

**PERCEPTION OF NIGERIAN SMES ON ELECTRONIC DATA
INTERCHANGE ADOPTION**

MAIKUDI SHEHU MUSAWA

A thesis submitted in Partial
Fulfillment of the requirement for the award of the
Degree of Master of Technology Management



Faculty of Technology Management, Business and Entrepreneurship

Universiti Tun Hussein Onn Malaysia

February, 2013

ABSTRACT

The wide adoption of electronic data interchange (EDI) by the SMEs is important for the success of the technology. A review of past EDI adoption literature indicates that past studies have focused mainly on large businesses. With the advance of technology, SMEs businesses are now able to enjoy the benefits of EDI. SMEs businesses are the backbone of the economy in Nigeria, despite these facts, there are relatively no identified studies on perception of EDI adoption among the Nigerian SMEs. A conceptual model is then proposed to address the above issues. The model may help Nigerians SMEs to achieve higher impacts on their businesses from the adoption of EDI and may also provide strategic roadmap for SMEs in other African countries. Using a technology, organization, and environment framework, this study tested a perception base model against the data collected from 204 SMEs firms in Nigeria. Four factors that were found to be significant in the SMEs EDI adoption were direct benefits, indirect benefits, financial resources, and external pressure to adopt EDI. The results of this study could provide insight into unique factors that drive EDI adoption by SMEs in Nigeria and serve as a guide to policy initiatives to the SMEs owner managers.

Key words: Technology adoption, EDI technology, Nigerian SMEs.



ABSTRAK

Penggunaan pertukaran data elektronik (EDI) oleh PKS (Perusahaan Kecil dan Sederhana) secara meluas adalah penting bagi kejayaan sesuatu teknologi. Kajian literatur berkenaan penggunaan EDI terdahulu menunjukkan bahawa kajian terdahulu lebih tertumpu kepada perniagaan besar. Dengan kemajuan teknologi, perniagaan PKS kini berupaya menikmati faedah EDI. Walaupun perniagaan PKS adalah tulang belakang ekonomi di Nigeria, tidak terdapat kajian yang khusus terhadap persepsi penggunaan EDI di kalangan PKS di Nigeria. Satu model konsep kemudiannya dicadangkan bagi menangani isu di atas. Model tersebut diharap dapat membantu PKS Nigeria mencapai impak yang lebih tinggi dalam perniagaan mereka dari aspek penggunaan EDI dan juga boleh menyediakan hala tuju strategik bagi PKS di negara-negara Afrika yang lain. Dengan menggunakan rangka kerja teknologi, organisasi, dan persekitaran, kajian ini menguji model persepsi asas terhadap data yang dikumpul daripada 204 firma-firma PKS di Nigeria. Faktor penting yang telah dikenalpasti sebagai signifikan dalam penggunaan EDI di kalangan PKS adalah faedah langsung, faedah bukan langsung, sumber kewangan, dan tekanan daripada luar. Dapatan kajian ini boleh memberi gambaran kepada faktor-faktor yang unik yang boleh membantu kepada penggunaan EDI di kalangan PKS di Nigeria dan sebagai garis panduan kepada pemilik PKS.

Kata kunci: Penggunaan teknologi, Teknologi EDI, PKS di Nigeria.



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LIST OF ABBREVIATIONS

IFC	International Finance Corporation
EU	European Union
GDP	Gross Domestic Product
SPSS	Statistical Package for the Social Sciences
ANOVA	Analysis of Variance
EC	E-commerce
IT	Internet Technology
EDI	Electronic Data Interchange
TPB	Theory of planned Behavior
CBN	Central Bank of Nigeria
TAM	Technology acceptance model
UTAUT	Unified Theory of Acceptance and Use of Technology
TRA	The theory of reasoned action
PU	Perceived usefulness
PEU	Perceive ease of use
U	Actual usage
BI	Behavioral Intention to Use
IS	Information System
SN	Subjective norm
PBC	Perceived behavioral control
A	Attitude toward behavior
SN	Subjective norm
PBC	Behavioral control
TOE	Technology - Organization - Environment
IOS	Inter-Organizational Systems
VAN	value-added network



SMEDA	Small and Medium Enterprise Development
Agency	
SME	Small and Medium Enterprise
NITDA	Nigeria Information Technology Development
Agency	
PDB	perceived Direct Benefits
PIB	Perceived Indirect Benefits
OR	Organizational Readiness
TR	Technological Resources
PEP	Perceived External Pressure
PIP	Perceived Internal Pressure
KMO	Kaiser-Meyer-Olkin Measure of Sampling
Adequacy	



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CHAPTER 1

INTRODUCTION

1.1. Introduction

The purpose of this chapter is to introduce the research, explain the research questions and clarify the research purpose. A brief overview of electronic data interchange activity in Nigeria is presented in this chapter.

1.2. Background of the Research

Electronic Data Interchange (EDI) is a subset of an inter-organizational system (IOS) providing a structured form of communication. Inter-organizational System (IOS) has become a very popular vehicle for electronic transfer of information in sales invoices, purchase orders, shipping, billing and other tasks from one firm to another. EDI is a tool that used to slash inventory, improve cash flow, and streamline a company's operation. EDI is used for transactions between and within organizations such as monitoring inventory levels, accessing marketing data (e.g. sales figures), and placing orders directly with manufacturers and controlling inventory level. EDI is also used to perform traditional business to business (B2B) communication

processes such as ordering, invoicing and providing shipping or backorder notification (Parsa and Popa, 2003).

To explain how Electronic Data Interchange, (EDI) adoption plays out in the Nigerian SMEs, it is better to start the investigation with a general framework of technology adoption and the assumption that the adoption of EDI may follow a pattern similar to that of general Information System, (IS) and Information Technology, (IT). The utilization of IS and IT in the SME is driven by the attitude of managers towards the use of information technology, their knowledge of information technologies, the size of the enterprise, the structure and culture of the organization, and the economy and infrastructure as important factors affecting the adoption of technologies and information systems (Chieochan, et al., 2000). Studies of the adoption of IT can be considered as originally from the study of the diffusion of innovation (DOI) and more specifically diffusion of IT innovation. Adoption is often associated with the decision to accept and use the innovation (Boving & Boker, 2003). Several adoption process models been developed in order to identify the process of how technology is adopted (Palen & Grudin 2003).

