

Adoption of Point of Sales Technology in Nigerian Retail Industry: A Partial Least Squares Approach

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Abstract

Cash based transactions are increasing in Nigerian economic sphere and are draining public funds in terms of cost of cash management. Hence the government introduced the cashless policy to drain the economy of the excess cash. This shift in payment process is in line with scholars' consensus on the need for strategic change in business processes. A number of factors triggered business process change, which includes technological developments such as payment process, vis-à-vis Point of Sale Terminal (POS). Change Sense of Urgency has been linked to behavioral intention (BI), thus researchers have used several theories to explain user BI. These theories were consolidated to form a Unified Theory of acceptance and Use of Technology (UTAUT). UTAUT is widely applied and extended to explain the phenomenon; however, 'Customers' Concern (CC) was neglected, despite importance of customers to business. This study aims to simultaneously examine the influence of CC along with UTAUT construct on BI. 321 valid data were collected from owners/managers of retail businesses in Nigeria, in a cross-sectional survey and were analyzed using Partial Least Square - Structural Equation Modeling (PLS-SEM) technique in SmartPLS software. Result of the analyses shows that CC, Performance Expectancy, Social Influence, and Facilitating Conditions significantly influences BI to use POS, while Effort Expectancy is not. Overall, the extended model was able to explain about 46% of variance in BI. Based on the result, managers' decision is therefore influenced by their concern for their customers.

Keywords

Retailing, Point of Sales Technology (POS), PLS-SEM, Customers Concern.

1. Introduction

The volume and value of cash-based transactions are increasing in Nigeria (Ayo & Ukpere, 2012; Chima, 2011). CBN introduced the cash-less policy to curtail the excess cash (Agboola, 2012; Ilesanmi, 2012; Yaqub, Bello, Adenuga, & Ogundeji, 2013), however, there is resistance to change to the alternative electronic payment channels, such as the POS, as the usage was put as 6% (Adepetun, 2012). Ironically, Change is an inevitable phenomenon for all businesses, to survive it, business enterprise must embrace change (Ahmad, 2012; Drucker, 1969; Hamel, 2000; Mintzberg, 1988; Toffler, 1970). Interestingly, one of Kotter's eight (8) steps to Change is Sense of Urgency (CSU). It is argued that personal attributes such as **behaviour** should lead the execution of what the change brings (Belasco, 1990; Harari, 1996; Kotter, 1995, 1996). Furthermore, Plouffe, Hulland, and Vandenbosch (2001) defined behavioral intention as "respondent's sense of urgency for formally adopting an innovation after it becomes broadly available" (p. 212). As CSU is linked to Behavioural Intention (BI), thus calls for research to examine user BI.

2. Theoretical Framework and Hypotheses

2.2 Behavioural Intention

Behavioural Intention is an important determinant of actual behaviour (Zhou, 2008), thus researchers have used several variables and models to examine similar phenomenon, for example; Abadi and Nematizadeh (2012), Mangin, Bourgault, León, and Guerrero (2012), Chen, Kuan, Lee, and Huang (2011), Ho and See-To (2010), Huh, Kim, and Law (2009), H. Li and Huang (2009), Kim, Ferrin, and Rao (2008), Troshani and Rao (2007), Rigopoulos and Askounis (2007), Nysveen, Pedersen, and Thorbjørnsen (2005), Van Slyke, Belanger, and Comunale (2004), Chang and Cheung (2001), W.W. Chin and Gopal (1995) etc. However, a number of them yielded a conflicting findings, (Alrawashdeh, Muhairat, & Alqatawnah, 2012; Birch & Irvine, 2009; Foon & Fah, 2011; Gao & Deng, 2012; Huang & Qin, 2011; Lai, Lai, & Jordan, 2009; Sumak, Polancic, & Hericko, 2010; Yamin & Lee, 2010). Despite previous researchers' attempts to explain the phenomena, however, there is need to further our understanding beyond what is known and understood (Venkatesh, Morris, Davis, & Davis, 2003). "future research should focus on identifying constructs that can add to the prediction of intention and behaviour over and above what is already known and understood" (Venkatesh et al., 2003, p. 471).

