Impact of Cybercrime and Trust on the Use of E-Commerce Technologies: An Application of the Theory of Planned Behavior

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Abstract

Cybercrime issues across many economies are increasing at a faster rate. The rapid diffusion and penetration of the internet, as well as the processes of digitization of economic activities, have been the major catalysts. These cybercrime activities continue to pose a serious threat to e-commerce technologies and influence consumers' intention to conduct transactions using such a medium. Considering the upsurge of cyber-crime activities and the paucity of research in this domain, particularly in developing countries, this paper investigated how cyber-crime and trust affect users' intention to conduct business via e-commerce technologies. Using a survey approach, an online questionnaire was distributed and data from 476 participants was rigorously analyzed using Partial Least Square Structural Equation Modelling. The results indicate that trust in internet media, attitude towards behavior, subjective norm, perceived behavioral control and cyber-crime perceptions are significant predictors of intention to purchase using e-commerce technologies. The findings elucidate businesses and stakeholders on the impacts of trust and cybercrime perceptions on users' purchase intentions. It further brings to the fore the need to incorporate security features that reduce the vulnerability of e-commerce platforms.

Keywords: Cybercrime, E-Commerce, Trust, Consumer Behavior, Perceived Risk, Theory of Planned Behavior, Purchase Intention, Ghana.

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Introduction

E-Commerce also referred to as Electronic Commerce is the use of information technology, including the Internet, computer, and other electronic devices, for buying, selling, transferring, and exchanging products, services, or information (Rezk, Barakat, & Saleh, 2017). E-commerce offers a lot of opportunities to businesses from small and medium scale enterprises (SMEs) to large scale industries (Leena, 2011). Businesses believe that the use of e-commerce offers numerous opportunities and advantages to their operations (Wirtz *et al.,* 2010, Fang *et al.*, 2014). The merits associated with the use of e-commerce include access to global and international marketplace, reduction in cost of operation, mass customization, high rate of competitive advantage and trading 24 hours in e-commerce (Kartiwi, 2006). E-commerce offers opportunities for firms to save time and also become cost-effective. As a result, e-commerce has positive effects on businesses as it increases the effectiveness of business operations and enhances financial performance of firms.

Globally, e-commerce transactions are faster and have become the preferred means of transacting business internationally as compared to traditional or physical business (Fang *et al.*, 2014). Rapid Internet usage and powerful handheld devices, as well as tremendous advancement of technology, remain the major factors contributing to the evolution of e-commerce technologies (Gantayat & Giri, 2016). The web and the Internet provide an essential medium for facilitating e-commerce transactions and technologies. Over the years, the Internet has facilitated the growth in the use of e-commerce thereby allowing many firms to adopt various e-commerce models (Gibbs & Kraemer, 2004). Since there are differences in the nature of market operations as well as resource strengths, the adoption and integration paths of e-commerce technologies by firms in their business operation also differs (Boateng, Molla, Heeks, & Hinson, 2011).

E-commerce technology adoption is increasing, and this has opened avenues for cybercrime activities (Johnson, 2016; Gantayat & Giri, 2016). Cybercrime issues across many economies are increasing at a faster rate (Gamreklidze, 2014). The rapid diffusion and penetration of the internet, as well as the processes of digitization of economic activities, have been the major catalysts. As a result, cybercrime issues in Africa seem to be the worst. Amidst the staggering activities such as human trafficking, financing of terrorism and money laundering, incidents such as credit card fraud, SIM-box fraud, cyber terrorism, Email spoofing, phishing, and false identification have surged considerably (Rezk et al., 2017). In 2018, the Bank of Ghana banking cyber fraud report revealed that cyber fraudsters steal or attempted to steal 325.9 million Ghana Cedis (61.5 million US Dollars) from financial institutions operating in the county (Bank of Ghana, 2019). Cybercrime, therefore, hinders the smooth development of the country's economy (Baylon & Antwi-Boasiako, 2016).

Ghana has consistently recorded growth in its economy over the past few years. In 2019, the International Monetary Fund predicted the Ghanaian economy to be the fastest-growing economy in the world, with a growth rate of 8.8 percent (Naidoo & Wallace, 2019). The country's economic growth has in part been attributed to the processes of digitalisation with most services being offered through online and automated services. The banking and financial industries have been at the centre of the digitisation of the Ghanaian economy. Due to the digitisation, internet penetration has become central to the country's economic development (Baylon & Antwi-Boasiako, 2016). However, the tremendous Internet penetration has brought a steady increase in cybercrime activities (Warner, 2011).

The reliability of the internet connection is further anticipated to provide opportunities for cybercriminals to engage in illicit activities online, thereby increasing the number of people who are likely to fall, victim.

Although e-commerce has increased during the last years around the world, many users, especially in developing countries, do not trust e-commerce to complete their purchase. It is therefore imperative to empirically examine the factors that account for users' distrust in e-commerce technologies so as to override any obstacle that may derail e-commerce technology adoption and its usage. Currently, research that discusses country-specific cybercrime perception and its influences on e-commerce purchase intention are scarce (Boateng *et al.*, 2011). This paper adopts the Theory of Planned Behavior (TPB) (Ajzen, 1991) as the theoretical lens to explore the study constructs. Cybercrime Perception, Trust of Sellers and Trust of Internet Medium are integrated with the relevant constructs of TPB. The question this paper seeks to address is how cybercrime perceptions and the various dimensions of trust affect users' intention to use e-commerce technologies. In doing so, we attempt to answer the calls for investigations into country-specific cybercrime and e-commerce activities. Our findings will enlighten stakeholders on the extent to which the proposed relationships affect users' purchase intention.

Literature Review / Related Works

Cybercrime is the threat caused by irresponsible actions of computer and internet users who take advantage of the vulnerabilities associated with the computer networks and the internet medium to perpetrate crime (Bendle, 2019). Cyber-crime is often perpetrated by organized groups (Levi, 2008), with the potential of causing large magnitude of losses. According to Hawkins, Yen, & Chou (2000), the openness of the Internet medium allows everyone access, creating an open medium for cybercrime activities. Furthermore, anonymity on the Internet hides the intentions of cyber-criminals (Laudon & Traver, 2016), thus making it more challenging to address cyber-crime activities. In essence, business transactions involving the use of the Internet poses significant threats or risks to both customers and vendors alike if the necessary security measures are not put in place. (Patel, Patel, Patel, & Pathrabe, 2017). Losing money through Internet purchases due to cybercrime affects both businesses and customers. Indeed Boateng et. al., (2011) suggest that cybercrime activities have the potential to stall development in less advanced countries.

Crimes mostly associated with the use of the Internet include fraudulent sales online, electronic fund transfer, identity theft/crimes, advance fee schemes and fraudulent investment (Clough, 2010). The risk associated with e-commerce business transactions is a source of worry for many due to the activities of cyber-criminals. Therefore, for successful business transactions using the Internet, measures must be put in place to safeguard the security of both customers and businesses (Apau, Koranteg, & Adu, 2019). Many less developed countries have made significant strive towards the adoption of e-commerce technologies. However, notorious computer users continue to take advantage of the vulnerabilities associated with the Internet medium and computer networks to perpetrate crimes against users (Warner, 2011). Perpetrators of cyber-crime identify weaknesses and vulnerabilities in e-commerce technologies, exploit the weaknesses and take advantage of victims using various means (Patel *et al*, 2017).