Past literatures have reported that EDI could yield enormous benefits to the SMEs provided that it is highly integrated (Murkhopadyay & Kekre, 2002; Parsa & Popa, 2003; Ngai & Gunasekaran, 2004). EDI provides direct benefits such as reduction in costs associated with clerical labors and forms as well as in length of data transmission and processing. Further, an integrated EDI with existing systems is believed to facilitate the reengineering of some critical business processes including improvement in customer service and trading partner relationship and also as entry barriers for new comers and exit barriers for trading partners (Lu and Hwang, 2001). At SMEs, inter-firm level, the Internet and EDI have great potential benefit for reducing transaction costs and increasing the speed and reliability of transactions. They can also reduce inefficiencies resulting from lack of co-ordination between firms in the value chain. Internet-based business-business interaction and real-time communication can reduce information asymmetries between buyers and suppliers and build closer relationships among trading partners (Moodley, 2002).

EDI has been widely accepted as an essential business tool used to facilitate inter-organizational transactions, and sometimes for improving internal operations by



integrating internal and external systems in order to obtain competitive advantage (King et al., 2002). It is claimed that EDI serves as a catalyst and a stimulus to improve business process and communication infrastructure that flow between organizations. EDI enables SMEs organizations to redesign their processes significantly because of its three main capabilities: high speed, reliability, and ease in getting the data. (King et al, 2002). In the present economy, it is important for SMEs to adopt processes that enable them to provide services that will bring about competitive advantage as EDI adoption by SMEs has been considered very essential in facilitating their business process.

EDI in fact emerged in late 1960s when transportation companies were looking for ways to alleviate delivery delays that resulted from large volumes of paper documentation (Powers & Carvar, 1990). The use of EDI however became popular and widespread in late 1980s and early 1990s. Several studies claim that EDI will continue to be used as an important communication medium by many business organizations for years to come (Silwa, 2000; Tingle, 2000).

EDI discussed in the literature refer to a technology that provides both operational and strategic advantages to its adopters. Because of that, quite a few studies conducted to examine factors affecting the adoption or the success of the adoption of EDI. For example, Angeles et al., (2001); and Jimenez and Polo, (2004) performed an extensive survey study on EDI adoption. In another study Premkumar, et al., (1999) examined Rogers's five innovative attributes in the context of EDI adoption in various industry. The study concluded that relative advantage, technical compatibility, and cost are significant factors in EDI adoption decision. However, a number of studies, (Angeles, 2000; Jun & Cai, 2003) have suggested that small businesses have shown a great interest in EDI.

EDI is a form of electronic communication with a comprehensive set of standards and protocols that allow the exchange of business transaction data and documents in a computer understandable format (Bidgoli, 1999). EDI originated as a device for large businesses to communicate multiline ordering and accounting information between the backend resource planning systems of trading partners. The investments in this technology, and its usage, correspond to the reorganization of the business process and communication infrastructure that flow between trading partners. As pointed out by King et al (2002), an implementation of EDI is a process



in which two or more organizations determine how to work together more effectively.

In spite of evident advantages of the EDI system, it has been emphasized by many researches and practitioners that the implementation of the EDI system can result in both positive and negative effects for the companies. On one hand, EDI facilitates the improvement of in-company operations and strengthens the relationship between trading partners. On the other hand, some problems or disadvantages relating to EDI implementation can occur unavoidably, i.e., required large initial investment. As pointed out by Angeles et al (2001), in order to benefit in full from the potential of EDI technology, a considerable amount of attention has to be paid to its implementation. A proper implementation of EDI may eliminate or at least minimize some of its disadvantages and improve the effectiveness of the system by increasing its value (Bidgoli, 1999). The distinctive characteristic of the EDI system consists of the opportunity that it offers to trading partners to exchange business information/documents electronically, instead of hardcopy documents. This leads to a new way of doing business known as electronic commerce (Rahman & Raisinghani, 2000).

EDI has been defined in different ways. Neef (2001) defines EDI as “a dedicated electronic connection, usually between buyers and their largest selling partners, used for transfer of purchasing information”. According to Chesher et al (2003) EDI is “the electronic transfer of structured commercial data using agreed message standards between computer applications”.

Banerjee and Golhar (2002) defined EDI as a system that automates routine transactions by integrating tasks and functions across a predetermined set of organizational boundaries. EDI comprises three basic functions: first, data transfer between partners, i.e. the actual transmission; second, data transformation or translation between proprietary format, i.e. the data format used by sender or recipient, and the standard format that is required to meet transmission protocol; third, directing data to and gathering it from different computer applications.

According to Lehmann (2002) EDI may be a set of reliable, accurate, low-cost techniques and services, which allows a firm to conduct business with its partners via the Internet. Many researches have focused on studying the impact of EDI on efficiency, effectiveness, industry structure, organizational structure, and management (Shang et al., 2005). Furthermore, Shang et al., (2005) argues that these



past studies have developed theories in the field of traditional EDI. He goes on to say that there seems to be a shortage of literature on EDI and its innovation-decision making process.

EDI has been widely accepted as an essential business tool used to facilitate inter-organizational transactions, and sometimes for improving internal operations by integrating internal and external systems in order to obtain competitive advantage (King et., al 2002). It is claimed that EDI serves as a catalyst and a stimulus to improve business process and communication infrastructure that flow between organizations. EDI enables organizations to redesign their processes significantly because of its three main capabilities: high speed, reliability, and ease in getting the data (King et al, 2002).

