

Using the Characteristics of Small Business Managers to Understand Information Technology (IT) Adoption in Nigeria

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Abstract

While previous studies emphasised that demographic characteristics can influence IT adoption, our understanding of these characteristics and how they influence IT adoption in Nigerian context remains to be explored. This study investigates the effects of demographic characteristics - age, gender, working experience and education (academic) attainment on SMEs' IT adoption behaviour and adopts a cross sectional research design using self administered questionnaires to collect the primary data. Custom factorial univariate analysis of variance was used to analysis the raw data. Age and education attainment were found to influence IT adoption while gender and working experience had no impact. Those responsible for introducing IT in Nigeria should be aware that the idiosyncrasies of decision makers can greatly influence IT adoption practices.

Keywords: Small and medium enterprises, Upper echelon theory, Information technology adoption, Demographic characteristics.

1.0 Introduction

Since the mid 1980's Nigeria has embarked on a structural adjustment programme (SAP) with the aim to revitalise economic growth and technology development in organisations. This has been made possible, mostly, due to the Small and Medium Development Enterprises Agency of Nigeria (SMEDAN), Micro-Finance Banks, and Central Bank of Nigeria (CBN) to instil competitive advantage among SMEs. Recently, CBN set up a N200bn SME credit guarantee scheme to support, among others, manufacturing and the packaging and distribution of primary products on the condition that SMEs have assets not exceeding N300m and a labour force of between 11 to 300 persons (Ojeme and Onuba, 2010; Osagie, 2010). In Nigeria, the success of such IT adoption, especially in SMEs, leaves much to be desired (Oladeji, 1998). This is due to lack of resources and substandard business policies (Lall, 1992). Business decisions are often exclusively reserved for corporate executives, who with few other people (perhaps family owners) exploit their position to their own advantage. Therefore, one important factor which can influence the success and/or failure of a SMEs' IT adoption behaviour is the demographic characteristics (Riemenschneider et al, 2003; Dwivedi and Lal, 2007). Thong (1999), for example, found that IT adoption is influenced by the characteristics of decision-maker's, as well as technology characteristics, environmental and organizational conditions.

He proposed that the characteristics of executives play a persuasive role in determining the extent to which an organisation adapts technology. Similarly, Chaung et al (2009) found that age and education influences the degree to which IT is adopted in small organisations. Nevertheless, our understanding of the characteristics and how this can influence IT adoption in the Nigerian context remains unexplored. Although a number of other IT adoption models and frameworks were considered for this study; namely: technology acceptance model (Davis, 1993); theory of reasoned action (Ajzen and Fishbein, 1980); theory of planned behaviour (Ajzen, 1991); innovation diffusion theory (Rogers, 1995); and resource-based view of the firm (Caldeira and Ward, 2002), we decided to use upper echelon theory (UET) as it focuses centrally on the qualities of the demographic characteristics. UET according to Hambrick and Mason (1984), states that strategic choices and business performance are determined and shaped by the characteristics of dominant (powerful) actors within an organization, particularly top executives. Such characteristics include: age; functional track (view taken as a result of in-depth experience acquired in a particular business area); career experience; education; socioeconomic status; financial position and team homogeneity/heterogeneity. Such characteristics may be influenced by both internal and external factors.

While a number of research studies (Chuang et al, 2007; Chuang et al, 2009) have sought to investigate factors influencing IT adoption in SMEs, there has been a dearth of studies which have applied UET to study SMEs in Nigeria. This paper is structured as follows. In the next section, building on UET we examine how the demographic characteristics of these small businesses can influence the IT adoption process. Next, we reviewed existing literature; discuss the theoretical framework underpinning of the study followed by the research method. Finally, limitations, suggestions for further study and conclusions are outlined.

