B2B E-commerce Adoption amongst manufacturing SMEs: Evidence from Ghana

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ABSTRACT

Electronic commerce (EC) has considerable potential to nurture the growth of small and medium-sized enterprises (SMEs) in developed and developing nations alike. However, e-commerce growths among SMEs in developing countries are still in entry adoption level and not moving beyond this stage. The aim of this study is to examine the factors affecting B2B e-commerce adoption in SMEs in developing countries. A questionnaire survey technique was used to collect data from a sample of 209 manufacturing SMEs in Ghana. This study uses structural equation modelling to investigate how different factors affect different levels of B2B e-commerce adoption. The key findings revealed that each level of e-commerce adoption was affected by different factors from different level of adoption. Also, relative advantage and intensity of competition have a significant effect on adoption behavior in Ghanaian manufacturing SMEs. Implications of the study, limitations and future research directions are also discussed.

Keywords: B2B ecommerce adoption levels, TOE framework, SMEs, Structural Equation Modelling, Ghana

INTRODUCTION

The era of information technology adoption, particularly in e-commerce (EC), has changed the way businesses and persons share information across the world. There is increasing inter-dependence among national economies through global trade and this has advanced the course of economic growth and development in both developed and developing countries. It is widely acknowledged that e-commerce promotes the development of businesses, particularly, small and medium ones in the developed nations through the use of the internet and communication technologies (Ifinedo, 2012; Molla & Licker, 2005a).

The importance of Small and Medium-sized Enterprises (SMEs) have been recognized globally during the last couple of decades. SMEs are regarded as very crucial to the growth and innovation of both national and international economies as they help to diversify their economies. The growth of e-commerce is a unique opportunity to open access to international markets for SMEs in developed and developing countries. This fact is not only measured by the number of SMEs which characteristic almost 90% of the total establishments across the globe, but also their significant role as the engine of growth and job creation (Ayyagari, Demirguc-Kunt, & Maksimovic, 2011; Wit & Kok, 2014).

The technological revolution and the internet has become an integral part of SME business operations in developing nations (Aminu, 2013; Jahanshahi,

Zhang, & Brem, 2013). They permit SMEs to expand their business into the world markets, increase competitive advantage, increase productivity, create new business and decrease operational costs (Alrousan & Jones, 2016; Oluyinka, Shamsuddin, Wahab, Ajagbe, & Enegbuma, 2013). Earlier literature reviews claim that e-commerce brings benefits to the economies of developed and advance developing nations. In the developing economies, particularly in Africa, people fail to reap benefits from innovative technologies. SMEs have adopted e-commerce but they are still in entry adoption level (use of email and website) and not moving beyond the stage (Molla & Licker, 2005a).

Besides, the United Nations Conference on Trade and Development (UNCTAD, 2015a) reports that e-commerce growth in SMEs is mainly confined to the advanced countries, in spite of the rise in e-commerce revenues, employment, and number of participating enterprises. Africa and Latin American combined accounts for less than 1% of total e-commerce, with over 95% taking place in the developed countries. This represents unbalanced benefits of e-commerce growth globally, while there is enormous potential in the under-developed countries. Likewise, the World Bank estimates that for the next 15 years, about 600 million jobs will be required to satisfy the increasing workforce globally, especially in Asia and Africa ("World Bank," 2015). In many Organization for Economic Co-operation and Development (OECD) countries, over 95% of enterprises in both advanced and less advanced countries are SMEs (OECD, 2012). In Ghana, the SMEs constitute majority of business establishments of about 92%. SMEs contribute about 70% of GDP and accounts for about 85% of manufacturing total employment (Abor & Quartey, 2010; Odoom, 2016). Significant prior literature has showed that the diffusion of the internet and for that matter e-commerce in Africa is so low (Ifinedo, 2011b; ITU, 2017), though, recent statistics have shown some improvement. Africa's internet usage in June 2017 was 388,104,452 with a 31.1% penetration rate as compared to 340,783,342 in June 2016. Ghana has 7,958,675 internet users out of the estimated population of 28,033,375 as of March 2017, with an internet penetration rate of 29.6% (Internetworldstats, 2017).

The Government of Ghana, in 2003, introduced the Ghana Information and Communications Technology (ICT) for Accelerated Development (ICT4AD, 2003) policy, followed by the liberalization of the ICT sector, purposely to facilitate ICT infrastructural developments and human resource capacity building in technology adoption. The ICT4AD policy is to provide an enabling platform for protecting the development of the ICT industry and promote e-commerce and internet use in Ghana. This has bolstered Ghana's ICT industry over the last decade and internet usage has greatly increased. Together with the mobile cellular market, the internet market in Ghana presents an important potential for growth and development, and more importantly, in bridging the digital divide between SMEs and their business partners in the advanced economies. Nonetheless, Ghana still remains in the early stages of e-commerce usage; and has been quite late in understanding the benefits of the internet (Quarshie & Ami-Narh, 2012).

The lack of adequate research that examines e-commerce adoption in developing countries and with particularly reference to Ghana, deserves much attention. For enterprises established in developed and advance developing countries, the adoption of e-commerce is a critical issue, but how does such adoption evolve for small enterprises in developing economies where the adoption of e-commerce is said to be progressing among SMEs. In fact, the gap in research is of how the various factors affect e-commerce adoption levels (Abou-Shouk, Megicks, & Lim, 2013; Al-Qirim, 2007) among SMEs in developing countries where limited studies had been undertaken and even fewer in Africa countries such as Ghana. Further, most prior studies of e-commerce adoption focused on dichotomous variables presenting adoption verse non-adoption, while few studies focused on factors affecting different levels of e-commerce adoption. This study attempts to bridge the knowledge gap in the e-commerce literature by employing a structural equation modelling to investigate the most significant factors affecting e-commerce adoption by focusing on Ghanaian manufacturing SMEs. The study proposes a research model to identify how these factors affect managers on different levels of e-commerce adoption.

The rest of the paper is organized as follows: Section 2 presents literature review covering an overview of e-commerce, the status of e-commerce in Ghana and the theoretical background and studies on levels of e-commerce adoption; section 3 presents the research model and hypotheses development; section 4 outlines the research methods and data analysis. The empirical findings of the study are explained in section 5. The discussion of these findings is

followed in section 6. Finally, section 7, concludes the paper, highlights the implications of the findings, suggests recommendation, and acknowledges some limitations.

2.1 LITERATURE REVIEW

There are varied definitions of e-commerce by many authors. World Trade Organization (WTO) defines the e-commerce as "the production, distribution, marketing, sales or delivery of goods and services by electronic means" (Kaynak, Tatoglu, & Kula, 2005). Another definition by Turban, King, Lee, and Liang (2012), defined e-commerce as "the process of selling, buying, transferring, or exchanging products, services, and/or information through computer networks, mostly the internet". Different definitions exist in literature, depending on the context and research objectives of the author (Choshin & Ghaffari, 2017).