Bidgoli (1999) suggested that EDI can enhance the organization competitiveness by expediting the delivery of information and reducing costs. In his study, he outlined seven additional benefits of EDI technology. These are: (1) promotion of true partnership relationships between the companies; (2) improvement of quality through improved record-keeping, fewer errors in data entry, reduced processing delays, less reliance on human interpretation of data, and minimized unproductive time; (3) acceleration of the order-invoice-payment process from days or weeks to hours or minutes; (4) delivery of sales information to manufacturers, shippers, and warehouses in real time; (5) improvement of organization's competitiveness; (6) provision with timely and accurate data for decision making; (7) improvement of the internal operations of a firm by reducing the process-cycle time.

Examples of electronic data interchange (EDI) are e-mail, electronic bulletin boards, fax machines and electronic funds transfer. The concept of EDI is all about using the Internet to do business better and faster. It is about giving customers controlled access to your computer systems and letting people customize products and services for themselves and delivering the products and services in due time. These personalized automated services are of great financial benefits to a business in the form of increased revenue and decreased cost of doing business. It is about committing your company to a serious online effort and integrating your Web site with the heart of your business. Trading activities of EDI usually have four main elements, which are, quoting, ordering, payment and delivery. If any of these stages is carried out online, that means EDI has taken place. In a more practical example, if one purchases a downloadable music album from notjustok.com, all the four trading



stages from quoting to delivery are carried out online. If one buys a digital camera from ebay.com, the ordering and payments are done online while the delivery involves couple of offline approaches. These transactions can all be termed EDI (The World Wide Web, [ref. 28.9.2011]).

The following are some of the types of merchandise in EDI: - Goods that can be easily transformed into digital format, such as books, music clips and videos, and software packages, Items that follow standard specifications such as Pinter ribbons, ink cartridges etc., highly rated branded items or items with return security like Dell, Hp and Compaq computers etc., Items sold in packets that cannot be opened even in physical stores, Items that can be experienced online, such as an online Mp3 music also may include stores for computer software, video games, electronics , furniture, food, toys, apparel and various CDs, DVDs and Mp3 downloads (Bhasker 2006, 23-25). The distinctive characteristic of the EDI system consists of the opportunity that it offers to trading partners to exchange business information/documents electronically, instead of hardcopy documents. This leads to a new way of doing business known as electronic commerce (Rahman and Raisinghani, 2000).

EDI system is used to transfer electronically repetitive business transactions. These include purchase orders, invoices, payments, bills, shipping manifests, and delivery schedules, confirmations, and so on. Data formatting standards since EDI messages are repetitive, it is reasonable to use some formatting standards. Standards can shorten the length of the messages and eliminate data entry errors, since data entry occurs only once. EDI translators An EDI translator converts data from proprietary formats into standard formatted message, the process being reversed at the receiving end. An inter-organisational interchange of electronic messages has been schematically presented, using EDI system. Thus, EDI seeks to take a form of a business application, translate that data into a standard electronic format, and transmit it using secure telecommunication links. At the receiving end, the standard format is retranslated into a format that can be read by the recipient's application. Consequently, output from one application becomes input to another through the computer-to-computer exchange of information (King et al 2002).

In the Information Systems field, researchers have widely used the Technology Acceptance Model (TAM) to study the adoption of various technologies and TAM has arguably become the most influential theory in the IS field. Researchers have also extended TAM (Wixom & Todd, 2005). For instance, some



researchers introduce many other factors to the model, such as subjective norm, perceived behavioral control, and self-efficacy social influences and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) to predict the adoption of an information technology, (Venkatesh & Davis 2000). Other researchers after years of investigation, added social influences and facilitating conditions to the two main constructs of TAM, i.e. PU and PEOU (Venkatesh et al., 2003).

The research will provide a critical review of the technology acceptance literature. More importantly, identifies a significant body of literature that reports inconsistent results with TAM model. According to Sun and Zhang (2006) technology acceptance model (TAM) have limitations such as the explanatory power of the model and the inconsistent relationships among constructs for example perceived usefulness (PU) and perceived ease of use (PEOU). They believed that adding moderators to the TAM model may overcome such limitations. They pointed out several studies that called for the inclusion of some moderator factor (e.g., Venkatesh et al., 2003; Agrawal & Prasad, 1998). Venkatesh et al., (2003) tested eight models used for explaining technology acceptance behavior and found that the predictive validity of six of the eight models significantly increased after the inclusion of moderators.

Agrawal and Prasad explicitly criticized the absence of moderating influences in TAM in a call for more research investigating such effect (Sun & Zhang, 2006). Agrawal and Prasad (1999) extended TAM by investigating the mediating effect of individual differences (in particular: role with regard to technology, tenure in workforce, level of education, prior or similar experiences, and participation in training) as external variables between PU and PEOU beliefs, attitude and behavioral intentions. TAM continued to evolve and during the elaboration period, TAM studies were focused on developing a newer version that encompassed the external variables affecting PU and PEOU and overcame the limitations raised by previous studies.

TAM continued to evolve new variables were introduced as external variables affecting PU, PEOU, BI, and actual use or behavior. Among the most frequently referenced are: system quality, compatibility, computer anxiety, enjoyment, computing support, and experience (Lee et al., 2003). TAM has evolved beyond its original form during the past twenty years. Wixom and Todd (2005) illustrated TAM extension in three primary ways. The first approach involved



including factors from related models (e.g., SN & PBC from TPB). The second approach involved introducing additional or alternative beliefs to the model (mostly from diffusion of innovation theory such as triability, compatibility, visibility or result demonstrability). The third approach involved examining external variables effecting PEOU and PU such as personality traits and demographic characteristics.

