The Moderating Role of Organizational Culture on Business to Business Electronic Commerce Adoption in Small and Medium Manufacturing Firms

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ABSTRACT
The purpose of this research is to examine the role of organizational culture in Business to business (B2B) electronic commerce adoption. An interaction model of organizational culture and technological, organizational, and environmental (TOE) factors was developed. A survey of 315 managers and owners in small and medium manufacturing firms in Ghana was used to test the proposed model. The analyzed data indicate that the moderating effect of organizational culture was found to be negative and significant in one path, which was top management support. Organizational culture did not moderate the effects of technological and environmental variables as well as the organization’s readiness. Past empirical research has paid insufficient attention to the moderating role of organizational culture in e-commerce; therefore, the results of this research contribute to filling the gaps in e-commerce literature. The findings offered insights into how owners, managers, and policy makers can facilitate the adoption of B2B e-commerce.

Keywords: B2B e-commerce; Organizational culture; TOE, SMEs; Partial least squares; Ghana

INTRODUCTION
There is growing inter-dependence among national economies through global trade, and this has propelled the economic growth and development of advanced and less advanced countries. The era of information technology adoption, particularly in Business-to-business (B2B) electronic commerce, has transformed the way businesses share information across the globe. B2B e-commerce stimulates the development of businesses, particularly, small and medium enterprises in the developed nations through the use of the internet and communication technologies (Ghobakhloo, Arias-Aranda, & Benitez-Amado, 2011; Sadowski, Maitland, & van Dongen, 2002). B2B e-commerce has been growing faster and faster, and most authorities 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, and revenue growth of B2B e-commerce is expected to increase to 6.7 trillion by 2020 (UNCTAD, 2015). In the United States of America (USA) for example, about $5.8 trillion in value, representing 91% of the total e-commerce volume comes from the adoption of B2B e-commerce technologies and the manufacturing sector is the major contributor (Mohtaramzadeh, Ramayah, & Jun-Hwa, 2018).

Despite the growing importance of B2B e-commerce adoption globally, this new phenomenon is not happening so fast for developing countries and more particularly, emerging economies in Africa (UNCTAD, 2015). Generally, the level of B2B e-commerce adoption in African countries is low, and that could affect their competitive positions in the world market. For instance, the world B2B e-commerce market is reported to be increasing rapidly, with the balance from high-income countries such as USA (36%), UK (18%), Japan (14%), and China (10%), whereas, that of African countries, for example, is below 3% (UNCTAD, 2015). However, there is a positive projection for the future of B2B e-commerce in emerging African economies such as Ghana, and Nigeria. There is an enormous potential of e-commerce in African enterprises and is projected that by the end of 2018, the African e-commerce market will soar to US$ 50 billion, from just US$ 8 billion in 2013 (UNCTAD, 2015).

Literature in information technology (IT) or information system (IS) fields have acknowledged that B2B e-commerce adoption could be the key to the survival of businesses in developing economies...
and also an essential indicator of economic growth especially for small and medium enterprises (SMEs) (Ghobakhloo et al., 2011; Molla & Licker, 2005). The development of B2B e-commerce provides unique opportunities to SMEs in the world to gain access to the international market. SMEs contributes to the economic development of nations, and Ghana SMEs are no exception. The emergence of the internet has allowed Ghanaian SMEs to implement e-commerce initiatives and compete effectively in both domestic and international trades. Knowing the enormous potential advantages that B2B e-commerce technologies can provide to businesses, researchers have given serious attention to the study of B2B e-commerce adoption in SMEs, particularly in the developed and developing countries. It allows manufacturing SMEs to gain returns through improved operational efficiency, decreased in inventories, increase in sales, improved customer/supplier relationships and good financial returns (Elbeltagi, Hamad, Moizer, & Abou-Shokh, 2016; Ghobakhloo & Tang, 2015). In this regard, the manufacturing sector could play a more significant role in Ghana’s economy. In Ghana, nearly 92% of business establishments are SMEs, contributes almost 70% to the Gross Domestic Product, and accounts for about 85% of manufacturing total employment (Awiagah, Kang, & Lim, 2016). Therefore, a study on the antecedents of B2B e-commerce adoption is of much significance and interest.

Though scholars have researched B2B e-commerce adoption and several theories have been proposed to explain it in different contexts, there are still critical concerns that have not been carefully investigated and need to be addressed. First, whereas there is a rich body of literature on how sets of factors influence the adoption of B2B e-commerce, the findings have not been consistent. This calls for a more comprehensive study to investigate the potential moderators and contextual factors (Mohtaramzadeh et al., 2018; Sila, 2013). In fact, the moderating effect of organizational culture may assist in resolving the inconsistency in past researches (Hewett, Money, & Sharma, 2002; Liu, Ke, Wei, Gu, & Chen, 2010). Second, it has been emphasized that existing theories and management practices designed in the context of developed nations need to be re-assessed in the context of developing countries to suit the technological and socio-cultural context of the recipient countries (Asare, Brashear Alejandro, Granot, & Kashyap, 2011; Mohtaramzadeh et al., 2018). This is because those concerns that could be seen as irrelevant for developed nations can otherwise, play a significant role in B2B e-commerce adoption in developing nations. Therefore, the need to understand whether existing theories apply to populaces in the region of Africa is an important issue. In order to fill this void in the existing literature, this current research is aimed at extending the current literature by (1) identify related technological, organizational, and environmental factors that influence B2B e-commerce adoption, and (2) to test the moderating effect of organizational culture between TOE related factors and B2B e-commerce adoption. Among the several viewpoints acknowledged in the literature, Innovation Diffusion Theory and the Technology-Organization-Environment (TOE) framework offer the most comprehensive and influential perspective. These two theories have emphasized how factors related to the TOE framework promote innovation adoption (Alsaad, Mohamad, & Ismail, 2017; Sila, 2013). This current research features an interactionist model accounting for the differential influences of TOE related factors and how these interact with organizational culture. This study contributes to the existing literature in several aspects. First, it is among the early empirical effort examining the interaction effects of TOE influential factors with organizational culture as a moderator. The application of the TOE framework in examining the factors that influence B2B e-commerce adoption in Ghana strengthens the stance as an articulated and validated model. Second, this research demonstrates that different organizational cultures (strong or weak) play different roles in B2B e-commerce adoption. This study adds to the current literature via organizational cultures as a moderator that could help address the inconsistency (Sila, 2013) on the set of factors influencing B2B e-commerce adoption. As a result of cultural and socio-demographic differences, this research proposes that organizational cultures could also have a negative effect in some environments like Ghana. Analyzing the proposed framework in an environment (Ghana) in which social characteristics may differ from those of the Western cultures in

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which past studies have been conducted (Alsaad et al., 2017), the present research provides new insights about B2B e-commerce adoption from a non-Western perspective. Finally, regarding methodological contributions, the present essay suggests the use of more advanced statistical methods to explore the moderating effects of studies relating to adoption. For instance, an interaction latent variable technique is capable of parceling out measurement error and therefore, yields a more accurate picture of interactions than the traditional, methods do (Hair, Hult, Ringle, & Sarstedt, 2016). This paper is structured as follows. The next section presents an overview of the theoretical background, introducing the factors influencing B2B e-commerce adoption and the role of organizational culture in technology. The essay continues with the research model and hypotheses presentation, followed by research methodology, results and discussion of the findings and their implications, as well as limitations and future research.

