Received 1 October 2013
Revised 22 January 2014
16 April 2014
28 August 2014
Accepted 12 September 2014

Demographic determinants of electronic commerce (EC) adoption by SMEs

A twist by location factors

Hart O. Awa
Department of Marketing, University of Port Harcourt, Port Harcourt, Nigeria, and
Don Monday Baridam and Barinedum Michael Nwibere
Department of Management, University of Port Harcourt, Port Harcourt, Nigeria

Abstract

Purpose – Research on the demographic characteristics of top management team (TMT) on e-commerce adoption has really advanced. Although some of such studies factored location factors as e-commerce adoption drivers, rare attempts have been made to unravel if the differences in the demographic composition of TMT and the rate of adoption may be explained by the differences in the firm's geographical location. Therefore, the purpose of this paper is to bridge this knowledge gap by proposing a framework that conceives and measures geographical location as a contextual variable between e-commerce adoption and TMT composition.

Design/methodology/approach – Data were generated from the opinions of owners/managers of 226 SMEs drawn purposefully from registered SMEs in five industries located in three geo-political zones of Nigeria. Two cities (a state capital and a commercial nerve centre) were studied and a four-step hierarchical regression (spanning factor-loading) was used to test the hypotheses.

Findings – Evidence from the study shows that the hypothesized relationships between demographic factors and e-commerce adoption (main/direct effects) were statistically significant (supporting *H1-H4*). The two moderators (physical infrastructures and industrial specialization) that explained location factors were equally statistically significant in moderating the relationship between the demographic composition of TMT and e-commerce adoption.

Research limitations/implications – Sampling the opinions of SMEs in some industries of three geo-political zones of Nigeria limits the power of generalization. Therefore, extended data and measures are required to replicate the study in order to build external validity and reliability, and possibly theories. Further, some errors seem unavoidable in the course of converting the data through SPSS procedure just as all the measures used appear subjective and prone to common method bias. Other demographic and location factors not captured in the study may be handled by future studies.

Originality/value – The work will be of benefit to the academia and practitioners in terms of showing how location factors dictate the relationship between the demographic composition of top management and e-commerce adoption. The paper raises pointers that stimulate future research and advised policy-makers on even or near-even distribution of infrastructural facilities.

Keywords E-commerce, SMEs, Adoption, Demographics

Paper type Research paper

1. Introduction

Whereas governments and large corporations play a dominant role in the formal economy, SMEs drive the informal sector (Mutuala and Brakel, 2006; Awa *et al.*, 2011); hence, many economies aggressively pursue public policies encouraging small is beautiful, especially in this digital era. Scholars (Scupola, 2009; Ojukwu and Georgiadou, 2007;

Journal of Enterprise Information Management
Vol. 28 No. 3, 2015
pp. 326-345

1741-0398
DOI 10.1108/JEIM-10-2013-0073

Ongori and Migiro, 2010; Ogechukwu, 2006) show that SMEs are the bedrocks for industrialization; they balance political and economic independence. SMEs vary amongst economies in the contexts of their number of employees, amount of capital invested, annual turnover, size of fixed investment, the nature of their business and/or the combination of all (Awa *et al.*, 2011; Gamage, 2003; SMEDAN, 2005). Scholars assert that SMEs are associated with socio-economic growth of any nations as they catalyze urban and rural developments and provide agility to adapt to changing market demands (Mutuala and Brakel, 2006; Apulu *et al.*, 2011; Ongori, 2009). Scupola (2009) proposes that they account for about 96-99 per cent of enterprises in most OECD nations and provide about 80 per cent of economic growth. In Nigeria, about 97 per cent of enterprises are SMEs and they employ an average of 50 per cent of the working population and contribute about 50 per cent to the country's industrial output (Ihua, 2009).

Thus, SMEs' strategic position in poverty alleviation (especially in developing economies) and the urge to boost success through targeting regional/global markets make e-commerce adoption critical in organizational change, business transformations, and interactive partnerships (see Alba *et al.*, 2005; Chibelushi, 2008). The worldwide connectivity turns the world flat (Israel, 2007) with e-commerce providing SMEs with operational agility that spans faster decisions and strengthened competitiveness (Ongori, 2009; Scupola, 2009; Mutuala and Brakel, 2006). Electronic commerce repositions SMEs' operation, structure, and strategy (Buhalis, 2003) within and beyond traditional boundaries; and serves as a key success factor and a driver of diversified socio-economic development. Scholars on innovation adoption (e.g. Rogers, 1995; Thong, 1999; Tornatzky and Fleischer, 1990; Shiau *et al.*, 2009; Awa *et al.*, 2011) espouse the construct of individual difference factors (IDFs) on the recognition that organizations differ in terms of the decision-makers' cognitive perception and assumption about future, alternatives, and consequences.

Aside end user's individual difference attitudes (Prahalad and Ramaswamy, 2004; Vargo and Lusch, 2004), firm's direction is a reflection of the mindset, value systems, and cognitive base of powerful coalition (Hambrick and Mason, 1984; Dwivedi and Lal, 2007). Awa *et al.* (2011) argue that often SMEs' decisions are the exclusive reserves of the CEO/owner, who in conjunction with a few other key captains (perhaps family members) exploit the potentials of existing theories to position and reposition the future strategic direction of the organization. Previous studies (e.g. Fillis *et al.*, 2003; Riemenschneider and Mckinney, 2002; Chuang *et al.*, 2009; Shiau *et al.*, 2009; Thong, 1999; Rogers, 1995; Kannabiran and Dharmalingam, 2012) report on the demographic determinants (e.g. age, experience and functional track, education, and gender) of e-commerce adoption amongst SMEs.

Though some of these studies (see Chuang *et al.*, 2009; Awa *et al.*, 2011; Hambrick and Mason, 1984) show mixed results and some others (Windrum and Berranger, 2002, 2003) propose firm's geographical location as an e-commerce adoption driver, limited studies featured or conceived location as a moderator variable operating between demographics and adoption. Kelley *et al.* (1993) suggest that the scarcity of empirical evidence confines any theoretical discussion about a subject to anecdotal report. Although ICT platforms tend to bridge the barriers of geographical location, agglomeration economies still exist especially in Nigeria; the fact is that there is an uneven developmental stride across zones and so, adoption opportunities may vary (see classical resources munificence theory). For commercial, cultural, regulatory and/or other reasons, scholarly accounts show that urban settings provide more attractive business opportunities than rural scenes (de Noronha Vaz *et al.*, 2006; Albaladejo-Pina

and Díaz-Delfa, 2009) and that there are different denominations for similar enterprises, and similar denominations for different enterprises (Valdés, 1996).

Nigeria's e-commerce is rapidly expanding as online sales grew N62.4 billion in 2011 against N49.9 billion in 2010 and the expectation is that the figure will double by 2014 (Uzor, 2013). However, such upward trajectory would rarely be sustained given the narrow focus on upper and middle classes. Reports (e.g. Uzor, 2013) show that aside these classes of people critically domiciling in some cities, their relative small number (when compared with low-income earners) rarely gives on-line business a boost in Nigeria. Therefore recognizing the strategic position of SMEs in socio-economic building and the opportunities the present situation offers based on their (SMEs) operating agility, this study intends to unveil if the differences in the demographics of top management team (TMT) and e-commerce adoption may be explained by differences in firm's geographical location. The structure of this paper spans theoretical review and development of hypotheses, research methods, analysis and discussion, future research directions, and implications and conclusion(s).

2. Conceptual review

SMEs in Nigeria believe that the uptakes of electronic commerce will revolutionize business operations but when compared with advanced economies, one may be tempted to say Nigerians uphold wait and see (imitative approach) attitude in adopting some of the ICT platforms. Ifinedo (2006) states that SMEs in Nigeria can increase their market reach, enhance customer service and reduce both marketing and distribution cost through e-commerce. However, the strength of e-commerce lies on its provision of a worldwide innovative platforms for optimizing operations and integrating services and business partnership via real-time flow of information (Ongori and Migiro, 2010; Al-Qirim, 2007). It provides new methods of communications, business transactions, market structures, education, and works that assure operational flexibility (see Awa *et al.*, 2010). Though e-commerce's definitions vary, Australian Society of Certified Practising Accountants refers to it as sharing of business information, maintaining business relationships and conducting business transactions by means of telecommunication networks (ASCPA, 1997). Awa *et al.* (2010) define it as a form of business transaction involving inter-firm alignment, where supposedly independent parties/firms interact and collaborate real-time through electronic networks rather than physical contacts.