The most commonly reported limitation of TAM is the measurement of usage by relying on respondents' self-reporting and assuming that self-reported usage reflects actual usage. A second limitation is related to the type of respondents or the sample choice. In some studies, it was a university student sample or professional users, which made generalization difficult (Legris et al., 2003). Another shortcoming is that TAM provides only limited guidance about how to influence usage through design and implementation (Taylor & Todd 1995; Venkatesh et al., 2003). Sun and Zhang (2006) stated two major shortcomings of TAM studies: the low explanatory power of the model i.e. different methods used (e.g., field versus experimental studies) and the inconsistent relationship among constructs. For example, perceived usefulness (PU) and perceived ease of use (PEOU).

Previous research on technology acceptance behavior has been inconclusive regarding the applicability of a western-developed model of technology acceptance in other developing countries (e.g., Straub et al., 1997; Rose & Straub, 1998; Straub et al., 2001; Anandarajan et al., 2000; Bagozzi et al., 2000; AL-Ghahtani, 2002 & 2003; Loch et al., 2003; Mao & Palvia, 2006; 2007; McCoy et al., 2007). Consequently, examining technology acceptance models in developing countries, especially in this era of innovation in SMEs, to overcome the gap between the two clusters (developed and developing countries) is worth investigation as TAM being the most frequently cited model addressing technology adoption process which identifies the relationships between perceived attributes of a technology, attitudes toward a technology, and actual usage. The theory employs the perceptions towards a technology, perceived benefits, organizational readiness and perceived pressure as main determinants explaining the adoption process. No study has attempted to investigate the extent of acceptance of EDI technology adoption in Nigerian SMEs in relation to technology acceptance model.



1.3. Problem Statement

Small and Medium businesses face more constraints at start up developmental phases than when established. SMEs make indispensable contributions to the economy. They act as major job providers, produce a significant part of the total value added, feed the larger industries with their needed inputs, as well as acting as distributors/buyers of their products. Small firms provide a large segment of the lower and middle-income population with low priced consumption goods and services. Small firms also represent a channel through which small savings are being translated into investments. Small enterprises could become major sources of constant innovation and experimentation and could thereby in some cases change the market structure. SMEs have been viewed as a source of technological progress, especially in new industries.

SMEs encounter increasing competitive pressure fuelled by globalization, legislation and the relaxing of trade barriers, as well as an increase in market expansion due to emerging technologies and innovation. Small and medium enterprises often flourish on their adaptability and agility such as their close proximity to their customers, their openness towards new ways of working, and their risk taking approach, but many micro, small and medium enterprise are susceptible to major external shocks (Berry, 2002; Laforet and Tann, 2006). Although SMEs experience difficulties in absorbing and coping with these obstacles, they need to develop an ability to deal with the ever increasing challenges, that is, risks faced by the organization (Leopoulos, 2006).

The fundamentally significant contribution of SMEs to the economy equally of developed and developing countries has been well appreciated (Sharma and Bhagwat, 2006). SMEs dominate the private sector in developing countries. However, their contribution to growth and employment is constrained by limited access to finance, a restrictive business environment with strong incentives for informality, poor management and technical capacity, and difficult access to information. Nevertheless, characterized by their flexibility and adaptability in contrast to their larger counterparts, SMEs are more likely to succeed in international trade. Such success, however, hinges on their competitiveness in terms of price, quality of goods, and ability to meet delivery requirements El-Gamal et al (2001)

claim that “despite the invigorated interest in SMEs, there is a scarcity of data in all countries.” They assert that this lack of data is most extreme in developing countries that mostly need it. SMEs rely on an environment in which structures and processes must remain simple, flexible, and adaptable (Carmichael, Turgoose, Older Gary, Todd, 2000). These unique characteristics affect Internet technologies adoption in SMEs. Implementing a successful EDI adoption is not as easy as most people might think. Many obstacles exist and they all revolve round three parts of EDI adoption—money, technology and people. Sometimes the cost of avoiding EDI is greater than the cost of adopting it. However, as EDI has grown and has become an important tool in highly-developed nations, such cannot be said for the lesser developed nations, thus creating a digital divide.

Nigeria being among the nations in the world that are blessed with abundant mineral resources, an entrepreneurial population and a productive agricultural base and by virtue of size, population location is well positioned to be the hub of economic activities in Africa. EDI adoption is an opportunity for SMEs businesses to explore the great benefits that the internet has brought in the form of new business models. The use of EDI in practical applications is still very limited among the Nigerian SMEs. There seems to be a number of problems and barriers that somehow hold back the application of EDI technology among the SMEs. This study emphasizes the importance of these new business models and also tries to find ways in which business models can be changed.

SMEs are unique and different compared to bigger business, especially in the ability of organizational resources, so managing SMEs is different from managing large businesses (Aragon-Sanchez & Sanchez-Maria, 2005). As SMEs grow, they faced new problems. The first problem is due to their limited staff, and second problem is limited access to resources. For SMEs to grow, they most acquire more resources, yet due to their nature being smaller in size this is not easy task. This leads to limited option in conducting business, limited option in acquiring assets and technology, and limited access to financial assistance such as loans. Third problem relates to their increasing customer numbers. These limitations also apply to adopting IT. SMEs have limited options for acquiring IT solutions to support their business. This is due to the limited capital to be invested in IT and the limited internal knowledge to handle the adoption process, operate the acquired IT solutions and maintain the IT resources (Aragon-Sanchez & Sanchez-Maria, 2005; Levy & Powell,



2005). In Nigeria, SME's are the backbone of the economy, but despite this, not many studies have been done to identify and explain factors that affect EDI adoption in SMEs.

In summary, this research attempts to fill a number of gaps in the literature as there are relatively no identified studies on EDI adoption among the Nigerian SMEs. A conceptual model is then proposed in the following chapter to address the above gaps. The model may help Nigerians SMEs to achieve higher impacts on their businesses from the adoption of EDI and may also provide a strategic roadmap for SMEs in other African countries.

1.4. Research Questions

The purpose of this study is to identify adoption factors of EDI and to develop a model of EDI adoption by SMEs in Nigeria. To be able to answer the purpose of this research, this research will address the following main research questions:

- RQ1. What are the factors affecting Nigerian SMEs decision to adopt EDI?
- RQ2. What are the relationships between these factors of EDI adoption: - (a) Perceived benefits, (b) Organizational readiness, (c) Perceived pressure and the Intention to adopt EDI among Nigerian SMEs?