Internationally, cybercrime and other criminal activities on the internet are on the rise. Warner (2011) attributes the increasing cybercrime activities to the inability of security agencies to have the necessary legal framework to deal with perpetrators. The diverse views on the prosecution of cybercriminals have also contributed to the non-standardized and lack of common legal framework for cybercrime prosecution (Brenner & Koops, 2004). The major challenge has been the application of the law of jurisdiction (Brenner, 2007). Currently, opinion on how cybercrime perpetrators should be punished is divided. Whereas some school of thought believes it should be the country where the internet service provider is located, others think it should be according to the laws of the country where the website is located. Many others also advocate for the person to be punished according to the laws of the country where the crime was committed (Brenner, 2007). All these challenges have contributed to consumer fear with regards to the safety of their online transactions, thereby making them distrustful of e-commerce technologies and associated platforms.

Many researchers have studied the effect of cybercrime on e-commerce transactions from different perspectives. Henson (2011) examined the extent to which the fear of cybercrime victimization and perceived risk affect customers' intention to purchase using e-commerce platforms. Using data collected from undergraduate university students of Cincinnati, the study found that, a larger proportion of the study respondents are worried about the fear of becoming victims of cybercrime. This fear, however, influences people's online behavior towards e-commerce transitions. Rofiq (2012), similarly conducted an empirical investigation into the effect of cyber fraud and trust with the online purchase intention of Indonesian consumers. Using the theory of Planned Behavior, the study results show that perceptions of cyber fraud have a negative effect on e-commerce transactions. Studies have further shown that the perception of cybercrime is not only prevalent in developing countries. A study conducted by Bohme and Moore (2012) found that cybercrime perceptions affect European citizens' intention to engage in online shopping, online banking, and other electronic transaction platforms. On the contrary, persons that have not heard anything about cybercrime are more willing to use online and electronic technologies for transactions.

E-commerce transactions must be safe for both sellers and buyers. In using the internet for any business transaction, trust is considered an important and significant indicator. (Rofiq & Mula, 2010). Thus, all antecedents of trust including institutional trust (trust of e-commerce sellers), technological trust (trust of internet medium) and service trust (trust in e-commerce) have a significant influence on consumers' purchase intention (Salel, Resk, & Barakat, 2017). Gefen, Benbasat, and Pavlou (2008) have highlighted the need to investigate the effects of trust on e-commerce activities, particularly within a social context. An empirical study conducted by Mukherjee & Nath (2007) examined consumers' intention to purchase through e-commerce. Mukherjee & Nath (2007)'s study re-examined commitment trust theory and found that trust and commitment positively affect consumers' purchase intention. Kim, Yim, Sugumaran, and Rao (2016), also examined consumers' purchase intention and e-commerce technologies and found that trust and benefits positively affect consumers' purchase intention, risk negatively affects purchase intention and trust negatively influence risk. Dai and Palvia (2009) conducted a cross country study in China and USA to examine customers' intention to use mobile commerce. The study found that consumers' intention to purchase using mobile commerce in China is influenced by subjective norm, perceived ease of use, and perceived

usefulness, whereas perceived innovativeness, compatibility, ease of use and perceived usefulness are the determinants of the use of mobile commerce in the USA. Consumers' intention to re-purchase through e-commerce technologies were examined by Zhang et al. (2011). The study revealed that quality online relationships and perceived usability of the website are predictive indicators of consumers' re-purchase intention. Salel et. al., (2019), found that cybercrime perception, trust of internet medium and the trust of sellers have an effect on Egyptian intention to purchase using e-commerce. In assessing the effect of consumer product evaluation and trust on repurchase intention, Sullivan and Kim (2018), found that perceived value and trust are the major determinants of consumer repurchase intention using e-commerce. Similarly, perceived risk perceived privacy and trust were found to the main predictors of user adoption of e-commerce in Sri Lanka (Aboobucker, 2019). Many more other studies have evaluated the dimension of trust on consumers' intention to purchase using e-commerce platforms (Abyad, 2017; Hallikainen, Laukkanen, 2018; Oliveira, Alhinho, Rita, & Dhillon, 2017; Ribadu & Rahman, 2019; Wen, Du, Ren, & Pan, 2019).

The review has shown that studies examining consumers' purchase intentions through the use of e-commerce and their cybercrime perceptions are limited. Perceived risk and trust remain the most used constructs that examine the purchase intention of e-commerce consumers. This paper employs cybercrime perceptions and trust as predictors of e-commerce purchase intention. The cybercrime perception is derived from perceived risk (Im, Kim & Han, 2008), and fear of crime (Warr, 2000). A lot of the studies conducted on consumer purchase intention using e-commerce were predominantly done across Europe and the United States. Therefore, it is important to test if concepts validated in these countries are applicable to countries where e-commerce is gradually emerging. Therefore, studying these concepts in Ghana, West Africa, which is currently undergoing the processes of digitization adds to the body of knowledge and empirical literature on the phenomena.

