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Factors Influencing Information Technology Adoption among SME Using Theory of Planned Behaviour

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Abstract:
Technology has been recorgnised as one of the strategic resources for sustaining effective and efficiency project performance among SMEs. Existing models of technology adoption have not provided sufficient insights on factors that could influence adoption of technology among SMEs in Nigeria. Therefore, this study examined the effects of theory planned behaviour (TPB) related to technology adoption among SMEs in Nigeria. Data was collected using semi-structured questionnaire from 106 respondents. The collected data was analysed using Partial Least Structural Equations Modelling (PLS). The results showed that, perceived behavioural control have significant and positive effect on technology adoption among SMEs. In addition attitude, and subjective norms positively influence technology adoption. This significant findings provides SMEs and policy makers to formulating legislation for influencing technology adoption among SMEs towards sharpening the economy of the North Eastern region of Nigeria.

Keywords: Technology Adoption, Theory of Planned Behaviour (TPB), Nigerian SME

1. Introduction

Information Technology (IT) has rapidly become an indispensable adjunct in the people life and has significantly impacted every facet of operations in organisations (Isaac *et al.*, 2017). Lack of IT adoption can lead to low performance and productivity (DeLone and McLean, 1992). Several models have been developed and proposed in order to predict and explain technology adoption. The theory of planned behaviour (TPB) is considered one of the theories employed to describe an individual technology adoption intention. The TPB is a well-known theory regarding the adoption and utilisation of information technology and has already been validated through several studies. In this study, TPB is employed as the underpinning theory. Perceived behavioural control, subjective norms, and attitude were the core constructs used for this study to assess SME intention to adopt IT. With the advancement of the innovative era knowledge-based economy, IT has been recognised as a strategic tool for sustainable projects performance amongst small and medium enterprises in the construction industry in Nigeria. According Eniola *et al.* (2015) organisations tend to perform well and create value when they adopt strategies that respond to current world of work needs. Therefore, information technology is a key strategy and driver to improve sustainable project performance. Thiam (2009) stated that, sustainable project performance is a global crusade movement, which is a process rather than an end goal. Green (2011) further noted that this process requires constant analysis and evaluation of the emerging trends so as to take the issue of technology and sustainable development to the next level. IT has long been recognised as one of the most critical tool for organisations to increase their projects performances (Okwandu and Mba, 2010), and competitiveness (Kalkan *et al.*, 2011; Oliveira and Martins, 2011). With information technology, it is foreseen that SME in the construction industry can compete more effectively and efficiently in the world of work.

Inefficiencies associated with practices of manual tracking of materials, and workers on project site often cause problems resulting in poor projects performance leading to cost overrun with affects successful completion of a project (Equere and Tang, 2012). With the advanced technologies and innovations in the construction industry all over the globe, it has become technically viable for SMEs in Nigeria to adopt IT for sustainable projects management, especially materials management. IT is not merely a mono-effect commodity, it has multiplier effects on the overall project performance through faster, easier and accuracy with neutralises the adverse effect of manually materials management on construction projects (Equere and Tang, 2012; Kulkarni *et al.*, 2017; Ngwu *et al.*, 2015). Despite government concerted efforts to promote IT adoption in Nigeria, there is no clear success from the part of SMEs in the construction industry in Nigeria. For instance, in a study done on technology adoption among SMEs in Nigeria revealed low level of IT adoption (Adeola, 2014; Apulu *et al.*, 2013). Similarly, recent studies on technologies such as IT, and ICT (Irefin *et al.*, 2012; Nguyen, 2009; Usman and Said, 2014) also showed low adoption of technologies amongst SME in Nigeria. This is attributed mostly

to high cost of adoption, inaccessible and ineffective IT infrastructures, employees attitude, technological problems among others (Abdul Hameed, 2012; Adebayo *et al.*, 2015; Ghobakhloo *et al.*, 2012; Wisdom *et al.*, 2014).