2.0 Literature review

As previously suggested, IT adoption by SMEs may be influenced by the internal characteristics of small businesses managers. In this section four predominant characteristics were examined: *age, gender, experience, and educational attainment.*

Age

A number of studies (Hambrick and Mason, 1984; Czaja and Sharit, 1998; Venkatesh and Morris, 2000; Morris, 2000; Chuang et al, 2009) have found that the age of the managers can significantly influence the extent of IT adoption within organisations. IT adoption, for example, may be more profound in organizations managed by younger executives than those managed by older ones. Child (1974) in studying the managerial factors influencing company performance illustrated that younger executives are more driven by risk-taking, innovation and achievement compared to their senior counterparts. This may be explained by the apparent conservative stance of older executives (Chown, 1960; Child, 1974; Alutto and Hrebiniak, 1975) or older executives avoiding any risky action capable of disrupting their social norms or infringing on his or her retirement benefits (Carlsson and Karlsson, 1970).

Gender

Studies (Heilbrun, 1976; Hofstede, 1991) have acknowledged that gender can determine human behaviour and management decision-making processes. Indeed, gender can have an influential role in determining how users respond to and use technology (Gefen and Straub, 1997; Zheng et al, 2006). Jimmie and Somnath (2010) in examining the relationship between gender and IT adoption found that females had fewer computers at home compared to men. Gefen and Straub, (1997) in extending Davis' technology acceptance model to investigate perceptual differences and use of E-mail, found that men and women differ in their perceptions of E-mail. This was linked to the tendency of men to feel more comfortable using technology than women. Furthermore, in technology-driven markets, often early adopters of new technological innovations are primarily young male executives (Lu et al, 2003). One possible reason is that females are less inclined and motivated to adopt and use technology than males (Qureshi and Hoppel, 1995).

Working Experience

The experience can also influence the type of behaviour taken by managers (Hambrick and Mason, 1984). This may include the amount of time spent with the organisation, for example, executives often brought in rather than promoted through the organisation are often more inclined to make technological, organisational, cultural and structural changes (Kotin and Sharaf, 1967). Often the motive for change is to bolster up workplace morale and instil motivation. New experienced executives may bring a wealth of know-how and insight with regards to adopting and implementing technology, than those recruited from the inside. This may allow the technological capabilities of the organisation to grow and exploit the potential of technology to streamline work tasks (Viswanath, 2000).

Lefebvre et al (1991) in exploring the relationship between executive experience and IT adoption processes in small manufacturing firms, found that as experience in IT adoption intensifies, the more likely an organisation can harness the true potential of technology to improve business processes.

Education (Academic) Attainment

A number of studies (Chuang et al, 2007; Dwivedi and Lal, 2007) have found that professionalism and the formal education level of executives can influence the IT adoption process. Agarwal and Prasad (1999), for example, found that managers with higher education levels have a greater awareness of the value and potential which technology can bring to the organisation. Highly educated executives have a greater tendency to learn technology and diffuse its benefits to the rest of the organisational workforce. Furthermore, education, to some extent, serves as an indicator of an executives' dexterity and their propensity to seek innovation (Hambrick and Mason, 1984). Executives with weak education often exhibit high levels of risk aversion because they feel threatened by change and only invest after first-mover advantages have been lost to other executives who, perhaps, have better education backgrounds. Rogers (1995) recognised that highly innovative executives aggressively thrive on innovation and often rely on knowledge and experience to advantageously steer the organisation in times of uncertainty.

2.2 Theoretical Foundation

Drawing on our previous discussion, these characteristics were drawn from Hambrick and Mason's (1984) upper echelons theory. The model depicts the main characteristics which may substantially influence SMEs managers' decision on IT adoption behaviour. The model proposes that both external and internal factors (situational conditions) can influence decision-makers' and their decision to adopt IT. However, our main focus here is on the internal characteristics. The decision to adopt IT coupled with adoption behaviour can be a key determinant of performance – through competitive advantage, performance and growth. Although, the model acknowledges that internal and/or external factors may influence managers behaviour, our study concentrates namely on the characteristics of the managers which may influence IT adoption behaviour – as internal factors were more prevalent from our initial examination of the literature. To summarise characteristics of the managers which may influence IT adoption behaviour, as discussed, include: age composition, formal education, experience, and gender.