THEORETICAL BACKGROUND AND LITERATURE REVIEW

This research adopts the definition of B2B e-commerce as the use of internet and web-technologies for conducting an inter-organizational business transaction (Teo & Ranganathan, 2004). The term B2B e-commerce has been used interchangeably with other phrases such as e-business, e-commerce, and web technologies that involves trading between organizations. More than a decade, several scholars in extant literature have investigated B2B e-commerce adoption using many models and theories relevant to information systems IS/IT adoption for SMEs. The most frequently applied theories identified in literature were Diffusion of innovation theory (Rogers, 2003), Institutional theory, and Technology-organization-environment (TOE) (Tornatzky & Fleischer, 1990) theory. The models that were developed based on these theories had a different focus and were considered to analyze different aspects of B2B e-commerce adoption. The TOE by Tornatzky and Fleischer (1990) postulates that the adoption of technology in firm depends on three contexts, namely technological, organizational, and environmental and has also been extensively used in several previous studies (Kuan & Chau, 2001; Sila, 2013; Zhu & Kraemer, 2005). All these studies confirmed the usefulness of the TOE model as a solid theoretic base in investigating technology innovation in SMEs due to its integrative schema. The reviewed literature suggests the TOE framework might be the appropriate starting point to study B2B e-commerce adoption because this theory applies the three contexts of B2B e-commerce adoption. It must be noted that although there are already many B2B e-commerce models studied under the TOE framework, the TOE framework does not explicitly identify the major constructs within the framework and variables in each context (Mohtaramzadeh et al., 2018; Wang, Wang, & Yang, 2010). As a result, earlier scholars have used TOE theory to suit their research objectives and considerations. Nonetheless, the main considerations that differentiate the authors’ B2B e-commerce model from earlier B2B e-commerce models are (a) almost all the B2B e-commerce models were developed in the advanced countries and as such the variables selected were more important to the context of each respective country. For instance, the key issues in adopting B2B e-commerce systems in developed nations were reported as trust, security, and privacy (Molla & Licker, 2005). As a result, scholars such as Sila (2013) and Duan, Deng, and Corbitt (2012) have included these factors along with other significant factors in their investigation model to study B2B e-commerce adoption in America and Australia. Conversely, the key concerns in developing nations that have been reported are not the quite the same, there are technology infrastructure issues, inadequate government support, managerial attitudes toward innovation and poor organizational culture (Ghobakhloo & Hong, 2013; Huy, Huynh, Rowe, & Truex, 2012; Molla & Licker, 2005). Therefore, this research considers perceived desirability, top management support, organization’s readiness, and organizational culture and incorporate them into the research model. (b) Since the adoption of B2B e-commerce systems is a joint decision between two or more organizations (Mohtaramzadeh et al., 2018; Teo, Lin, & Lai, 2009), means that B2B e-commerce systems are propelled more by environmental factors than technical and organizational factors. Thus, the proposed research model includes three environmental factors (competitive pressure,
business partners’ pressure and government support) to the model. (c) Several prior B2B e-commerce models do not address the issue of organizational culture vis-à-vis the adoption of B2B e-commerce. Therefore, organizational culture concept is added to the model to test its moderating effect along with the antecedents of B2B e-commerce adoption.

Factors Affecting B2B E-commerce Adoption

Several researchers in B2B e-commerce adoption literature, have investigated B2B e-commerce adoption from a different theoretical viewpoint. Because of the enormous potential that organizations can be gained from B2B e-commerce systems, several scholars have paid great attention to B2B e-commerce adoption. A summary of important studies on B2B e-commerce adoption is provided in Table 1. The review of the literature led to some important observation. First, though researchers have recognized several factors that influence the adoption of B2B e-commerce, the findings have been inconsistent. Factors found to be significant by one researcher, have not always been found to be significant by others. For example, perceived relative advantage as a technological factor has frequently been investigated, but the results were found to be inconsistent across studies (significant in studies by (Ghobakhloo et al., 2011; Rahayu & Day, 2015) and insignificant in studies by (Duan et al., 2012; Mohtaramzadeh et al., 2018). Mohtaramzadeh et al. (2018) and Sila (2013) have stated that such inconsistency could be as a result of the dependency of the investigation findings on the cultural aspect of the firm in business and, this contextual nature of IT adoption has often been cited but rarely explored. Organizational culture denotes the collection of assumptions, values, and beliefs that organizational members have in common (Mohtaramzadeh et al., 2017). Extant literature has shown that within the network of a social relationship through radicalism, culture plays a significant role in business (Jasperson, Carter, & Zmud, 2005; Mohtaramzadeh et al., 2018) since it can affect how employees embrace innovation and thus affect B2B e-commerce adoption. Therefore, organizational culture has a critical role to play in the success of B2B e-commerce adoption. However, most of these studies have mainly centered on the culture at the national level, socio-cultural including political and religious characteristics (Leidner & Kayworth, 2006), which has left gaps at the organizational level of work, which can be explored on how an organization’s culture can affect B2B e-commerce adoption. This research is a step toward filling this research gap. The primary objective of this research is to examine how organizational culture can be a potential moderator effect on the successful adoption of B2B e-commerce.

Organizational Culture and E-commerce Adoption

Organizational culture has been recognized as a dominant factor in the success and failure of IS/IT adoption in organizations (Leidner & Kayworth, 2006; Ruppel & Harrington, 2001; Teo & Ranganathan, 2004 ). Grandon and Pearson (2004) who studied factors affecting the adoption of EC, found that the compatibility between an organization’s culture and EC was a key determinant of EC adoption of SMEs in the US. Thatcher, Foster, and Zhu (2006) proposed that among the Taiwan textile industry, cultural factors such as power structure and tendencies impeded the adoption of B2B e-commerce systems. Likewise, Zhu and Thatcher (2010) found that cultural infrastructure were influential factors that affected the decision to adopt e-commerce among firms worldwide. Ruppel and Harrington (2001) who investigated factors affecting intranets adoption found that the adoption of the intranet is facilitated by an organizational culture that emphasized trust, flexibility and innovation, policies, procedures, and information management. Teo and Ranganathan (2004 ) showed that organization culture presents a possible critical barrier between organizations collaborating in B2B e-commerce activities. Organizational culture is recognized as one of the main factors that can enhance and inhibit innovation adoption. A study by Valencia, Valle, and Jimeñez (2010) revealed that organizational culture is a clear determinant of innovation strategy and that adhocracy cultures foster innovation adoption, whereas, hierarchical cultures promotes imitation cultures.

In summary, the reviewed literature shows that cultural differences have different influences on the level of technology adoption in organizations. It has been argued that diverse organizational cultures often possess different underlying values,
assumptions, and expectations that directly or indirectly affect technology adoption in organizations. Therefore, it can be concluded that organizational culture can weaken or strengthen the effect of antecedent factors on technology adoption. This study seeks to verify such arguments by examining the relationship between technological, organizational, and environmental factors and B2B e-commerce adoption.