Although, IT adoption is a complex process which is affected by several factors, identifying the factors that can significantly influence the adoption would provide an insight on how to enhance IT adoption amongst SMEs in the construction industry in Nigeria. This is because of the role SMEs play in the economic thrust in both developed and developing nations. Furthermore, dearth of research on IT adoption within SME in particular SME construction companies in the context of Nigeria have caused the gap of knowledge on SMEs IT adoption with posed the problems and challenges in IT adoption. In fact, it is well perceived that the "knowledge-gap" between SME and IT adoption is one of the major culprits for the low adoption. Furthermore, reviews indicated theory of planned behaviour (TPB) which has been used to predict people's action and intention to adopt IT were carried out in the context of large scale construction firms and developed countries (Solomon et al 2015; Fatimah, 2011). Therefore, this paper attempts to explore the TPB to predict the potential factors that have significant influence in the enhancement of IT adoption for SME construction companies in the north-eastern Nigeria.

2. Literature Review

2.1. Small and Medium-Sized Construction Firms

Small and Medium Enterprises (SME) construction firms are the majority in the Nigerian construction industry and minority of large mostly foreign firms. The large construction firms constitute about 5% of the total number of firms, and control about 95% of the construction market, leaving the smaller firms with about 5% of the projects markets (Equere and Tang, 2012). It is well acknowledged that SME performance is the lifeblood of the economic development by contributing to the development and economic growth of the country. SMEs are vital role players in the growth economy of most nations (Aina and Amnes, 2007; Ebitu *et al.*, 2016; Tunji-Olayeni *et al.*, 2014). Consequently, the performance of SME in the construction sector is closely associated with the nation's performance and development. Considering the important contribution of SMEs construction sector to the impetus of growth of the nation's resources, hence the Nigerian government introduced several programs to support the development and performance growth of SMEs. For instance, schemes like industrial development centre (IDC), small and medium and medium enterprises development agency of Nigeria (SMEDAN) are offered by the government with a primary target of providing training, financial assistance, training and entrepreneurs skills to heighten SMEs performance and competitiveness resulting in their growth and development.

Scholars globally acknowledged macroeconomic as the driver of nation's economic activity and prosperity OECD, 1996 as cited in (Eniola *et al.*, 2015). Scholars further acknowledged that, improving the pace of economic development through transformation from industry based to IT-based economy and consequently be among the twenty leading economies of the world come year 2020, the performance of SME is considered as the backbone toward achieving this objective (Eniola, 2014; Kanayo, 2014; ONUOHA, 2012). Hence, SMEs are perceived as being the main key element to economic growth, poverty alleviation and employment generation to both skilled and unskilled teeming youths in Nigeria. Despite SME roles in the impetus socio-economic development of nations, the supply of this essential significant role of SME, world over is scarce, however in varying degree of intensity. This is attributed to low IT adoption and use in materials management practice consequently affecting the projects performance of SMEs in Nigeria. Therefore, in order to obtain a clear picture of this phenomenon, the SMEs stakeholders are evaluated using theory of planned behaviour.

3. Theory of Planned Behaviour

Theory of planned behaviour (TPB) forms an extension of theory or reasoned action (TRA) (Ajzen *et al.*, 2011). TPB added a supplementary belief known as perceived behavioural control (PBC) to have a better behavioural intention prediction Thus, TPB assumes three independent determinants of behavioural intention, which cumulatively generated behavioural intention. These three variables of considerations resulted in behavioural beliefs, normative belief, and control beliefs. Behavioural beliefs are beliefs about the likely outcomes of the behaviour and the assessments of these outcomes which produces favourable or unfavourable attitude towards the behaviour; Control beliefs are beliefs about the presence of factors that may hinder or influence the performance of the behaviour and the perceived power of these factors which produce perceived behavioural control; and normative beliefs are beliefs about the normative expectations of others and motivation to comply with these expectation produce perceived social pressure or subjective norm (Ajzen *et al.*, 2011). Four major elements are in this theory:

- ❖ *Attitude*: refers to the degree to which a person has a satisfactory or unsatisfactory assessment about behaviour in an inquiry or performing behaviour (Ajzen *et al.*, 2011). According to Kumar *et al.*(2008) attitude is an evaluative disposition based upon cognitions, affective reactions, behavioural intentions and past behaviours and it describes general individual feelings of favour or disfavour towards a specific behaviour, thus it is a strong intention indicator towards a target behaviour.
- ❖ *Subject norms*: This is a behavioural social factor within TPB that considered perceived social pressure as influencer of intention towards uptake or un-uptake, or compliance with expectations of engaging in the adoption behaviour (Al-Swidi *et al.*, 2014). According toAjzen *et al.* (2011) subjective norm could is the perceived social pressure to perform or not to perform towards the target behaviour.
- ❖ *Perceived behavioural control*: means individual's perception of ease or complicatedness towards performing target behaviour (Ajzen, 1991; Ajzen *et al.* 2011). This is a perceived ability and confidence a person possessed in target behaviour. Chiou (1998)asserts that perceived behavioural control comprises of two elements: the resources availability needed to take on the behaviour and ability for self-confidence to perform target behaviour.

❖ *Behavioural intention*: According to Ajzen *et al.* (2011)the theory of planned behaviour revealed that intention is action of attitude, subjective norm, and perceived behavioural control. Therefore, intention is the cognitive representation of an individual readiness to perform target behaviour, and the immediate antecedent of behaviour.

Reviews indicated that behavioural intension is influenced by attitude towards individual readiness to perform target behaviour in question, subjective norm and perceived behavioural control. For example, in a study conducted by Shah Alam and Mohamed Sayuti (2011)used multiple regression analysis and found that 29.1% of the variance in the behavioural intention is explained by attitude towards behaviour, subjective norm, and perceived behavioural control. In the same vein, Al-Swidi*et al.* (2014) in their study investigated the applicability of the TPB with subjective norm as moderating construct using structural equation model (SEM) and their findings revealed that, behavioural intention is influenced by attitude toward the behaviour and subjective norm with subjective norm moderating the attitude toward the behaviour. Though, their findings did not find significant relationship between perceived behavioural control and behavioural intention.

Kesharwani and Singh Bisht (2012) use TPB, with additional 2 constructs (Islamic of product and demographic factor) to established Islamic home financing acceptance. They employed Ordered Probit Model (OPM), and their findings revealed that, subjective norm have significant influence with t=28.04 and p=0.0000, this indicated subjective norm as the most significant predictor of Islamic home financing, followed by perceived behavioural control with t=11.26 at p=0.000, then attitude with t=5.74 at p=0.000. In order to validate the conformity to fact of the theory of planned behaviour, Engle *et al.* (2010) conducted a broad analytical review of the theory in twelve countries. They found that behavioural intention, in each of the country of their study, is determined by attitude toward the behaviour, subjective norm and perceived behavioural control although at varying degree of importance. This attest to Ajzen (1991) proposition that the relative importance of attitude towards the behaviour , subjective norm and perceived behavioural control on behavioural intention is expected to vary between and across situations and behaviour. Based on the above review, Figure 1 illustrated the conceptual model for this study.
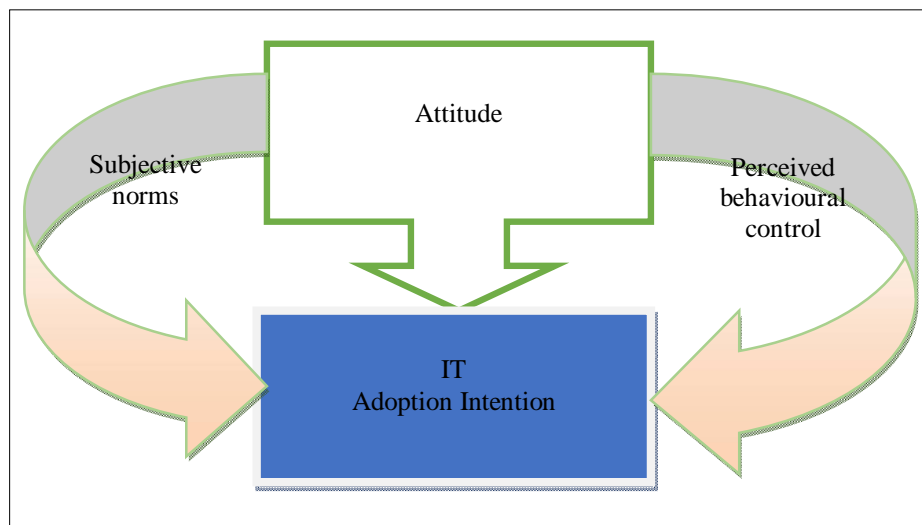

