Mukherjee and Nath (2007) shows that perceived privacy is significantly related to trust followed by security. In addition, it was also found that perceived security is linked to customer trust in the purchase of e-tourism products in South Korea (Kim, Chung, & Lee, 2011). Customers who have developed trust based on security and privacy are more likely to shop on the same websites. In light of the aforementioned, the following hypotheses are developed:

H6: *Trustworthiness mediates the relationship between security and customer e-loyalty in online shopping.*

H7: *Trustworthiness mediates the relationship between privacy and customer e-loyalty in online shopping.*

RESEARCH METHOD

Data was analyzed using SPSS statistical software and SmartPLS 3.0. This study was conducted using a survey quantitative approach to collect primary data. The survey instrument –a questionnaire, was developed through gathered data from literature review. Respondents in this study mainly comprised internet users living in Kuala Lumpur, Cyberjaya, and Putrajaya, Malaysia. Their names were obtained from a list of internet users provided by Telekom Malaysia. Selection of respondents was done with systematics random sampling from the internet users list.

Using power analysis at 80% and an effect size of 0.15, the required sample size for a total of three predictors stand at 80. Out of the 500 respondents received, a total of 395 were usable making the response rate at 79%. At 395 respondents, it also represented the power at 99.9%. That is to say, the sample size is adequate enough to prevent Type I and Type II errors, making it suitable to proceed with the analysis using PLS-SEM.

PLS-SEM was used to measure the proposed model. PLS-SEM has been widely used to estimate causal relationships with latent variables across a variety of disciplines, including knowledge management (Cepeda-Carrion, Cegarra-Navarro, & Cillo, 2018), information technology (Ramayah, Yeap, Ahmad, Halim, & Rahman, 2017), human resource (Ringle, Sarstedt, Mitchell, & Gudergan, 2018), marketing (Ting, Chuah, Cheah, Memon, & Yacob, 2015), tourism (Oviedo-García, Castellanos-Verdugo, Vega-Vázquez, & Orgaz-Agüera, 2017) and sports management (Torrado et al., 2017). The popularity of PLS-SEM can be attributed to it being a second-generation technique that evaluates both measurement and structural model simultaneously, a shortfall of first-generation techniques (Hair, Hult, Ringle, & Sarstedt, 2017). Collectively speaking, the motivations of adopting PLS-SEM in this study are (1) it is a variance based structural equation modeling focusing on predictive capability of the model (Ramayah, Cheah, Chuan, Ting, & Memon, 2018) (2) It is a non-parametric technique with lesser restrictions on distribution and sample size requirements (Hair et al., 2017).

The analyses involved the testing of the measurement model and the structural model using the bootstrapping technique. The measurement items were adapted from several sources pertaining to technology trust (privacy and security), trustworthiness, and customer e-loyalty (Corbitt, Thanasankit, & Yi, 2003; Flavián & Guinalíu, 2006; Flavián & Gurrea, 2008; Wu, 2011; Yang, Jun, & Peterson, 2004). All measurement items were anchored on a 7-point Likert scale, with endpoints labeled 'Strongly disagree' and 'Strongly agree'. Next, it covered the respondents' demographic data and profiles.

RESULTS

Respondents' Profile

The researcher utilised descriptive statistics to obtain the general information of the respondents. A large pool of respondents consisted females, which represented 53.9 percent and males recorded 46.1 percent of the total sample size. For ethnic composition, Chinese formed 48.4 percent of the total respondents followed by Malay with 30.1 percent. The third ethnic group, Indian recorded 8.9 percent of the total targeted study population. Most of the respondents were aged between 26–30 years; only 6.8 percent in the group ranged from 41 to 45 years old. 21.5 percent of the total respondents aged between 18 and 25 years old. As for education level, 77 percent of the respondents had a bachelor's degree followed by 10.4 percent with a master's degree. Household income varied from less than RM 1000 per month to over RM 7,001 per month. The largest group, 42.3 percent of the respondents earned less than RM 3001 to RM 5000 as household income.