1.5. Objectives of the Research:

- a) To identify factors affecting the adoption of EDI Technology in Nigerians SMEs.
- b) To assess the relationship between factors of EDI adoption and intention to adopt EDI.

1.6. Significance of the Study

Adoption studies can provide researchers and SMEs owner managers, policy makers with valuable information that improve the efficiency of communication among them in promoting available technologies. Apart from this, acquired information from such studies could enhance the efficiency of EDI adoption research, and technology transfer. The present study attempted to reveal those underlying factors that may account for the observed variations in the adoption of EDI among the SMEs in Northern part of Nigeria. To this end, the findings of this study expected to render very valuable information for further promotion of this important technology adoption in the study area. The key findings from this study could help to fine tune SMEs EDI adoption in such a way that the factors affecting EDI adoption among the SMEs addressed.

This study has practical as well as academic relevance. EDI research promises many benefits, ranging from modest reduced communication and administration costs, and improved accuracy to transformative enabling business process reengineering or supporting industry value chain integration initiatives such as just-in-time inventory, continuous replenishment, and quick response retailing. The findings points will be in the direction of assisting SMEs, policy makers and other stakeholders, in addressing issues impeding adoption of electronic data interchange technologies in SMEs in Nigeria.

This research will benefit both researchers and SMEs owner/managers. Researchers will benefit from the study's theoretical information and explore further EDI adoption patterns among SMEs. SMEs owner/managers who learn factors affecting organizations to adopt EDI will make better strategic decisions concerning the adoption of EDI.

1.7. Structure of the Thesis

This thesis organized into Six Chapters. Chapter 1 presents the overall view of the thesis by focusing on the gap of the research. This followed by research questions, objectives and significance of the study. Chapter 2 is literature review. In this part, the related literature will be reviewed; theoretical framework and conceptual issues



will be discussed to establish the linkages between technology adoption and EDI adoption. Chapter 3 discusses the methodological foundation and data analysis technique. This chapter presents the questionnaire administration and the methods of examining responses. Chapter 4 presents the analysis of data obtained from the field survey. Chapter 5 presents the discussion of results and summary of major findings, and chapter 6 provides conclusions and recommendation.

1.8. Summary

The main reason for this research is to investigate factors affecting the adoption of EDI Technology in Nigerian SMEs. This chapter leads the reader through a literature review of internet technology and EDI adoption in the Nigerian SMEs. SMEs are been recognized for playing very important roles towards the economic growth, development and stability of several economies. SMEs play a vital role in employment generation and immensely contribute to the Gross Domestic Products (GDPs) of several countries. Based on the above statement, it can be said that there are a number of benefits associated with the use of IT. IT offers SMEs a competitive edge over its competitors (for example increase in production capacity planning and control); hence, it is vital for Nigerian SMEs to use IT and IT be regarded as a critical tool for SMEs' competitiveness. In addition, studies show that a growth in the Electronic Data Interchange (EDI) capability is now becoming a requirement for effectively servicing many large business customers (Furst, Long & Nolle, 1998). The Nigerian SMEs should therefore be able to utilize the benefits and drivers of EDI adoption and avoid or reduce the negative impact from the different barriers in EDI adoption.



CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

This chapter reviews relevant literature that provides the theoretical framework and conceptual framework for the study. It has the following headings: The definition of SMEs and their characteristics, overview of the internet and EDI, factors affecting EDI adoption by Nigerian SMEs, the benefits of internet and EDI in SMEs business, barriers and Challenges of EDI adoptions in Nigeria and relevant technology diffusion models of EDI Adoption among Nigerian SMEs.

2.2. Definition of small and medium enterprise (SMEs)

SMEs contribute to the economy by providing work and contributing significantly to Gross Domestic Products (GDP) and Gross National Products (GNP) (Guinea, Kelly and Hunter, 2005; Gutter & Saleem, 2005). The definitions of SMEs itself varies between organizations and countries. There are various indicators used across the world to define SMEs. There is no single universally accepted definition of SMEs. For instance, SMEs enterprise is defined along three dimensions: in terms of either employment or investment or turnover, or a combination of any two, or all of the above (Bala-Subrahmanya, 2005). Specifically, in Nigeria, ministries, research institutes, agencies, and private sectors, institutions, use different definitions that involve the above three dimensions (Oyefuga et al., 2008). Notwithstanding,

Ramachandran (2002) argued that SMEs in the Nigerian context are best defined as enterprises with a total capital employed not less than N1.5 million, but not exceeding N200 million, including working capital, but excluding cost of land and/or with a staff strength of not less than 10 and not more than 300. In Nigeria SMEs are the backbones to the economy. Looking at earlier definition of SMEs, it means that 97% of all businesses in Nigeria are "small businesses". The SME sector provides, on average, 50% of Nigeria's employment, and 50% of its industrial output.

2.3. Characteristics of small and medium enterprises (SMEs)

The activities of SME enterprises in Africa Rogerson (2001), is important for the promotion of economic growth, job creation and the mitigation of poverty. Generally, SMEs experience a scarcity of resources (Wong, 2005; Jun & Cai, 2003), such as time, financial and human resources. According to Arendt (2008) the main trade carried by SMEs may be segregated by size of enterprise, for instance, microenterprise operations tend to be "low tech" and focused on retailing, and services such as salons, tailoring, etc. Small businesses make more use of various technologies as they grow to scale and simply be larger versions of microenterprises or be engaged in different businesses that require more employees (5-25) to produce a product. Examples of these kinds of small businesses include small-scale manufacturing (e.g. furniture), chemicals and Pharmaceuticals, and organized retailers such as clothing outlets, shoe stores, etc. SMEs possess 'specific attributes that differentiated them from the large organizations. SMEs differ from large companies in the way they develop their corporate strategies and their technology policies. Large companies typically have well-defined processes for developing and implementing strategies through a corporate planning process (Pool, et al., 2006).