These suggest that electronic commerce encompasses electronic trading, electronic messaging, electronic data interchange, electronic fund transfer, electronic mail (e-mail), facsimile (FAX), electronic catalogue, bulletin board services, shared databases and directories, electronic news and information services, electronic payroll, electronic forms, and other types of electronic data transmission (Philip, 1997). From the strategic, operational, and tactical standpoints, all these platforms assist SMEs to democratize ideas (supply, archive, and utilize digital data with less restrictions), to build on-line communities and business partnerships (B2B and B2C), to optimize value-chain through real-time inter-and intra-firm knowledge sharing, and to create systems integration and/or collaborative environments (Love *et al.*, 2004; Alba *et al.*, 2005). Often these attract higher levels of product and process innovation (Raymond and Bergeron, 2008) spanning improved competitiveness (Alberto and Fernando, 2007), costs reduction (in terms of disintermediation, virtual stores, inventory holding, total cycle-time and lead-time compression, and network relationships); and improved customer service through transparency, value-added information and new levels of innovation from

network externalities and knowledge sharing (Awa *et al.*, 2011; Kannabiran and Dharmalingam, 2012).

With disintermediation (B2B and B2C), SMEs are expected to automate operations and to reach consumers directly while satisfying communications, networks and research needs. Kannabiran and Dharmalingam (2012) observe that advanced technologies such as ERP/CRM software assist SMEs to increase productivity, improve inventory control, and increase sales through closer community accords and faster delivery. However, studies (Metaxiotis, 2009; Federici, 2009) found that the diffusion of e-commerce amongst SMEs is relatively slow in many economies when compared with what it is in large enterprises. Kannabiran and Dharmalingam (2012) report that advanced technologies target large firms because of their financial strength and technical capability to identify alternative technologies that would suit their operations. This contrasts SMEs where extant literature shows that irrespective of their more agility and receptivity to novelty, they scarcely exploit ICT solutions to the fullest. The Sectoral e-Business Watch study reports that the over 1.9 million SMEs in UK connected to the internet, surpassing government's estimate of 1.5 million, tend to use internet only to send mails, transfer files, or gather information (European Commission, 2007). The source further reports a dearth of empirical evidence supporting that SMEs invest in ICT platforms to improve services, processes, business automation, and internal processing of business information and knowledge. Scupola's (2009) estimate shows that about 15 per cent of small firms and 30 per cent of medium-sized firms employ ICT practitioners or have ICT department.

In a typical e-commerce adoption model, perceived benefits, organizational size and readiness and external pressure (Mehrtens *et al.*, 2001); competitive pressures (Premkumar and Roberts, 1999); anticipated operational supports, cost reduction and social approval (Shiau *et al.*, 2009; Holsapple and Sena, 2005); and application complexity and providers' perspectives (Brown and Lockett, 2004) are amongst the major factors. While these critical adoption drivers and/or inhibitors hold sway, studies and theories view management's characteristics and supports (Hambrick and Mason, 1984), owners' enthusiasm and growth ambitions (Fillis *et al.*, 2003), CEO's knowledge and characteristics (Shiau *et al.*, 2009; Thong, 1999), managers' belief differences (Riemenschneider and Mckinney, 2002), and managerial productivity (Grandon and Pearson, 2004) as significant adoption predictors of e-commerce solutions that must complement existing factors. Awa *et al.* (2011) observe that the adoption of e-commerce solutions depends on the functional and/or emotional feelings of decision makers, which reflect their attitudes, perceptions, psychographics, motivation, and other IDFs. Kannabiran and Dharmalingam (2012) opine that CEO/owner is essential for setting appropriate ICT goals, identifying critical information needs, allocating resources, and managing executions.

Through the strengths of existing theories, owner managers (perhaps with other captains) position and reposition firm's strategic thrusts (Awa *et al.*, 2011); they drive e-commerce solutions by shaping values and cognitive bases of dominant actors, especially if it is perceived to contribute to the operational efficiency (Somuyiwa and Adewoye, 2010). In their survey of SMEs in Portuguese manufacturing industry, Caldeira and Ward (2002) found that top management perspectives (TMPs) and attitudes towards ICT adoption explain different corporate success stories. They argue from resource-based points that SMEs develop internal skills, competences, and capabilities subject to TMPs and attitudes towards ICT adoption. However, TMP's demographics and attitudes toward e-commerce adoption may be moderated by firm's location.

3. Conceptual development and hypotheses

The research framework visualizes the interrelationships amongst the three groups of variables (predictor- age, experience, education, and gender; dependent- adoption; and moderator- firm's location) whereas the empirical review provides the scholarly evidence. Though the predictor variables are well studied, simplistic and seem somewhat superficial in the context of e-commerce, introducing geographical location as a moderator variable provides potentially unique twist since (to one's self) ICT inquiries (e.g. Fillis *et al.*, 2003; Shiau *et al.*, 2009; Thong, 1999; Grandon and Pearson, 2004) scarcely sought to use location factors to explain the critical link between e-commerce adoption and the demographic composition of top management. Extant inquiries (e.g. Apulu *et al.*, 2011; Apulu and Latham, 2011; Apulu and Ige, 2010; Kannabiran and Dharmalingam, 2012; Riemenschneider and Mckinney, 2002) focus more on the development of adoption forecasts, and the identification of adoption drivers and inhibitors than on the demographic characteristics of decision makers.

Further, rather than being treated as adoption factor as proposed by Windrum and Berranger (2002, 2003); location factors were conceived in the framework as moderator variables because of Nigeria's developmental and geo-political peculiarities. Over the years, successive governments in Nigeria and some other nations believe so much in concentrating developmental strides in some regions based on the levels of industrial activities, ethnic chauvinism, political affiliation, and other critical factors, and so introducing location factors as contextual variables tends to recognize the roles played by environment in shaping these factors and actual adoption and add to extant frameworks that dwelt more on adoption determinants and critical adoption factors.

3.1 Age

Age measures one's date of birth. Several studies (Hambrick and Mason, 1984; Hedges, 2010; Justice, 2010; Glover, 2010; Den Hoogen, 2010; Chuang *et al.*, 2009; Czaja and Sharit, 1998) on generational differences establish association between decision-makers' age and organizational characteristics in terms of risk taking. Age impacts directly on perceived usefulness (PU) both in long and short terms (Venkatesh and Morris, 2000) and on employees' performance of computer-based tasks (Czaja and Sharit, 1998). Younger executives are much more associated with achievements, speed, novelty, mobility, flexibility, risk taking, and above all, corporate growth (see Chuang *et al.*, 2009; Justice, 2010; Glover, 2010; Den Hoogen, 2010; Shiau *et al.*, 2009). Hedges (2010) surveyed mobile phone users and found that the adoption of new devices is evident among senior executives under 40, where 73 per cent uses mobile phone as their primary communication tool against 28 per cent executives of 50 and above. This provides a glimpse that younger executives are more mobile and more digital; the younger the executives the greater their proclivity to take greater advantage of new applications. Scholars (Glovers, 2010; Den Hoogen, 2010) propose that while older executives permit new applications to drive the task; younger executives are increasingly becoming fluent in their language mobility. This has the potential of turning younger executives to device agnostics since they can use the device for many tasks; thus, behaviour is driven less by the available devices and more by the task at hand (Den Hoogen, 2010; Hedges, 2010; Justice, 2010).