Interestingly, Customer Concerns was neglected in the previous literature (Abubakar & Ahmad, 2014), despite their important roles to all businesses (Hammer & Champy, 1993) and their exposure to numerous technological innovations such as the POS (Suki & Ramayah, 2010). Therefore, as crucial as customer is to businesses, it is expected that the merchandise are uncertain of the reaction of their customers would be once the merchandise adopted the new payment system, hence might be hesitant to accept it (Van Birgelen, de Ruyter, & Wetzels, 2003). Therefore, based on the researcher's knowledge, there is scarce of literature that incorporates customer concerns in manager's intention to adopt technology in business, thus create an opportunity (gap) for researchers to investigate.

2.1 Performance Expectancy

Because the technology under investigation (POS) is relatively new in Nigeria (Chiemeke & Evwiekpaefe, 2011; Ogunleye, Adewale, & Alese, 2012b), owners, and managers of retail businesses might be sceptical about the performance of the system. They might also be of concerned whether the system performance can be commensurate to its cost of implementation. Therefore this study hypothesised that behavioural intention of owners or managers is dependent on their perception of the performance of POS. The more they felt the system can improve their business performance, the more they intend to use it. Interestingly, related studies conducted in developing country (Deng, Liu, & Qi, 2011) as well as developed country (Carter, Schaupp, & McBride, 2011) on Web-based Q&A in China and e-File in US respectively, have shown a significant positive relationship between performance expectancy and behavioural intention. Similarly, studies conducted on Interactive whiteboard in Australia (Wong, Russo, & McDowall, 2013), e-books in China (Gao & Deng, 2012), e-mail system in Malaysia (Yamin & Lee, 2010), e-Government in Qatar (Al-Shafi & Weerakkody, 2009), Mobile Device in Finland (Carlsson, Carlsson, Hyvonen, Puhakainen, & Walden, 2006), have all found significant positive relationship between facilitation conditions and behavioural intention. Therefore the current study offered the following statement;

H1: There is significant positive relationship between performance expectancy and behavioral intention to use POS.

2.2 Effort Expectancy

Similar to performance expectancy, effort expectancy can also be traced to TAM and TAM2. The construct is synonymous to perceived ease of use in TAM (Davis, Bagozzi, & Warshaw, 1989), complexity in MPCU (Thompson & Higgins, 1991) and ease of use in Moore and Benbasat (1991)'s IDT. All of these constructs and their subsequent applications in IS research has proved their similarities both in measurement scales and definition (Venkatesh et al., 2003). The work of (Venkatesh et al., 2003) combined these constructs in UTAUT, thus defined it as "the degree of ease associated with the use of the system" (Venkatesh, et al., 2003; p.450). Therefore this study defines it as owners' and managers' the anticipated simplicity and/or difficulty of using POS in their businesses.

As the definition of this construct depicts, the simplicity or difficulty of use of an information system can be associated with how experienced the user is. This can be seen in Venkatesh et al. (2003), in which data were collected longitudinally in three (3) different times. Effort expectancy was significant on behavioural intention in the first time period after training, but subsequently insignificant because of sustained usage. Similarly, the effect was seen in mandatory and voluntary settings, however only in the first time period was significant. Therefore the choice of non-users as subjects for the current research is expected to yield a significant result, going by their inexperience in the use of the system. Similarly, as Ogunleye, Adewale, and Alese (2012a) argued that POS is in its early stage of penetration Nigeria, therefore owners, and managers of retail businesses might be concerned about the amount of physical, mental and material effort needed to operate the system. This, couple with the inconsistency of previous finding, required further investigation (Mitchell & Jolley, 1992), especially in Nigerian retail industry. Furthermore, significant positive

relationship was found between effort expectancy and behavioural intention in the study on I-Pass adoption in Taiwan (Wu, Yu, & Weng, 2012). In the same way, Yahya, Nadzar, Masrek, and Rahman (2011) found significant positive relationship in e-sharia portal adoption study, just like Carter et al. (2011) also found in e-file adoption study in the US. These are in line with several other studies such as Al-Shafi and Weerakkody (2009), Payne and Curtis (2008), Carlsson et al. (2006) etc. Therefore this study hypothesised the following statement.

H2: There is significant positive relationship between effort expectancy and behavioral intention to use POS.

2.3 Social Influence

Social influence was proposed as a direct determinant of behavioural intention to use technology, although there is difference of significance influence between users in mandatory and those in voluntary settings (Venkatesh et al., 2003). Warshaw (1980) stressed that the explanation for such differences is, in mandatory settings, rewards and punishment could trigger the user to behave according to the beliefs of their superior executives. A further variation was detected among different gender and experience levels of users (Venkatesh & Davis, 2000; Venkatesh & Morris, 2000).