Nevertheless, it is important to note that IT adoption by SMEs can also be influenced by a number of external factors. The presence of family members on the SME manager who act as a trusted source of advice on operational and strategic issues can influence corporate aims and IT adoption practices (Martin and Matlay, 2003; Simpson and Docherty, 2004; Galloway and Mochrie, 2005). The characteristics of the managers may also be influenced by specific and/or general business advice from informal sources, including, IT consultants and experts (Lawson *et al*, 2003; Martin and Matlay, 2003; Brown and Lockett, 2004; Beckinsale *et al*, 2006). The decision to adopt IT can be inhibited or motivated by the trading partners (customers, dealers, and suppliers) along the value chain (Beck *et al*, 2005). Additionally, owner-managers' intention to introduce IT can be informed by consumer readiness. Consumer readiness may be determined by the level of computer and internet penetration within a country or the consumers' understanding of and/or appreciation of technology (Zhu et al, 2002). Ayo (2008), for example, a study e-commerce in Nigeria highlights that one of the greatest barriers to e-commerce growth is low computer adoption rates among households.

Customer willingness to use internet technology and conduct online transactions in Nigeria is further hindered by security concerns, high illiteracy rates, lack of rigorous systems and restrictions in global markets. Moreover, an increasingly unstable, unpredictable and competitive market can determine the managers desire to adopt technology (Grover, 1993), for example, executives may not want to invest in technology due to lack of financial resources or fear of financial loss. On the contrary, increased competitive pressure may act as a catalyst to adopt technology to fend off competitors or out-perform rivals (Cooper et al, 1974; Porter and Millar, 1985; Kaynak et al, 2005; Xu et al, 2007).

2.3 Research Question

This study revolves around four demographic characteristics of small business managers. The rationale for this research is based on the premise that this study can help reveal the characteristics that can impact on small businesses tendency to adopt IT in Nigeria. Research question for this study is:

What demographic characteristics determine the adoption of ICT by small business managers in Nigeria?

3.0 Methodology

The study generally adopted a cross sectional research design because it was inexpensive (Bryman, 2008) and allowed us gather primary data on a very short interval.

1000 SMEs were drawn from Nigerian Chamber of Commerce and Nigerian Corporate Affairs Commission using a simple random sampling. A questionnaire was developed and administered to managers from different industries and because SMEs contacted cut across various types which are mostly professional service firms, we grouped these SMEs into three - professional, non professional and manufacturing SMEs. Professional service SMEs were classified based on the definition given by Miles et al (2004) and was distinguished from non professional service SMEs based on the level of academic attainment of the managers. For example, a small law firm or accounting firm was classified as a professional service business because most of them have at least a university degree, while a superstore was regarded as a non professional service business. Each SME had to adhere to certain criteria such as not having more than 250 employees (European Commission, 1996).

3.1 Measurement Instruments

Drawing on Thong's (1999, p191) study, IT adoption is defined "as using computer hardware and software applications to support operations, management, and decision making in the business". Each SME had to computerised, for example, using more than one software application and several personal computers. It is important to note that in this paper *adoption* and *use* are used interchangeably since the aim of small business managers to adopt IT is to carry out their business activities. The first part of the questionnaire consists of same eight measures used by Chuang et al (2009). These measures were believed to capture a wide range of business activities small businesses in Nigeria use computer for. These items measured the extent small businesses had use IT in their day to day business activities. They include using computer for online banking, use computer for e-mail or internet connection, purchase of business products and services, selling business products and services, loan or other credit, manage inventory, administrative functions such as word processing, managing firm's accounts/book-keeping. The respondents were asked to indicate the extent of IT adoption on a Likert scale ranging from unaware, not at all, adopt to a little extent, adopt to some extent, adopt to a greater extent and adopted regularly.

The second part of the questionnaire was developed to reflect the four demographic characteristics based on literature reviews. Age and working experience were measured in years. Gender was represented by dummy variable (1 if male and 0 if otherwise) which the software used for this analysis generated. Education (academic) attainment was measured based on the levels of education in Nigeria- First School leaving Certificate, West African Examination Council, Professional Certificates, National Diploma/vocational programme, First Degree/Higher National Diploma, Post Graduate Degree.