Shiau *et al.* (2009) suggest that age explains why SMEs in Singapore are probably more innovative and aggressive than those in Taiwan. However, older executives' conservative stance explains the difference in organization's strategic thrusts. Older executives rarely have physical and mental stamina (Child, 1974) as well as social

enablement to grasp novel behavior (Holt and Komlos-Weimer, 1999); exhibit greater psychological commitments to corporate status-quo and place premiums on career and financial security (Alutto and Hrebiniak, 1975). Carlsson and Karlsson (1970) opine that older executives generally avoid any risky actions capable of disrupting their social circles, spending traits, and expectations bordering on retirement benefits. Our discussion so far leads us to:

H1. The younger the top executives of a firm, the higher the firm's propensity to adopt e-commerce.

3.2 Gender

Gender and age of the decision-makers influence a firm's risk taking behaviour and shape strategic thrusts. Gender shapes human behaviour and managerial decisions (Heilbrun, 1976); it determines the extent of innovative behaviour. Studies (Gefen and Straub, 1997; Jimmie and Mukhopadhyay, 2010) show that innovation adoption is faster amongst men than amongst women. For instance, Gefen and Straub (1997) found perceptual differences between males and females in the use of e-mails whereas Jimmie and Mukhopadhyay (2010) survey the relationship between gender and e-commerce adoption and had their findings connected to sex role. Specifically, they report that females use less computer facilities at home than men. In technology-driven markets, early adopters of new innovations are predominantly young males (Lu *et al.*, 2003). The Germany mobile phones market is 60 per cent men and 40 per cent women; thus, men spend more time on mobile phones than women (Target Group Index Europa Survey, 2000). This may not be the case in developing nations like Nigeria, where many jobless women carry an array of cell-phones in their hand bags. These arguments are hypothesized below as:

H2. The male top executive(s) influence the adoption of e-commerce more than females.

3.3 Experience

Experience they say is a corporate asset and the best teacher. When consistently acquired, experience impacts on operations, cost structure, employee morale and productivity, learning curves, and adjustments to market demands. Zmud (1979) opines that experience is rated a significant IDF in technology acceptance research. In addition to other infrastructural resources, lack of CEO's experience and his experience in e-commerce potentials hinder adoption (Chuang *et al.*, 2009; Kannabiran and Dharmalingam, 2012; Tan *et al.*, 2009). Favourable experience in terms of an innovation's simplicity, PU, compatibility, amongst others, influence adoption of similar ones on accounts of stimulus generalization (see Ivan Pavlov in Kotler and Keller, 2009), technology cluster (see Cook, 2008), cognitive consistency (see Heider, 1958; Osgood and Tannenbaum, 1955), affect transfer (see Wright, 1975), categorization theory (see Fiske, 1982), and Thorndike's law of effects (see Thorndike, 1947). Therefore, executives' knowledge, skills, attitudes, and practices or internet-use experiences are key adoption determinants (Galloway and Mochrie, 2005; Wainwright *et al.*, 2005; Sabherwal *et al.*, 2006).

Lefebvre *et al.* (1991) explore the relationship between executives' experience and e-commerce adoption processes in small manufacturing firms and found that when experience in e-commerce intensifies, organizations harness the true potential of technology to improve business processes. This is supported by other studies (Hashim, 2007; Bassellier *et al.*, 2003) which reported that CEO's knowledge reflects how early or late e-commerce adoption takes place. The industry where the experience is acquired

matters; executives who drew experiences from railway are far less apt to be aggressive in adopting innovations than those coming from competitive industries and perhaps have prior experience on e-commerce solutions as evidenced in their skills to simplify its complexities to improve PU (see Levitt, 1960):

H3. The more experienced top executives are in e-commerce, the higher their firm's propensity to adopt e-commerce.

3.4 Education

The top executives' level of formal education is a significant predictor of e-commerce adoption (Chuang *et al.*, 2009; Federici, 2009; Sanna *et al.*, 2007). Education affects proactive and/or reactive approaches to rapid technological changes. To a large extent, educational attainment shapes an individual's value systems, cognitive preferences, ability to learn, dexterity, and innovativeness (Becker, 1970). Although, we literarily believe that better educated persons prefer larger enterprises to SMEs, Rogers (1995) recognizes that highly innovative executives aggressively thrive on innovation and often rely on knowledge and experience to advantageously steer up the organization in times of uncertainty. This is easier to achieve in SMEs because of their decision-making agility. Educated CEOs are more cosmopolitan in their social relationships, more informed about value creation, more exposed to mass media, show less group cohesiveness, and are more likely to obtain information from scientific sources and experts. They have a greater tendency to learn about an innovation and to diffuse its benefits to others. Conversely, executives with weak education often exhibit high levels of risk aversion because they feel threatened by change and only invest after first-mover advantages may have been lost:

H4. The better educated top executives are, the more their likelihoods to influence e-commerce adoption.

3.5 The moderator

Traditionally, location and central place experts use geographical factors to develop conceptual frameworks that guide the design of optimally positioned facilities/networks; they analyze spatial structure of a business or the complexity of firms in terms of geographical areas. Wever and Stam (1999) distinguish between classical resources munificence theory and the learning economy theory. The first proposes that some geographical areas have a more favourable location and resource advantages than others in terms of better educated workforce, better knowledge centres, more venture capital companies, and more quality services. The probability of adopting innovative concepts within a region correlates with the existing range and quality of resources (see Windrum and Berranger, 2002).

Scholarly accounts show that despite the benefits of e-commerce to enterprises located in the rural settings, adoption remains very sluggishly (de Noronha Vaz *et al.*, 2006; Albaladejo-Pina and Díaz-Delfa, 2009; Cawley and Gillmor, 2008) because of acute existence of many adoption barriers. Urban and localization economies within the classical munificence theory provide further insights; urban economies arise from urban concentration and include such external factors as availability of diversified workforce, physical infrastructures, and a range of diversified activities. Studies show that the rural-urban migration of youths positively correlates with the composition of decision-makers and the adoption of service innovation (see Hambrick and Mason, 1984; Thong, 1999). Other studies (see Saxenian, 1994; Child, 1974; Shiau *et al.*, 2009; Carlsson and Karlsson, 1970) propose that in most urban settings with stiff

competition, TMT dominated by mentally alert younger executives has the social and psychological stamina to adopt and manage knowledge capital, and to turn it into a competitive advantage.

Localization economies (or development from below) refer to the mobilization and maximization of industrial specialization (e.g. natural and created endowments, human and institutional resources, and other specialized inputs) in an area with the primary objective of satisfying clients. Studies (de Noronha Vaz *et al.*, 2006; Saxenian, 1994) propose that spatial proximity (perhaps induced by location-specific advantages) of similar industrial activities (perhaps amongst similar firms) promotes a network of knowledge externalities and the use of better educated and informed executives in repositioning the competitive strength of players. The learning economy approach, on the other hand, opines that innovation is a process of interaction in the value-chain, involving suppliers, consumers, and knowledge centre. The geographic proximity and the institutional framework encourage interaction that will cause the formation of regional clusters of innovative activities (Storper, 1995; Morgan, 1997). All these theorists suggest that there are many location factors that moderate the demographics of top management and e-commerce adoption. Therefore, our discussion is hypothesized below:

H5a. The relationship between the demographic factors and e-commerce adoption is moderated by the physical infrastructures; specifically where physical infrastructures exist, e-commerce adoption faster.

H5b. The relationship between the demographic factors and e-commerce adoption is moderated by the degree of the location's industrial specialization; specifically where industrial specialization exists, adoption is faster.

4. Materials and methods

4.1 Population and data collection

Guided by Krejcie and Morgan's (1970) table, data were collected from owners/managers of 226 SMEs. They were drawn from registered SMEs in five industries, including furniture, business centres (only those offering cybercafé services), superstores, printing and publishing, and electronics and home appliances. These firms operate in the cities of South-east, South-west, and South-south geo-political zones of Nigeria. The existence of the least religious and/or political uprisings informed our choice of these zones. Purposefully, two cities (a state capital and a commercial nerve centre) representing different levels of industrial specialization and physical infrastructures were chosen in order to test location differences as captured in *H5a* and *H5b*. For instance, Port Harcourt and Warri were selected from the South-south; Lagos and Ijebu-ode from the South-west; and Enugu and Aba from the South-east. The population information was guided by records from Pillars Association, Parent Trade Unions, Chamber of Commerce, Industry, Mines, and Agriculture, and Corporate Affairs Commission.