E-commerce is classified in many ways, the commonly known ones that have featured prominently in prior literature are business-to-consumer (B2C) and business-to-business (B2B). Simply, B2C is a commercial transaction between businesses and consumers and B2B is an electronic interaction between business organizations. It could involve online versions of traditional transactions related to goods that are subsequently sold to consumers via retail outlets. Also, it can involve the provision of goods and services to support other businesses. B2B e-commerce has been growing faster and faster and most experts predict that B2B e-commerce would continue to grow faster than the B2C (Sila, 2013). B2B e-commerce accounts for the dominant share of global e-commerce (UNCTAD, 2015a) and revenue growth of B2B e-commerce is expected to increase to 6.7 trillion by 2020 (Frost & Sullivan, 2015). The growth of the B2B e-commerce system is recognized due to the swift means by which companies purchase, sell and engage customers, and has therefore become more of a strategic tool in their business policies (Gorla, Chiravuri, & Chinta, 2017). However, in some least developed countries, particularly, Sub-Saharan Africa (SSA), B2B e-commerce continue to be in their early stages of development. This study focuses on B2B EC and defines B2B e-commerce in accordance with (Teo & Ranganathan, 2004) as cited in Oliveira and Dhillon (2015 p. 24) as "the use of internet and web-technologies for conducting inter-organizational business transactions". We have used the term B2B e-commerce interchangeably with other phrases such as e-business, e-commerce, and web technologies that involves trading between firms.

2.2   E-commerce in Ghana

It has been argued that the development of ICT provides leapfrogging opportunities for developing countries. Ghana's ICT sector has improved over the last decade, and according to the data development group of the World Bank ("World Bank," 2015). ICT infrastructure is progressing better than other low-income countries and above the 1.1% average for SSA. As one of the first countries to introduce widespread liberalization in basic telecommunications services in 1994, Ghana took an important step forward in embracing the potential of competitive markets to generate growth and innovation in the sector. In many respects, the growth of Ghana's ICT sector over the intervening decade has exceeded all expectations suggesting that the ICT4AD policy introduced in 2003 and the National Telecommunications Policy unveiled in 2005 has enabled the country to achieve some successes. There are over 140 licensed internet service providers (ISPs), extending from total telecommunications products and services to customized data management, and this has accounted for the country's highly competitive internet market. Ghana's e-commerce readiness is taking shape following the introduction of wireless third and fourth-generation (3G/4G) mobile, and fixed-wireless and mobile broadband technologies such as High Speed Packet Access (HSPA), and Worldwide Interoperability for Microwave Access (WiMAX). Improved international connectivity combined with the rollout of National Fibre Communications Backbone Infrastructure Networks by a number of players is transforming the country's broadband market. In mid-2013, Ghana Interbank Payment and Settlement Systems (GhIPSS) began hosting an online internet gateway. This has helped overcome a major stumbling block for e-commerce in Ghana. Ghana's access to international bandwidth has increased significantly which has translated into some improvement in internet access and a dramatic fall in the cost of international bandwidth, and so to the price of retail access. As at June 2017, 34.7 % of Ghanaians use the internet compared to only 4.2% in 2009 (ITU, 2017). Ghana has done relatively well in comparison to many countries in SSA, when assessed alongside countries like Kenya and Nigeria. Many individuals and businesses are now using the internet and e-commerce to improve their business operations and to remain competitive (Awiagah, Kang, & Lim, 2016; Quarshie & Ami-Narh, 2012). Ghana has experienced some level of ICT infrastructure development and some institutional development like the creation of the Ghana Investment Fund for Telecommunications   (GIFTEL)   has   enhance

broadband development in ensuring that users find the internet more relevant and useful (MOC, 2016). The re-privatized national carrier, now branded as Vodafone Ghana, has also been more effective in driving the broadband market by increasing its retail and wholesale offerings. All these have provided relatively appropriate infrastructure for e-commerce adoption in Ghana.

2.3 Theoretical background

For over a decade, new information technology terms have emerged that include ICT, electronic data interchange (EDI), e-business, e-commerce and the internet. These terms are used interchangeably and this study identifies the use of these terms as representing the general meaning of technology use. Several scholars in extant literature have investigated e-commerce adoption using many models and theories relevant to information systems (IS)/ IT adoption for SMEs. Some examples of the models are technology acceptance models (Davis, Bagozzi, & Warshaw, 1989; Venkatesh & Bala, 2008), the diffusion of innovation theory (DOI), IT adoption models (Moore & Benbasat, 1991; Premkumar & Roberts, 1999; Riemenschneider, Harrison, & Mykytyn, 2003), the IS adoption model (Thong, 1999), internet adoption models (Beatty, Shim, & Jones, 2001; Mehrtens, Cragg, & Mills, 2001), Electronic data interchange (EDI) adoption models (Chwelos, Benbasat, & Dexter, 2001; Iacovou, Benbasat, & Dexter, 1995), and e-commerce adoption (Grandon & Pearson, 2004).

Each of these conceptual approach presents a group of factors that influence the adoption of different information technologies to the broader understanding of EC. Likewise, the technology-organisational-environmental model (TOE) by Tornatzky and Fleischer (1990) has extensively being used in various earlier studies investigating SMEs' adoption of technology. Some empirical evidence of having used TOE framework in support of several IS/IT domains include Electronic Data Interchange (EDI) adoption (Kuan & Chau, 2001), information systems (IS) adoption and use (Thong, 1999), Enterprise Resource Planning adoption (Pan & Jang, 2008), e-business adoption (Oliveira & Martins, 2010; Zhu & Kraemer, 2005), business-to-business adoption (Kurnia, Karnali, & Rahim, 2015; Sila, 2013). All these studies confirmed the usefulness of the TOE model as a solid theoretical base in investigating technology innovation in SMEs due to its integrative schema. Many researchers proposed that integrating TOE with DOI (Rogers, 2003) will

present more strength in explaining technology adoption. For instance, (Oliveira & Martins, 2010; Scupola, 2009b; Zhu & Kraemer, 2005) integrated DOI and TOE model in identifying the factors that influence and inhibit technology adoption in SMEs. Their findings established that using both theories provided a robust explanation in the adoption of technology among organizations. This study incorporates the TOE and DOI models due to their consistency in focusing on both the organization's internal and external characteristics, including the technological features in the study of different levels of B2B e-commerce adoption.

2.4 Past empirical studies on B2B e-commerce adoption

It is essential for SMEs that want to adopt B2B e-commerce to examine all characteristics within their technological, organizational, and environmental contexts to recognize the factors that will determine their successful development. In examining technological, organizational and environmental factors and how they impact on the adoption of e-commerce among manufacturing SMEs in Iran, Ghobakhloo, Arias-Aranda, and Benitez-Amado (2011) revealed that relative advantage; compatibility; information intensity; management innovativeness; buyer/supplier pressure; technology vendors' support; and competition did affect the Iranian manufacturing SMEs' early adoption of e-commerce.

Besides, Lip-Sam and Hock-Eam (2011) in studying the factors that influence the adoption of B2B e-commerce among Malaysian SMEs and of the application of the technology-environment-organization (TEO) framework, found that external support and manager attributes influenced the adoption of B2B e-commerce significantly among Malaysian SMEs. The results also revealed that SME owners or managers played a critical part in the high rate of B2B e-commerce adoption.

Investigating the adoption of B2B e-commerce in Chinese SMEs, Chong, Man, Chen, and Lai (2011) revealed that the critical success determinants were information system/technology infrastructure and performance, top management support and commitment, information visibility, successful customer relationships, global competition, government encouragement and commitment, cultural consideration, and security and trust. Halaweh (2011) cited in Kamoun and Halaweh (2016) studied the security factor effect on e-commerce adoption amongst Jordanian companies. The study revealed that security concerns were the major reason for Jordanian firms not adopting e-commerce.