4.0 Data Analysis and Findings

First, descriptive statistics on reliability, frequencies, percentages, means and standard deviations were calculated. This is to ensure that the observed sets of individual variables associated with the managers' characteristics were examined. Furthermore, Test of Overall Model of Significance and Effect and Multiple Comparison of internal characteristics of managers were conducted to unveil demographic characteristics influencing the extent of IT adoption by small businesses in Nigeria in each category.

4.1 Reliability analysis

The reliability of the variables was tested to assess the accuracy of their measurement power. Firstly, we conducted a small pilot survey involving 30 subjects and any inconsistencies and/or ambiguities were corrected before the actual survey. Secondly, each SME manager was given two questionnaires – one in the month of December 2010 and the other, in the month of January 2011. Questionnaires were administered to SMEs' through the final year marketing students of the Federal Polytechnic Nekede Owerri, Nigerian with specific instructions. Respondents that returned one of the two questionnaires were not included in the analysis. The reliability of the constructs was measured using Cronbach's Alpha (α). This was to ensure that the same set of items to be measured obtained the same response when re-administrated to the same respondents. The results of Cronbach's Alpha (α) = 0.83. This surpassed Nunnally's (1978) benchmark of 0.7.

4.2 Descriptive statistics of the respondents

1000 questionnaires were distributed and 433 were returned. This represents 43.3% of the total number, while 56.7% were not returned. *Types of SMEs* in table 1 show that professional service SMEs represent 223(51.3%) followed by non-professional service SMEs 122(28.2%). Manufacturing SMEs were the least type of SMEs representing 88(20.3%). This implies that in Nigeria, small service business sector is one of the leading sectors. *Gender* shows that 311(73.7%) of respondents are male, 110(26.1%) are females. This also depicts that males are most likely to occupy managerial positions than females.

Age group shows that respondents between 28-37 years responded far more than any other age group and represent 181(42.4%). This indicates that in Nigeria, young managers are prone to adopting IT more than older executives. And as small business managers get older, they are less likely to adopting IT.

In the same table 1, under *academic attainment*, the analysis highlights that the more educated an SME manager is, at least to first degree level, the more knowledgeable the manager will be with respect to certain IT applications to help improve their business activities. This is highlighted in table 1 where 195 (45.9 %) represent respondents with first degree/ higher national diploma.

This result also indicates that young graduates when in school often engage with computers to carry out their basic classroom assignments and become more familiar with computers. Hence, the chance of engaging with IT is likely to be higher when they become managers. Wadongo et al (2010) also found similar result in their study. *Working experience* in table 1, unveils SME managers with job experience of fewer than 5 years are more prone to adopting IT because they are likely to become enthusiastic or excited using computer to do their job than older managers with many years of experience. This was obvious in table I where the respondents with fewer than 5 years of experience represent 200(48.1%). Also, results in other categories show that the more work experience small business manager acquires the less interested they are in adopting IT.

Table 1. Characteristics of the of the respondents

CHARACTERISTICS	Frequency (Percentage)	IT adoption Mean	Standard Deviation
Types of SMEs(N=433)			
Professional Services	223 (51.3)	2.93	1.05
Non professional services	122 (28.2)	2.85	1.06
Manufacturing	88 (20.3)	2.63	0.96
Gender(N=421)			
Male	311 (73.7)	2.79	1.03
Female	110 (26.1)	3.03	1.05
Age Group (N=427)			
18 - 27 yrs	156 (36.5)	3.10	0.85
28-37 yrs	181 (42.4)	2.83	1.11
38-47 yrs	68 (15.9)	2.42	1.31
48 -57yrs	20 (4.7)	2.41	0.75
58- Above yrs	2 (0.57)	2.31	2.56
Academic Attainment (N=425)			
First school leaving certificate	6 (1.4)	2.45	1.46
West African Examination Council	41(9.6)	1.44	1.11
Professional Certificates	23 (5.4)	2.84	0.97
National Diploma/Vocational Prog.	73(17.2)	2.77	1.60
First Degree/Higher National Diploma	195(45.9)	3.16	0.80
Post Graduate Degree	87(20.5)	2.97	0.80
Working Experience (N=416)			
Under 5 Years	200 (48.1)	3.05	0.79
6-10 yrs	120 (28.8)	2.67	1.18
11-15yrs	59 (14.2)	2.60	1.29
16-20yrs	26 (16.3)	2.58	1.15
Over 20 yrs	11 (2.6)	2.95	1.63