In this study, computer usage, frequency of using the internet and the number of e-purchasing report were also analysed. Approximately, the targeted respondents (41.5%) were recorded using the internet for one to five hours per week, and only 13.7 percent claimed they accessed internet from 11 to 20 hours. This aligned with the 2017 report by the MCMC indicating that that majority of the Malaysian internet consumers spent about three hours per day online (MCMC, 2017). These respondents also found that approximately 98.7 percent of the respondents frequently sought product information over the cyberspace.

Measurement Model

The measurement model involves the testing of the composite reliability, convergent validity, and discriminant validity. Overall, as tabled in Table 1, the loadings of all the items measured were loaded highly on its own construct rather than any other constructs, exceeding the threshold of 0.5 (Hair et al., 2017). At the same time, the AVE values exceeded 0.5 (Hair et al., 2017) while the composite reliability (CR) values were above 0.8 (Hair et al., 2017). Therefore, we can conclude that convergent validity was established.

Table 2 describes the constructs' discriminant validity. In confirming the discriminant validity, the square roots of AVE were used on the inter-correlations of the constructs, in which they must exceed the cut-off value of inter-construct correlation (Fornell & Larcker, 1981). The results showed that the AVE square roots were higher than the correlation values and can be summarised that the measurement model of this study was satisfactory.

Table 1: Measurement Model

Model construct	Measurement Items	Cronbach Alpha	Factor Loading	CR	AVE
e-loyalty	WOM	0.741	0.870	0.853	0.661
	FPI		0.855		
	CB		0.703		
Privacy	PRIVACY 1	0.739	0.657	0.838	0.566
	PRIVACY 2		0.848		
	PRIVACY 3		0.689		
	PRIVACY 4		0.800		
Security	SEC 1	0.702	0.789	0.817	0.532
	SEC 2		0.683		
	SEC 3		0.595		
	SEC 4		0.819		
Trustworthiness	HON	0.871	0.906	0.921	0.710
	BN		0.860		
	INT		0.781		

Table 2: Discriminant Validity of Constructs

	e-loyalty	Privacy	Security	Trustworthiness
e-loyalty	**0.813**			
Privacy	0.656	**0.752**		
Security	0.688	0.757	**0.729**	
Trustworthiness	0.763	0.720	0.759	**0.843**

Note: Diagonals represent the square root of the average variance extracted while the other entries represent the correlations

Structural Model

After the measurement model was validated, the structural model was then tested by analysing the inner model. Bootstrapping, a statistical re-sampling method was used in assessing the structural model. The outcomes of hypotheses are presented in Table 3. H1, H2, H3, H4 and H5 examine the relationships between security, privacy, trustworthiness, and e-loyalty.

The results of hypotheses underline that security (β= 0.502, $p < 0.01$), privacy (β= 0.339, $p < 0.01$) has a positive influence over trustworthiness. Similarly, security (β= 0.118, $p < 0.01$), privacy (β= 0.141, $p < 0.05$), and trustworthiness are significant in influencing online customer loyalty. Concomitantly, trustworthiness is significant in influencing online customer loyalty (β= 0.517, $p < 0.01$). In this respect, we can conclude that H1, H2, H3, H4 and H5 are all supported. On mediation analysis, results show that trustworthiness mediated the relationship between security and e-loyalty (β= 0.502, $p < 0.01$) as well as between privacy and e-loyalty (β= 0.339, $p < 0.01$). Similarly, we can conclude that H6 and H7 are supported.

Other than generating path coefficients, PLS also created R^2 value. R^2 indicates the percentage of the constructs, but path co-efficient also indicates the strength of the relationships between the constructs (Chin, 1998). This study found that the R^2 value for the two indicators were customer e-loyalty at 0.617 and trustworthiness at 0.625. In this sense,

the interactions were able to explain 61.7 percent of the variance of customer e-loyalty; these being security and privacy.