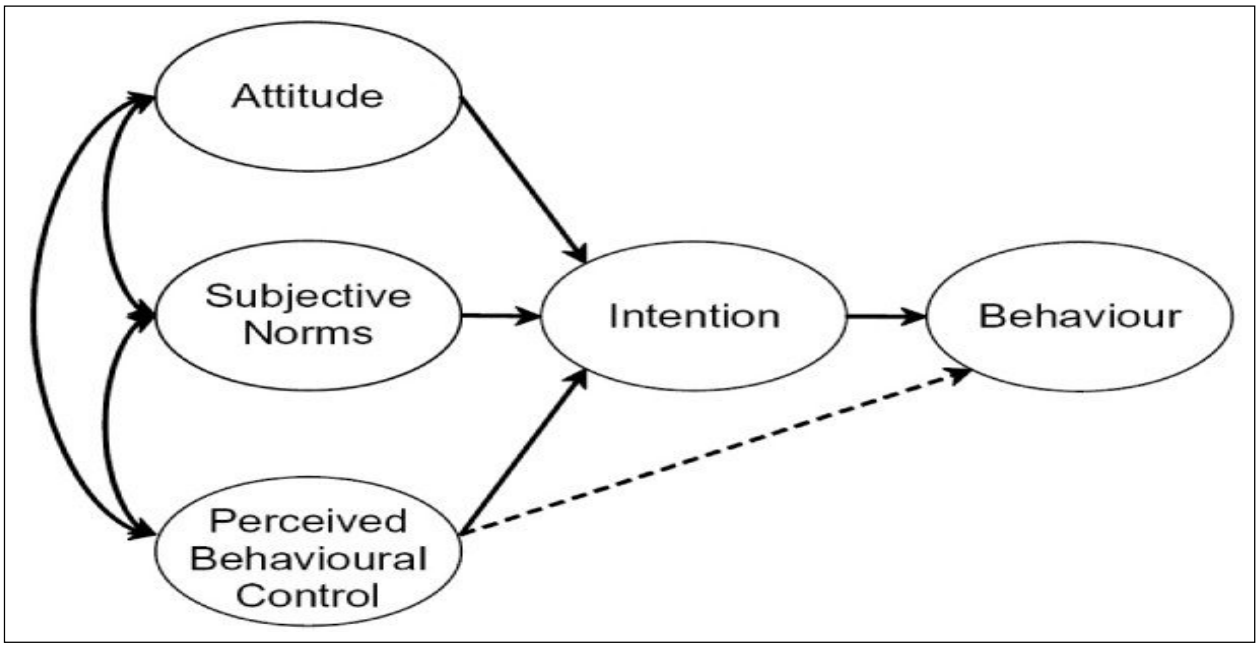
Theoretical Framework

1. Theory of Planned Behavior

This study adopted the Theory of Planned Behavior (TPB) as the theoretical foundation underpinning the research. TBP is considered as one of the most classic theories of persuasion, acceptance, and use of technology. The theory emerged as an extension of the Theory of Reasoned Action (TRA) (Fishbein & Ajzen (1975). The theory is used to explain the relationship between attitude and behavior in humans and is also used to predict how individuals behave based on their pre-existing attitudes and behavioural intentions. Ajzen (1991) believed that attitude towards behavior, perceived behavioral control and subjective norm are the three basic determinants of intent. Behavioral intention is the likelihood and willingness to perform certain behaviour (Zhang *et al,.*2011). According to Cohen, Ding, Lesage and Stolowy (2008) attitude is measured by people's belief that behaviour leads to some outcome that can be favorable or unfavorable. Subjective norms, however, is the degree to which a person thinks that the importance of other people influences their behavior (Chen & Lu, 2011). Perceived behavioral control is considered an important aspect for consumers given the attitude towards certain behavior and the reference group of others within the society (Sun, Law,

& Schuckert, 2019). Perceived behavioral control refers to the potential constraints of intended actions, such as available resources and opportunities. Thus, perceived behavioral control refers to the ability of individuals to control a given behavior (Hsu and Huang, 2012). TPB has been employed in many studies that examine decision-making processes, including online shopping intention (Chuchinprakarn, 2005; Fortes & Rita, 2016; Pappas, 2016; Lim et al., 2016; Van der Heijden, Verhagen & Creemers, 2003), M-commerce adoption (Gangwal & Bansa, 2016; Mansyur, Hariadi, & Andayani, 2018) and Mobile and internet banking intention (Khasawneh & Irshaidat; 2017; Shankar & Kumari, 2016). This paper adopts TPB because it is one of the most used theories in the field of e-commerce that has successfully been used to explain and predict users' behavior. Figure 1 shows the constructs of the original TPB.

Figure 1. Constructs of the Original TPB

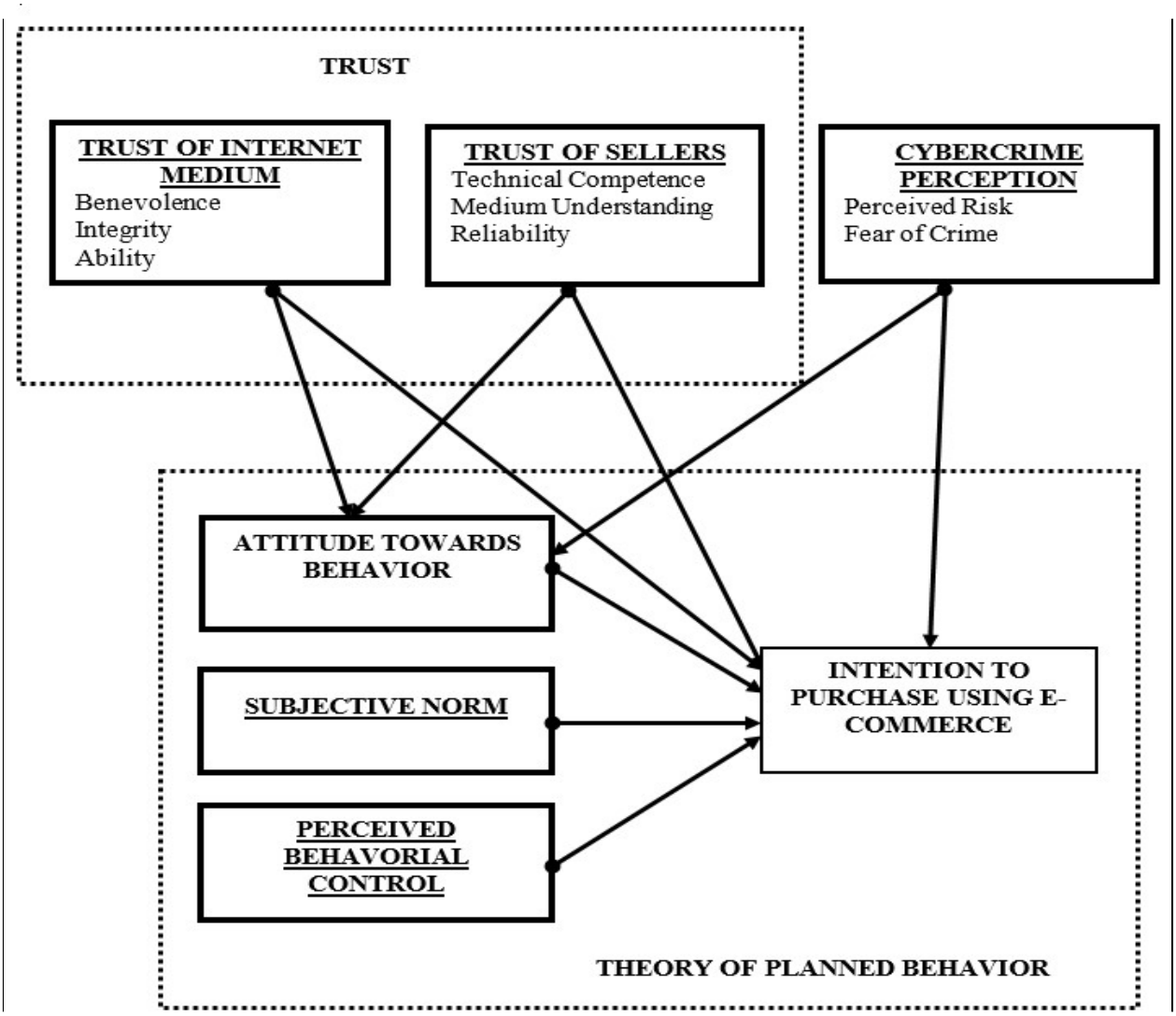


2. Conceptual Model

The conceptual model proposed in this study integrates cybercrime perceptions, trust of Internet medium and trust of sellers with the Theory of Planned Behavior (Fishbein & Ajzen, 1975). Trust of sellers comprises three dimensions including ability, benevolence, and integrity (Mayer, Davis & Schoorman, 1995), whereas trust of the internet medium consists of an understanding of the medium, reliability and technical competence (Lee & Turban (2001). The proposed model postulates that cybercrime perceptions, trust of sellers and trust of internet medium directly affect attitude towards behavior and e-commerce purchase intention. The assumption made in this paper is that, the perception of users on the existence of cybercrime is not only attitudinal but also intentional. This could be as a result of users' online experiences or opinions of people they know. Therefore, users develop an attitude towards cybercrime and become conscious of falling victims to such criminal activities online. By so doing, users become intentional in their choices and transactions online. This, therefore, means that their trust in e-commerce technologies

become attitudinal and intentional. Furthermore, it is suggested that subjective norm and attitude towards behavior influence e-commerce purchase intention. Hypotheses are therefore postulated based on this conceptual model, to test the relationships between the constructs. Figure 2 illustrates the conceptual model for the study.