Previous research on SMEs shows that SMEs have fewer resources and expertise in terms of management of new technologies (Barnes et al., 2008). According to Wymer and Regan (2005) SMEs are more vulnerable because of their lack of financial and human resources as well as information resources that sufficiently understand and master the organization and its environment. Many SMEs do not possess the technological background, which would enable them to use and evaluate IT, or lack the time to explore it (Barnes et al., 2008). It is the skill and



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enthusiasm of the owner-manager that typically drives the business forward and shapes the character of investment decisions (Barnes et al, 2008). Yet the needs to remain flexible and innovative are the criteria for survival and success for SMEs.

Small and medium enterprises (SMEs) operate in the same environment as their larger counterparts, but without the associated benefits such as adequate capital and extended human resources of the larger organizations (Berry, 2002; Laforet and Tann, 2006). SMEs encounter increasing competitive pressure fuelled by globalization, legislation and the relaxing of trade barriers, as well as an increase in market expansion due to emerging technologies and innovation. Small and medium enterprises often flourish on their adaptability and agility such as their close proximity to their customers, their openness towards new ways of working, and their risk taking approach, but many micro, small and medium enterprise are susceptible to major external shocks (Berry, 2002; Laforet and Tann, 2006). Although SMEs experience difficulties in absorbing and coping with these obstacles, they need to develop an ability to deal with the ever increasing challenges, that is, risks faced by the organization (Leopoulos, 2006).

Despite their limited resources, SMEs are also known for their flexibility (Aragon-Sanchez & Sanchez-Marin, 2005). SMEs can quickly adapt themselves to new challenges and pressures. SMEs' flexibility is possible since their internal structure tends to be simple and informal. Decisions are made quickly, since there is only a handful of staff to be consulted and there is not the complexity of bigger companies. In SMEs, managers directly control all the resources and manage all the staff. The SME's structure is usually flat and allows direct communication between manager and staff.

2.4. The nature of SMEs in Nigeria

Small and Medium Scale Enterprises (SMEs) are potent economic drivers as well as important sources of flexibility, innovations and employment creation (Mutula and Brakel, 2006; Metaxiotis, 2009; Federici, 2009; Ramdani, Kawalek, & Lorenzo, 2009). Small and Medium Enterprises (SMEs) are, without doubt, the bedrock of any developing economy. In general, SMEs are the bases upon which future economic

and employment growth built. Small and Medium Sized Enterprises (SMEs) play important roles in the process of industrialization and economic growth (Adekunle and Tella, 2008). SMEs contribute significantly to the economic development of Nigeria. These contributions are remarkable as about 10% of the total manufacturing output and 70% of the industrial employment are by SMEs (Aina, 2007). Also, Ihua (2009) states that about 97% of the entire enterprises in Nigeria are SMEs and they employ an average of 50% of the working population as well as contributing up to 50% to the country's industrial output.

Nigeria is a developing country in sub Saharan Africa where SMEs account for 60 to 70 per cent in terms of employment (Ojukwu, 2006). Lal (2007) stated those SMEs currently represent about 90 percent of the industrial sector in terms of number of enterprises. A study conducted by the International Finance Corporation (IFC) in 2001, estimated that 96 per cent of all businesses in Nigeria are SMEs compared to 53 per cent in USA, 65 per cent in the EU (European Union) with SMEs in both places accounting for over 50 per cent of their respective country's Gross Domestic Product (GDP). Given the above figures, it is important for such businesses to be prepared to take full advantage of any benefit offered by EDI Technology, the adoption of the technology can give SMEs a better opportunity to compete in their Markets and soon this will be a competitive necessity for survival in all organizations.

Adenikinju (2005) stated that, SMEs start typically with an ownership structure of sole proprietorship. However, in the past two decades, this orientation has been changing, partly because of the indigenization decree of '70s and partly as a consequence to better exposure and enlightenment. Many SMEs are now in one form of partnerships or the other and they are better for it, while some are still on in their old ways. They registered either as enterprises or as limited liability companies and characterized by highly centralized labor-intensive operations. Small and medium-sized enterprises (SMEs) are considered as major economic players and a potent source of national, regional and local economic growth (Taylor and Murphy, 2004). Many SMEs have survived and even experienced considerable growth because of improvement in quality of products and services. This is the result of improvements in productivity through varied mechanisms such as technological upgrading (Berry & Sandee, 2001).



2.5. Significance of Nigerian SMEs

SMEs have been discovered to be a key driver for a country's economic growth (Schliemann, 2009) hence SMEs cannot be overlooked in the economic development of any country. Okongwu (2001) argues that SMEs are recognized as the main source of economic growth and a major factor in promoting private sector development and partnership, in developed and developing countries. SMEs help to create employment and are often seen as very important for the growth and innovation of dynamic economies (Mutula and Brakel, 2006). Therefore, economic growth and development in Africa can be achieved through the emergence of strong SMEs, which will later grow to become major players in the developing economy. SMEs help to diversify economic activities that have significant contributions to imports and exports, they are flexible and can adapt quickly to changing market demands (Ongori, 2009). Thus, SMEs contribute more and more to the national and international economies of the world. According to Wattanapruttipaisan (2003), the significance of SMEs for growth, productivity and competitiveness of the economies in both developed and developing countries is acknowledged universally, since SMEs bring about substantial local capital formation, contribute to improved living standards and achieve high levels of productivity. SMEs are identified as a major means of achieving equitable and sustainable industrial diversification.