As declared by Biola and Dan (2012), social influence plays an important role in shaping the behaviours of Nigerians, it is therefore expected that social influence can affect behavioural intention of retail managers in Nigeria. Thus it is important to empirically test Biola and Dan (2012)'s assertion in order to confirm or reject their claim. Interestingly, previous studies have found significant positive relationship between social influence and behavioural intention. For example the studies on I-Pass in Taiwan (Wu et al., 2012), IT Innovation in Malaysia (Moghavvemi, Salleh, Zhao, & Mattila, 2012), Virtual Fitting room in China (Huang & Qin, 2011), M-Commerce in Hong Kong (Lai et al., 2009) and Network IT in Taiwan (Lin & Anol, 2008) respectively. Based on the above therefore, the following statement is made;

H3: There is significant positive relationship between social influence and behavioral intention to use POS.

2.4 Facilitating Conditions

Although the construct was not initially proposed as direct determinant of behavioural intention in UTAUT because the core concepts in the constructs were largely taken care of by most of effort expectancy items (Venkatesh et al., 2003), it was earlier established in MPCU, IDT, TPB and DTPB theories that facilitating condition is a direct determinant of behavioural intention to use technology. This forms the basis for researchers to test a direct causal relationship between the constructs. However, these studies produced contradictory findings. For example, Wang and Yang (2005) conducted a study on the adoption of online stocking system among Taiwanese investors.

As previously stated, Rehman, Esichaikul, and Kamal (2012) argued that developing economies are faced with inadequate ICT infrastructures. Nigeria is one of developing economies (International Monetary Fund, 2012) and it is therefore faced with such infrastructural deficiencies (Gholami, Ogun, Koh, & Lim, 2010). Despite huge potentials Nigerian market possessed (Uzonwanne, 2011) it is faced with severe shortage of supply of electricity (Onyema, 2011). Currently, Nigeria with over 170 million people generates 20.13 billion kWh of electricity, far below its contemporaries such as South Africa and Malaysia. South Africa, with 48.8 million people generates 238.3 billion kWh and Malaysia, with 29.1 million people generates 118.2 kWh respectively. Therefore it is expected that facilitating conditions will significantly influence managers' behavioural intention to adopt technology. Similarly, studies conducted in developing countries on Location-Based Service in China (Zhou, 2012), e-learning in Jordan (Alrawashdeh et al., 2012), internet banking in Malaysia (Foon & Fah, 2011), m-Commerce in China (Zhou, 2008) and Tablet PC in developed economy US (El-Gayar & Moran, 2006) have all found significant positive relationship between facilitation conditions and behavioural intention. Therefore the current study offered the following statement;

H4: There is significant positive relationship between facilitating conditions and behavioral intention to use POS.

The differences in findings of previous studies relating the relationship between performance expectancy, effort expectancy and facilitating conditions on behavioural intention might be as results of different set of technologies and context involved in the studies. Also different countries with different level of technology penetration and sophistication might be one of the reasons. (L. Li, 2010) performed a meta-analysis of technology adoption literatures and suggested that more research needed to be conducted because of inconsistency conclusions in the literatures. Therefore further studies need to be conducted to broaden our understanding of the phenomenon.

Extension of UTAUT Model

We propose an extension of UTAUT with another variable which has not been tested in previous studies and it is an important variable worth inclusion in the model. The authority to expand or extend the theory can be seen in (Venkatesh et al., 2003), when they suggested as thus; “future research should focus on identifying constructs that can add to the prediction of intention and behaviour over and above what is already known and understood” (p. 471). Lallmahamood (2007) argued that there might be other important variables that can better explain intention, which were not included in his study, thus other variables should be further investigated since UTAUT focused on performance expectancy, effort expectancy and social influence to predict intention (AbuShanab & Pearson, 2007; Oshlyansky, Cairns, & Thimbleby, 2007).