The external environment has a significant impact in the adoption of new technologies and as a result, organizations adopt innovation in reactions to the demands of the external environment (Kabanda & Brown, 2017). For instance, Chwelos et al. (2001) in their electronic data interchange (EDI) adoption model examined competitive pressure, external pressure, trading partner's support and trading partner's innovation readiness as environmental attributes. Quaddus and Hofmeyer (2007) studied competitive pressure, trading partners support, vendor support and government support by associating them with diverse external conditions to investigate the influencing factors in the adoption of business to business trading exchange in small businesses. In examining four types of IT innovation adoption in US small businesses, Premkumar and Roberts (1999) proposed competitive pressure, trading partners' pressure, trading partners' support and vertical linkage as the external factors. Investigating the factors that affect the adoption of e-commerce within SMEs in Ghana, (Awiagah et al., 2016) revealed that technological, organizational, environmental and individual factors had an effect on e-commerce adoption. The study showed that government support and management support significantly influenced the behavior intention of SMEs to adopt e-commerce. However, relative advantage had an insignificant impact on technology adoption due to minimal awareness of e-commerce benefits. Based on literature review, although many studies are increasingly investigating e-commerce adoption in SMEs in both developed and developing countries, there are limited studies on how the various factors affect different levels of e-commerce adoption as suggested by Sila (2013).

2.5 Maturity Models of E-commerce

E-commerce maturity model is defined as "stages from initial state to maturity to help organizations evaluate its situation, to guide improvement initiatives and to control progress and the sophistication of e-commerce use" (AlGhamdi, Alfarraj, & Bahadad, 2014 p.40). Therefore, e-commerce maturity model relates to sequential levels of e-commerce adoption. Several prior studies have investigated the different factors associated with adopters and non-adopters of e-commerce in SMEs at both individual and organizational levels. (Ramsey & McCole, 2005; Tan & Teo, 1998; Tan, Tyler, & Manica, 2007; Teo & Ranganathan, 2004). However, the factors influencing e-commerce adoption in organizations are different from those affecting individuals' adoption of e-commerce in terms of the progression of e-commerce maturity (Ghachem,

2006). The use of e-commerce maturity model is very vital in order to have a holistic description of the factors that may affect different levels of e-commerce maturity. Since the evolution of internet in the 1990s, many maturity models have been developed to identify the sequential levels of e-commerce adoption in SMEs (Abou-Shouk et al., 2013; Chan & Swatman, 2004; Chen & McQueen, 2008; Daniel, Wilson, & Myers, 2002; Lefebvre, Lefebvre, Elia, & Boeck, 2005; Molla & Licker, 2004; Rayport & Jaworski, 2002; Subba Rao, Metts, & Mora Monge, 2003).

SMEs are noted to normally start with a simple static website which gives the enterprise an online presence by giving information about the company, its services and contact details. Then the enterprise may introduce a dynamic online presence in a two-way communication conduit between the firm and its suppliers and customers, which involves answering queries and receiving feedback. The third stage is electronic transaction, where there is an online order system supported by online payments. The final stage constitutes an online collaboration, where all business operations involving suppliers are integrated electronically (Daniel et al., 2002; Molla & Licker, 2004). Based on the above discussion, it can be clearly established that e-commerce adoption is regarded a multi-level phenomenon rather than the dichotomy of adopter verse non-adopter. Among these e-commerce maturity models, this research adopted Molla and Licker (2004) e-commerce maturity model to identify the organizational level of e-commerce and more importantly, because this model is more relevant in evaluating e-commerce adoption levels in developing countries.

It is worth mentioning that there are insufficient empirical researches on the factors that affect the different levels of e-commerce adoption within SME. Likewise, the reviewed literature shows that the determinants of e-commerce adoption can be different based on the level of adoption being considered. In the context of Ghana, there is scanty information on the factors that affect e-commerce adoption levels. Hence, this current study aims at filling the knowledge gap in literature and to provide the importance of understanding these factors in the diffusion of e-commerce within SMEs.

RESEARCH MODEL AND HYPOTHESIS DEVELOPMENT

3.1 Research model
Based on review of literature, the study adapts the TOE framework to explain the significance of the various factors affecting the different levels of e-

commerce adoption in manufacturing SMEs. The proposed research model **(see figure 1)** represents the independent variables that affect e-commerce adoption and dependent variables consisting of six phases of e-commerce adoption. The stages are: stage 00 - the non-adopter, where a company has no internet link; stage 1 (e-connect) - where the company has an internet link purposely for only email use in the business operations, but no website; stage 2 (e-broadcast) - where a company has a static website (meant to publicize the company's products and services) and one-way communication without any interaction. Stage 3 (e-interact) - where a company has an interactive website that receives queries, forms, and emails from customers and suppliers and gives feedback online, but does not have online payment integrated in it. Then, stage 4 (e-transact), is similar to stage 3, but with a financial transaction platform, online payment that allows buying and selling of products and services to customers and suppliers. Finally, stage 5 (e-collaborate) -where the company does all business processes electronically with suppliers and business partners such as management information systems and customer relationship management. This model's validation will be tested among owners/managers in Ghana in order to offer a better understanding of the factors affecting the levels of e-commerce adoption among manufacturing SMEs in Ghana.
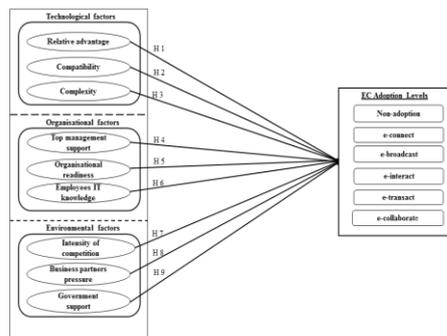

Figure 1. Research model
3.2 Hypothesis Development
3.2.1 *Technological factors*
Relative advantage is the extent to which the adoption of an innovation is perceived as providing greater organizational benefits than maintaining the status quo (Alsaad, Mohamad, & Ismail, 2017). Several empirical researchers have identified relative advantages to include increasing profits, improving productivity, increasing competitiveness, improving customer satisfaction and services as a significant determinant of technology adoption (Oluyinka et al., 2013; Poorangi, Khin, Nikoonejad, & Kardevani, 2013; Rahayu & Day, 2015). A study by Sin et al.

(2016) on the influence of relative advantage and competitive pressure towards implementation of e-commerce showed that relative advantage was a significant predictor of e-commerce adoption in SMEs. Similarly, other studies that focused on web adoption confirmed relative advantage as having a positive correlation and very significant in distinguishing between adopters and non-adopters in SMEs (Aziz & Jamali, 2013). However, other studies found relative advantage insignificant in affecting e-commerce adoption in SMEs as owners/managers do not have adequate awareness of the benefits associated with the adoption of e-commerce within SMEs (Alamro & Tarawneh, 2011; El-Gohary, 2012). In SMEs, if owners/managers see that the benefits to derive from adopting new systems will outweigh the associated risks, there is a greater possibility they will adopt the technology (Thong & Yap, 1995). Hence, this study postulates the following:
H1: There is a significant relationship between relative advantage and the adoption level of e-commerce

Compatibility refers to the degree of fitness with previous experience and existing technology infrastructure, values, culture, and desired work practices of the organization (Alsaad et al., 2017; Choshin & Ghaffari, 2017). The company's compatibility with regards to technological innovation is very crucial to e-commerce adoption by SMEs. This implies that it is necessary for the managers to assess if adopting a new technology will meet the company's goals and internal processes. Many past researches on e-commerce adoption among SMEs showed compatibility has a positive and significant effect on e-commerce adoption and usage (Ahmad, Abu Bakar, Faziharudean, & Mohamad Zaki, 2015; Aziz & Jamali, 2013). Conversely, other studies showed compatibility having an insignificant influence on e-commerce adoption (Al-Somali, Gholami, & Clegg, 2011; Rahayu & Day, 2015). A study by Azam and Quadddus (2009), noted that compatibility has a significant positive effect but was less of a predictor in e-commerce adoption in SMEs than other constructs of innovation attributes. The study therefore, theorizes the following:
H2: There is a significant relationship between compatibility and the adoption level of e-commerce