Figure 1: Conceptual IT-TPB Model

4. Methodology
The study adopted quantitative research method based on pragmatism philosophy. Hence, sample of one hundred and thirty (130) respondents were randomly drawn from the target population based on table of sample size determination. The respondents are SME-owners, managers, and project supervisors, who are the potential stakeholders of SME in Nigeria. Data was collected using structured questionnaire survey. The survey was conducted amongst SME in the construction industry in the North-Eastern Nigeria. One hundred and thirty questionnaires were distributed in the three states of the region (Bauchi, Borno and Gombe) and one hundred and seven (107) questionnaires were retrieved, out of which eleven (11) questionnaires were returned incomplete and hence considered inappropriate for this study analysis. Therefore, ninety-six (96) equivalent to eighty nine percent (89%) completed questionnaires were used for this study analysis and this percentage is sufficient for analysis based on sample size required in SmartPLS analysis (Hair Jr *et al.*, 2016; Wong, 2013).

The collected data was analysed using Partial Least Squares-Structural Equations Modelling (PLS-SEM) in order to assess the causal relationships TPB constructs towards IT adoption within the context of SMEs in the construction industry. Reinartz *et al.* (2009), Henseler *et al.* (2009) and Hair *et al.* (2017) put forward that, PLS have number of advantages: It involves no assumption about the distribution of the population, normality of the data distribution is not requisite, and also no sample size restrictions. This mean even with small sample size analysis can be run. Overall, PLS accommodates all type of scale whether nominal, ordinal or continuous. Therefore, the choice of PLS was informed by the fact that it strikes a balance between the strict assumptions of the covariance-based SEM and the limitations of first generation multivariate techniques. Hair *et al.* (2016) contended that that PLS path modelling is used in behaviourism predicting relationship between latent variables.

5. Findings and Discussion

5.1. Respondents Profile

Masi *et al.* (2013) suggested that, the technique of selecting respondents could be optimal mean of maximizing the effectiveness of the study and explore the issue or factors under investigation. Bryman (2015) further suggested that, classification of respondents could be in three categories: managers (top, middle and lower management levels). The top managements are presidents, vice presidents and chief executive officers (CEO) who shoulder with the greatest responsibilities of the organisations goals and the middle management are those who took the short-range goals of the organisation while the lower managements are those who directly assign work and supervise a small group of works. Table 1 presents respondents profile for this study.

POSITION	TYPE OF RESPONDENT	YEARS OF EXPERIENCE
SME-owner	SME	11year
Director	SME	15year
Manager	SME	22year
Project Supervisors	SME	7year

Table 1: Respondent's Profile

The study focused on the SME stakeholders in SME as they are the owners and key decision makers who decide what happens in this type of industry (Tunji-Olayeni *et al,* 2014), hence the power and in-depth knowledge of their respective company is of great importance to this study.

5.2. Assessment of Measurement Model

The measurement model (Outer model) is aimed to assessed the empirical relationships between the constructs, in order to compare the theoretically established outer and inner models with reality as represented by the sample data (Hair *et al.*, 2012). The outer model is assessed by considering the convergent validity and discriminant validity (Chin, 1998). Esposito Vinzi *et al.* (2010) stated that, for convergent validity to be to be achieved the rules of thumb for factor loadings should be 0.7 and above, while for the average variance extracted (AVE) it should be greater than 0.5. Composite reliability is recommended the threshold to be 0.6 and above and Cronbach's alpha threshold to be 0.7 and above(Bagozzi and Yi, 1988). This techniques improves data quality (Hair *et al.*, 2012). Thus, the measurement model of this study was assessed through evaluating the internal consistency (composite reliability), convergent validity (CV) and discriminant validity (AVE), in order to ensure the variables are fit and reliable (Hair *et al.*, 2012). Table 2 below presents the results of the convergent validity and the reliability of the study measurement model.