**Research Model and Hypotheses**

A combination of six independent adoption factors within the three contexts of the TOE framework and B2B e-commerce (EC) adoption (dependent variable) with organizational culture as the moderator were used as the research model for the investigation (see Figure 1). A brief validation of the research hypotheses and their relationships are discussed below.

The technological context is related to technologies available to the organization. Innovation attributes including relative advantage, compatibility, complexity, trialability influence a firm’s adoption of innovation. Perceived desirability denotes the degree to which an innovation is an appropriate and desirable choice (Alsaad et al., 2017). Thus, the tendency to adopt B2B e-commerce will be higher if the SMEs sees it as a needed choice than those who do not. Consistently, relative advantage, compatibility, and complexity have been recognized as the most significant factors influencing innovation adoption and therefore considered in this study. Though earlier studies have addressed these three attributes separately, current empirical studies have found that they are highly interrelated and reinforce each other (Alsaad et al., 2017). In a highly competitive environment, perceived desirability serves as a significant driving force for adopting B2B e-commerce systems. In agreement with Alsaad, Mohamad, and Ismail (2015), this research suggests that perceived desirability influences a firm’s adoption of B2B e-commerce. Thus, this hypothesis is posited:

**H1.** There is a positive relationship between perceived desirability and B2B e-commerce adoption.

Organizational context describes an organization’s characteristics. An organization’s readiness is the degree to which available resources seem to be equal to the available resources desirable to adopt real innovation and sustain that specific innovation for long (Chwelos et al., 2001). Organizational readiness has to do with the technological, human, cultural and financial resources that organizations acquire, install and integrate with their business processes (Grandon & Pearson, 2004; Ifinedo, 2011). Financial resources have been proven by many researchers to have positive and significant relations to SMEs the adoption of ICT and e-commerce (Mishra & Agarwal, 2010). Organizations are having a higher level of IT human resources will adopt more information management practices, integrate their IT innovation and equip employees with greater information system knowledge (Huy et al., 2012; Mishra & Agarwal, 2010). Based on the above, organizational readiness is a crucial driver of an organization’s inclination to adopt new technologies. Therefore, this hypothesis is proposed:

**H2.** There is a positive relationship between organizational readiness and B2B e-commerce adoption.

Whereas an organizational readiness relates to technological and financial resources. Top management support describes the extent to which the organization’s leadership recognizes the essence of B2B e-commerce and the degree to which they are dedicated to its adoption (Alsaad et al., 2017; Liang, Saraf, Hu, & Xue, 2007). The success of technology adoption involves how top management evaluates the strategic opportunities and the long-term vision of integrating the innovation into their business activities and processes (Duan et al., 2012; Ifinedo, 2011; Liang et al., 2007). Top management commitment support is suggested to have a direct influence on technology adoption in SMEs (Hamad et al., 2018; Teo et al., 2009). Hence, the following is posited:

**H3.** There is a positive relationship between top management support and B2B e-commerce adoption.

Environmental context is the base from which an organization operates. This research focuses on competitive pressure, business partners’ pressure and government support. Competitive pressure is the rate to which an organization is affected by competition in the market to adopt technology (Alsaad et al., 2017; Huo, Zhao, & Zhou, 2014).
<table>
<thead>
<tr>
<th>Main findings on factors influence of B2B E-commerce adoption</th>
<th>Reference and country of study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant: Perceived relative advantage, compatibility, CEO’s innovativeness, information intensity, buyer/supplier pressure, technology vendors support and competition</td>
<td>Cost, CEO IS knowledge, business size</td>
</tr>
<tr>
<td>Significant: Relative advantage, complexity, top management support, firm size, and government support</td>
<td>Compatibility, competitive pressure, business partners’ pressure</td>
</tr>
<tr>
<td>Significant: Cost, network reliability, data security, scalability, top management, firm size, firm type, management, trading partner’s pressure, competitive pressure</td>
<td>Complexity, trust</td>
</tr>
<tr>
<td>Significant: Perceived desirability, management support, and competitive pressure.</td>
<td>Organization’s readiness</td>
</tr>
<tr>
<td>Significant: Organizational IT readiness, top management support, strategic orientation, customer pressure, regulatory environment, and national readiness</td>
<td>Organizational readiness perceived indirect benefits</td>
</tr>
<tr>
<td>Insignificant: Perceived direct benefit, top management support, external pressure, and trust</td>
<td>Lack of internet trust</td>
</tr>
<tr>
<td>Insignificant: Organizational size, intolerance of failure, the incapacity of dealing with changes, lack of enterprise-wide information sharing</td>
<td>Perceived relative advantage, legal infrastructure, IT infrastructural and trading partners pressure</td>
</tr>
<tr>
<td>Insignificant: Cost of adoption, top management support, competitive pressure, and government support</td>
<td>Technology integration, firm size</td>
</tr>
<tr>
<td>Insignificant: Perceived relative advantage, technology readiness, owner innovativeness – owner IT ability, owner IT experience</td>
<td></td>
</tr>
</tbody>
</table>
In today’s competitive environment, organizations need to regularly assess advances in modern technologies and adapt them to gain competitive advantages. In the context of B2B e-commerce adoption, several researchers have identified competitive pressure to be the best external predictor of B2B e-commerce adoption in SMEs (Grandon & Pearson, 2004; Sila & Dobni, 2012; Sin et al., 2016). It is believed that competitive pressure influences the adoption of technology when SMEs observe that such technologies can strengthen their competitive position and assist them in achieving performance and sustained competitive advantage (Grandon & Pearson, 2004; Huy et al., 2012). Manufacturing SMEs have to adopt B2B e-commerce when faced with a high level of competition. Thus, this hypothesis is proposed: H4. There is a positive relationship between competitive pressure and B2B e-commerce adoption.

Business partners’ pressure reflects the extent of effects and pressure that an enterprise incurred from relational channels such as suppliers and customers to adopt B2B e-commerce systems (Saprikis & Vlachopoulou, 2012; Zhu & Thatcher, 2007). Findings from empirical studies show that B2B e-commerce adoption entails compatibility in goals and interests among business partners and preparedness to cooperate since the success of B2B e-commerce adoption depends on the partners to jointly adopt the technologies in their business activities (Ghobakhloo et al., 2011; Ifinedo, 2011). Business partner’s pressure was found as a major factor in predicting SMEs adoption of B2B e-commerce adoption and had a positive effect on adoption of technology (Al-Qirim, 2007; Huy et al., 2012). Therefore, the following is hypothesized: H5. There is a positive relationship between business partners’ pressure and B2B e-commerce adoption.

Government support can be established in three different ways. First, by instituting relevant legislation and policies, second, by providing specific incentives and funding, and third, by adopting IT infrastructure and creating a skilled IT workforce, altogether that will have both direct and indirect stimulation effects on technology and B2B e-commerce adoption (Huy et al., 2012; Saprikis & Vlachopoulou, 2012). Researchers have established that government support has a positive and significant effect on the decision of SMEs to adopt technology in firms (Scupola, 2003; Thatcher et al., 2006). The reviewed literature suggests that government’s support influences SMEs to adopt B2B e-commerce. Hence, the following is posited: H6. There is a positive relationship between government support and B2B e-commerce adoption.