Complexity on the other hand, is the rate to which the adoption an of innovation is seen to be relatively difficult to use (Rogers, 2003). The technical know-how needed for e-commerce can prevent its adoption if individuals find the technology applications

difficult to use and understand (Alsaad et al., 2017; Teo, Wei, & Benbasat, 2003). Moreover, the choice to adopt a new technology can be influenced by the complexity of the innovation, which means the managers expect that a high degree of perceived complexity of e-commerce would negatively impact on the decision to adopt the technology (Hameed & Counsell, 2014). Conversely, if the IT applications are simple to use, the adoption of innovation would be more likely. Many past studies found a negative relationship between complexity and e-commerce adoption (Huy, Huynh, Rowe, & Truex, 2012; Maryeni, Govindaraju, Prihartono, & Sudirman, 2014). Similarly, other handful of studies found complexity to have an insignificant relationship with e-commerce adoption in SMEs (Almoawi & Mahmood, 2011; Poorangi et al., 2013). Hence, the study hypothesizes the following:
H3: There is a significant and negative relationship between complexity and the adoption level of e-commerce

3.2.2 *Organisational factors*

Top management support comprises the extent to which the organisation's leadership recognises the essence of e-commerce (Alsaad et al., 2017). Getting the endorsement of management guarantees adequate allocation of technological and financial resources desired to adopt IT innovations (Awa, Ojiabo, & Emecheta, 2015; Liang, Saraf, Hu, & Xue, 2007). Top management commitment support is suggested to have a direct influence on technology adoption in SMEs. Teo, Lin, and Lai (2009) indicated that top management support is very crucial to overcome the barriers that a company faces in adopting new technology. A number of researchers have postulated that a good attitude to general IT adoptions positively correlates with the spread of internet use and e-commerce adoption within SMEs (Al-Alawi & Al-Ali, 2015; Kurnia et al., 2015). This was equally proven by Al-Somali et al. (2011) who established that top management support is a critical predictor in separating adopters from non-adopters within SMEs in Saudi Arabia. Top management support is an influential predictor in either motivating or inhibiting the IT adoption process. Thus, top management support is a significant determinant that affects e-commerce adoption. This leads to postulating the following hypothesis:
H4: There is a significant relationship between top management support and the adoption level of e-commerce
Organizational readiness is the extent to which available resources are perceived to be equal to the resources desirable to adopt an effective innovation

and sustain that specific innovation for a longer period of time (Kang & Park, 2014). Furthermore, it is proposed that organizational readiness signifies technological sophistication and abundant financial resources to enable that organizations acquire, install and integrate information technology in their business processes (Grandon & Pearson, 2004; Ifinedo, 2012). Small businesses generally have inadequate financial resources to acquire hardware, software and other IT equipment to aid in adopting new technologies. Studies in IT found that financial resources are the main features differentiating small businesses from larger enterprises (Ramdani, Chevers, & Williams, 2013). Moreover, financial resources have been proven by many researches to have positive and significant relations to SMEs adoption of ICT and e-commerce (Musawa & Wahab, 2012; Scupola, 2009a). The profound changes that IT introduces calls for adapting to new technologies that may require changes in the working attitudes of the employees, as well as with a higher level of education, their level of performance and the extent of their knowledge development that can facilitate and speed up the adoption of IT innovation (Huy et al., 2012; Oliveira & Martins, 2010). Based on the above, organizational readiness is considered as a crucial driver of an organization's inclination to adopt any new technology. Subsequently, the study hypothesizes the following:
H5: There is a significant relationship between organizational readiness and the adoption level of e-commerce
The employee's IT knowledge is crucial for an organization's capability to adopt or not to adopt ICT and e-commerce in SMEs (Wang & Hou, 2012). Many changes are needed in employees' knowledge as to how to use information and the technical know-how to apply technology adoption in their organizations (Chanvarasuth, 2010; Choudrie & Culkin, 2013). These may require changes in working attitudes of the employees, a higher level of education, their level of performance and the extent of their knowledge development that can facilitate and speed up the adoption of IT innovation (Huy et al., 2012; Oliveira & Martins, 2008). Alam and Noor (2009) found that employee's IT knowledge and skills are important in motivating an organization to adopt e-commerce. Several earlier studies found that IT and e-commerce knowledge among employees is a significant variable in ICT and e-commerce adoption in SMEs (Huy et al., 2012; Scupola, 2009a; Thong, 1999).
However, SMEs in developing nations have tried to postpone innovation adoption or the adoption of new technology up until when they have enough internal

expertise (Thong, 1999). In contrast, some studies found employees' knowledge of IT and e-commerce to be insignificant in adopting ICT and e-commerce in SMEs (Alzougool & Kurnia, 2008; Jamali, Marthandan, Khazaei, Samadi, & Fie, 2015). Based on the correlation between employees' IT knowledge and a firm's adoption of new technology, this study posits the following:

H6: There is a significant relationship between employees' IT knowledge and the adoption of adoption level of e-commerce

3.2.3 Environmental factors

Intensity of competition is the rate to which an organization is affected by competition in the market to adopt an innovation (Huo, Zhao, & Zhou, 2014; Rahayu & Day, 2015). Several studies confirmed intensity of competition to be the best external predictor of e-commerce adoption in SMEs (Abou-Shouk, Lim, & Megicks, 2016; Sin et al., 2016). These findings suggest that competitive pressure impacts the adoption and use of information systems and assists SMEs to achieve superior firm performance and sustained competitive advantage. A study by Huy et al. (2012) showed competitive pressure has a positive and significant influence in differentiating between SMEs adopters and non-adopters of e-commerce in Vietnam. Empirical findings suggest that competitive pressure impacts the adoption and use of information system and assist SMEs to achieve superior firm performance and sustained competitive advantage (Ghobakhloo & Tang, 2015). Therefore, when an organization encounters intense competition, they will be compelled to adopt technology. However, a sharp contrast such as in (Thong, 1999) found that competition exerts little influence on the adoption of new technologies or of e-commerce in small enterprises. Likewise, Scupola (2009a) and Alamro and Tarawneh (2011) found competitive pressure to be an insignificant factor in e-commerce adoption by SMEs. Therefore, we postulate the following

H7: There is a significant relationship between intensity of competition and the adoption level of e-commerce

In the context of technology adoption, business partners' pressure is the extent of effects and pressure that an enterprise incurred from relational channels such as suppliers and customers in order to adopt e-commerce systems (Abou-Shouk et al., 2016; Saprikis & Vlachopoulou, 2012). Business partner's pressure was found as a major factor in predicting SMEs adoption of e-commerce adoption and has a positive effect on adoption of technology (Huy et al., 2012; Walker, Saffu, & Mazurek, 2016). Several

empirical researches have confirmed that coercive or normative pressure from business partners, customers, or parent companies is a powerful determinant of technology adoption (Awa, Ojiabo, & Orokor, 2017; Ghobakhloo & Tang, 2015). However, some studies found business partners' pressure to have no significant effect on e-commerce adoption (Alamro & Tarawneh, 2011; Scupola, 2009a). More people are now having internet access in Ghana (Quarshie & Ami-Narh, 2012) and there would be pressure on SMEs to adopt IT and offer more business activities from the web. Small businesses are sensitive towards pressure from trading partners since they are more likely to be dependent economically on their trading partners for survival. Hence, we hypothesize the following:

H8: There is a significant relationship between business partner pressure and the adoption level of e-commerce

Scholarly empirical evidence shows the importance of government support in IT adoption, particularly e-commerce (Abou-Shouk et al., 2016; Awiagah et al., 2016). Government support in the context of IT has been established in three different ways: legislations and policies, IT infrastructure and funding (Huy et al., 2012; Saprikis & Vlachopoulou, 2012) that has both direct and indirect stimulation effects on technology and e-commerce adoption. Several studies confirmed that governmental factors have a positive and significant effect on SMEs adoption of e-commerce (Ifinedo, 2011a; Kabanda & Brown, 2017). For example, (Martinsons, 2008) as cited in Awiagah et al. (2016) found that the level of e-commerce and e-business adoption in developing economies has greatly improved through government's commitment in providing the necessary infrastructure for e-commerce adoption. Government policies relating to regulations, data protection, security and tax and price of internet access have a strong positive correlation on the development of e-commerce. On the other hand, a study by Scupola (2009a) in examining factors that influence e-commerce adoption in Australia and Denmark SMEs, found that government's role in Danish SMEs were insignificant as opposed to the role of government in Australian SMEs that was indirectly significant. In the case of Ghana, with the liberalization of the ICT sector and government policies has enabled the country to experience increase internet penetration and this has led to an upsurge in several IT-related services. Such supports will motivate SMEs to be more willing to adopt and intensely use these technologies. Based on prior studies identified in literature, it is suggested that government's support

influences SMEs to adopt e-commerce. Hence, to test the effect of government support, we posit the following:

H9: There is a significant relationship between government support and the adoption level of e-commerce

4 Methodology of the Study and data analysis

This research used a questionnaire survey-based quantitative data collection process across the manufacturing sector in Ghana. We relied on the provisions of the Regional Project on Enterprise Development Ghana, to capture those businesses with less than 100 employees classified as small and medium-sized businesses. After the pre-test, some changes were made to the questionnaire including brief meaning of B2B e-commerce at the start of the questionnaire, since this study context is mainly categorized as B2B e-commerce. The study randomly selected 797 manufacturing SMEs from the databases of National Board for Small Scale Industries and Association of Ghana Industries in four regions out of the ten regions in Ghana, namely; Greater Accra, Western, Ashanti and Eastern. Only manufacturers with internet access/websites were chosen. A total of 209 responses were selected after validation and free of missing data (an effective response rate of 26.2%). The instruments used to measure the constructs in the study were employed from earlier literature as shown in Table 1. We measured the e-commerce adoption by nine factors; for all measures, multiple items based on a five-point Likert scale were used. We also operationalized e-commerce adoption levels by measuring the current level of e-commerce adoption using the multichotomous question type. Through the help of ten research assistants, self-administered questionnaires were delivered by hand to selected firms over a four-month period.

Table 1. Operational Definitions of the Constructs

Constructs (Abbreviations)	Operational definition	References
Relative advantage (Rel)	The extent to which e-commerce is perceived to benefit the enterprise such as enhance communication with business partners	Grandon and Pearson (2004) Oluyinka et al (2014)
Compatibility (Comp)	The degree to which an e-commerce adoption is perceived as consistent with the existing values and operations of the enterprise	Premkumar (2003); Scupola (2001)
Complexity (Copx)	The extent to which e-commerce adoption is perceived as relatively difficult to understand and use	Premkumar and Roberts (1999); Grandon and Pearson (2004)
Top management support (Msup)	The level of manager's perception towards the role of IT adoption in business activities in their organizations	Teo and Ranganathan (2004) Masrek et al (2008)
Organizational readiness (Orgn)	The availability of the needed financial resources for e-commerce adoption	Kurnia et al (2009); Grandon and Pearson (2004)
Employees IT knowledge (Eitk)	The extent to which employee IT knowledge is perceived through practice and training by use of e-commerce applications	Huy et al (2012)
Intensity of competition (Icom)	The level of e-commerce capability in the firm's industry as compared to its competitors	Shaharudin et al (2012)
Business partners' pressure (Bpre)	The degree of power that an enterprise incurred from suppliers/customers which has already adopted e-commerce	Shaharudin et al (2012)
Government support (Gsup)	Government policies and initiatives to promote IT adoption and use	Gibbs, Kraemer, and Dedrick (2003); Hameed and Counsell (2012)

4.1 Profile of surveyed sample

Surveyed sample were distributed across all sizes of businesses. However, in accordance with the Regional Project on Enterprise Development of Ghana classification, more than 60% of the respondents could be classified as "small businesses". Besides, 37% of the respondents have been in business for more than 10 years. First, responses from the polymers and rubbers producers were (18.4%), closely followed by drinks and beverages producers (16.7%), pharmaceutical producers (13.7%), real estate and construction (10.4%), wood tissue and paper producers (7.9%), then fabricated metal producers (5.3%) and the rest of the manufacturing firms (29.6%). About 42% of the responses were from Chief Executive Officers/owners and the rest were from Heads of information technology departments.

4.2 Measurement model

Partial Least Square-Structural Equation Modelling (PLS-SEM) was employed to analyse the data collected due to its ability in handling formative and reflective latent variables (Kock, 2012). SEM is a robust analytical technique combining measurement and structural models to generate a simultaneous statistical test (Hoe, 2008). Since the purpose of the study is to identify the significant factors that influence different levels of e-commerce adoption, SEM was considered as the appropriate technique to use when describing the relationships among multiple predictors and criterion variables. SEM will

enhance a complete comprehension of the real factors that affect the adoption level of e-commerce among manufacturing SMEs in Ghana. The Warp PLS 3.0 was used to test the measurement and structural models.

The measurement model examines the relationships between latent variables and their indicators (Hair et al, 2010). The measurement model comprise a tests of the internal consistency reliability, convergent validity, and discriminate validity of the study instruments, which refers to the strength of scales used to analyse the suggested model (Hair, Ringle, & Sarstedt, 2011). In this study, the model has a reflective latent variables that was tested comprising the technological context (relative advantage, compatibility and complexity); organizational context (top management support, organizational readiness and employees IT knowledge); and environmental context (intensity of competition, business partner pressure and government support) conceived as reflective latent variables and secondly, the formative latent variables adopted as a multichotomous question type through the proposed six stage e-commerce adoption.

In Table 2, the Cronbach's alpha and composite reliability (CR) for all the independent variables exceeded the recommended level of 0.70, indicating an acceptable internal consistency reliability (Fornell & Bookstein, 1982). Moreover, in testing the convergent validity, two criteria as recommended by Kock (2012), Hair et al. (2011) and Vinzi, Chin, Henseler, and Wang (2010) were followed. These are that for all constructs, the indicators loading ought to be equal to or more than 0.5. Thus the average variance extracted (AVE) of at least 0.5 show the convergent validity is satisfactory as depicted in Table 2. The results show that all indicators are found to be significant and with loadings higher than 0.5 with p-values <0.05. In measuring the discriminate validity, the square root of the AVE (SQTR AVE) should be greater than the correlation with any other construct (Fornell & Larcker, 1981). The discriminant validity was equally established by ensuring that the AVE meets the Fornell-Larcker criterion as seen from table 2.