However, because the epistemology underlying quantitative paradigm is to generate explanation that leads to prediction and control over phenomena, positivist ontology was employed. Questionnaire (made up of structured disguised, structured-undisguised, and unstructured questions) was designed; and the bases for sampling span a predetermined benchmark of defining SMEs in terms of having not more than 20 workers and other conditions such as having the owner(s) directly involved in the

management, and exploiting the potentials of network externalities. The state capitals and commercial nerve centres attracted 100 and 70 copies of the questionnaire, respectively, because of their differences in socio-economic and socio-political strengths. This brought the total copies of questionnaire to 510 and a return rate of 226 (24.33 per cent) Table I.

4.2 Measures and refinements

Drawing from Thong (1999), e-commerce adoption measures the extent of use of computer hardware and software applications to support operations, management, and decision-making process. The intra-firm and inter-firm adoptions are often the main approaches adopted for the study of this phenomenon (see Battisti and Stoneman, 2003). While the former relates to adoption of e-commerce as a part of business strategy within a firm; the latter refers to adoption taking place amongst businesses, regardless of the level of integration. This study takes the latter approach since her interest spans the extent of interconnectivity between firms; SME and its trading partners (e.g. customers, dealers, manufacturers, bankers, and suppliers). We developed an extended and improved measurement based on the eight items proposed by NSSBF to ascertain if respondents use e-commerce for one business task or the other. The 11 scale item is shown below:

(1) using e-commerce to improve customer service;

(2) using e-commerce for inventory management;

(3) using e-commerce for cost reduction;

(4) using e-commerce for e-trading and e-messaging;

(5) using e-commerce for inter-firm fund transfer;

(6) using e-commerce for processing loan credits and banking details;

(7) using e-commerce for e-mails, FAX, e-catalogue, and e-news;

(8) using e-commerce for bulletin board services, shared databases and directories;

(9) using e-commerce for e-payroll and e-forms;

(10) using e-commerce for book-keeping; and

(11) using e-commerce for ordering and managing stock in stock.

Adopting the approach proposed by Chuang *et al.* (2009), the composite measure(s) for each industry/firm involved summing up the "yes" responses to generate a scale from 1 to 11, where one and 11 were the least and the highest extents of adoption, respectively.

City	Number of questionnaires administered	Number of questionnaires returned	Percentage of returns
1 Port Harcourt	100	42	8.24
2 Warri	70	39	7.65
3 Enugu	100	38	7.45
4 Aba	70	39	7.65
5 Lagos	100	47	9.22
6 Ijebu-ide	70	21	4.12
Total	510	226	44.33

Table I.
Descriptive statistics

The scale for location reflected statement items that bordered on how the relationship between top management composition and e-commerce adoption is shaped by physical infrastructures and industrial specialization. These two location factors were chosen based on the peculiarities of Nigeria in terms of developmental strides and minerals' deposit that inform varying degree of industrial concentration. The measures developed for physical infrastructure were good road networks, regular energy supply, stable internet facilities, and availability of bandwidths and other infrastructures; and those of industrial specialization were extent of mineral deposits, availability of manpower, existing knowledge centre, and venture capital in action. Likert-scale was developed with multiple response options ranging from (1) "don't agree at all" to (5) "completely agree" in order to assess location factors and to lend support to the demographic details.

For the demographic determinants, age was measured by one statement item involving years (nominal data); adult defines those above 40. Gender is self-explanatory (Chuang *et al.*, 2009) and also involved one statement item; nominal scale (1 if male and 0 if otherwise). Experience measures career consistency (in ICT firms) on a scale spanning less than five years, between five and ten years, etc. Education measures academic attainment of the respondents as shown in the scale developed by Awa *et al.* (2011):

- First School Leaving Certificate.
- Junior Secondary Certificate Examinations.
- Senior Secondary Certificate Examinations or equivalents (WASC and GCE).
- National Diploma or its equivalent.
- BSc, BTech, BA, Higher National Diploma (HND).
- Post-graduate degrees.
- Professionals without degrees/HND.

Although previous studies (Kannabiran and Dharmalingam, 2012; Chuang *et al.*, 2009; Shiau *et al.*, 2009) directly or indirectly confirm the content validity of some of these scale items, the items were further subjected to face validity involving the scrutiny of informed persons in order to ensure that the statements framed up appropriately and internally represent the property measured. Further, a pilot study of 12 subjects was conducted to pre-test the scale items on limited sampling units in order to improve simplicity and consistency before the actual study.

5. Analysis and findings

Figure 1 presents a framework of four hypothesized main/direct effects and two moderation effects that explain firm's location. The measures were reliable and valid and the two effects were tested using a four-step hierarchical regression procedure. Cohen and Cohen (1975) propose that the process involves factor-loading of the independent variables, loading of the direct effect, the moderator, and then the interaction effects. Since in some cases nominal data collected, SPSS procedure converted them to interval to permit the use of regressions. Essentially, testing the moderation involves examining the general moderating effect of the moderators, and then examining the moderator effect and the direction of the moderation for each link between the independent and the dependent variables. The model summary in Table II shows

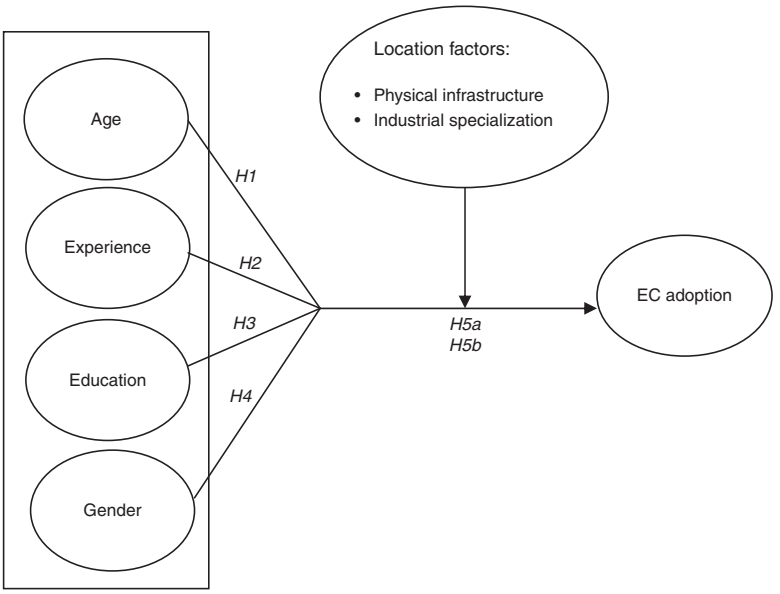

Figure 1.
Research framework

that the predictor variables explain an overall estimate of 27 per cent variations of e-commerce adoption behaviour (see $R^2 = 0.271$, $p < 0.01$). Thus, managerial characteristics of key actors are largely a function of demographic factors and they directly influence the adoption of e-commerce amongst SMEs.

When the model variables were loaded, the additional variance explained stood at 0.23 per cent and F change of 3.71, $p < 0.01$. However, four regression coefficients were considered because we propose that the four loaded demographic factors influence e-commerce adoption. The model equation shows statistical interaction between the demographic factors and e-commerce adoption, thereby lending support to *H1-H4*. See age ($\beta = 0.354$, $p < 0.05$), gender ($\beta = 0.243$, $p < 0.05$), experience ($\beta = 0.313$, $p < 0.05$) and education ($\beta = 0.204$, $p < 0.05$). Further observation shows that < 40 years of age ($\beta = 0.277$, $p < 0.05$), at least five years experience ($\beta = 0.265$, $p < 0.05$), male ($\beta = 0.263, p < 0.05$), and BSc/HND and above ($\beta = 0.224, p < 0.05$) show a significant positive relationship with ecommerce adoption. Factoring in location factors suggests that physical infrastructures and industrial specialization have significantly positive moderation on top management's demographic composition and e-commerce adoption (see the values for R^2 change); thus, the factors contribute to the explanation of e-commerce adoption. Though the values differ, the individual moderation effect of each indicator of location is significant (see interactive values). The location factors brought in an incremental variance of 25 per cent and when the interaction items were loaded, the incremental variance became 36 per cent. The F change statistics of 3.27 for model 3 and 4.46 for model 4 were significant.