**Organizational Culture and B2B E-Commerce Adoption**

Organizational culture is a complex construct that has been investigated at various levels in different contexts, resulting in diverse conceptualizations and dimensions being used in various studies (Senarathna, Warren, Yeoh, & Salzman, 2014; Shao, Wang, & Feng, 2015). Organizational culture has been defined as a set of shared values, beliefs, and assumptions that are reflected in organizational goal and activities that support its members understanding of organizational functioning (Mohtaramzadeh et al., 2018). O’Reilly, Chatman, & Caldwell (1991) as cited in Mohtaramzadeh et al.
(2018) defined organizational culture as a collection of core belief and values consensually shared by organizational members. Tsui, Zhang, Wang, Xin, and Wu (2006) adopted this definition to conceptualize a framework for identifying organizational culture with different organizations in China. They identified five organizational culture values or dimensions to be common across organizations. These are employee orientation, customer orientation, systematic management control, innovativeness, and social responsibility. In particular, the cultural focus on innovativeness, cohesiveness, risk-taking, participation, creativity, and teamwork offers employees an increased sense of ownership and responsibility in adopting new technologies (Tsui et al., 2006).

Increasingly, scholars have recognized that organizational culture could play a significant role in decisions in adopting high technology (Khazanchi, Lewis, & Boyer, 2007; Liu et al., 2010). In particular, it has been proposed that organizational culture can have an effect on an organization’s capability to process information, rationalize, and exercise discretion in its decision-making processes in technology adoption (Liu et al., 2010; Mohtaramzadeh et al., 2018; Senarathna et al., 2014; Valencia et al., 2010). In this regard, prior researchers have found that organizations with “strong culture” and “weak culture” have different influences on the organization’s interpretation of internal and external activities, and thus differentially influence its response to the expectations and requirements of that internal and external environment (Khazanchi et al., 2007; Liu et al., 2010; Mohtaramzadeh et al., 2018). In applying the five dimensions, Mohtaramzadeh et al. (2018) indicated that organizations with "strong culture" could strengthen the influence of technological and organizational factors in the adoption of B2B e-commerce. Therefore, as the members of organizations are given the privilege to use an IT application organization where involvement, teamwork, creativity, and innovation are encouraged (strong culture), they are capable of determining the degree of usefulness of the information technologies in meeting their needs. Likewise, they were of the view that an organization with a strong culture may not appreciate what may be gain from external pressure.

The organization believes that is the heterogeneity that allows them to win competitive advantage. In the context of environmental factors, an organization with a strong culture tends to rate adoption of the technology independently, rather than being influenced by external and internal powers. A strong culture can weaken the impact of the environmental pressure on the probability of adopting B2B e-commerce.

The literature shows that an organization with “strong culture” could emphasize internal development with increasing resources to enhance information sharing among its members, to improve human relations, optimize existing operational equipment and practices, value generation information, and performance (Aktaş, Çiçek, & Kiyak, 2011; Mohtaramzadeh et al., 2018). With the inclination for unique practices (Khazanchi et al., 2007), an organization with a strong culture, compared to an organization with weak culture, may not respond as favorably to business partners’ and competitive pressures.

Following the logic of the arguments, this research postulates that an organization with strong culture may reinforce the influences of technological (perceived desirability) and organizational elements (organizational readiness and top management support) in the adoption of B2B e-commerce. Likewise, a strong culture can limit the impact of competitive and business partners’ pressures. Therefore, this research theorizes that assuming the same level of perceived environmental pressures, an organization with a strong culture is less inclined to adopt B2B e-commerce. This leads to the following hypothesis:

**H7.** The greater the organizational culture, the more the positive relationship between TOE related factors and B2B e-commerce will be attenuated.

**MATERIAL AND METHODS**

**Sampling and Data Collection**

This study’s analysis applies specifically to manufacturing SMEs in Ghana. We choose these firms as an area of study since they play a crucial and integral role in the economy of Ghana. A questionnaire survey was used to collect data from the respondents. In this research, we relied on the provisions of the NBSSI, Ghana to capture those businesses with less than 100 employees classified
as small and medium-sized businesses. Data for this research were gathered from CEOs and owners or information managers and business operation managers who are directly responsible for firms’ activities. Usually, many of the data associated with SMEs is collected and kept by parties who are concerned in the operations of SME. For example, the Ghanaian government via the National Board for Small Scale Industries (NBSSI) and the Registrar General Department provides some SME data in specific areas. Also, the Association of Ghana Industries (AGI) and Global Business Directorate (GBD) were other relevant sources of data to complete the sample frame. The data provided by these agencies were accessed through their websites. To ensure that only manufacturing SMEs were selected for the sample frame, a list of 943 manufacturing firms was randomly selected. A systematic random procedure was used to choose a representative sample of 691, using the aggregation of product type and geographic locations as stratification criteria. Geographic locations were across four regions out of the ten regions in Ghana, namely; Greater Accra, Western, Ashanti, and Eastern. These regions have highly urbanized centers made up of Metropolitan and Municipal Assemblies and most industries are sited in these regions. The sampling frame is a cross-section of six industries, namely: construction and electricals, polymers and rubbers, textiles and clothing, pharmaceuticals and chemicals, food processing and beverages, and wood, tissues and paper products, in order to increase generalizability. With the help of fifteen research assistants, self-administered printed questionnaires were delivered by hand to each of the selected sample firms from the 11th of October 2018 and continued for three and a half months. The personal delivery approach was follow up by telephone calls and e-mails reminding the respondents of the survey. After 14-weeks, a total of 315 valid answers had been received, attaining a final response rate of 45.6%. Non-response bias was assessed by splitting the responses into early and late response groups. The results of t-tests, showed no significant mean differences between the two groups, revealing that a non-response bias was not a problem in this research. Almost 65% of the respondents were Chief Executive Officers and owners, and the rest were Heads of information technology units, and have been in business for more than ten years. Following the NBSSI classification, 60% of the respondents could be classified as “medium businesses.” Detailed descriptive statistics on the respondents’ characteristics are shown in Table 2.

**Measurements**

The instrument for the survey was designed after reviewing the relevant literature and two pretests. For clarity of the questionnaire and the accuracy of the responses, the first pretest was conducted by 20 doctoral students, who checked the face validity of the measurement items including two academic Lecturers who are conversant with information technology. The second pretest was performed by 30 managers, who reviewed the content of the questionnaire to see whether it reflected real situations of the Ghanaian business environment and whether the measures are meaningful to them. This resulted in some minor changes that were added, such as the meaning and description of B2B e-commerce adopted in this research was clearly stated on the questionnaire. The survey for this research contained three distinct parts: (i) TOE related factors, (ii) organizational culture parameters, and (iii) demographic characteristics.