Table 2. Constructs Loadings, AVE, Squared AVE, Cronbach Alpha and Composite Reliability

Constructs	Indicators	Loadings	AVE	SQTR AVE	Cronbach Alpha	CR
Rel	Rel1	0.803	0.587	0.766	0.824	0.877
	Rel2	0.768				
	Rel3	0.755				
	Rel4	0.765				
	Rel5	0.737				
Comp	Comp1	0.640	0.573	0.756	0.812	0.870
	Comp2	0.772				
	Comp3	0.815				
	Comp4	0.788				
	Comp5	0.757				
Copx	Copx1	0.824	0.718	0.847	0.803	0.884
	Copx2	0.884				
	Copx3	0.834				
Msup	Msup1	0.832	0.715	0.845	0.800	0.883
	Msup2	0.819				
	Msup3	0.885				
Orgn	Orgn1	0.741	0.615	0.784	0.790	0.864
	Orgn2	0.820				
	Orgn3	0.748				
	Orgn4	0.824				
Eitk	Eitk1	0.824	0.718	0.847	0.884	0.803
	Eitk2	0.884				
	Eitk3	0.834				
Icom	Icom1	0.863	0.717	0.846	0.868	0.910
	Icom2	0.843				
	Icom3	0.832				
	Icom4	0.847				
Bpre	Bpre1	0.729	0.642	0.801	0.877	0.813
	Bpre2	0.823				
	Bpre3	0.814				
	Bpre4	0.834				
Gsup	Gsup1	0.839	0.734	0.856	0.927	0.943
	Gsup2	0.869				
	Gsup3	0.817				
	Gsup4	0.883				
	Gsup5	0.880				
	Gsup6	0.849				

III. Results and Discussion

After the data integrity checks, a descriptive analysis of an independent t-test was conducted using SPSS 22 to describe the significant differences in the constructs of different levels of e-commerce adoption. This analysis provided an initial idea on the factors that may influence the adoption level of e-commerce in Ghana. The results showed that e-connect, e-broadcast and e-interact are the adoption levels among the respondents.

As shown in Table 3, the attributes of technological dimension consist of three variables: relative advantage, compatibility and complexity. The mean values of relative advantage differ in the three samples. For e-connect, the mean value of relative advantage was 3.0035, which is lower than the values of the two other groups of adopters 'e-broadcast and e-interact' being 3.9124 and 4.0475, respectively. Moreover, the results of t-test show that there was a significant difference between the e-connect and e-broadcast groups and between the e-connect and e-interact with regard to relative advantage (p<0.05) which indicates that the other adopter groups are more aware of technology than the e-connect adopters. Similarly, there was significant differences between e-broadcast and e-interact adopters.

Table 3. Descriptive statistics of variables affecting e-commerce adoption levels in Manufacturing SMEs

Variables	E-connect N = 43		E-broadcast N = 110		E-interact N = 56		E-connect verse E-broadcast	E-connect Verse E-interact	E-broadcast verse E-interact
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Level of Significance (p-value)	Level of Significance (p-value)	Level of Significance (p-value)
Relative advantage	3.0035	.74308	3.9124	.49679	4.0475	.45750	0.000*	0.000*	0.006*
Compatibility	2.8956	.90226	3.8729	.50191	3.7126	.43385	0.000*	0.000*	0.068
Complexity	3.4944	.92343	2.9897	.88086	2.3257	.91353	0.002*	0.000*	0.000*
Top management support	2.3551	.73839	2.6170	.68380	2.6924	.75940	0.041*	0.006*	0.583
Organizational readiness	3.0929	.84774	3.0026	.53460	2.9397	.54600	0.500	0.200	0.538
Employees' IT knowledge	3.9125	.50887	3.9914	.59127	4.1262	.58983	0.409	0.015*	0.228
Intensity of competition	3.1428	.96977	3.9795	.44439	4.4363	.47840	0.000*	0.000*	0.000*
Business partners' pressure	2.9093	.71633	3.0221	.72469	2.8192	.87317	0.377	0.478	0.189
Government support	2.2731	.74231	2.7618	.63827	3.0915	.88994	0.000*	0.000*	0.028*

*p<0.05

In addition, the mean values of compatibility for e-connect, e-broadcast, and e-interact were 2.8956, 3.8729 and 3.7126, respectively. The mean value for compatibility was lower in the e-connect group than the e-broadcast and e-interact groups. In fact, the mean value of e-broadcast group was close to that of e-interact groups; and the t-test results show no significant differences in these groups, while there was a significant difference between e-connect and e-broadcast groups and between e-connect and e-interact in terms of compatibility, which indicates that adopters of higher levels e-commerce were more aware of opportunities the web offers to their businesses.

For the complexity variable, the mean value in the e-connect group was 3.4944, which is higher than that of the e-broadcast group with 2.9897 and the e-interact group with 2.3257. This shows that the e-connect group face more difficulty in understanding and using e-commerce applications in their business than the other two higher levels of adopter groups. Moreover, the t-test results show significant differences between all three levels of e-commerce adoption in terms of complexity, which indicates that the lower levels of e-commerce adopters were less likely to adopt higher technology applications because they found it difficult to use and understand than the higher levels of adopters.

The organisational factors dimension includes three variables: top management support, organizational readiness and employees' IT knowledge. Table 3 shows that the mean value of top management support in the e-connect group was 2.3551, which lower than that of the e-broadcast group with 2.6170 and the e-interact group with 2.6924. This indicates that lower e-commerce adopters were less aware of the opportunities possible through technology than higher e-commerce adopters. The results of t-test show that there were significant differences between e-connect and e-broadcast groups and between e-

connect and e-interact groups regarding top management support (p<0.05); however, there were no significant differences between e-broadcast and e-interact with regard to management support.

For organisational readiness variable, variable was higher in the e-connect group (3.0929) than the e-broadcast group (3.0026) and the e-interact group (2.9397), which indicates that the lower levels e-commerce adopters have less available capital to implement e-commerce applications than higher levels of adopters. However, the mean values of the three groups were close to each other and the t-test results show that there were no significant differences between three groups with regard to organizational readiness (p>0.05).

The mean value of employees' IT knowledge for the e-connect group was 3.9125, which is lower than those for the e-broadcast with 3.9914 and the e-interact with 4.1262 groups. The t-test results show that there were no significant differences between the e-connect and e-broadcast groups or between the e-broadcast and e-interact groups while there were significant differences between the e-connect and e-interact groups in terms of employees' IT knowledge (p>0.05) which suggests that employees in the higher levels of e-commerce adoption in manufacturing SMEs have more IT knowledge and skills than simple adopters.

The environmental factors dimension also consists of three variables: intensity of competition, business partners' pressure and government support. For the intensity of competition construct, the mean value for e-interact group was 4.4363 compared to an e-connect value of 3.1428 and e-broadcast value of 3.9795. The results also show that there was a significant difference between the three levels of e-commerce adoption in Ghanaian manufacturing SMEs, which suggests that the owners/managers were more aware of the opportunities and benefits gained by adopting e-commerce applications and were more influenced by other competitors in terms of e-commerce adoption. Regarding the business partners' pressure variable, the mean values differ in the three sample groups. In the e-connect group that value was 2.9093, which was lower than that of the e-broadcast group with value of 3.0221, while the mean value of the e-interact group was lower than those of the two other groups, being 2.8192. Moreover, the results of the t-test show that there were no significant differences between the three sample groups (p>0.05) which indicates that business partners' pressure variable is similar in all different groups of e-commerce adoption.