6. Discussion

This paper attempts to provide additional insight into the demographic determinants of e-commerce adoption by introducing the moderation effects of some location factors. Specifically, our investigation focused on identifying the moderator effects of physical

Independent variable	Std. β Stage 1 (Model 1)	Std. β Stage 2 (Model 2)	Std. β Stage 3 (Model 3)	Std. β Stage 4 (Model 4)
Age	0.354*	0.212*	0.281*	0.224*
Gender	0.243*	−0.193*	−0.156*	0.242*
Experience	0.313*	0.423*	0.201*	0.253*
Direct effects				
Adoption is at < 40 years	0.277*	0.005	0.088	0.069
Adoption is at faster at 40 years	0.423	0.102	0.216	0.087
Adoption is at faster at above 40 years	0.231	0.066	−0.077	0.067
		0.263*	0.096	0.179
Adoption is at faster when males are involved	0.202	0.285	0.120	0.166
Adoption is at faster when females are involved	0.067	−0.212	0.265*	0.087
Adoption is at faster when experience is at least 5 years	0.207	0.201	−0.244	0.025
Adoption is at faster when experience is less than 5 years	−0.112	0.222	0.431	−0.111
Adoption is at faster when experience is between 5 and 10 years	0.224	−0.078	0.213	0.234
Adoption is at faster when education is at least OND	−0.076	0.065	0.057	0.224*
Adoption is at faster when education is BSc/HND and above	0.127	0.017	0.074	−0.055
Moderating variables				
Physical infrastructures			0.021	0.281*
Industrial specialization			0.065	0.249*
Interactive effects				
Age × physical infrastructures				0.423*
Age × industrial specialization				0.344*
Experience × physical infrastructures				0.273*
Experience × physical specialization				0.287*
Education × physical infrastructure				0.266*
Education × physical specialization				0.324*
Gender × physical infrastructure				0.254*
Gender × industrial specialization				0.321*
Model summary				
R	0.521	0.554	0.587	0.602
R^2	0.271	0.3	0.345	0.362
Adjust R^2	0.220	0.252	0.256	0.269
R^2 change	–	0.032	0.004	0.013
F change	–	3.71*	0.327**	0.426**

Notes: *$p < 0.05$; **$p < 0.01$

Table II. Hierarchical regression analysis

infrastructures and industrial specialization on the demographic composition of top management and e-commerce adoption. Although with varied statistical strengths, the two factors significantly moderate the relationship(s). Proposing that e-commerce adoption varies with firm's location, this finding debunks Thompson Friedman's proposition of the world is flat (see Israel, 2007; Gengatharen and Standing, 2005). With uneven developmental strides in some developing economies, e-commerce can rarely be perceived by SMEs to provide plausible ways to overcome the ordeals of distance and size. The predictor variables explain e-commerce adoption behavior; thus, lending support to extant studies (e.g. Thong, 1999; Dwivedi and Lal, 2007; Shiau *et al.*, 2009; Awa *et al.*, 2011). First, the equation found that age has significant positive relationship with e-commerce adoption. While some studies (Hambrick and Mason, 1984; Child, 1974;

Awa *et al.*, 2011) confirm the significant role of younger executives in adoption decision; others (e.g. Chuang *et al.*, 2009) assume age has a significant but negative effect.

One possible explanation to this contradiction is that ICT adoption cuts across ages in the developed nations; whereas in some developing nations, adoption is faster amongst younger executives who often exploit its platforms to build corporate growth, interconnectivity, and competitiveness. When the location factors were loaded against age, their interactions were statistically significant (see $\beta = 0.423$, $p < 0.05$a; $\beta = 0.344$, $p < 0.05$b). This suggests that the relationship between the age bracket of members of top management and adoption of e-commerce is shaped by location factors; with executives of < 40 being major adopters. While this age bracket concentrates more in the cities (see Uzor, 2013), studies (Hambrick and Mason, 1984; Child, 1974; Saxenian, 1994; Shiau *et al.*, 2009; Carlsson and Karlsson, 1970) propose that age has a lot to do in the strategic and proactive mindsets of top executives in dealing with the competitive states of nature that greet related activities in proximity.

Second, ICT-related experience of top management was critical (in fact next to age) in determining e-commerce adoption. This finding is consistent with previous (Galloway and Mochrie, 2005; Wainwright *et al.*, 2005; Sabherwal *et al.*, 2006; Lefebvre *et al.*, 1991; Bassellier *et al.*, 2003) and recent (Chuang *et al.*, 2009; Kannabiran and Dharmalingam, 2012; Tan *et al.*, 2009; Hashim, 2007) studies that found that top management's internet-use experiences, skills, and practices intensify adoption. It is plausible that better appreciation of the potentials of ICT platforms goes with CEOs' learning and experience curves. When the location factors were measured against experience, their interactions were statistically significant (see $\beta = 0.273$, $p < 0.05$a; $\beta = 0.287$, $p < 0.05$b). It is evidenced that top management made up of executives with at least five years of experience are critical in the adoption. Previous studies (Hambrick and Mason, 1984; Thong, 1999; Dwivedi and Lal, 2007; Shiau *et al.*, 2009; Child, 1974) found that the experience of members of top management about the nature of the environment explains her propensity to understand and adopt novelties that make them more competitive.

Third, gender has a significant positive correlation coefficient with e-commerce adoption and the value for males was statistically significant (see $\beta = 0.263$, $p < 0.05$). While this finding consistent with similar studies (Gefen and Straub, 1997; Jimmie and Mukhopadhyay, 2010; Lu *et al.*, 2003; Awa *et al.*, 2011) that found statistical interaction between e-commerce adoption and gender, Igbaria *et al.* (1998) assume that different genders have different uses for ICT; males and females use more of productivity and application packages, respectively. When the location factors were factored in, their interactions were still statistically significant (see $\beta = 0.254$, $p < 0.05$a; $\beta = 0.321$, $p < 0.05$b). Finally, education attracted a significant positive correlation coefficient. This finding contradicts previous studies (see Dwivedi and Lal, 2007; Chuang *et al.*, 2009) much as it is consistent with some others (Awa *et al.*, 2011; Choudrie and Dwivedi, 2005). Choudrie and Dwivedi (2005) studied broadband use within households and reported that ICT adoption amongst a variety of firms is influenced by top management's knowledge of it benefits and the firm's expectations rather than educational attainment of the decision makers. When the location factors were measured against education, the result was positive statistical interactions (see $\beta = 0.266$, $p < 0.05$a; $\beta = 0.324$, $p < 0.05$b).

7. Limitations and directions for further studies

This study is besieged with some limitations that perhaps ignite need for future research. First, drawing our sample from SMEs in some industries operating in the three geo-political zones may limit the power of generalization of our findings against

those industries and zones not studied on the recognition that no two industries/zones are exactly the same. Therefore, external validity and possibly theories is often built by replicating and cross-validating the variables and their measures. Second, though concrete steps were taken to minimize their effects on results, some errors seem unavoidable in the course of converting data just like all the measures used appear subjective and prone to common error bias. Third, other demographic (e.g. income, marital status, functional track, etc.) and location (better knowledge centres, conglomeration of venture capital companies, spatial proximity, etc.) factors not captured in this study may be studied by future researchers.

8. Conclusion and implications

E-commerce is associated with socio-economic developments and operational efficiency. Geographical locations differ in terms of the opportunities they offer different young, educated, and experienced labour force, which ultimately define extent of innovation adoption. SMEs located far from the cities tend to adopt ICT solutions very sluggishly because the range and quality of available resources may not be adequately encouraging. Somuyiwa and Adewoye (2010) propose that SMEs need quality resources to improve geographical proximity and to overcome communications ordeals placed by their size and physical distance. SMEs are constrained by limited resources to fully exploit the capabilities of e-commerce but their operating agility offers them leveraging strengths to tap the huge growing market, and to experiment and customize entrepreneurial solutions faster than large enterprises with more established bureaucratic hierarchies. Mintzberg (1979) theorizes that the CEOs of SMEs (and perhaps in conjunction with their lieutenants) make the most critical decisions because of the centralised structures; thus, their demographic characteristics significantly explain and predict e-commerce adoption.