**Table 2. Demographic profile of respondents (n = 315)**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Industry</td>
<td>Construction and Electricals</td>
<td>29.5</td>
</tr>
<tr>
<td></td>
<td>Polymers and Rubbers</td>
<td>19.1</td>
</tr>
<tr>
<td></td>
<td>Textiles and Clothing</td>
<td>14.9</td>
</tr>
<tr>
<td></td>
<td>Pharmaceutical and Chemicals</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td>Food Processing, and Beverages</td>
<td>12.4</td>
</tr>
<tr>
<td></td>
<td>Wood, Tissues and Papers Products</td>
<td>10.8</td>
</tr>
<tr>
<td>Firm size</td>
<td>5-29</td>
<td>40.3</td>
</tr>
<tr>
<td></td>
<td>30-99</td>
<td>59.7</td>
</tr>
<tr>
<td>Education</td>
<td>Secondary level</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Tertiary level</td>
<td>44.8</td>
</tr>
<tr>
<td></td>
<td>Postgraduate level</td>
<td>15.2</td>
</tr>
<tr>
<td></td>
<td>Professional level</td>
<td>39.0</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>74.3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>25.7</td>
</tr>
<tr>
<td>Age</td>
<td>Less than 30 years</td>
<td>8.6</td>
</tr>
<tr>
<td></td>
<td>30 – 39 years</td>
<td>49.5</td>
</tr>
<tr>
<td></td>
<td>40 – 49 years</td>
<td>37.1</td>
</tr>
<tr>
<td></td>
<td>50 years and above</td>
<td>4.8</td>
</tr>
</tbody>
</table>
The constructs and items that have been examined in prior investigations were used to ensure greater convergent and discriminant validity. Perceived desirability was abstracted as an inclusive construct derived from three dimensions (relative advantage, compatibility, and complexity). Eight items were used to measure perceived desirability and adopted from Alsaad et al. (2015). Organizational readiness as the next variable comprised IT human resources and financial resources and was measured using five items adopted from Grandon and Pearson (2004) and Chwelos et al. (2001). Top management support was adopted from Teo and Ranganathan (2004) and Liang et al. (2007) and consisted of four items. The measures of competitive pressure were obtained from Al-Qirim (2007) using five items. Four items were used to measure business partner’s pressure and adopted from Teo et al. (2003) and Al-Qirim (2007). Finally, government support was measured using six items adopted from Gibbs, Kraemer, and Dedrick (2003) and Kuan and Chau (2001). All these independent variables within the research model were measured with a five-point Likert scale, ranging from “very much” (5) to “very much” (1). B2B e-commerce adoption as the dependent variable was measured as a dichotomous variable “YES” or “NO.” The B2B e-commerce adoption was operationalized as a four-stage model and adopted from a framework developed by Elbeltagi et al. (2016), which is relevant to the B2B e-commerce realities of manufacturing SMEs. However, it was modified to suit the context of the current research.

Organizational culture construct was adapted from the studies of Tsui et al. (2006) and Tsui, Wang, and Xin (2002) that identified five organizational (Chin, Marcolin, & Newsted, 2003). PLS analysis permits for the conceptualization of a hierarchical model through the repeated use of manifest variables (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005).

The analysis in this research was performed in two steps by conducting reliability and validity assessment of the measurement model, followed by the structural model assessment and hypotheses testing. B2B e-commerce adoption (dependent variable) is a dichotomous variable.

**Measurement Model**

**DATA ANALYSIS AND RESULTS**

The hypotheses are tested using partial least squares structural equation modeling (PLS-SEM) and through the WarpPLS software package (Kock, 2012). PLS uses both measurement and structural models to generate a simultaneous statistical test (Fornell & Larcker, 1981; Hoe, 2008). PLS is a full-fledged SEM method that can test for exact model fit and works perfectly in explanatory and predictive research (Chin, 2010; Henseler, Hubon, & Ray, 2016). Also, PLS-SEM is a well-established variance-based SEM technique that has recently gained acceptance across many disciplines including information systems (Benitez, Llorens, & Fernandez, 2015). Moreover, PLS-SEM avoids the challenges associated with small sample size and has less strict assumptions of normality distribution and error terms (Hair et al., 2016), and as well as handling a high number of indicators, constructs, and relationships (Chin, 2010; Hair, Ringle, & Sarstedt, 2011). PLS-SEM is also more appropriate than covariance-based-SEM for analyzing models with second-order constructs and moderating variables.

The measurement model was measured for construct and indicator reliabilities, convergent validity and discriminant validity. Composite reliability (CR), average variance extracted (AVE), and loadings for each of the first-order constructs are measured. The composite reliability of all constructs was higher than 0.7, confirming the reliability of the first-order constructs model. Likewise, the indicator reliability was assessed based on the criterion that loadings should be higher than 0.7 and that each loading below 0.70 should be removed (Hair et al., 2016). The remaining loadings are higher than 0.70, confirming good indicator
reliability of the instrument. Likewise, the convergent validity was tested with AVE, and all the first-order constructs compared positively against the minimum acceptable value of 0.50 (Fornell & Larcker, 1981; Henseler, Ringle, & Sinkovics, 2009). Also, Fornell-Larcker’s criterion was used to examine the square roots of the AVEs for all first-order constructs to estimate the discriminant validity as shown in Table 3. The square roots of the AVE scores were all greater than the correlations among the constructs; thus, the discriminant validity was established. Lastly, issues of collinearity between the constructs were tested. The variance inflation factor (VIF) is a frequently used method to identify multi-collinearity (Hair et al., 2011). VIF values of all constructs were less than the cut-off value of 3.3 (Kock, 2012). This shows that the issue of collinearity was not a problem. Collectively, the above discussion gives evidence of the soundness of the first-order measurement model of this research.

The second-order measurement model was assessed using the reflective-formative measurement type for organizational culture construct. In generating the second-order organizational culture, two-steps were followed. First, the first-order latent variables for employee orientation (EMO), customer focus (CUF), strategic management and control (SMC), innovativeness (INN) and social responsibility (SOR) were constructed to their respective blocks of manifest variables using reflective indicators in the measurement model. Guided by the indicator reliability criteria, items with loadings less than 0.70 were deleted. In Table 4, the AVE square roots were all greater than the correlations among constructs. Thus, the measurement model for the second-order organizational culture construct in this stage had good convergent validity and discriminant validity. Second, the second-order latent variable (organizational culture) was generated by linking it to the blocks of the underlying first-order latent variables, which operated as formative indicators for this second-order latent variable. However, the traditional indicators of reliability and convergent validity of the formative constructs were not relevant (Bollen, 2014). The VIFs were lower than 3.3 and significant at p <0.01, indicating a highly acceptable measurement model for the organizational culture construct. The measurement model assessment showed that the model has good construct reliability, indicator reliability, convergent validity, and discriminant validity for both first- and second-order latent variables and can be used to test the structural model.