Constructs	Items	Factor Loadings	Average Variance	Composite Reliability
ATT	ATT1	0.762	0.484	0.788
	ATT2	0.727		
	ATT3	0.723		
	ATT4	0.553		
SN	SN1	0.803	0.682	0.896
	SN2	0.859		
	SN3	0.810		
	SN4	0.831		
PBI	PBC1	0.734	0.657	0.884
	PBC2	0.860		
	PBC3	0.818		
	PBC4	0.825		
ITA	ITA1	0.809	0.647	0.880
	ITA2	0.740		
	ITA3	0.821		
	ITA4	0.844		

Table 2: Convergent Validity and Reliability Results
NB: ATT= Attitude towards IT adoption; SN=Subjective norms towards
IT adoption; PBI=Perceived behavioural intention to adopt ITA; Information Technology adoption.

The results shows that the average variance (AVE) of SN, PBI and ITA constructs were all achieved based on the recommended 0.5 and above threshold (Bagozzi and Yi, 1988). However, the AVE of ATT construct has not statistically achieved the recommended threshold, but it is important to note that achieving value below the threshold or even negative value does not imply the construct is not important as argued by Hair *et al.,* (2012) who stated that, even a negative (-) result should be considered because it has its own effect in a different way. Similarly, the composite reliability (CR) are all above the recommended threshold of 0.7 (Wong, 2013). The

outer weights values of the items indicates that the achieved values are statistically significant (Wong, 2013), this evident the relative significant contribution of the items to the constructs. However, ATT4 loadings is below the recommended threshold, though indicator's with weaker loadings are sometimes retained on the basis of their contribution to content validity (Hair *et al.*, 2016). Therefore, the convergent validity and reliability (CR) of the measurement model were satisfactory achieved.

The discriminant validity (DV) was assessed by comparing the AVE of constructs shared on it and other constructs. Therefore, for valid discriminant of construct, AVE shared on itself should be greater than the variance shared with other constructs (Fornell and Larcker, 1981). The cross loadings among the constructs was assessed. Table 3, presents the correlation among the constructs and the observed correlations among constructs confirmed that, the discriminant validity of the measurement model is established as indicated in Table 3. The results confirmed all the variables represent the true measures of their individual variables as evidenced in their statistical values.

Constructs	ATT	SN	PBC	ITA
ATT	**0.696**			
SN	0.443	**0.804**		
PBI	0.453	0.453	**0.811**	
ITA	0.159	0.207	0.074	**0.826**

Table 3: Discriminant Validity
Note: All the bolded values represent the square root of the AVE while other values represent latent variables correlations

5.3. Structural Model

The results of the structural model (inner model) based on the direct relationships between the predictors in research model is shown in Figure 2 below. The model shows an achieved R^2 value of 0.301. This means that, the variance of intention to adopt information technology is explained by the exogenous constructs of attitude (ATT), subjective norms (SN), and perceived behavioural intentions (PBI) at 30.1%. Perceived behavioural control have the highest path weight of 0.326, followed by attitude with path weight of 0.279, and subjective norm as having the less path weight of 0.141 towards IT adoption. However, the achieved R^2 indicated that, cumulatively the constructs explained 30.1% variance of IT adoption within SMEs in the construction industry in Nigeria. The structural model in Figure 2 shows the achieved constructs results.
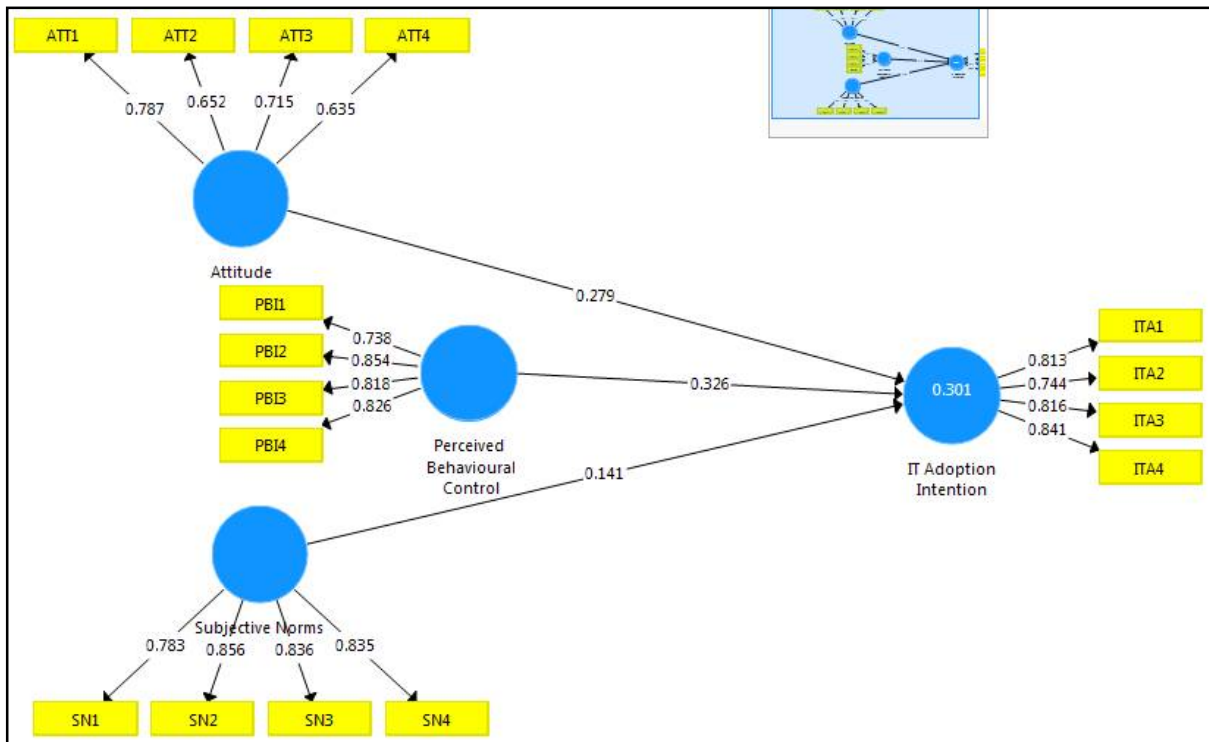