SMEs can be considered as the driving force for the economy in Nigeria (Bada, 2002). They assist in promoting the growth of the country's economy; hence, all the levels of government at different times have policies that promote the growth and sustenance of SMEs (Ogechukwu, 2006). In Nigeria, SMEs are driving force behind job creation and wealth creation. The future of the economy relies heavily on ensuring that SMEs improve their competitiveness by their performances (Illesami, 2007). SMEs also play a vital role in enhancing the economic development of Nigeria. SMEs contributed greatly by the provision of employment opportunities, marketing of goods and services, supplying the needs of larger industries and in terms of growth and development of the rural areas. They have also brought about the growth of indigenous entrepreneurship in Nigeria and increased local participation (Ogechukwu, 2006). If given the necessary support, SMEs could become important players in the development process of the Nigerian economy,

having proved to be one of the most viable sectors with economic growth potentials. Lal (2007), Henderson (2002), Salami (2003), and Oyefuga et al., (2008), argued SMEs create jobs; increase wealth and incomes within their host domains; and promote industrial and economic development through the utilization of local resources, production of intermediate goods and the transfer/transformation of rural technology.

Henderson (2002) additionally noted that SMEs connect the community to the larger, global economy. Hadjimanolis, (1999) and Oyefuga et al., (2008) highlighted the role of government policies and interventionist schemes for SMEs to overcome barriers to their innovativeness and/or productivity. SMES are very significant to the economic success for most countries and their citizens and in recent times observed to employ an increasing proportion of the workforce of most countries. There is a fast growth in the number of privately owned small and medium-sized companies worldwide; however, several issues that deter their growth plague this category of business in Nigeria.

Nigerian SMEs promote industrial and economic development and are responsible for the production of intermediate goods and the transformation of rural technology (Aina, 2007). Nigerian SMEs not only provide employment and income for majority of its citizens but are also recognized as the breeding ground for domestic entrepreneurial capabilities, technical skills, technological innovativeness and managerial competencies for private sector development (SMEDAN, 2005, Aina, 2007). The assistance of SMEs to any economy are obvious, as SMEs are known to contribute to the development of several economies in terms of output of goods and services and creation of jobs at relatively low capital cost (Apulu and Latham, 2010). SMEs also improve forward and backward linkages between economically, socially and geographically diverse sectors of many economies (SMEDAN, 2005). Thus, the development of SMEs is an essential element in the growth strategy of many economies including Nigeria.



2.6. Challenges in Nigerian SMEs

Many factors affect the performance of Nigerian SMEs and these factors increase their rate of failure. Costello and Sloane (2003) stated that SMEs hindered in adopting technologies because of the barriers that arises in the organizations. The factors also includes lack of awareness among owner-managers, lack of skills and training, cultural factors, lack of government policies that support IT adoption and integration in SMEs (Adenikinju, 2005). The state of infrastructures, especially telecommunications infrastructures, poses a major hindrance to the use of IT in Nigeria (Akpan-Obong, 2007).

However, there are still lots of challenges for SMEs in adopting EDI. EDI is changing business process in many organizations and, is set to have significant sociotechnical implications (Al-Qirim, 2003; Currie, 2000). This is due to the fact that many researchers hold the view that EDI has positive impact on business operations. Policy makers and managers are certain that EDI conveys wide range of benefits, and companies that are left behind in adopting this new system cannot compete favorably in the global marketplace (Noor, 2009). Some business entities around the world have implemented EDI and some of the benefits reaped includes: improvements in operational efficiency and revenue generation by integrating EDI into their value chain activities, access to wider range of markets, greater potential for partnership with suppliers and vendors, improved customer services, accessibility, flexibility in administration and partnership, information update, lower transaction costs, product/service differentiation, ability to enter supply chain of larger companies (Vaithianathan, 2010). Unfortunately, SMEs in Africa has lagged behind most of the world's economies in tapping into these possibilities and emerging technologies and therefore could not realize the full potential benefits of EDI.

Molla and Licker (2005) claim that EDI facilitates the growth and expansion of firms in developing countries due to the ability of the Internet to reduce cost of transactions, to eliminate intermediaries and facilitating linkages to the global supply chains. The expansion and growth can be possible if SMEs in less developed countries can take advantage of Internet technologies to make substantial savings on communication, production process, and delivery of goods and services. Jeyaraj,



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Rottman and Lacity (2006) identified two major external pressure such as trading partners (customers and supplier) and competitive pressure in SMEs EDI adoption. SMEs being part of larger system will be subjected to external pressure in order to conform to technologies used by suppliers and customers for optimization of transactions.

EDI is gradually reshaping business practices and procedures around the world allowing trading partners to exchange information in a standard electronic format (Maingot and Quon, 2001). EDI is an essential business tool for dealing with large customers as well as enhancing their own operational efficiency. This would be through the integration of EDI into its existing internal information system, making use of the early delivery of machine-process able information. Clarke (2001) indicated that EDI saved unnecessary recapture of data. This leads to faster transfer of data, far fewer errors, less time wasted on exception handling and hence a more streamlined business process. Benefits can be achieved in such areas as inventory management, transport and distribution, administration and cash management. EDT offers the prospect of easy and cheap communication of structure information throughout the government and between government agencies and their suppliers and clients.

Clarke (2001) also pointed out that EDI could be used to automate existing processes. In addition, the opportunity can be taken to rationalize procedures, and thereby reduce costs and improve the speed and quality of service. Because EDI necessarily involves business partners, it can be used as a catalyst for gaining efficiencies across organizational boundaries. This strategic potential inherent in EDI is expected to be, in the medium-term, even more significant than the short-term cost, speed and quality benefits. In their research on the Impact of EDT on Delivery Performance, Sohel and Schroeder (2001) suggested that linking up with customers and suppliers through EDI will improve on time delivery performance (percentage of orders delivered on time). Moreover, managers can gain additional improvement in on-time delivery performance by using EDI even when they already have quality management and/or HT in place.