2.5 Customer Concerns

Fillion, Hassen, and Jean-Pierre (2011) concluded that studies on adoption of technology among individuals has been widely researched in the last 20 years. Furthermore, Suki and Ramayah (2010) emphasised that nowadays customers are exposed to numerous technological innovations such as the POS. Acceptance or rejection of such technologies by the customers is certainly not dependent on whether they have used the device or not. Customers in this day and age also have access to information on other products and vendors, thus they have power over the vendors, because of access to alternative products. Therefore they assume control of the market (Hammer & Champy, 1993). As essential as customer to businesses, it is expected that the merchandise are uncertain of the reaction of their customers would be once the merchandise adopted the new payment system, hence are hesitant to accept it (Van Birgelen et al., 2003). It should be noted that credit and debit cards are means through which POS payments are made (Agabonifo, Adeola, & Oluwadare, 2012). However, there is the problem of number of holders of credit or debit card among Nigerians. Chiemeke and Ewwiekpaefe (2011) expressed concern that only few Nigerians are holders of credit/debit card despite its large population of over 170 million people. This study therefore conceptualises Customer Concerns will influence merchandise’ behavioural intention to use POS. Therefore the following hypothesis is stated;

H5: There is significant positive relationship between Customer Concerns and behavioral intention to use POS.

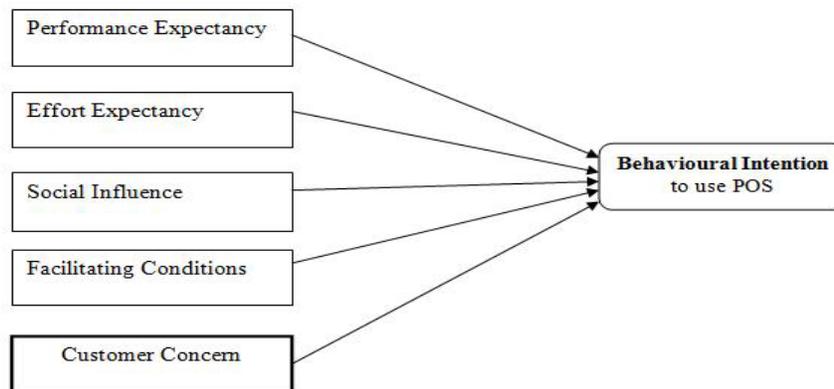


Figure 1: Theoretical framework

3. Methodology

Quantitative paradigm was employed in this study to examine the relationships among the variables in the model, as depicted in Figure 1. The unit of analysis is organisation, thus owners/managers are the subject of the study. They were selected using area sampling technique, from six geo-political zones in Nigeria. The sample size was determined based on the rule of 10 (Wynne W Chin, 1998; J. F. Hair, Ringle, & Sarstedt, 2011). The rule states that the minimum sample size should 10 times the number of structural paths pointing at a particular latent construct in the model. Thus our minimum sample should be 50 (10x5). Moreover, (Cohen, 1992)’s power analysis was also used to determine the sample size that gives a minimum power of 80. We use G*Power 3.1 (Erdfelder, Faul, & Buchner, 1996) conducted a priori power analysis assuming a significance level of 0.05 and medium effect sizes (0.15) as recommended and demonstrated in Lowry and Gaskin (2014). We found that 92 samples are enough to achieve the power of 80.4. Measurement items for the constructs in the model were adapted from extant literature. We prepared 600 questionnaires and administered to the respondents through research assistants. 198 responses were retrieved, out of which 165 were valid. This represents 33% response rate, which is adequate (O’Sullivan & Abela, 2007), also

considering (Renko & Ficko, 2010)' 8.2% response rate. Partial Least Squares – Structural Equation Modeling (Wold, 1974) was used to analyse the data, using SmartPLS 2.0 (Ringle, Wende, & Will, 2005). PLS is a predictive technique that allows simultaneous evaluation of structural relationships, theory development and also tolerates few sample size (J. F. Hair et al., 2011; Tabachnick & Fidell, 2007). PLS has received tremendous application recently. For example, the study of sustainable conservation programs (Jaafar, Noor, & Rasoolimanesh, 2015).

4. Results

4.1 Measurement Model Assessment

We calculated the PLS algorithm in SmartPLS software 2.0 (Ringle et al., 2005) and obtained the factor loadings and cross-loadings. The result indicated that loadings for all the items ranged from 0.737. to 0.905, which is consider acceptable in exploratory research (J. F. J. Hair, Hult, Ringle, & Sarstedt, 2014; J. J. F. Hair, Black, Babin, & Anderson, 2010). However, BI4, SI5 and EE5 items loaded 0.411, 0.632 and 0.643 respectively. These values appeared to be low based on (J. J. F. Hair et al., 2010) criterion, however, indicators for every construct loaded higher in their respective construct above the cross-loadings in other constructs. This indicates a good internal consistency of the measures.