Figure 2. Conceptual Framework (Authors' Construct)



3. Hypothesis Formulation

Trust remains a critical antecedent that influences many businesses. Trust demonstrates the partners' commitment to trust business contracts. (Lee *et al.*, 2011), Koranteng, Wiafe, and Kuada (2019) argue that the fear of being exploited by others is eliminated when trust exists between individuals. Thus, confidence in business relationships is increased by trust and plays a significant role in the quality and nature of business transactions that often exist between sellers and buyers (Lee, 2009). Tung *et al.* (2008), El Said and Galal-Edeen

(2009) and Kim *et al.* (2008) have all demonstrated that trust of sellers positively influences e-commerce purchase intention. Therefore, hypothesis one is formulated as follows:

Hypothesis 1: Trust of e-commerce sellers positively affects e-commerce consumers' purchase

The trust of the seller in e-commerce transactions is an important factor influencing individuals' attitudes to purchase using online services. In China and the USA, evidence by previous studies suggests the effect of trust of sellers on the desire of consumers to purchase or transact business using electronic business services (Pavlou & Chai, 2002). This, therefore, means that, as consumers trust in online sellers' increases, their attitudes towards behaviour of online purchases also increase. In an empirical study of consumers' e-commerce purchase intention which conducted by El Said and Galal-Edeen (2009), the study results showed that the trust of e-commerce sellers have a positive impact on the behavioral attitude intention to purchase through online means. Hypothesis two, therefore, is stated as follows:

Hypothesis 2: Trust of e-commerce sellers positively impacts consumers' attitude towards behavior

Confidence in technology and its features are imperative in influencing users' perceptions and attitudes. Naturally, people are reluctant to adopt technologies if they have concerns. Kaplan & Nieschwietz (2003) empirically prove that customers are hesitant to perform transactions on e-commerce platforms because of the lack of trust in the Internet medium. Several studies have demonstrated the positive effects of consumers' trust in technology and its influence on attitude towards e-commerce technologies (Grazioli & Jarvenpaa, 2000; Wu & Chen 2005; Dinevet et.al., 2008). The online behavior of consumers, their desire to engage in business activities or commerce using online technologies will be based on the trust and confidence the consumer has for the medium in which the transaction is taking place. Consumers are aware of the vulnerabilities associated with internet technologies, as such e-commerce consumers will prefer to transact business with vendors that have the necessary infrastructure to protect their interest whiles they are online. As consumers' Internet medium trust increases, their attitude towards the use of e-commerce to transact business will be positively increased. In accordance with these empirical studies, hypothesis three postulates that:

Hypothesis 3: Trust of the internet medium positively influence e-commerce consumers' attitude towards behavior

Customers' desire to use e-commerce technologies for business transactions is significantly influenced by the role of technology. Technology remains an important precursor in encouraging and facilitating customers' business transactions through the use of e-commerce technologies. However, there is hesitation on the part of many people to transact business using e-commerce technologies due to lack of trust with the Internet medium (Kaplan & Nieschwietz 2003). Tung, Chang & Chou (2008) have also pointed out that trust of a system positively influences the decision to use electronic logistics information systems. This, therefore, means that if trust is achieved or maintained,

customers will be comfortable in transacting business using online or e-commerce. Therefore, fourth hypothesis is stated as follows:

Hypothesis 4: Trust of the Internet medium positively impacts consumers e-commerce purchase intention

The perceived risk serves as barriers to the success of e-commerce transactions and technologies. Negative perceptions reduce individuals' commitment and willingness to transact business using online services (Rofiq *et al*, 2011). Studies have further demonstrated that perceived risk negatively affects customers' attitudes towards online purchases (Lee, 2009; Dinev*et al*. 2008-9). Due to the continuous activities of online fraudsters and cyber fraud activities such as credit card fraud, phishing, man in the middle attacks, auction fraud, identity theft, and many other online related crimes, many consumers have a negative attitude towards online transactions for fear that, they will be victims of crimes on the Internet. According to Lee (2009), the negative perception of people towards online business transaction consequently has effects on the attitude to conduct business using online technologies. This, therefore, means that cybercrime perceptions of e-commerce consumers negatively affect their attitude towards behavior of e-commerce technologies. This study postulates hypothesis five as follows:

Hypothesis 5: Cyber-crime perceptions negatively impacts attitude towards behavior

As already mentioned, perceived risk poses great obstacles to the successful execution of e-commerce transactions. Due to risk, customers are not willing to conduct business or purchase items on the Internet using e-commerce technologies. Kim *et al*. (2008) opined that perceived risks negatively impact consumers' intention to purchase using online technologies. Fear of crime in online environment also contributes negatively to e-commerce transactions (Dinev, Hu & Yayla (2008). The perception of people that crime will be committed against them through their online purchases will prevent them from engaging in online transactions. Hypothesis six is therefore postulated as follows:

Hypothesis 6: Cyber-crime perceptions negatively impacts consumers' intention to purchase through e-commerce.

According to Cohen, Ding, Lesage and Stolowy (2008) attitude is measured by people's belief that a behaviour leads to some outcome that can be favorable or unfavorable. Attitude toward behaviour is explained in the e-commerce adoption as the evaluation of a person's desire to transact business through the use of e-commerce technology. Several studies previously conducted have revealed that 'attitude towards behavior' positively impact online purchase intentions. Chen & Li (2010) found that 'attitude towards behavior' has a positive influence on the intention to use e-services. Other studies that have shown positive relationship between attitude and purchase intention include Kim *et al* (2008), El Said and Galal-Edeen (2009), Crespo and Bosque (2008) and Yu and Wu (2007). This study, therefore, formulates hypothesis seven as follows:

Hypothesis 7: 'Attitude towards behavior' positively influences consumers' e-commerce purchase intention.

Subjective norms, however, is the degree to which a person thinks that the importance of other people influences their behavior (Chen and Lu, 2011). The applicability of subjective norms in e-commerce stem from the perceived social pressure pertaining to conducting business using e-commerce (Rofiq *et al*, 2011). In e-commerce technologies, numerous studies have demonstrated that subjective norms positively influence the intention to transact business through the use of e-commerce technologies. Several studies conducted in the past have shown a positive association between subjective norm and the consumer's e-commerce technologies purchase intention (Crespo & Bosque, 2008; Lim & Dubinsky, 2005). In addition, Yu and Wu (2007) in their study empirically demonstrated that a positive relationship exists between subjective norm and purchase intentions. Hypothesis eight is there formulated as follows:

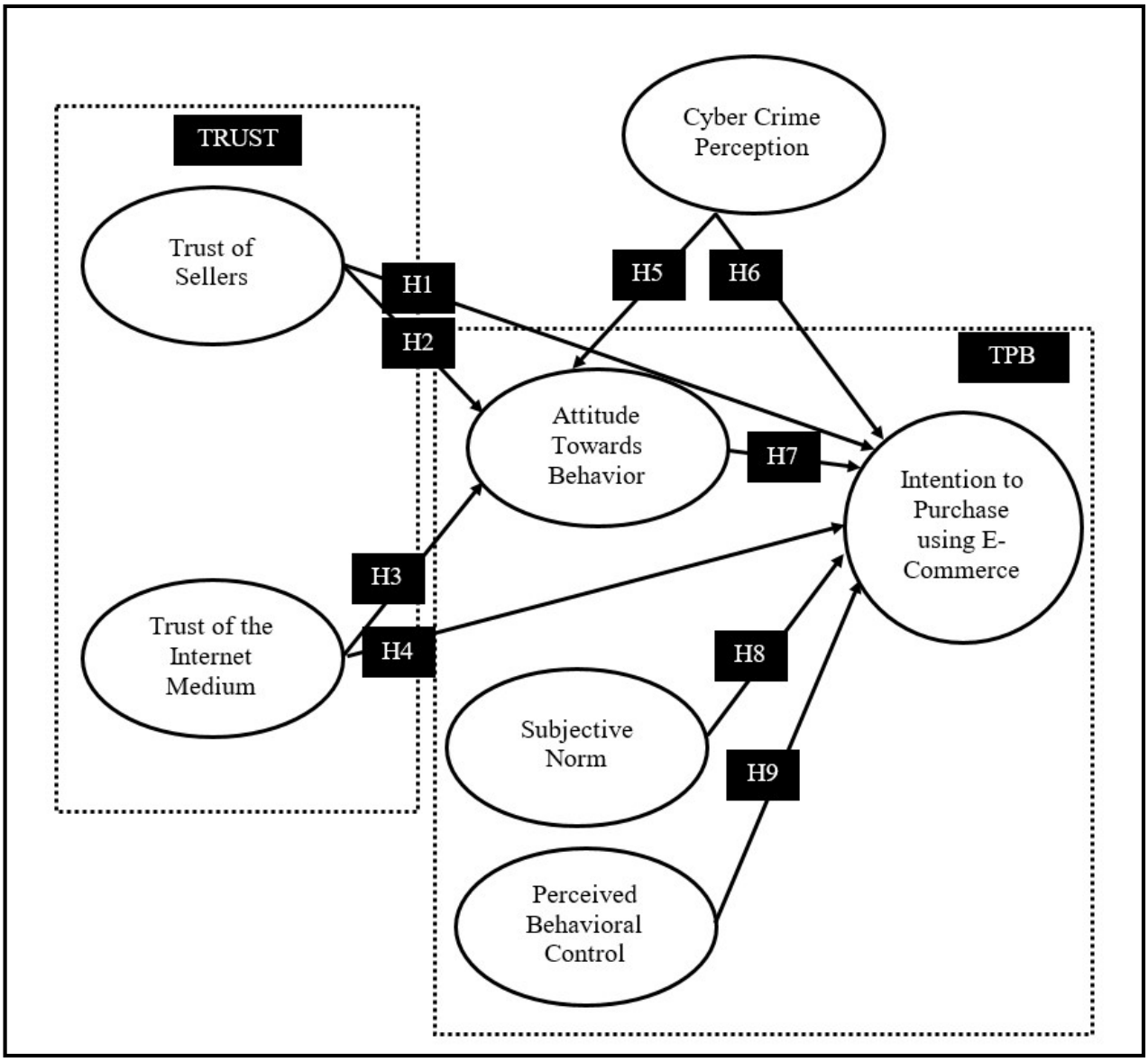
Hypothesis 8: Customers' subjective norm positively impacts consumers' e-commerce purchase intentions.

Perceived behavioral control is considered an important aspect for consumers given the attitude towards certain behavior and the reference group of others within the society (Sun, Law, & Schuckert, 2019). Perceived behavioral control refers to the potential constraints of intended actions, such as available resources and opportunities. Thus, perceived behavioral control refers to the ability of individuals to control a given behavior (Hsu and Huang, 2012). Related to intention to commit to transactions using e-commerce, George (2004) demonstrates that perceived behavioural control affects intentions to purchase through the Internet. Chen and Li (2010) also present that perceived behavioural control has a direct influence on continuous e-service usage intentions. This finding is similar to a report of Lim and Dubinsky (2005) that perceived behavioural control affects purchase intentions on the Internet. Perceived behavioural control is a perception of ease or difficulty that controls performing a transaction using e-commerce. In this regard, hypothesis nine is postulated as follows:

Hypothesis 9: Customers' perceived behavioral control positively impacts consumers' e-commerce purchase intentions

Based on the stated hypothesis, a model was therefore postulated to show the relationships between the various hypotheses that have been formulated. Figure 3 demonstrates the hypothesized model for the study.

Figure 3: Hypothesized Model (Authors' Construct)



Methodology

a. Data Collection

This research seeks to deductively predict users' intention to purchase using e-commerce technologies. To be able to draw a generalized conclusion based on the population sample, a survey research approach was adopted to prove or otherwise the validity of the hypotheses developed (Saunders et al., 2009). An online questionnaire was adopted as the primary instrument for collecting data for this paper. Links to the online questionnaire was disseminated through social media platforms in Ghana. Additionally, a self-administrated questionnaire was distributed. This method has gained popularity in

recent times and has been widely used. Previous studies conducted by Hansen *et al* (2004), Jensen *et al.* (2005), Liao *et al.* (2007), Murphy and Blessinger (2003) and Rofiq and Mula (2010) which examined similar subject in different jurisdiction all made use of online questionnaires. More recently, Merhi, Hone, and Tarhini (2019) adopted the same procedure to collect data which was used to examine Lebanese and British consumers' intention to use mobile banking services. While this approach was to ensure the questionnaire was widely distributed, responses were only limited to Ghanaians.

The questionnaire consisted of two parts. The first part comprised six closed-ended questions determining the demographic characteristics of the study respondents through the use of nominal scale. The demographic variables included age, gender, education, occupation, use of e-commerce and cybercrime experience. The second part included the TPB model items which were adopted from previous studies. The TPB constructs included: (i) Customer Subjective Norm (CSN) (ii) Attitude Towards Behavior (ATB) (iii) Perceived Behavioral Control (PBC) and (iv) Consumer's E-commerce Purchase Intention (IPE). These constructs were measured using three items each. In addition, three items were also adopted to measure the integrated constructs, thus; (v) Trust of the Internet Medium (TIM) (vi) Trust of E-commerce Seller (TES) (vii) Cyber Crime perception (CCP). Most of the question items were adopted from prior studies (appendix one).