Predictive relevance Q^2 generally assesses the predictive validity of the endogenous constructs in a complex model (Chin, 1998). Specifically, Q^2 can be assessed through cross-validated communality and cross-validated redundancy. As recommended by Chin (1998), if a cross-validated redundancy reaches $Q^2 > 0$ or the cut-off value of $Q^2 > 0.5$, it implies that the model of study has predictive relevance, whereas, if $Q^2 < 0$, it means that it lacks predictive relevance (Hair et al., 2017). In this study, customer e-loyalty was predicted by two major independent variables (security and privacy) and the only mediator (trustworthiness). This study obtained a highly predictive model.

Table 3: Path Co-Efficient and Testing of Hypothesis

Hypothesis	Relationships	Path Coefficient	t-value	Decision
H1	Security -> trustworthiness	0.502	8.423**	Supported
H2	Privacy -> trustworthiness	0.339	3.333**	Supported
H3	Security -> e-loyalty	0.188	2.967**	Supported
H4	Privacy -> e-loyalty	0.141	2.343**	Supported
H5	Trustworthiness -> e-loyalty	0.519	8.872**	Supported
H6	Security->trustworthiness->e-loyalty	0.502	11.375**	Supported
H7	Privacy->trustworthiness->e-loyalty	0.339	7.550**	Supported

*Note: *P<0.05, ** P<0.01*

The researcher has tested the overall fit-of-path model using PLS path analysis modelling. A global fit measure (GOF) was performed to determine the overall prediction power of a complex model (Hair et al., 2017). The outcome of 0.639 (R^2 average is 0.617, while the AVE average is 0.661) highlights that the model is above the required large effect sizes R^2 value of 0.36 (the largest cut-off value). Therefore, the results confirmed that the proposed PLS model was sufficient. The formula for calculating GoF is shown below:

$$GoF= \sqrt{\overline{(AVE)} \times \overline{(R^2)}}$$

DISCUSSIONS

Underlying this study is the notion of security and privacy being the main impediments towards internet shopping. Website security has been recorded as an important concern among internet users. The results we obtained were not surprising. Earlier studies such as Constantinides (2004); and Yoon (2010) have proven that such relationships do exists.

In addition, this study also found that website privacy drives customer e-loyalty. This significant finding may stem from privacy being a growing factor of importance in customers' satisfaction of online services (Ackerman & Davis, 2016; Liang & Shiau, 2018; Martin, 2018; Mohammed & Tejay, 2017). Concerns of privacy often surface because of the emergence of new information technologies. Many customers are resistant to provide their personal data such as bank account information to web retailers because they are incognisant of the e-retailers' security measures in protecting their personal information. Additionally, trust also

reduces perceived risks in e-transactions when e-consumers or e-shoppers do not have any direct interaction with the e-retailers. This reflects trustworthiness originates from consumers who willingly share their attitude to e-purchasing based on their previous experiences.

Collectively speaking, customers with a positive awareness on security and privacy increases the level of trust they have on the e-retailer. In turn, this translates into increase in e-loyalty, increase in revisit frequency and eventually boosts the e-retailers' returns. It is therefore valid to conclude that in this information age, protecting the privacy of e-users, and preventing unauthorised use and disclosure of personal data are two imperative elements on websites, especially in handling private information.

IMPLICATIONS

The overall current findings of this study are informative and can be used as a basis for future researchers, who are interested in study on online shopping or activities in Malaysia.

The findings provide valuable insights that add a new body of knowledge in online e-loyalty literature. In addition, the findings also enhance knowledge of online services and consumer attitudes and behaviours in the Malaysian context. Examination of the proposed constructs and effects of trustworthiness forms a new knowledge base for future researchers who aspire to explore the influences on internet user behaviour. Relatively, e-retailers should realise the importance of building online customer loyalty which has to be proceeded with the establishment of trustworthiness.

Practically, the findings may also assist Malaysian e-retailers in understanding the key factors of business-to-consumer interactions and methods to capture a larger number of online shoppers. These key factors are relevant to help e-marketers in identifying and improving ways to attract more Malaysian consumers to shop online. This research particularly details the area of trustworthiness in the online context. Hence, in a highly competitive internet environment, Malaysian online retailers should develop an in-depth understanding on how to build sustainable customer e-loyalty in order to stay relevant and enduring.

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