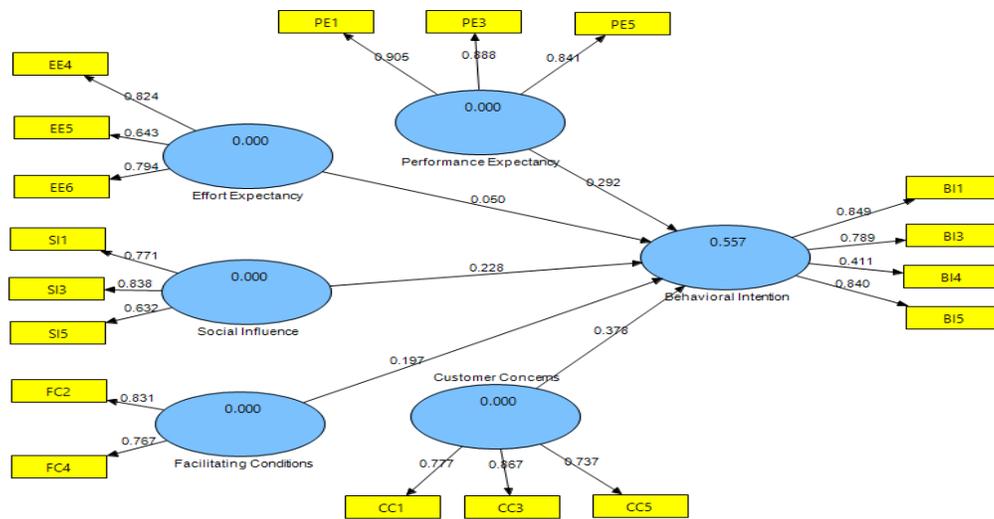


Figure 2: Measurement model

Internal Consistency and Convergent Validity (CV)

Composite reliability (CR) and average variance extracted (AVE) were used to evaluate the internal consistency based on J. J. F. Hair et al. (2010) criteria. CV is a degree of agreement among multiple items in measuring a particular concept. Factor loading for each item should be greater than 0.7 (J. J. F. Hair et al., 2010). However, Hair, et al., (2014) argued that indicator loading above 0.4 can be retained, unless if its deletion can improve the AVE or CR loadings. Interestingly, the AVE and CR values have exceeded the 0.5 (Bagozzi & Yi, 1988; Fornell & Larcker, 1981; J. J. F. Hair et al., 2010) and 0.7 (Gefen, Straub, & Boudreau, 2000; J. J. F. Hair et al., 2010) benchmarks respectively as depicted in Table 1.

Table 1: Measurement model assessment and effect sizes

Constructs	Indicators	Loadings	AVE	Composite Reliability	Effect Sizes (f ²)	Effect Sizes (q ²)
Behavioural Intention	BI1	0.849	0.554	0.824	0.557*	0.282**
	BI3	0.789				
	BI4	0.411				
	BI5	0.840				
Customer Concerns	CC1	0.777	0.633	0.837	0.287	0.095
	CC3	0.867				

	CC5	0.737				
Effort Expectancy	EE4	0.824	0.574	0.800	0.002	-0.003
	EE5	0.643				
	EE6	0.794				
Facilitating Conditions	FC2	0.831	0.639	0.779	0.070	0.022
	FC4	0.767				
Performance Expectancy	PE1	0.905	0.772	0.910	0.133	0.042
	PE3	0.888				
	PE5	0.841				
Social Influence	SI1	0.771	0.565	0.794	0.088	0.022
	SI3	0.838				
	SI5	0.632				

*R², **Cross-Validated Redundancy

Discriminant validity

This is the extent of how indicators actually represent a construct and how they are different from other construct (J. F. J. Hair et al., 2014). According to (2000), the square root of AVE value for each construct should be greater than the value of correlations with other construct. The highest correlation among the construct is 0.544 between behavioural intention and performance expectancy, while the lowest value of square root of AVE is 0.708 for customer concerns. Table 2 illustrates that the square root of the constructs' AVE are above the value of correlations of the respective constructs with the rest of them. This is in line with Compeau, Higgins, and Huff (1999)'s criteria.