### Table 3. Correlations and squared roots of AVEs for the first construct

<table>
<thead>
<tr>
<th>Constructs</th>
<th>PES</th>
<th>ORG</th>
<th>TMS</th>
<th>COP</th>
<th>BUP</th>
<th>GOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PES</td>
<td>0.796</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORG</td>
<td>0.473</td>
<td>0.730</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMS</td>
<td>0.102</td>
<td>0.114</td>
<td>0.818</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COP</td>
<td>0.346</td>
<td>0.407</td>
<td>0.015</td>
<td>0.801</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUP</td>
<td>-0.391</td>
<td>0.435</td>
<td>0.070</td>
<td>-0.369</td>
<td>0.906</td>
<td></td>
</tr>
<tr>
<td>GOS</td>
<td>0.342</td>
<td>0.480</td>
<td>-0.027</td>
<td>0.586</td>
<td>0.385</td>
<td>0.810</td>
</tr>
</tbody>
</table>

### Table 4. Correlations and squared roots of AVEs of organizational culture (second-order construct)

<table>
<thead>
<tr>
<th>Constructs</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employee orientation</td>
<td>0.803</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Customer focus</td>
<td>0.414</td>
<td>0.794</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Systematic management control</td>
<td>0.373</td>
<td>0.333</td>
<td>0.853</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Innovativeness</td>
<td>0.433</td>
<td>0.378</td>
<td>0.468</td>
<td>0.809</td>
<td></td>
</tr>
<tr>
<td>5. Social responsibility</td>
<td>0.412</td>
<td>0.538</td>
<td>0.403</td>
<td>0.426</td>
<td>0.854</td>
</tr>
</tbody>
</table>

### 5.2. Structural Model and Hypotheses Testing

The results of the measurement model produced a statistically satisfactory goodness of fit between the survey data collected and the proposed research model. The model fit and quality indices for the structural model had acceptable values and
therefore supported the research model. The key criterion for the structural valuation is the coefficient of determination ($R^2$), which accounts for 42% of the variance explained in the model. To assess the structural model and to test the proposed hypotheses, the direct effect model in which the moderator was excluded was tested. After, the moderating effect was examined in another model, identified as the interaction model (Hair et al., 2016). In the direct effect model, both the standardized path coefficients, effect size, and their significance p values were used for hypotheses testing. These results are presented in Table 6 and Figure 2. As seen in Table 6, perceived desirability positively influenced B2B e-commerce adoption ($\beta = 0.366; p < 0.01$) in manufacturing SMEs in Ghana, supporting H1. Similarly, the two hypotheses regarding organizational factors, organization’s readiness ($\beta = 0.181; p < 0.01$) and top management support ($\beta = 0.105; p < 0.05$) have positive influence B2B e-commerce adoption, thus, supporting H2 and H3. Competitive pressure also was predicted to directly and positively influence B2B e-commerce adoption, and this effect was proven ($\beta = 0.220; p < 0.01$), supporting H4. It was expected that business partners’ pressure directly and positively influenced B2B e-commerce adoption; however, the results were not significant. Therefore, H5 was not supported. Also, it was assumed that government support would directly and positively influence B2B e-commerce adoption; this statement was upheld ($\beta = 0.108; p < 0.05$), supporting H6.

Regarding effect size, the results from the statistical analysis of the research model revealed that perceived desirability and top management support have a medium effect on B2B e-commerce adoption, whereas, organizational readiness, competitive pressure and government support has a small effect on the adoption of B2B e-commerce.

![Figure 2. Structural Model of the Direct Effect Testing](image_url)

In testing the moderating role of organizational culture, an interaction model between the predictors (TOE related factors) and organizational culture on the criterion variable (B2B e-commerce adoption) was initiated. The results are shown in Table 7. The results indicated a negative moderating path coefficient between top management support and organizational culture ($\beta = -0.121; p < 0.05$), while the path coefficients of the other TOE related factors were reasonably weak (less than 0.1) and insignificant ($p > 0.05$). The negative moderating effect of organizational culture on the relationship between top management support and B2B e-commerce adoption was significant. Figure 3 shows the value of the direct and interaction effect of top management support with organizational culture toward B2B e-commerce adoption.
The main direct relationship between top management support and B2B e-commerce adoption, as depicted in Figure 3, was positively significant. However, the interaction relationship between top management support (TMS) and organizational culture (OC) toward the adoption of B2B e-commerce (TMS*OC→B2B e-commerce) reported negative (-0.121), significant (p < 0.05). The negative moderation between the two variables implies that as organizational culture rises or increases, the value of the direct relationship between top management support and B2B e-commerce adoption falls or decreases.

Figure 3. Moderating and Direct Link of TMS and B2B E-commerce Adoption

Figure 4 demonstrates the interaction patterns using Aiken, West, and Reno (1991) procedure of computing slopes one standard deviation above and below the mean of organizational culture. Figure 4 indicates the relationship between top management support (TMS) and B2B e-commerce adoption (B2BECa) under high and low levels of organizational culture (OC). This result implies that with low organizational culture, the effect between top management support and B2B e-commerce adoption is stronger than with high organizational culture. Conversely, the effect between top management support and B2B e-commerce adoption tends to be flatter in high organizational culture. That meant organizational culture was less predictive of B2B e-commerce adoption as organizational culture became high. This proposes that the moderation effect of organizational culture on the relationship between top management support and B2B e-commerce adoption is stronger for low organizational culture as compared to high organizational culture. Overall, the results indicated that the inclusion of the interaction terms enhanced the model output whereby the R-squared increased from 0.417 to 0.472.

DISCUSSION

This research analyzed a context-specific model using the TOE framework and proposing organizational culture as a moderator. The results of this research revealed that though not all the influential factors reported significant effects, the prediction within the TOE framework and B2B e-commerce adoption were recognized.

In the context of the technological factor, the results showed that perceived desirability has a significant effect on B2B e-commerce adoption in Ghanaian manufacturing SMEs. This finding follows the reasoning that SMEs recognize the economic benefits linked with the adoption of technology as has been reported extensively in the innovation diffusion literature (Davis, 1989; Ifinedo, 2011; Venkatesh & Bala, 2012). It is in agreement with Ghobakhloo et al. (2011) and Rogers (2003) who revealed that B2B e-commerce applications would be adopted when its qualities are perceived to fit the potential needs of the adopters. The desirability of B2B e-commerce adoption among adopters could help increase the pace of business operations and coordination of SMEs thus leading to achieving competitive
Table 5. Results of the main (direct) effect of hypothesis testing

<table>
<thead>
<tr>
<th>Hyp.</th>
<th>Relationship</th>
<th>Path coefficient</th>
<th>S.E</th>
<th>P Value</th>
<th>$f^2$</th>
<th>Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Perceived desirability $\rightarrow$ B2B e-commerce Adoption</td>
<td>0.366</td>
<td>0.055</td>
<td>0.001*</td>
<td>0.224</td>
<td>YES</td>
</tr>
<tr>
<td>H2</td>
<td>Organizational readiness $\rightarrow$ B2B e-commerce Adoption</td>
<td>0.181</td>
<td>0.053</td>
<td>0.001*</td>
<td>0.085</td>
<td>YES</td>
</tr>
<tr>
<td>H3</td>
<td>Top management support $\rightarrow$ B2B e-commerce Adoption</td>
<td>0.105</td>
<td>0.055</td>
<td>0.029**</td>
<td>0.215</td>
<td>YES</td>
</tr>
<tr>
<td>H4</td>
<td>Competitive pressure $\rightarrow$ B2B e-commerce Adoption</td>
<td>0.220</td>
<td>0.054</td>
<td>0.001*</td>
<td>0.115</td>
<td>YES</td>
</tr>
<tr>
<td>H5</td>
<td>Business partners’ pressure $\rightarrow$ B2B e-commerce Adoption</td>
<td>-0.075</td>
<td>0.056</td>
<td>0.088</td>
<td>0</td>
<td>NO</td>
</tr>
<tr>
<td>H6</td>
<td>Government support $\rightarrow$ B2B e-commerce Adoption</td>
<td>0.108</td>
<td>0.056</td>
<td>0.042**</td>
<td>0.063</td>
<td>YES</td>
</tr>
</tbody>
</table>