Therefore, recognizing that corporate directions and dynamics are largely a product of cognitive perceptions and assumptions of key actors, this paper conceived location factors as moderators between the demographic composition of top management and e-commerce adoption. Specifically, evidence from the study led to the conclusion that physical infrastructures and industrial specialization statistically moderate the demographic composition of top management and e-commerce adoption. Thus, e-commerce is yet to achieve its target in some economies because the infrastructural facilities are not evenly distributed and so, some cities play stronger host than others. The implications of our conclusion are theoretical and practical.

8.1 Theoretical

The academia is provided with another theoretical framework and stream of research evidences that provide further lenses into the specifics of B2B and B2C while specifically, contributing to the growing literature on SMEs' adoption of e-commerce. Ceteris paribus, the adoption theory emphasizing that e-commerce assists SMEs to overcome the challenges of size and distance can seldom be queried. However, the uneven spread of facilitating and developmental infrastructures largely makes adoption speed dependent on firm's location and creates room for investigation. Given that ample scholarship focuses on how demographic factors influence e-commerce adoption, this study takes a new twist and proposed a conceptual framework that reported a statistical relationship between demographic composition of top management and e-commerce adoption under the moderation of location factors.

8.2 Practical

Implicit from the findings are the following practical implications. First, the government and agencies should spread the facilitating and developmental infrastructures evenly to encourage SMEs exploit the full potentials of e-commerce irrespective of their locations. This will de-emphasize rural-urban migration and allow SMEs to tap to the fullness the demographic factors. Second, SMEs should recognize the differences in the adoption and demographic composition of top management as spelt by location factors and tailor decisions accordingly. Third, staffs' learning and experience curves should be constantly updated by creating an environment that allows for training and retraining in order to unfold more opportunities within and beyond a location. Fourth, service providers should increase the switching costs by improving upon ICT infrastructures to a level where location factors and demographic composition of management team will rarely be adoption barriers, especially amongst developing economies.

References

Alba, M., Diez, L., Olmos, E. and Rodriguez, R. (2005), "Global performance management for SMEs", *International Federation for Information Processing Book Series*, Springer, Boston, MA.

Albaladejo-Pina, I. and Díaz-Delfa, M. (2009), "Tourist preferences for rural house stays: evidence from discrete choice modelling in Spain", *Tourism Management*, Vol. 30 No. 6, pp. 805-811.

Alberto, B. and Fernando, L. (2007), "A firm-level analysis of determinants of ICT Adoption in Spain", *Technovation*, Vol. 27 No. 6, pp. 352-366.

Al-Qirim, N. (2007), "The adoption of e-commerce communications and applications technologies in small Businesses in New Zealand", *Electronic Commerce Research and Applications: Intelligent Agents in E-Services*, Vol. 6 No. 4, pp. 462-473.

Alutto, J. and Hrebiniak, L. (1975), "Research on commitment to employing organizations: preliminary findings on a study of managers graduating from engineering and MBA programmes", paper presented at Academy of Management Meetings, New Orleans, LA.

Apulu, I. and Ige, E. (2010), "Are Nigeria SMEs effectively utilizing ICT", *International Journal of Business and Management*, Vol. 6 No. 6, pp. 207-214.

Apulu, I. and Latham, A. (2011), "Drivers for information and communication technology adoption: a case study of nigerian small and medium sized enterprises", *International Journal of Business and Management*, Vol. 6 No. 5, pp. 51-60.

Apulu, I., Latham, A. and Moreton, R. (2011), "Factors affecting the effective utilization and adoption of sophisticated ICT solution: case studies of SMEs in Lagos, Nigeria", *Journal of Systems and Information Technology*, Vol. 13 No. 2, pp. 125-143.

ASCPA (1997), "E-Commerce: the way to go", *Australian Accountants*, October-November, pp. 50-51.

Awa, H., Eze, S., Urieto, J. and Inyang, B. (2011), "Upper echelon theory: a major determinant of information technology (IT) adoption by SMEs in Nigeria", *Journal of Systems and Information Technology*, Vol. 13 No. 2, pp. 144-162.

Awa, H., Nwibere, B. and Inyang, B. (2010), "The uptakes of electronic commerce bySMEs: a meta theoretical framework expanding the determining constructs of TAM and TOE framework", *Journal of Global Business and Technology*, Vol. 6 No. 1, pp. 1-27.

Bassellier, G., Benbasat, I. and Reich, H. (2003), "The influence of business managers in IT competence on championing IT", *Information Systems Research*, Vol. 14 No. 4, pp. 317-336.

Battisti, G. and Stoneman, P. (2003), "Inter- and intra-firm effects in the diffusion of new process technology", *Research Policy*, Vol. 32 No. 9, pp. 1641-1655.

Becker, H. (1970), "Socio-metric location and innovativeness: reformulation and extension of the diffusion model", *American Sociological Review*, Vol. 35 No. 2, pp. 267-303.

Brown, D. and Lockett, N. (2004), "Potential of critical e-applications for engaging SMEs in e-business: a provider prospective", *European Journal of Information Systems*, Vol. 13 No. 1, pp. 21-34.

Buhalis, D. (2003), "eAirlines: strategic and tactical use of ICTs in the airline industry", *Information and Management*, Vol. 41 No. 7, pp. 805-825.

Caldeira, M. and Ward, J. (2002), "Understanding the successful adoption and use of IT/IS in SMEs: an explanation from portuguese manufacturing industries", *Information Systems Journal*, Vol. 12 No. 2, pp. 121-152.

Carlsson, G. and Karlsson, K. (1970), "Age, cohorts and the generation of generations", *American Sociological Review*, Vol. 35 No. 4, pp. 710-718.

Cawley, M. and Gillmor, D. (2008), "Integrated rural tourism: concepts and practice", *Annals of Tourism Research*, Vol. 35 No. 2, pp. 316-337.

Chibelushi, C. (2008), "Learning the hard way? Issues in the adoption of new technology in small technology-oriented firms", *Education + Training*, Vol. 50 Nos 8/9, pp. 725-736.

Child, J. (1974), "Managerial and organizational factors associated with company performance", *Journal of Management Studies*, Vol. 11 No. 3, pp. 13-27.

Choudrie, J. and Dwivedi, Y. (2005), "The demographics of broadband residential consumers in British local community: the London Borough of Hillingdon", *Journal of Computer Information Systems*, Vol. 45 No. 4, pp. 93-101.

Chuang, T., Nakatani, K. and Zhou, D. (2009), "An exploratory study of the extent of information technology adoption in SMEs: an application of upper echelon theory", *Journal of Enterprise Information Management*, Vol. 22 Nos 1/2, pp. 183-196.

Cohen, J. and Cohen, P. (1975), *Applied Multiple Regression/Correlation Analysis for the Behavioural Sciences*, Lawrence Erlbaum Associates, Hillsdale, NJ.

Cook, N. (2008), *Enterprise 2.0: How Social Software Will Change Future of Work*, Gower Publishing Ltd., Farnham.

Czaja, S. and Sharit, J. (1998), "Age difference in attitudes towards computer", *Journal of Gerontology Series B: Psychological Sciences*, Vol. 53 No. 5, pp. 329-341.

de Noronha Vaz, T., Morgan, E. and Nijkamp, P. (2006), *The New European Rurality: Strategies for Small Firms*, Ashgate Publishing Ltd., Aldershot.

Den Hoogen, I. (2010), "Early adopters and power users", *Forbes/INSIGHTS*, pp. 9-11.

Dwivedi, Y. and Lal, B. (2007), "Socio-economic determinants of broadband adoption", *Industrial Management and Data Systems*, Vol. 107 No. 5, pp. 654-671.