For the government support variable, the results show that the mean value of this support in the e-

connect group was 2.2731, which is lower than the e-broadcast and e-interact groups whose mean values were 2.7618 and 3.0915 respectively. Although the mean values in three sample groups were low, the results of t-test show significant differences between them (p<0.05), which suggests that government support has some influence on e-commerce adoption levels among manufacturing SMEs in Ghana.
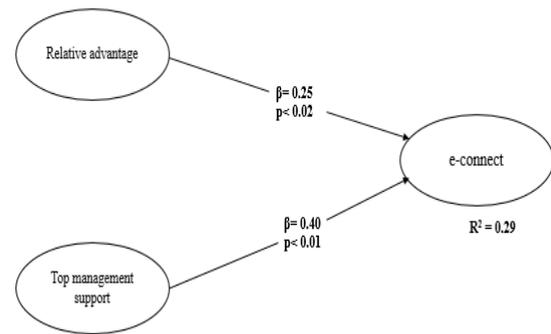
4.4 Structural model

The structural model was evaluated by testing the path coefficients ("beta coefficient") with their respective p values (Chin, 1998; Kock, 2012), this shows the strength of the causal relationships among the variables (Chwelos et al., 2001) and these relationships among latent constructs were hypothesized in agreement with the literature review and logical reasoning. Likewise, the path coefficient and significance p value (P<0.05) support the suggested empirical relationship between constructs, whereas the path coefficients with insignificant p value (P ≥ 0.05) do not support the hypothesis (Vinzi et al., 2010). Based on the adoption levels identified in the study, three models were tested to examine how the various factors influence the three different levels of e-commerce adoption among Ghanaian manufacturing SMEs. Within each level, the path loadings, R-squared coefficients (R^2) and effect size (f^2) were given.

4.4.1 Structural Model for e-connect Adoption

The results in Figure 2 show that relative advantage and top management support has a significant and positive effect on e-connect adoption, (β=0.25, P< .02) and (β=0.40, P<.01) respectively. However, compatibility, complexity, organizational readiness, employee IT knowledge, intensity of competition, business partner pressure and government support had an insignificant impact on e-connect.

For R^2, it was found that relative advantage and top management support together explain 29% of the variance in the adoption of e-connect. Also, the study's statistical analysis results show that the effect size for relative advantage and top management support are 0.192 and 0.090 respectively. This provides evidence that relative advantage has more impact than top management support on e-connect adoption.

Figure 2: Structural model of e-connect

4.4.2 Structural Model for e-broadcast Adoption

With e-broadcast adoption, relative advantage (β=0.43, p<.01) and intensity of competition (β=0.47, P<.01) had a significant and positive impact on e-commerce adoption. Likewise, as depicted in figure 3, top management support (β= -0.11, P<.03) and organizational readiness (β= -0.08, P<.04) have a negative effect on e-broadcast adoption. However, compatibility, complexity, employee IT knowledge, business partner pressure and government support had an insignificant effect on the adoption of e-broadcast.

R^2 showed that together relative advantage, top management support, organizational readiness and intensity of competition explained 52% of the variance in the e-broadcast adoption. The f^2 score results shows that relative advantage and intensity of competition had a medium effect on e-broadcast, 0.230 and 0.275 respectively. However, it had a very weak effect on organizational readiness and top management support, at only 0.006 and 0.004 respectively.

Figure 3: Structural model of e-broadcast
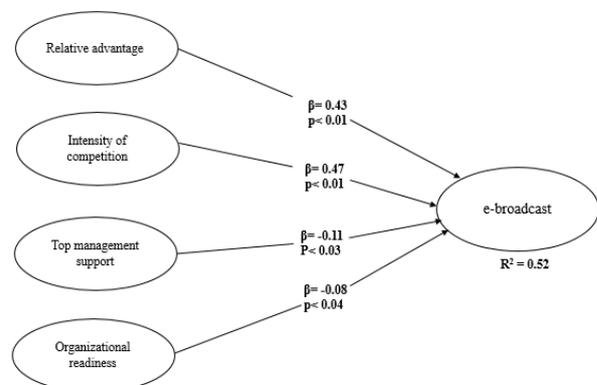
4.4.3 Structural Model for e-interact Adoption

Regarding e-interact, the results reveal that there was a significant and positive influence from relative advantage and intensity of competition (β=0.46, P<.01) and (β=0.35, P<.03) respectively. Nonetheless, as presented in figure 4, complexity (β= -0.16, P<.02) and government support (β= -0.15, P<.02) have a negative effect on e-interact adoption. With regards to compatibility, organizational readiness, top management support, employees' IT knowledge and business partner pressure, these did not have a significant effect on e-interact adoption. Likewise, it was found that e-interact adoption explained 46% of the variance on relative advantage, intensity of competition, complexity and government support.

For effect size (f^2), the score of 0.170 and 0.257 show that the relative advantage and intensity of competition have medium effect on e-interact adoption level. The respective score of 0.005 and 0.01 demonstrate that complexity and government support had a very weak effect on e-interact adoption.

Figure 4: Structural model of e-interact
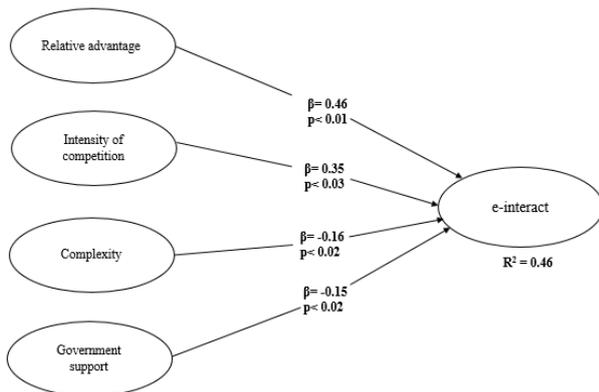
4.5   Model Fit Indices

As provided by Warp PLS 3.0 (Kock, 2012), model fit was measured by three criteria: average path coefficient (APC), average R-squared (ARS), and average variance inflation factor (AVIF). Also, based on p-values, it is recommended that if the p-values for both APC and R^2 are lower than 0.05 and AVIF is less than 10, it then imply that the model has a good fit with the data (Kock, 2012). It can be seen from the data in Table 4 that the fit indices meet these criteria, hence suggesting that the model fit with the data.

Table 4. Model fit Indices

Indices	APC	ARS	AVIF
Model of e-connect	0.34*	0.16*	1.10
Model of e-broadcast	0.32*	0.21*	1.12
Model of interact	0.34*	0.21*	1.21

*P<0.05

Note: APC: average path coefficient; ARS: average R-squared; AVIF: average variance inflation factor

5   Discussion

This study's results reveal that technological, organisational and environmental factors affected manufacturing SMEs' adoption of B2B e-commerce in Ghana. With regards to relative advantage, the results showed a positive and significant effect on EC adoption levels among the Ghanaian manufacturing SMEs. These findings are in agreement with that of (Abou-Shouk et al., 2013; Ghobakhloo et al., 2011; Poorangi et al., 2013) who found relative advantage to have a positive and significant effect on the adoption of e-commerce. However, this result is in contrast with the findings of Awiagah et al. (2016) who found that relative advantage had an insignificant influence on e-commerce adoption among SMEs in Ghana.

Compatibility on the other hand, exhibited an insignificant impact and unrelated with any of e-commerce adoption levels. These findings are consistent with earlier studies (Adewale, Ayo-Oyebiyi, & Adebayo, 2013; Al-Somali et al., 2011; Elbeltagi, Al Sharji, Hardaker, & Elsetouhi, 2013) who found compatibility not to have a significant influence on e-commerce adoption in SMEs. For complexity, although a negative relationship was expected to exist between complexity and the e-commerce adoption, the findings of the study showed it has an insignificant influence on e-connect and e-broadcast adoption. This is somewhat consistent with previous studies which found complexity to be insignificant in e-commerce adoption by SMEs (Almoawi & Mahmood, 2011; Poorangi et al., 2013). Meanwhile, it has a significant effect on e-interact. This result is consistent with previous studies (Abou-Shouk et al., 2013; Ching & Ellis, 2004) who also found that complexity had significant impact on e-commerce adoption by SMEs. More importantly, these results provide a statistical evidence that different factors affect each level of e-commerce.