4.3 Test of overall model of significance and effects on IT adoption

In adopting this test, what the researcher often looks for, are the unique effects associated with the categorical independent factors or covariates (Garson, 2009). The effect size coefficient according to Wadongo et al (2010) always depicts the relative importance of any given covariate and interaction effect. These are known as standardized measures of the strengths of the relationship. In table 2 below, partial " n^2 " was used to measure the effect of the extent of IT adoption. The reason behind the f-test was to determine the significant of each main effect to help reveal if the overall model is actually working.

Table 2. Test of between subject effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	145.978 ^a	18	8.110	12.364	.000	.429
Intercept	174.178	1	174.178	265.554	.000	.473
Gender	.003	1	.003	.004	.947	.000
Academic Attainment	63.264	5	12.653	19.291	.000	.246
Age Group	13.602	1	13.602	20.738	.000	.065
Work Experience	.058	1	.058	.088	.767	.000
Error	194.148	296	.656			
Total	2903.703	315				
Corrected total	340.126	314				

Note; computed at $\alpha = 0.05$ level of significance where R Squared = .429 and Adjusted R Squared 0.394

In table 2, the correct model depicts that the overall model is significant $F = 12.364, p = 0.000$ and the effect partial $\eta^2 = 0.429$. This explains the level of impact of IT adoption on small business managers. Small business managers characteristics explains 39.4% variance of the extent of IT adoption. Furthermore, the table depicts that academic attainment $F = 19.291$ was significantly related to IT adoption at $p = 0.00$. This reveals that the more education the SME managers acquire, the more IT they are likely to adopt. The partial $\eta^2 = 0.246$ also showed that academic attainment has the greatest impact on IT adoption compared to other variables. Furthermore, age group was also significant at $p = 0.000$, but has no impact on IT adoption. On the contrary, gender and work experience were found to be insignificant. This implies that the level of work experience and age composition do not influence IT adoption by small business managers.

4.4 Multiple comparison and effects on IT adoption

The major reason for performing this test is to determine the significance of the differences in levels of small business managers’ characteristics/ determinants of IT adoption. Generally, the overall significance of the test reveals that at least one group is significantly different from one or more of the SME managers’ characteristics (see table 5). Univariate General Linear Model (GLM) was used to perform the test because as a general model, it tends to combine different models such as regression and ANOVA. It further allows the researcher to see within each level, the variable that has an impact on IT adoption.

Table 3. Parameter Estimates

Parameter					95% Confidence Interval
	B	Std. Error	T	Sig.	Lower Bound
Intercept	2.794	.538	5.197	.000	1.736
[Gender=1.00]	-.008	.114	-.067	.947	-.232
[Gender=2.00]	0 ^a
[Academic attainment =1.00]	-.521	.442	-1.178	.240	-1.391
[Academic attainment =2.00]	-1.455	.186	-7.806	.000	-1.822
[Academic attainment =3.00]	-.164	.228	-.722	.471	-.612
[Academic attainment =4.00]	-.403	.175	-2.305	.022	-.748
[Academic attainment =5.00]	.101	.132	.771	.441	-.158
[Academic attainment =6.00]	0 ^a
Age Group	-.330	.073	-4.554	.000	-.473
Working Experience	.017	.056	.296	.767	-.093