This study adopted non-probabilistic, convenience sampling technique specifically for the data collection. This method was employed, as it enables the researcher to collect data from potential participants of the study based on their availability. The period of the data collection was between June and August 2018. Respondents who were willing to participate in the study were asked to report their opinions on a set of five-point Likert scale questions related to the factors that influence their e-commerce purchase intentions. Nonetheless, all the questions were pretested with 20 initial participants to validate their reliability with all Cronbach's alpha values greater than 0.7. Following the pre-testing of the questionnaire, four questions were subsequently modified. Participation in this study was entirely voluntary and no financial reward was offered to the study participants.

b. Data Analysis

Partial Least Square Structural Equation Modeling (PLS-SEM) was used in the evaluation of the hypothesized model. PLS-SEM is a statistical technique that allows researchers to simultaneously test and estimate a hypothesized relationship in a given conceptual model in order to establish the possible correlation between dependent and independent variables (Sarstedt, Ringle, & Smith, 2014). PLS-SEM is based on the iterative approach that maximizes the explained variables of endogenous constructs (Hair, Sarstedt, Hopkins, & Kuppelweiser, 2014). Contrary to the Covariance-Based (CB) SEM which aims to confirm theories y determining how well a model can estimate a covariance matrix for the sample data, PLS-SEM operates very much like multiple regression analysis (Hair, Ringle, & Sarstedt, 2011). The PLS-SEM approach provides potent techniques for validating the measurement model and also for the estimation of the structural model. Thus, PLS is effective for observing the relationship between latent variables (Hoyle, 1995). According to Hair, Hult, Ringle, and Sarstedt (2016), PLS is appropriate for research that extends existing theory and in situations where the research goal is to predict the effects of target constructs. Moreover, unlike other covariance-based techniques, PLS is robust to errors from a multivariate distribution (Gefen, Rigdon, & Straub, 2011). PLS-

SEM has received considerable attention in recent times across many disciplines including marketing (Hair, Ringle, Sarstedt, & Mena, 2012), management information system (Ringle, Sarstedt, & Straub, 2012) and operations management (Peng & Lai, 2012). PLS requires that the sample size should be ten times larger than the number of structural paths directed at a target construct in a structural model hence, suitable for this study. Also, PLS-SEM was considered appropriate for this study due to its applicability in a situation where a transition between dependent (exogenous) and independent (endogenous) variables occurs as in the case of behavioral intention (IPE).

Results

1. Descriptive Analysis

The data were screened for missing data and duplicate responses. The results as shown in table 1 indicate that the missing value for all 21 indicators is zero, as such the 476 responses were used for the final data analysis. This means that all 476 respondents who participated in the survey completed the questions perfectly. Missing data does not exist and as such further treatment for missing data is not required. The initial model consisted of seven constructs and 21 indicators. These are TIM, TES, ATB, CCP, CSN, PBC and IPE. Each of them consisted of three items each. The mean for all items was above 3. The mean for all the items ranged between 3.025 and 4.789. This implies that majority of the respondents indicated generally positive responses to the factors under consideration. In order to ensure the accuracy of the data for further analysis, the test of normality was conducted. The Partial Least Square (PLS) analysis of the data shows absolute kurtosis values range from 0.061 (CSN1) to 1.22 (CCP3) and the absolute skewness values also range from 0.165 (ATB2) to 1.098 (CCP1) (Table 1). The maximum kurtosis value achieved from the test was 1.22 while the test achieved a maximum skewness value of 1.098. The normal range of kurtosis and skewness is ±2.58 as indicated by Tabachnick and Fidell (2007). This presupposes that all the items were found to be normally distributed since their kurtosis and skewness were found to be less than ±2.58. Based on the kurtosis value and skewness value obtained in this study, the assumption of normally distributed data is achieved; hence PLS-SEM analysis of measurement model and structural models were estimated. Table 1 shows a detailed analysis of normality.

All respondents indicated that they had used e-commerce before as shown in Table 2. An analysis of the respondents' demographics indicates a male majority of 82.4% whereas female representation was only 17.6%. Also, respondents below 30 years were recorded as majority (75.6%), 22.7% were between 30 and 50 years whilst 1.7 were above 50 years. Majority (74%) of the respondents were having undergraduate degree with the remaining (26%) having postgraduate degrees. Moreover, 42.9% representing majority of the respondents were students, 25.2% were professional workers, and 16.8% were self-employed with 15.1% being academics. In terms of the cybercrime experience of respondents, majority (63%) indicated that they have fallen victim to spam. Also, 40% have experienced investment fraud whereas 17% have encountered phishing mail. The rest are identity theft, credit card fraud, auction fraud, parcel courier email scheme representing 14%, 12%, 10%, and 5% respectively. Other types of cybercrime accounted for 4%. The summary of respondents' demographics is shown in table 2.

Table 1. Results showing the Test of Normality

Variable	*Mean*	*Standard Deviation*	*Kurtosis*	*Skewness*
TES1	3.899	0.879	0.967	0.618
TES2	4.429	1.875	0.549	0.488
TES3	4.336	1.802	-0.198	0.401
TIM1	4.218	1.927	0.747	0.829
TIM2	4.487	1.906	-0.127	0.381
TIM3	4.286	1.779	0.067	0.526
CCP1	3.429	1.602	0.201	1.098
CCP2	3.588	1.679	-0.586	0.736
CCP3	4.798	1.784	1.22	0.905
CSN1	4.605	1.891	0.061	0.364
CSN2	4.218	1.927	0.747	0.829
CSN3	3.025	0.783	-0.31	0.381
ATB1	4.832	1.781	0.2	0.735
ATB2	4.21	1.849	-0.678	0.165
ATB3	4.025	1.783	-0.31	0.381
IPE1	4.126	1.894	-0.985	0.176
IPE2	4.143	1.813	0.586	0.587
IPE3	3.034	0.859	0.164	0.579
PBC1	3.143	0.981	0.373	0.789
PBC2	4.328	1.988	0.866	0.94
PBC3	4.681	1.144	-0.535	0.347

Table 2. Demographics of Respondents

Demographics	*Value*	*Frequency*	*Percentage*
Sex			
	Male	392	82.4%
	Female	84	17.6%
Age			
	Below 30	360	75.6%
	30 – 50	108	22.7%
	Above 50	8	1.7%
Education			
	Postgraduate	124	26%
	Undergraduate	352	74%
Occupation			
	Student	204	42.9%
	Academic	72	15.1%
	Profession	120	25.2%
	Other	80	16.8%
Use of E-commerce	Yes	476	100%

	No	0	0%
Cyber Crime Experience**	Spam	300	63%
	Investment fraud	190	40%
	Phishing	86	17%
	Identity theft	70	14%
	Credit card fraud	49	12%
	Auction fraud	44	10%
	Parcel courier Email Scheme	26	5%
	Other	20	4%

Source: Field Data, 2018 *****Multiple Responses***

2. Measurement of Constructs

The study considered Coltman, Devinney, Midgley, and Venaik (2008)'s recommendation for analysis of measurement model. The item reliability, internal consistency, convergent and discriminant validity were studied. All constructs were modeled as reflective and item loadings were above the 0.7 threshold (Barclay, Higgins, & Thompson, 1995) (see table 2). Internal consistency was analyzed using Cronbach's Alpha. As other researchers prefer, composite reliability was also assessed (table 3).

Table 3. Item Loadings, Construct Validity and Reliability

Constructs	*Indicators*	*Loadings*	*Cronbach's Alpha*	*Composite Reliability*	*Average Variance Extracted (AVE)*
Attitude Towards Behavior	ATB1	0.845	0.763	0.863	0.678
	ATB2	0.845			
	ATB3	0.779			
Cyber Crime Perception	CCP1	0.825	0.786	0.827	0.615
	CCP2	0.752			
	CCP3	0.774			
Consumers' E-commerce Purchase Intention	IPE1	0.808	0.849	0.725	0.501
	IPE2	0.839			
	IPE3	0.838			
Perceived Behavioral Control	PBC1	0.790	0.742	0.788	0.567
	PBC2	0.795			
	PBC3	0.910			
Subjective Norm	CSN1	0.724	0.754	0.858	0.669
	CSN2	0.889			
	CSN3	0.833			
Trust of E-Commerce	TES1	0.823	0.741	0.853	0.659
	TES2	0.798			

Sellers	TES3	0.814			
Trust of Internet Medium	TIM1	0.830	0.714	0.838	0.635
	TIM2	0.799			
	TIM3	0.853			

Convergent validity was measured using Average Variance Extracted (AVE). As required by Wixom and Watson (2001) all AVE values were above 0.5. Discriminant validity was measured by comparing the square root of AVE of a latent variable against correlations with other latent variables (Fornell & Lacker, 1981). The diagonal values in table 4 show that all correlation values were greater than the AVEs of constructs as preferred by Fornell and Lacker (1981).