* p < 0.01, ** p < 0.05, Hyp = Hypothesis, S.E = Standard error

Table 6. Results of the interaction model

<table>
<thead>
<tr>
<th>Interaction term</th>
<th>Path coefficient</th>
<th>S.E</th>
<th>P Value</th>
<th>S/NS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived desirability*OC $\rightarrow$ B2B e-commerce Adoption</td>
<td>-0.068</td>
<td>0.053</td>
<td>0.113</td>
<td>NS</td>
</tr>
<tr>
<td>Organizational readiness*OC $\rightarrow$ B2B e-commerce Adoption</td>
<td>-0.092</td>
<td>0.052</td>
<td>0.050</td>
<td>NS</td>
</tr>
<tr>
<td>Top management support*OC $\rightarrow$ B2B e-commerce Adoption</td>
<td>-0.121</td>
<td>0.056</td>
<td>0.014**</td>
<td>S</td>
</tr>
<tr>
<td>Competitive pressure*OC $\rightarrow$ B2B e-commerce Adoption</td>
<td>0.014</td>
<td>0.052</td>
<td>0.233</td>
<td>NS</td>
</tr>
<tr>
<td>Business partners’ pressure*OC $\rightarrow$ B2B e-commerce Adoption</td>
<td>0.041</td>
<td>0.053</td>
<td>0.232</td>
<td>NS</td>
</tr>
<tr>
<td>Government support*OC $\rightarrow$ B2B e-commerce Adoption</td>
<td>-0.065</td>
<td>0.053</td>
<td>0.121</td>
<td>NS</td>
</tr>
</tbody>
</table>

** p < 0.05, OC - Organizational culture, S.E - Standard error, S - Significant, NS - Non-significant
In the context of organizational context factors, it was found that an organization’s readiness is an important determinant that positively and significantly influences B2B e-commerce adoption among manufacturing SMEs in Ghana. This explains that regardless of the business type, there are the technical know-how and financial resources within the manufacturing SMEs in Ghana. This empirical study affirms the findings of Huy et al. (2012), Grandon and Pearson (2004) and Mishra and Agarwal (2010) who found that SMEs possess the technological, human and financial resources to adopt B2B e-commerce. The finding suggests the existence of reliable internet broadband connectivity from telecommunication network providers, and the existence of manufacturing SMEs’ level of technical skills and human resources that are conversant in IT applications to adopt B2B e-commerce technologies. Internet penetration has increased drastically in recent times which has its attendant impact on the related ICT innovation accessible to Ghanaian manufacturing SMEs. It also points to the fact that most of the manufacturing SMEs are aware of the benefits of technology adoption. In fact, these B2B e-commerce technologies may be relevant in supporting their business activities and information exchange inside and outside their operations.

Regarding the influence of top management support on B2B e-commerce adoption, it was found that the impact of top management support on B2B e-commerce adoption was significant and positive. This result emphasizes the high dependence of manufacturing SMEs in Ghana on the strategic decisions carried out by top managers. This finding supports previous studies associated to organizational technology adoption, suggesting that top management’s support and commitment are very crucial because they positively influence B2B e-commerce adoption, examples such as (Ghobakhloo et al., 2011; Ifinedo, 2011; Mohtaramzadeh et al., 2018; Sila & Dobni, 2012). Considering the particular characteristics of manufacturing SMEs, top managers have the principal responsibility in determining all operations, both the present and future of the organization. Therefore, top managers who are ingenious and innovative would be more inclined to adopt B2B e-commerce technologies. Prior literature related to B2B e-commerce adoption indicated that critical concerns in the Western countries included lack of trust, security, and privacy that hamper the growth of B2B e-commerce systems, whereas, in the emerging economies, the main difficulties were associated with management issues (Ghobakhloo et al., 2011; Mohtaramzadeh et al., 2018; Tan et al., 2007). The majority of industrial establishments are SMEs, and the main decision makers of these enterprises are owners; therefore, their innovativeness, strategic orientation, and support guarantee the inadequate resources to be allocated to address the challenges hindering the adoption of B2B e-commerce. In this study, the relationship between the top management and the adoption of B2B e-
commerce shows that to promote B2B e-commerce adoption in Ghanaian SMEs, it is very important to communicate with top managers at the higher hierarchy to win their approval.

In the context of environmental factors, it was found competitive pressure is an essential that positively influences B2B e-commerce adoption among manufacturing SMEs in Ghana. This relevance of competitive pressure on the adoption of B2B e-commerce in Ghanaian manufacturing SMEs is in agreement with past studies (Duan et al., 2012; Hamad et al., 2018; Scupola, 2003). The positive and significant relationship between the competitive pressure on B2B e-commerce adoption shows that Ghanaian manufacturing SMEs are more inclined to adopt B2B e-commerce technologies in order to have a competitive edge and to reinforce relationships along their value chain. This implies that the manufacturing SMEs reacted to competition because they consider the adoption of B2B e-commerce as a strategic necessity to remain competitive in today’s marketplace. Websites and email address have become the most used technology applications for initiating business partnerships.

The finding goes in line with the results of earlier studies (Ghobakhloo et al., 2011; Grandon & Pearson, 2004; Huy et al., 2012; Ifinedo, 2011) that found competitive pressure significant in B2B e-commerce adoption by SMEs. Therefore, attaining competitive advantage is still one of the fundamental drivers of B2B e-commerce adoption. Regarding the influence of business partners’ pressure on B2B e-commerce adoption, though earlier studies have confirmed the significance of demand and pressure from business partners, suppliers and customers to adopt B2B e-commerce (Al-Qirim, 2007; Ghobakhloo et al., 2011; Huy et al., 2012; Sila & Dobni, 2012), this study did not agree to this assertion in the context of manufacturing SMEs in Ghana. These results show that business partners’ pressure has an insignificant effect on Ghanaian manufacturing SMEs’ of B2B e-commerce. The finding of this research is in agreement with the findings by Hamad et al. (2018) and Mohtaramzadeh et al. (2018) who found that business partners’ pressure did not influence organizational’s adoption of B2B e-commerce. Ineffective pressure from partners to use such systems might be the reason for the relatively low level of penetration of B2B e-commerce systems among SMEs in Ghana. Also, many of the trading partners are local suppliers who do not use B2B e-commerce and therefore, manufacturing SMEs are not coerced to adopt B2B e-commerce system in their business operations.

The findings of this study found that government support positively influences B2B e-commerce adoption in Ghanaian manufacturing SMEs. This implies that owners/managers experience support from the government in the adoption of B2B e-commerce, which is consistent with earlier studies that found government support significantly in B2B e-commerce adoption in SMEs (Huy et al., 2012; Thatcher et al., 2006). This finding does agree with the findings of Awiagah et al. (2016) who found that government support played a significant role in the adoption of e-commerce in SMEs in Ghana. The liberalization of the ICT sector and the availability of broadband connectivity has expanded internet penetration and use. The SME sector is moving pretty fast regarding technology adoption partly because universities in Ghana are doing much better in producing qualified IT graduates capable of technological innovation. The findings of this research suggests that manufacturing SMEs recognizes the benefits associated with technology adoption and has been motivated to adopt B2B e-commerce systems. Manufacturing SMEs that experience a lack of support in the areas of financial and tax incentives, IT expertise, and training services from the government had encountered major problems in adopting B2B e-commerce technologies. In this regard, governments should help the manufacturing SMEs through the provision of the necessary IT expertise and adequate allocation of financial budget to improve the adoption of B2B e-commerce among SMEs in Ghana. If owners and senior managers of manufacturing SMEs perceive that government institutions and technology vendors are sensitive to their needs and concerns, then they would be more inclined to adopt B2B e-commerce systems.