European Commission (2007), "Sectoral e-business Watch 2006", available at: www.ebusiness.watch.org

Federici, T. (2009), "Factors influencing ERP outcomes in SMEs: a post-introduction assessment", *Journal of Enterprise Information Management*, Vol. 22 Nos 1/2, pp. 81-98.

Fillis, I., Johanson, U. and Wagner, B. (2003), "A conceptualization of opportunities and barriers to e-business development in the small firms", *Journal of Small Business and Enterprise Development*, Vol. 10 No. 1, pp. 336-344.

Fiske, S. (1982), "Schema-triggered affect: applications to social perception", in Clark, M. and Fiske, S. (Eds), *Affect and Cognition: The 17th Annual Carnegie Symposium on Cognition*, Lawrence Erlbaum Associates, Hillsdale, NJ, pp. 55-78.

Galloway, L. and Mochrie, R. (2005), "The use ICT in rural firms: a policy-oriented literature review", *Info*, Vol. 7 No. 3, pp. 33-46.

Gamage, A. (2003), "Small and medium enterprise development in Sri Lanka: a review", available at: wwwbiz.meijo-u.ac.jp/SEBM/ronso/no3 4/aruna.pdf (accessed 6 June 2009).

Gefen, D. and Straub, D. (1997), "Gender difference in the perception and use of e-mail: an extension to the technology acceptance model", *MIS Quarterly*, Vol. 21 No. 4, pp. 389-400.

Gengatharen, D. and Standing, C. (2005), "Framework to assess the factors affecting success or failure of the implementation of government-supported regional E-marketplaces for SMEs", *European Journal of Information Systems*, Vol. 14, pp. 417-433.

Glover, M. (2010), "Reaching executives through mobile adv.", *Forbes/INSIGHTS*, pp. 12-13.

Grandon, E. and Pearson, J. (2004), "Electronic commerce adoption: an empirical study of small and medium US business", *Information & Management*, Vol. 42 No. 1, pp. 43-52.

Hambrick, D. and Mason, P. (1984), "Upper echelons: the organization as a reflection of its top managers", *Academy of Management Review*, Vol. 9 No. 2, pp. 193-205.

Hashim, J. (2007), "Information communication technology (ICT) adoption among SMEs owners in Malaysia", *The International Journal of Business and Information*, Vol. 2 No. 2, pp. 221-240.

Hedges, M. (2010), "The need to be nimble", *Forbes/INSIGHTS*, pp. 6-8.

Heider, F. (1958), *The Psychology of Interpersonal Relations*, John Wiley & Sons Inc., New York, NY.

Heilbrun, A. (1976), "Measurement of masculine and feminine sex role identities as independent dimensions", *Journal of Consulting and Clinical Psychology*, Vol. 44, pp. 183-90.

Holsapple, C. and Sena, M. (2005), "ERP plans and decision-support benefits", *Decision Support Systems*, Vol. 38 No. 4, pp. 575-590.

Holt, B. and Komlos-Weimer, M. (1999), "Older adults and the world wide web: a guide for web site creators", SPRY foundation, available at: www.spry.org/pdf/website_creators_guide.pdf

Ifinedo, P. (2006), "Factors affecting e-business adoption by SMEs in sub-saharan Africa: an exploratory study from nigeria", in Al-Qirim, N. (Ed.), *Global Electronic Business Research: Opportunities and Directions*, Idea Group Publishing, Hershey, PA, pp. 348-362.

Igbaria, M., Zinatelli, N. and Cavage, A. (1998), "Analysis of information technology success in small firms in New Zealand", *International Journal of Information Management*, Vol. 18 No. 2, pp. 103-119.

Ihua, U. (2009), "SMEs key failure-factors: a comparison between the United Kingdom and Nigeria", *Journal of Social Sciences*, Vol. 18 No. 3, pp. 199-207.

Israel, S. (2007), "SAP global survey: Doc Searls' global neighbourhoods (Web log post)", available at: http://redcouch.typepad.com/weblog/2007/07sap-global-su-1.htm1 (accessed 5 July).

Jimmie, J. and Mukhopadhyay, S. (2010), "A bi-national examination of gender and ICT adoption", *International Journal of Society Systems Science*, Vol. 2 No. 3, pp. 255-268.

Justice, C. (2010), "A more mobile future", *Forbes/INSIGHTS*, pp. 14-15.

Kannabiran, G. and Dharmalingam, P. (2012), "Enablers and inhibitors of advanced information technologies adoption by SMEs: an empirical study of auto ancillaries in India", *Journal of Enterprise Information Management*, Vol. 25 No. 2, pp. 186-209.

Kelley, S., Hoffman, D. and Davis, M. (1993), "A typology of retail failures and recoveries", *Journal of Retailing*, Vol. 69 No. 4, pp. 429-452.

Kotler, P. and Keller, K. (2009), *Marketing Management*, 13th ed., Pearson Prentice Hall, Upper Saddle River, NJ.

Krejcie, R. and Morgan, D. (1970), "Determining sample size for research activities", *Educational and Psychological Measurement*, Vol. 30, pp. 607-610.

Lefebvre L., Harvey, J. and Lefebvre, E. (1991), "Technological experience and thetechnology adoption decisions in small manufacturing firms", *R&D Management*, Vol. 21 No. 3, pp. 241-249.

Levitt, T. (1960), "Marketing myopia", *Harvard Business Review*, Vol. 38, July-August, pp. 26-44.

Love, P., Irani, Z. and Edwards, D. (2004), "Industry-Centric benchmarking of information technology benefits, costs and risks for small and medium sized enterprises in construction", *Automation in Construction*, Vol. 13 No. 4, pp. 507-524.

Lu, J., Yu, C. and Yao, J. (2003), "TAM for wireless internet", *Internet Research: Electronic Networking Applications and Policy*, Vol. 13 No. 3, pp. 206-222.

Mehrtens, J., Cragg, P. and Mills, A. (2001), "A model of internet adoption by SMEs", *Information and Management*, Vol. 39 No. 3, pp. 165-176.

Metaxiotis, K. (2009), "Exploring the rationales for ERP and knowledge management integration in SMEs", *Journal of Enterprise Information Management*, Vol. 22 Nos 1/2, pp. 51-62.

Mintzberg, H. (1979), *The Structure of Organizations*, Prentice-Hall, Englewood Cliffs, NJ.

Morgan, K. (1997), "The learning region, institutions, innovations and regional renewal", *Regional Studies*, Vol. 31 No. 5, pp. 491-503.

Mutuala, S. and Brakel, P. (2006), "E-readiness of SMEs in the ICT sector in Botswana with respect to information access", *The Electronic Library*, Vol. 24 No. 3, pp. 402-427.

Ogechukwu, A. (2006), "The role of small scale industry in national development in Nigeria", a paper presented at Association for Small Business and Entrepreneurship Annual Conference, Corpus Christi, TX, 1-3 November.

Ojukwu, D. and Georgiadou, E. (2007), "Toward improving inter-organizational trust amongst SMEs: a case study from developing countries", *Proceedings of the 9th International Conference on Social Implications of Computers in Developing Countries*, *Sao Paulo*.

Ongori, H. (2009), "Role of information communication technologies adoption in SMEs: evidence from Botswana", *Research Journal of Information Technology*, Vol. 1 No. 2, pp. 93-104.

Ongori, H. and Migiro, S. (2010), "Information and communication technology adoption: a literature review", *Journal of Chinese Entrepreneurship*, Vol. 2 No. 1, pp. 93-104.

Osgood, C. and Tannenbaum, P. (1955), "The principles of congruity in the prediction of attitude change", *Psychological Review*, Vol. 62 No. 1, pp. 42-55.

Philip, M. (1997), *Successful E-Commerce*, Bookman, Melbourne.

Prahalad, C. and Ramaswamy, V. (2004), "Co-creating unique value customers", *Journal of Strategy and Leadership*, Vol. 32 No 3, pp. 4-9.