Table 4. Discriminant Validity Test (Fornell and Lacker Criteria)

	ATB	***CCP***	***IPE***	***PBC***	***SN***	***TES***	***TIM***
ATB	***0.823***						
CCP	0.679	***0.784***					
IPE	0.554	0.528	***0.708***				
PBC	0.396	0.421	0.394	***0.753***			
CSN	0.657	0.669	0.597	0.458	***0.818***		
TES	0.657	0.687	0.547	0.412	0.680	***0.812***	
TIM	0.535	0.506	0.712	0.320	0.564	0.539	***0.797***

The possibility of multicollinearity was also evaluated using Variance Inflation Factor (VIF). According to (Hair et al., 2016), VIF less than 3 is required. Table 5 shows the result of the multicollinearity test.

Table 5. Collinearity Assessment with Variance Inflation Factor

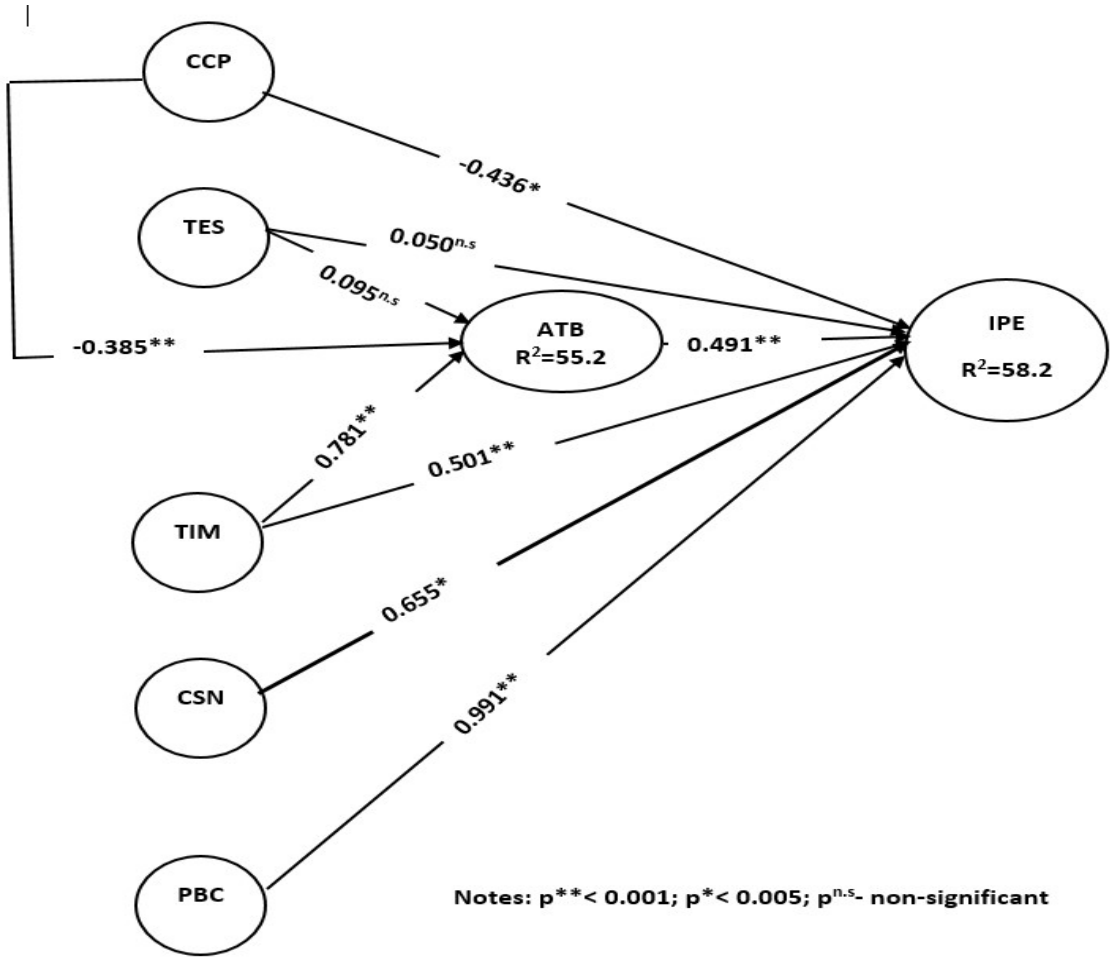
	ATB	***IPE***
ATB		2.351
CCP	1.992	2.490
PBC		1.320
CSN		2.532
TES	2.089	2.481
TIM	1.483	1.634

5.3. Structural Model

The bootstrap technique (100 samples) was adopted to estimate the structural model. Kock (2011) asserts that this approach is suitable when the sample size is greater than 100. Figure 4 shows the results of the PLS analysis. The R-Squared values are indicated in percentages whereas the path coefficients are shown on the arrows. Path coefficients were significant when p-values were less than 0.05. Figure 4 indicates that TIM, TES, and CCP

explained 55.2% of the variance in ATB. Moreover, CSN, PBC, ATB in combination with TIM, TES and CCP accounted for 58.2% of the variance of IPE.

Figure 3: PLS Analysis of Structural Model



Again, most of the proposed relationships were supported. Specifically, CCP (β = -0.385, p < 0.001) and TIM (β = 0.781, p < 0.001) significantly affected ATB. In addition, CCP (β = -0.436, p < 0.005), TIM (β = 0.501, p < 0.001), CSN (β = 0.655, p < 0.005), and PBC (β = 0.991, p < 0.001) had significant impacts on IPE. Meanwhile, TES failed to affect ATB (β = 0.095, p < 0.005) and IPE (β = 0.050, p > 0.005) respectively. In table 6, a summary of all the proposed relationships, their path coefficients, p-values ad whether they were supported or not are indicated.

Table 6. Significance of Path Coefficients

	Hypotheses	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Supported
TES -> IPE	H1	0.050	0.052	0.076	0.652	0.257	No
TES -> ATB	H2	0.095	0.004	0.063	1.662	0.087	No
TIM -> ATB	H3	0.781	0.779	0.054	3.328	0.000	Yes
TIM -> IPE	H4	0.501	0.499	0.055	9.065	0.000	Yes
CCP -> ATB	H5	-0.385	-0.378	0.053	7.192	0.000	Yes
CCP -> IPE	H6	-0.436	-0.428	0.062	5.575	0.003	Yes
ATB -> IPE	H7	0.491	0.494	0.070	6.313	0.001	Yes
CSN -> IPE	H8	0.655	0.657	0.068	2.274	0.002	Yes
PBC -> IPE	H9	0.991	0.995	0.049	8.862	0.000	Yes

As some researchers prefer, Stone-Geisser (Q^2) was also analyzed to complement the R^2 values. The results indicate all Q^2 values were greater than 0.2 thus proving the validity of the model (see table 7). Further analysis was performed to evaluate the total effects and effects sizes of the proposed relationships (Cohen's f^2). Effect sizes can be small irrelevant (<0.02); small (0.02); medium (0.15) or large (0.35).