The internet can facilitate the quick and efficient movement of information among trading partners at a greatly reduced cost, e-business is gaining ground globally (Ministry of Commerce Barbados, 2005) as cited in (Emma and Georgia 2009). The adoption of e-business technologies is influenced by many factors. A



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study conducted by Ramsey et al., (2003) found that the growing awareness and understanding of the benefit of EDI among SMEs could positively influence their desire and interest in adopting e-business. Peer pressure or industry standard is also a driving force to pushing firms up the ladder of adoption of e-business technologies (Kula et al., 2003). However, this could become an inhibitor of adopting new technologies if there is no industry leader or champion to innovate and to demonstrate the strategic advantage of using advanced e-business technologies. A study conducted by Locovou et al., (1995) found that the owner's lack of awareness of the technology and perceived benefits is a major factor to a take up of electronic business. According to Olatokun and Kebonye (2010), other factors such as the size of the enterprise and the type of business enterprise could also influence its adoption.

2.7. The role of information technology (IT) in minimizing the challenges faced by Nigerian SMEs

In the present knowledge-based economy, it is important for SMEs to adopt processes that enable them to provide services that will bring about competitive advantage. IT has a significant positive impact on organizational performance (Maldeni and Jayasena, 2009) and is vital to SMEs. IT is known as a major catalyst and enabler of organizational change (Hazbo et al, 2008). Without the utilization of IT, it may be impossible for modern SMEs to compete as IT has a significant impact on SMEs operations and is claimed to be crucial for the survival and growth of economies in general (Berisha-Namani, 2009). IT provides opportunities for business transformations (Chibelushi, 2008) and provides SMEs the opportunity to conduct business anywhere (Jennex et al, 2004). The European Commission (2008), states that SMEs could use IT in order to grow and to become more innovative. Hence, there is a need to encourage the use of IT in SMEs and address the high cost of ownership of IT equipment since it can help to improve technical and managerial skills, making available e-business solutions for SMEs. Love et al (2004) ascertain that the use of IT offers many benefits to SMEs at different levels (operational level, tactical level and strategic level).



In Africa, the use of IT is very recent i.e. is at the developmental stage in which African countries are trying to struggle in implementing IT as compared to countries like the UK and USA, which is at a better stage (Harindranath et al, 2008). Chacko and Harris (2005) state that there are two ways SMEs can benefit from IT. Firstly, SMEs can be the producers of IT. Secondly, SMEs can be users of IT with the intention to increase productivity or improve communication for reaching new customers. Chacko and Harris (2005) also state that the use of IT by SMEs depends on the benefits the IT tools can bring to the business, which means its usage depends on the cost effectiveness. The IT's adopted by SMEs serve as basic tools for their business communication such as using either mobile phones or fixed lines. For example, after SMEs adopt IT tools, they also use personal computers (PC) with basic software installed. They can enjoy improved communication (with suppliers, customers or employees and so on) and meet information processing needs. Having Internet presence also enable SMEs to enjoy improved communication tools such as email, file sharing, creating websites, and e-commerce, among others (Chacko and Harris, 2005). In addition, Chacko and Harris (2005) identified three benefits associated with the use of IT in SMEs: the benefits it can bring to the business in terms of utilization, the IT literacy level of its employees and the financial resource available.

Levy et al (2001) consider how IT is utilized by SMEs and point to the operational nature of the investments, which is driven by the consideration of cost and efficiency. However, Chacko and Harris recommend that whichever criteria is used should start with the basic technologies such as fixed line or mobile phone, fax, computers and basic document processing with Microsoft Office software to more advanced technology such as email, e-commerce and information processing systems. Ongori (2009) states that the use of IT would help change the way businesses operate in this era of globalization by changing business structures and increasing competition, creating competitive advantage for businesses and by changing business operations. For these reasons, SMEs must have an ability to compete and dynamically respond to rapidly changing markets using IT. According to Kapurubandara and Lawson (2006), for survival and staying abreast in a competitive global economy it is apparent that SMEs embrace IT, as it is becoming imperative for SMEs to gain competitive advantage and for stability in international markets.



Ongori (2009) states that in the present era of globalization, SMEs must have an ability to compete and dynamically respond to rapidly changing markets as it plays a significant role in an organization's growth and success. This implies that SMEs need to be connected to the digital marketplace. Based on the review of literatures, it implies that there is need for Nigeria SMEs to make good use of the latest technologies and ideas as this may likely assist them stay competitive (Lal, 2007). Information Technology (IT) is regarded as a driver and enabler of economic development in most economies including Nigeria. IT has brought about changes in the way businesses are conducted amongst SMEs as they play a major role in storing, retrieving, processing and disseminating information (Apulu and Latham, 2009). Ifinedo (2006) states that SMEs in Nigeria can increase their market reach, enhance customer service and reduce both marketing and distribution cost through e-business.

Akpan-Obong (2009) states that Nigeria is a major actor in the IT sector in Africa. The author added that Nigeria could take the lead in the IT sector in Africa as a result of its policy approach to growing ITs and the active roles of the SMEs. Nigeria has so far recorded significant achievements in IT utilization, and has recorded higher growth rates in the penetration and diffusion levels of IT. Akpan-Obong (2009) further added that Nigeria could lead the way to harnessing IT for socio-economic growth. Also there are prospects for SMEs development and economic growth with the application of IT despite the poor state of infrastructures in the country. Hence, there is a need for Nigeria SMEs to utilize IT.

In general, the process of IT adoption in SMEs is different from their larger counterparts. It has been reported that there is significant difference between large organizations and SMEs in benefiting from IT solutions so that; large organizations have profited noticeably more than SMEs in both their improved sale and costs saving (Riquelme, 2002). These differences could be attributed to the unique characteristics of SMEs such as limited access to the marketplace, globalization constraint, flexible structure, faster responses to changes and agile decision-making process Mehrtens et al., (2001) as well as specific circumstances commonly referred to as a resource (knowledge, skill, financial and managerial) poverty (Nguyen, 2009). Consequently, IT adoption by SMEs is considerably different from larger businesses (Fink, 1998).

Information technology (IT) provides support for SMEs to operate in more efficient and effective ways (Laudon & Laudon, 2006; Turban et al., 2006; Utomo &



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