Premkumar, G. and Robert, M. (1999), "Adoption of new information technologies in rural business internet commerce", *International Journal of Management Science*, Vol. 27 No. 4, pp. 467-484.

Raymond, L. and Bergeron, F. (2008), "Enabling the business strategy of SMEs through e-business capabilities: a strategic alignment perspective", *Industrial Management & Data Systems*, Vol. 108 No. 5, pp. 577-595.

Riemenschneider, C. and Mckinney, V. (2002), "Assessing belief differences in small business adopters and on-adopters of web-based e-commerce", *Journal of Computer Information Systems*, Vol. 42 No. 2, pp. 101-107.

Rogers, E. (1995), *Diffusion of Innovations*, 4th ed., The Free Press, New York, NY.

Sabherwal, R., Jeyaraji, A. and Chowa, C. (2006), "Information systems success: individual and organizational determinants", *Management Science*, Vol. 52 No. 12, pp. 849-864.

Sanna, L., Sami, S. and Petri H. (2007), "Enterprise size matters: objectives and constraints of ERP adoption", *Journal of Enterprise Information Management*, Vol. 20 No 3, pp. 319-334.

Saxenian, A. (1994), *Regional Advantage*, Harvard University Press, Cambridge, MA.

Scupola, A. (2009), "SMEs' e-commerce adoption: perspectives from Denmark and Australia", *Journal of Enterprise Information Management*, Vol. 22 Nos 1/2, pp. 152-166.

Shiau W., Hsu P. and Wang, J. (2009), "Development of measures to assess the ERP adoption of small and medium enterprises", *Journal of Enterprise Information Management*, Vol. 22 Nos 1/2, pp. 99-118.

SMEDAN (2005), "SME success", *Digest*, Vol. 3 No. 1, pp. 420-427.

Somuyiwa, A. and Adewoye, J. (2010), "Managing logistics information systems: theoretical underpinning", *Asian Journal of Business Management, Maxwell Scientific Organization*, Vol. 2 No. 2, pp. 41-47.

Storper, M. (1995), "The resurgence of regional economics, ten years later: the region as a Nexus of untraded interdependencies", *European and Urban Regional Studies*, Vol. 2 No. 3, pp. 191-221.

Tan, K., Chong, S. and Eze, U. (2009), "Internet-based ICT adoption: evidence from Malaysia SMEs", *Industrial Management & Data Systems*, Vol. 103 No. 2, pp. 224-244.

Target Group Index Europa Survey (2000), available at: www tgisurveys.com/f reportframes.htm

Thong, J. (1999), "An integrated model of information systems adoption in small businesses", *Journal of Management Information Systems*, Vol. 15 No. 4, pp. 27-31.

Thorndike, R. (1947), *Research Problems and Techniques*, Report No. 3 AAF Aviation Psychology Programme, US Government Printing Office, Washington, DC.

Tornatzky, L. and Fleischer, M. (1990), *The Process of Technology Innovation*, Lexington Books, Lexington, MA.

Uzor, B. (2013), "Low-income group seen as drivers of sustainable e-commerce growth in Nigeria", *Business Day*, 6-8 September, p. 4.

Valdés, L. (1996), "El turismo rural en España", in Pedreño Muñoz, A. and Monfort Mir, V.M. (Eds), *Introducción a la economía del turismo en España*, Civitas, Madrid.

Vargo, S. and Lusch, R. (2004), "Evolving to a New Dominant logic for marketing", *Journal of Marketing*, Vol. 68, January, pp. 1-17.

Venkatesh, V. and Morris, M. (2000), "Why don't men ever stop to ask for direction? Gender, social influence and their role in technology acceptance and usage behaviour", *MIS Quarterly*, Vol. 24 No. 1, pp. 115-139.

Wainwright, D., Green, G., Mitchell, E. and Yarrow, D. (2005), "Toward a framework for benchmarking ICT practice, competence, and performance in small firms", *The International Journal for Library and Information Services*, Vol. 6 No. 1, pp. 39-52.

Wever, E. and Stam, E. (1999), "Clusters of high technology SMEs: the dutch case", *Regional Studies*, Vol. 33 No. 4, pp. 391-400.

Windrum, P. and Berranger, P. (2002), "The adoption of e-business technology by SMEs", working paper, MERIT and International Institute of Infonomics, Maastricht.

Windrum, P. and Berranger, P. (2003), "Factors affecting the adoption of intranets and extranets by SMEs: a UK study", working paper, MERIT, Maastricht Economic Research Institute on Innovation and Technology, Maastricht.

Wright, P. (1975), "Consumer choice strategies: simplifying vs optimizing", *Journal of Marketing Research*, Vol. 11, February, pp. 60-67.

Zmud, R. (1979), "Individual differences and MIS success: a review of the empirical literature", *Management Sciences*, Vol. 25 No. 10, pp. 966-979.

Further reading

Bagozzi, R. and Yi, Y. (1988), "On evaluation of structural equation models", *Journal of Academy of Marketing Science*, Vol. 16 No 2, pp. 74-94.

MacGregor, R. and Vrazalic, I. (2005), "A basic model of electronic commerce adoption barriers: a study of regional small businesses in Sweden and Australia", *Journal of Small Business and Enterprise Development*, Vol. 12 No. 4, pp. 510-527.

Nunnally, J. (1978), *Psychometric Theory*, McGraw-Hill, New York, NY.

Simpson, M. and Docherty, A. (2004), "E-Commerce adoption support and advice for UK SMEs", *Journal of Small Business & Enterprise Development*, Vol. 11 No. 3, pp. 315-328.

Ukoha, O., Awa, H., Nwuche, C. and Asiegbu, I. (2011), "Analysis of explanatory and predictive architectures and the relevance in explaining the adoption of IT in SMEs", *Interdisciplinary Journal of Information, Knowledge and Management*, Vol. 6, pp. 216-229.

This article has been cited by:

1. Hart O. Awa, Ojiabo Ukoha, Bartholomew C. Emecheta. 2016. Using T-O-E theoretical framework to study the adoption of ERP solution. *Cogent Business & Management* **3**:1. . [CrossRef]
2. AwaHart O. Hart O. Awa Hart O. Awa holds a PhD in Marketing with specialization in Consumer Behavior and is currently a Senior Academic and a Faculty member of Management Sciences, at the University of Port Harcourt, Nigeria. He is at present the Faculty Co-ordinator of post-graduate programs as well as the Quality Assurance Officer. Hart serves in the University-wide Examination Committee and co-ordinates the faculty teaching of Scientific Research and ICT at the masters and PhD programs. Aside being a member of many professional bodies, he serves in the editorial and review boards of many reputable journals and has presented leading papers in conferences in Nigeria, UK, USA, Canada, Australia, Ireland, and Eastern Europe. Specifically, Hart is in the top league of the very few Nigeria-based teachers who champions scholarly writing on technology adoption and application of ICT platforms to business. Over 20 of his ICT-based articles had been published by journals indexed and abstracted in Thomson Reuters, Association of Business Schools (ABS), Web of science emerging sources citation index (ESCI), Scopus, and other top databases. One of his papers, co-authored with Professors Ogwo E. Ogwo and Ojiabo Ukoha Ojiabo, won the 2015 best paper award at the Imperial College conference organized by WBI, Australia and LARAP, UK. Hart is a member of the Emerald Literati network in recognition of his scholarly role in the Emerald family and having published nine of his papers in different but indexed emerald journals. Among others, Hart's interest spans co-creation, consumer psychology, ICT application to business, and innovation adoption. OjiaboOjiabo Ukoha Ojiabo Ukoha Ojiabo Ojiabo Ukoha Ojiabo is a Professor in Mathematics and Computer Science, at the University of Maryland, USA. His interests include the infusion of technology into mathematics instruction, factor analysis in applied research, and recruiting and retaining low-income students in computer science and other STEM disciplines. Department of Marketing, University of Port Harcourt, Port Harcourt, Nigeria Department of Mathematics, University of Maryland, College Park, Maryland, USA . 2016. A model of adoption determinants of ERP within T-O-E framework. *Information Technology & People* **29**:4, 901-930. [Abstract] [Full Text] [PDF]