Table 7. Effect Sizes, Total Effects and Stone-Geisser (Q^2)

	ATB	IPE	Q^2
ATB		***0.091*** 0.009	0.350
CCP	***0.385*** 0.166	***0.071*** 0.001	
IPE			0.265
PBC		***0.091*** 0.015	
CSN		***0.155*** 0.023	
TES	***0.295*** 0.093	***0.077*** 0.002	
TIM	***0.181*** 0.049	***0.518*** 0.367	

NB: Boldface Items represent Total Effects; Underlined Items represent Effect Sizes.

The results shown in table 7 indicate that TIM (0.049) and TES (0.093) had a small effect on ATB whereas that of CCP (0.166) on ATB was medium. Meanwhile, the effect of TES (0.002), CCP (0.001), ATB (0.009) and SN (0.015) on IPE were irrelevant. Moreover, whereas the effects of CSN (0.023) was small, that of TIM (0.367) on IPE was large.

Discussion

In this study, the Theory of Planned Behavior (TPB) was adopted as a theoretical lens to examine consumers' intention to make purchases using e-commerce. The theory was extended with relevant constructs (Trust of E-Commerce Seller, Trust of Internet Medium, Cyber Crime Perception) to improve the potency of the model. The research model was evaluated using Partial Least Square Structural Equation Modelling. The independent constructs explained 55.2% and 58.2% of the variances in Attitude Towards Behavior and Consumers' Purchase Intention respectively. Specifically, the model proposed that Trust of E-Commerce Sellers affects both Attitude Towards Behavior and Consumers Intention to Purchase. Although previous studies (Kim et al. 2008; El Said & Galal-Edeen 2009); Liu et al. 2005); Tung et al. 2008) have found positive associations between these constructs, the results were contradictory in this study's context. This is not surprising given that e-commerce is still an emerging concept in developing countries. Thus, unlike developed countries where consumers' purchase intentions may be informed by sellers' online rating or reputation, this might not be the case in developing countries given the limited knowledge about the innovation. In addition, Trust of Internet Medium and Cyber Crime Perceptions influenced Attitude Towards Behavior and Consumer Intention to Purchase using E-Commerce. This finding is supported by Kim et al. (2008) and Yang et al. (2012). In essence, knowledge about perceived risks and threats on the internet is not limited to developed countries. As such, negative cyber-crime perceptions negatively affect consumers' attitude and purchase intentions. Moreover, Subjective Norm and Perceived Behavioral Control impacted Consumers Intention to Purchase Using E-Commerce. In other words, the expectations of relevant others influenced consumers to use e-commerce for their purchase. Although findings from relevant studies (Yu & Wu 2007; Lim & Dubinsky, 2005; Hansen et al., 2004) support this result, it is reasonable. This is because people living in developing countries have great respect for elders in the society. Therefore, consumers will most likely adopt the opinions of respected people in society to use e-commerce for their purchases.

Conclusion and Recommendations

a. Conclusion

The merits associated with e-commerce technologies is undoubted. Relevant research has shown that e-commerce enables cost reduction, mass customization and high rate of competitive advantage. However, the recent rise of cyber-crime incidents threatens the use of e-commerce technologies for transactional operations. Amidst these, there is a paucity of research with regards to the factors that influence e-commerce use for transactions, particularly in developing countries. To bridge this gap, this paper adopted the Theory of Planned Behavior as a theoretical lens to examine which factors influence Consumers Intention to Purchase using E-Commerce. The theory was extended with

Cyber Crime Perceptions, Trust of E-Commerce Sellers and Trust in Internet Medium. Responses from 467 participants gathered using Google Forms were analyzed with Partial Least Square Structural Equation Modelling. The results indicated that Cyber Crime Perception, Trust in Internet Medium, Subjective Norm and Perceived Behavioral Control all impact Attitude Towards Behavior and Consumers' Intention to Purchase Using E-Commerce. There was also a positive association between Attitude Towards Behavior and Consumers' Intention to Purchase Using E-Commerce. Meanwhile, Trust of E-Commerce Sellers failed to impact either Attitude Towards Behavior and Consumers' Intention to Purchase Using E-Commerce. Some of the findings contradict existing findings. This confirms that technology behavior differs across societies. Furthermore, it unveils the importance of trust and cyber-crime perceptions of e-commerce usage. As such, stakeholders are encouraged to improve the security and privacy features of e-commerce technologies. In addition, the development of appropriate e-commerce frameworks is needed to identify and punish offenders. This will reduce the negative perceptions associated with e-commerce.

b. Main Contribution and Advancement of Research

The present study addressed a noteworthy gap in extant e-commerce adoption literature through the extension of Theory of Planned Behavior with Cyber Crime Perceptions and trust. Trust remains a critical variable in e-commerce transactions and their addition improved the TPB significantly achieving good model fit. Whiles e-commerce adoption and research have gained notable recognition and well-grounded in developed countries, there is the paucity of research in developing countries where e-commerce is emerging. This present study is, therefore, fundamental to the continuous development and improvement of e-commerce technologies in Ghana and other countries with similar cultural settings. This study, therefore, contributes to validating constructs that have been tested in developed countries on e-commerce adoption in developing countries. The importance of accounting for countries with different economic, cultural, social and psychological factors when examining e-commerce adoption thus emerges as integral to the advancement of technology adoption studies.

c. Managerial and Practical Implications

E-Commerce contributes significantly to the advancement of businesses in developing countries. This assertion is driven by the perceived potential of the internet in reducing transaction and operational costs and facilitating global supply chains. The results presented in this study provide relevant implications for both e-commerce stakeholders and businesses in developing countries especially Ghana and countries of similar cultural settings on the factors that affect intentions to purchase using e-commerce. Specifically, it informs developers of e-commerce technologies of the importance of trust and how it affects users' adoption behavior. The guarantee of security, privacy, and trust should be of paramount importance in future strategies targeting e-commerce technology adoption, in addition to a continuous promotion of use of technology. We recommend that developers and designers should integrate major security features in future e-commerce technologies to curtail breaches and vulnerabilities. This will boost users' confidence and trust in the system. By these findings, governments, policymakers, and stakeholders are also enlightened on the effects of cyber-crime perceptions on users' purchase intention. As indicated, the lack of strong legal frameworks for e-commerce activities is a major cause of

cyber-crime. E-commerce vendors are encouraged to consult, design, implement and evaluate appropriate e-commerce frameworks to identify offenders.

d. Limitations and Directions for Future Research

Like many other studies, this study has some limitations that must be acknowledged. First of all, the data collection for the study was done using non-probabilistic approach, convenient sampling technique specifically. Thus, the findings of the study cannot be generalized to represent the entire population. Secondly, the study did not consider the moderating effects of demographic characteristics such as age, gender, educational level, income, and experience on how it contributes to the adoption of e-commerce. Future research should, therefore, integrate the demographic variables omitted in this study to provide a comprehensive understanding of user intentions. Additionally, future research may consider cultural dimensions to arrive at a better understanding of the phenomena.

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