Figure 2: Structural Model

Drawing from the lenses of the results of the structural model, the exogenous constructs are significant towards IT adoption. Taking a holistic view of the statistical relationships between the exogenous constructs and endogenous construct, it shows that perceived behavioural intention and attitude have significant influence on SME construction sector IT adoption intention. This finding recounted with the findings of Ajzen *et al.* (2011)who found all the TPB exogenous constructs are having significant influence on intention of using mortgage in financing homeownership. This also corroborated with the findings Nasri and Charfeddine (2012)who found subjective norms as most significant factor that influence intention of using mortgage in financing homeownership in Nigeria.

In sum, various authors found subjective norms as not just an indicator, but the most significant predictor of intention in their findings (Al-Swidi *et al.*, 2014; Jackson *et al.*, 2013; Mathieson, 1991). This confirms the economic influence on small firms to act or not act considering the subjective norm of cost towards adopting new technology. This corroborated with the findings of Kasim *et al.* (2013) and Akintelu *et al.* (2016)who found cost as significantly affects the intent to adopt IT. Deba 2015 found small firms who are likely to adopt are mostly firms who are likely to deviate from social norms. Therefore, the study finding supported that TPB constructs influenced IT adoption in the SME construction companies in Nigeria and this consistent with Rojas-Méndez *et al.* (2017)findings. Thus, SMEs are likely to accept information technology when the social influence acted positively. Hence, intention to adopt information technology in SMEs is likely to be high if SME have favourable attitude towards technology, subjective norm and perceived behavioural control.

6. Conclusion

This study used the Theory of Planned Behaviour (TPB) to examine the adversity of SME through information technology adoption in Nigeria. The study found intention to adopt IT was significantly affected by attitude toward technology, subjective norms, and perceived behavioural control. The finding shows that the low information technology adoption was uphold by social influence on SMEs, and their perceived ability or otherwise to adopt IT. These cumulatively explained 30.1% of the variance in intention to adopt IT in SME construction companies. This study contributed to body of knowledge in SME construction companies through technology adoption and utilisation, and has implications to policy makers and SME construction firms. The conclusion drawn by this paper is SMEs has the capacity of counter balance-force the economic hardships in the country through adoption and utilisation of IT in SME's resulting in effective projects performance. It is therefore recommended that policy makers should design IT adoption policies that would suit and influence IT adoption within SME construction firms.

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