Furthermore, the study's results showed that top management support has a significant influence on e-connect adoption, thereby supporting previous studies of Ifinedo (2011) who also found that top management support impacted basic e-commerce adoption among Canadian SMEs. However, it has a negative influence on Ghanaian manufacturing SMEs' adoption of e-broadcast and insignificant effect on e-interact adoption. Again, this result provides

statistical proof that different factors affected each level of e-commerce. This could be attributed to the fact that owners/managers find the features associated with higher technology adoption irrelevant or inappropriate to the nature of SMEs' processes. This perspective appeared in the study by Kartiwi and MacGregor (2007) who found that e-commerce was inappropriate for some Indonesian SMEs' types of business, products or services. However, this findings is different from that of Chong et al. (2011) and Ghobakhloo et al. (2011) who found that top management support had positive effect on SMEs' adoption of B2B e-commerce. Nonetheless, the influence of top management support on Ghanaian manufacturing SMEs decision to adopt higher e-commerce applications must remain in question and to receive further investigation.

From the results, organizational readiness was identified as having an insignificant effect on e-connect and e-interact, whilst it has a negative influence on e-broadcast adoption. These might be that the owners/ managers have negative attitude towards adopting higher level of e-commerce because they perceived that the country do not have appropriate and adequate infrastructure support. This affirmed the findings of Elbeltagi, Hamad, Moizer, and Abou-Shouk (2016) and Kabanda and Brown (2015) who attributed poor infrastructure as the main barrier to SMEs adopting e-commerce. Similarly, it might be that the Ghanaian manufacturing SMEs' owners/mangers do not like to take risks in acquiring sophisticated IT applications because they think there is no warranty that they would obtain a return on any investment on technology. Concerning employees' IT knowledge, it was found to have an insignificant influence and irrelevant to any of e-commerce adoption levels. This might be that most manufacturing SMEs' managers' decisions regarding e-commerce adoption are not influenced by their employee's IT knowledge. This viewpoint is consistent with previous studies that found employee's IT knowledge as insignificant and did not influence decision makers in adopting e-commerce (Hung, Chang, Lin, & Hsiao, 2014). It could also be as the result of owners'/top managers' unwillingness to employed external IT consultants to assist them in adopting higher technology due to the fact that they did not undertake e-commerce transactions.

Moreover, the results indicated that intensity of competition has a significant impact on e-broadcast and e-interact adoption. This shows that Ghanaian manufacturing SMEs reacted to competition because they fear that they would lose their edge if they do not adopt e-commerce. This accounts for the predominant use of websites (e-broadcast) by many Ghanaian manufacturing SMEs with the purpose of advertising their products and other information. This is somewhat consistent with the findings of earlier studies (Ghobakhloo et al., 2011; Huy et al., 2012) that found competitive pressure significant in e-commerce adoption by SMEs. This result also confirmed the study of Zhu, Dong, Xu, and Kraemer (2006b) who found that early stages of adoption rather than non-adoption are more likely affected by intensity of competition.

Likewise, business partner pressure has an insignificant impact on Ghanaian SMEs' adoption levels of e-commerce. Generally, suppliers and partners not pressurizing manufacturing SMEs to use e-commerce in doing business with them and also most of the business partners are local suppliers who do not use e-commerce or only adopt basic applications of e-commerce. This result seems to agree with Iddris (2012) who found that supplier and partner pressures did not have a significant effect on Ghanaian SMEs' adoption of e-commerce.

Finally, from the results, government support showed an insignificant effect on e-connect and e-broadcast adoption. However, it has a negative influence on e-interact adoption. This indicates to that somewhat e-interact adopters were more aware of government's role in supporting SMEs' in adopting e-commerce, which is consistent with earlier studies that found government support significant in e-commerce adoption in SMEs (Hung, Yang, Yang, & Chuang, 2011; Huy et al., 2012). The insignificance could be possibly related to the provision of inadequate infrastructure, law and legislations governing e-commerce. It might pose challenges to Ghanaian SMEs to adopt higher levels of e-commerce. This confirmed the findings of Kwadwo, Martinson, Evans, and Esther (2016) and Iddris (2012), who found lack of infrastructures and legislations protecting e-commerce activities as main obstacles to Ghanaian SMEs adopting e-commerce.

IV. Conclusion

Generally, there is lack of researches investigating whether various factors affect different levels of e-commerce in SMEs. Therefore, this study examined how different factors impact on levels of B2B e-commerce adoption, thus contributing to extant the maturity level of e-commerce in SMEs, specifically in the area of information technology studies. The factors chosen for this study were based on the most frequent and dominant factors from prior studies, resulting in nine factors that examine their relationship to e-commerce adoption level among Ghanaian manufacturing SMEs.

A vigorous statistical technique, structural equation modelling analysis was used to test the proposed hypotheses in identifying the factors associated with the research model. The study found that currently there are only three different levels of e-commerce adoption in Ghanaian manufacturing SMEs namely; e-connect, e-broadcast and e-interact and that there is statistical evidence showing that different factors affect different levels of e-commerce adoption. Relative advantage and intensity of competition have a significant effect on adoption behavior amongst Ghanaian manufacturing SMEs.

The study showed that government's role is inadequate and does not significantly influence Ghanaian SMEs in adopting e-commerce. Government support should be more supportive through drafting policies and legislations, offering training and educational programs, electronic infrastructure and funding. The government should also offer tax incentives on technology devices such as computers, servers and website designs which may expedite e-commerce adoption. In terms of legislations, the government should design a solid regulatory framework to support e-commerce adoption and protect businesses and customers against hacking and fraud. Moreover, the government has to further improve the internet infrastructure and provide subsidies to SMEs through the provision of short and long term loans with low interest which would boost the growth of e-commerce adoption. The findings of this study offer a useful model for owners/managers of manufacturing SMEs to improve their decisions regarding e-commerce adoption. It can guide decision makers to identify which level of e-commerce could be useful for their business and help draw a roadmap and strategies for managers interested in expanding their business and acquiring more benefits from adopting e-commerce applications.

6.1 Limitations and future research direction

First, the study employed a quantitative method that is based on self-administrated cross-sectional survey to investigate the factors associated with e-commerce adoption level by Ghanaian manufacturing SMEs. The cross-sectional survey only reflects the respondents' beliefs, perceptions and experiences towards e-commerce adoption at a particular point in time. However, these can change over time which necessitates conducting a longitudinal survey in future research to provide more robust evidence that explains the factors associated with e-commerce adoption and gives further validation of the research model proposed in this study.

Second, the data of this study was confined to Ghana which may restrict applying its findings to other countries. Therefore, future research is needed to replicate it in other countries particularly the Sub-Saharan Africa countries in order to expand the generalizability of the study.

Finally, owners'/managers' perception of e-commerce adoption in Ghanaian manufacturing SMEs were assessed. It would be interesting to conduct a future research to examine these perceptions toward e-commerce adoption in a wider range of SMEs sectors such as financial and services in order to identify the factors influencing owners'/managers' decisions on the level of e-commerce adoption. Such research can also provide a useful comparative view of the different types of SMEs and the factors affecting owners'/managers' decisions on the level of adoption, which contributes to the knowledge and understanding of e-commerce adoption by SMEs.

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