Table 2: Discriminant Validity

Constructs	1	2	3	4	5	6	AVE
(1) Behavioural Intention	0.744						0.554
(2) Customer Concerns	0.501	0.708					0.633
(3) Effort Expectancy	0.418	0.228	0.758				0.574
(4) Facilitating Conditions	0.443	0.201	0.325	0.799			0.639
(5) Performance Expectancy	0.544	0.226	0.474	0.257	0.878		0.772
(6) Social Influence	0.442	0.027	0.348	0.342	0.405	0.752	0.565

Note: The values in the diagonals cells (bold) are the square root of the AVE while the un-bolded values are the correlations

4.2 Structural Model Assessment

Having met the all the assessment conditions for measurement model, we assessed the structural model by performing the bootstrapping procedure in SmartPLS (J. F. Hair et al., 2011; J. F. J. Hair et al., 2014). Hypotheses were tested to examine the relationship among the variables in the model and all the paths are significant, except effort expectancy behavioural intention. As shown in Table 3, customer concerns has the highest effect on behavioural intention (beta 0.378, t. value 7.749), followed by performance expectancy, social influence and facilitating conditions (beta 0.292, 0.228, 0.197 and t. value 3.403, 2.886, 2.779 respectively). We further calculate the p. value and found all but effort expectancy to be significantly related with behavioural intention.

Prior to that, the coefficient of determination of the endogenous variable in the model was assessed. Cohen (1988) recommended three levels of structural model quality as; substantial (0.26), moderate (0.13) and weak (0.02) respectively. During the assessment of measurement model for this study, the standard PLS algorithm was calculated for the main effect model. The R² value for behavioural intention is 0.557 (refer to figure 1). Therefore the R² substantial based on (Cohen, 1988). Additionally, we assess the effect sizes (f^2) of the exogenous variable behavioural intention (Cohen, 1988; Henseler & Fassott, 2010). The effect sizes are evaluated as small (0.02), medium (0.15) or large (0.35) respectively (Cohen, 1988). As shown in Table 1 customer concerns has the highest effect size of 0.287. Although the effect is medium, it is nearly large (0.35). This followed by performance expectancy (0.133), social influence (0.088) and facilitating conditions (0.070), which have small effect sizes respectively.

Furthermore, a blindfolding procedure (Henseler, Ringle, & Sinkovics, 2009) was run with 7 omission distance, to obtain Q^2 value for the endogenous latent constructs. Q^2 is the measure of model predictive capability (Geisser, 1974; Stone, 1974). As demonstrated in J. F. J. Hair et al. (2014), a PLS path model with Q^2 greater than 0 has predictive relevance. The Q^2 value for behavioural intention is 0.282. This implies that the model has predictive relevance.

Table 3. Summary of Hypotheses Testing

Hypotheses	Relationships	Path Coefficients	Std. Error	T. Value	P. Value
H1	Customer Concerns -> Behavioural Intention	0.378	0.049	7.749	0.000
H2	Effort Expectancy -> Behavioural Intention	0.050	0.080	0.624	0.267
H3	Facilitating Conditions -> Behavioural Intention	0.197	0.069	2.866	0.002
H4	Performance Expectancy -> Behavioural Intention	0.292	0.086	3.403	0.000
H5	Social Influence -> Behavioural Intention	0.228	0.082	2.779	0.003

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

5. Discussions and Conclusion

The motivation of the researchers to embark on this study was informed by the amount of physical cash circulating in Nigerian economy and its consequences on cost of cash management thus becomes a source of concern for the government. While CBN rolled out cashless policy to drain the excess cash-based economy via POS and other electronic means of payment, the prospective users resist changing to the new payment process. People, process and technology are integral parts business process reengineering and technology, which is a subset of change. To begin change, change sense of urgency (CSU) is required to be created in the people. Interestingly CSU has been traced to behavioral intention.

However, while existing literature's attempts were incomprehensive in examining behavioral intention, particularly related to technology adoption, the context of the study (retail industry) hinted that customer is an integral part of its business. Therefore the current study conceptualized customer concerns as determinant of behavioral intention, along with UTAUT independent variables.

Based on exhaustive literature review and consideration of the context of current study, five direct determinants of behavioral intention were proposed. Four of the direct determinants are adapted from UTAUT; Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions, while Customer Concerns is added to the UTAUT model as an extension of the model. All of these direct determinants are hypothesized to have significant positive relationship with behavioral intention. Consequently, the result of the hypothesis testing revealed that all except effort expectancy have significant positive relationship with behavioral intention. This extension has provided further insight into the technology diffusion phenomena, by incorporating merchants' customer concerns to the existing lists of determinants of successful technology implementation in business process.

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