Note; computed at $\alpha = 0.05$ level of significance

Table 3 above clearly indicates that in *academic attainment group* (West African Examination Council Certificate) shows $B=-1.455$, $t = -0.7806$. This means that regardless of the fact that the test was significant, at $p=0.00$, it predicted IT adoption negatively and only few managers with this certificates adopt IT in their respective businesses. This was the same with small business managers with National Diploma $B=-0.403$; $t=-2.305$ and at significant at $p=0.022$. In general, the level of academic attainment of these two groups is significant but they do not influence the extent of IT adoption positively. *Age group* of small business managers in table 3 is also significant but negatively predicts IT adoption. On the contrary, none of the categories associated with *working experience group* and *gender* respectively influenced small business managers' adoption behaviour.

5.0 Discussion

The objective of this study was to investigate the influence of the characteristics of small business managers on IT adoption in Nigeria. From the overall analysis, the findings revealed that academic attainment and age impact or explain the amount of variation associated with the extent of IT adoption in SMEs in Nigeria. These findings have been supported by previous researchers. For example, studies conducted by Tong, (1999), Chuang et al (2007) and Chuang et al (2009) also showed that decision makers' characteristics do influence IT adoption. Chuang et al (2009) recent study also unveiled that the age of business managers influences the extent of IT adoption. This is similar to our finding. Furthermore, past studies have also pointed out that the level of education attainment of the top decision makers often impact on IT adoption (Dwivedi and Lal, 2007 Chuang et al, 2007). Similar to Agarwal and Prasad (1999) and Chuang et al (2009), our finding reveals that the education attainment positively influenced the decision of small business managers on IT adoption. However, in our study, within this category, those that have West African examination Council Certificates and National Diplomas have the greatest impact on the group although they predict IT adoption negatively (see table3).

On the contrary, other studies (Choudrie and Dwivedi, 2005) have also found that education attainment has no impact on IT adoption. According to Chuang et al, (2009) the differences in studies are likely to be attributed to the context or setting where the research was carried out and the independent variables associated with the study. In addition, previous studies (Hambrick and Mason, 1984; Kotin and Sharaf, 1967) argue that the level of work experience of decision makers can positively influence the extent an organisation can adoption IT. In line with these arguments, similar study carried out by Lefebvre et al (1991) confirmed this. However, their finding was not similar to our study. Our study reveals that work experience has no impact on the extent of IT adoption. This is similar to gender which has a negative relationship on the extent of IT adoption. According to Chuang et al (2009) key reasons for differences in research findings are often attributed to the methodology used and the type of technology investigated.

6.0 Limitations and Suggestions for Further Studies

This research study is not without its limitations. We cannot claim that our findings will automatically apply to all SMEs. One way of building validity is by carrying out similar surveys in other industries (Shiau et al, 2009) and perhaps repeating the survey over different time periods to reflect changing business needs. Furthermore, although a number of external factors such as firm's size, trading partners' readiness, competitive pressure, among others, were reviewed in our literature, their effects on IT adoption were not directly measured in this study. Therefore further studies should investigate these factors from the Nigerian context. This study specifically examined how age, education, experience, gender of small business managers influence IT adoption. However, there may be other variables overlooked in this study; including: functional tracks, socio-economic or financial status.

7.0 Conclusion and Implications

The characteristics of small business managers play an influential role in determining the extent of IT adoption. In this study the characteristics of small business managers including age, gender, academic attainment, experience, and their effects on IT adoption were investigated. Drawing on the custom model, the study found that age (see table 2) has the strongest influence on SME IT adoption behaviour, followed by academic attainment, In contrast, gender and work experience have no impact on IT adoption in small businesses in Nigeria. The study also raises a number of theoretical and practical implications. A major theoretical implication of this study is that upper echelon theory (UET), the theoretical framework used for this investigation, can serve as an effective framework for understanding how the characteristics of the small business managers can influence IT adoption. Secondly, the methods used in this study are rarely applied by researchers studying IT adoption. These methods can serve as additional methods for studying IT adoption. One practical implication of this study is that those responsible for introducing IT should be aware that the internal characteristics of decision makers can greatly influence IT adoption practices.

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