On the other hand, the influence of organizational culture as a moderator variable, the interaction model was partially established. Only the interaction term between organizational culture and top management support was found to be negative and significant. The results from the interaction model testing show that organization culture moderates negatively and significantly the relationship between top management support and B2B e-commerce adoption. This result is in agreement with Mohtaramzadeh et al. (2018) who found that the relationship between top management support and B2B e-commerce adoption is significantly stronger for
manufacturing SMEs with “weak culture.” The reason for these findings is that manufacturing SMEs with “strong culture” are better placed to adopt B2B e-commerce. This is because, SMEs with “strong culture” is more probable to be innovative, and be able to transfer their skills, knowledge, and information sharing along the value chain. The adoption of high technology emphasize team building and encourages more champions as compared with “weak culture” (Khazanchi et al., 2007; Mohtaramzadeh et al., 2018). In effect, the process of adopting new technology is advanced in organizations with “strong culture” in contrast to organizations with “weak culture.” This discussion supports the earlier findings that postulate e-commerce adoption is facilitated by companies that stress an environment of flexibility, innovation, trust, and knowledge sharing among employees and their business partners (Mohtaramzadeh et al., 2018; Senarathna et al., 2014; Zhu & Thatcher, 2010). The findings of the interaction effect in this study reveal that the role of top managers is weaker in manufacturing SMEs with “strong culture.” This result is realistic since these companies are essentially technology-oriented and tend to be less dependent on support from senior managers in technology adoption. In contrast, the role of top managers in technology adoption is explicitly in organizations with “weak culture.” This implies organizations with “weak culture” own complex hierarchy and systems control that impedes the process of technology adoption (Mohtaramzadeh et al., 2018; Valencia et al., 2010) due to their high reliance on support from top managers. The results of this investigation carry a very significant message for manufacturing SMEs in Ghana, specifically, organizations with “weak culture” that will have to get the needed commitment and support from top managers to adopt B2B e-commerce. The fact is that managers will have to embrace their roles as dynamic leaders in innovation adoption particularly in an organization with “weak culture,” and assess whether and how they will add value to the innovation process. This needs managers to fully understand the obstacles and enablers that influence B2B e-commerce adoption.

IMPLICATIONS FOR RESEARCH AND PRACTICE

The results of this research provide several significant theoretical and practical implications. The first vital contribution is extending innovation adoption and IS literature to the context of B2B e-commerce. This research applied the TOE framework to investigate issues in the context of African emerging economies. By far, this study has extended the TOE framework which was developed for the western societies. This research operationalized organizational culture construct as a second-order latent variable in the interaction model, which facilitated testing the moderating effect in the research model. This is a significant contribution to the existing literature in organizational technology adoption because the moderating role of organizational culture has not been paid sufficient attention in previous studies related to B2B e-commerce in general. Therefore, this investigation adds largely to the present knowledge base by filling the gaps in the current technology adoption literature in relating to moderating effect of organizational culture in the adoption of B2B e-commerce in the context of the emerging economy of Ghana.

Besides, this present research proves that top management support is fundamentally crucial in the adoption of B2B e-commerce process. Therefore, this study strengthens the significance of this factor in the adoption of B2B e-commerce field in Ghana. The study reveals that organizational culture negatively moderates the relationship between top management support and B2B e-commerce adoption. Certainly, this is a vital contribution by itself because these kinds of inferences given the domain and the context of this investigation are surprisingly missing from earlier literature.

Further, the examination of the determinants of B2B e-commerce in the Ghanaian context has a number of important implications that could help managers, government and policymakers to facilitate B2B e-commerce adoption. This research sought to assist SMEs to become more successful in B2B e-commerce adoption. Empirical findings from this research show the importance of top management roles in manufacturing SMEs in the context of emerging economies. In fact, B2B e-commerce is not likely to be adopted if top managers and owners do not show commitment and support. Senior management teams should commit unrelenting support to B2B e-commerce initiatives by dedicating adequate resources to foster the greater use of B2B e-commerce technologies, particularly in SMEs, which have scarce resources and “weak” culture. Top managers should exercise their significant influence on organizational members regarding the potential and significance of conducting B2B e-commerce technologies. Likewise, top managers should be innovative and embrace
technological innovation and express their fear and belief by participating in various support mechanisms such as IT sensitization, training program and activities through working groups to change their perception and attitude. The full potential of technology and for that matter, B2B e-commerce can only be realized if owners and top managers will recognize that exploiting the full benefits of B2B e-commerce would require them to think beyond the risk element at the initial stage of IT investment. Top managers need to provide more technical and organizational support that will create the enabling environment to infuse B2B e-commerce and to lessen the uncertainties around technical and organizational changes.

Also, B2B e-commerce adoption requires the existence of appropriate government policies and support. The government should be more supportive through drafting favorable policies and legislation, providing more training and education programs. The government should also provide tax incentives on technology devices such as computers, servers and website designs which may advance B2B e-commerce adoption in manufacturing SMEs. Regarding legislation, the government should design a concrete regulatory framework to support B2B e-commerce adoption and protect businesses and customers from hacking and fraud. The government of Ghana is taking several measures to develop and improve business processes and to transform Ghana into a digital society. Generally, this research model will help exploit the potential benefits of Ghana’s government information and communication technology implementation efforts by offering an understanding of the issues that influence the adoption and implementation of internet technologies such as B2B e-commerce.

LIMITATIONS AND FUTURE RESEARCH
This research employed a cross-sectional survey to investigate the B2B e-commerce adoption at one point in time, which does not permit the interpretation of causal inferences between variables. Thus, a longitudinal study would be preferable. Additionally, this research relied on a single key respondent to evaluate all of the variables in the questionnaire. Researchers of organizational technology adoption have criticized the suitability of self-reported measures of technology use due to subjects’ lack of information, attention lapses and the threat of biased responses. Nonetheless, these issues are not of serious concern for this investigation because it was assumed that the key respondents are involved with the strategic activities of the SMEs. They possess the experiences they could elaborate and are dependable sources of information about the firms’ activities than multiple respondents from each firm, who could be difficult to access and probably could have resulted in smaller available sample size from the firms. Also, the questionnaire contained some items that were modified to fit the context of the study and differed in wording than the normal variables used by other scholars. Therefore, it is suggested that future empirical research that will use these variables, should use the original source of reference. Future studies might consider the moderating role of other variables of inter-organizational issues such as network age and network size. Finally, this research was limited to the urban centers in only four regions out of the ten regions. Certainly, further investigation is needed to validate the findings achieved for the determinants of B2B e-commerce adoption. Hence, future research should extend to other SMEs sectors (e.g., financial and services) and across different developing countries and cultures like China, to enhance the generalizability of findings.

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DECLARATION OF INTEREST STATEMENT

No potential conflict of interest reported the Authors