ABSTRACT
The objectives of this paper is to develop the framework for business-to-business electronic commerce (B2B e-commerce) in developing countries like Malaysia with specific interest in the small to medium-size enterprises (SMEs) sector. This paper begins by identifying internal and external barriers collected from the available literature which the results are used to develop a framework for e-commerce adoption among SMEs. Among the internal barriers identified are related to organization resource, top management, and individual’s characteristic, while for external barriers are relate to technological, economic, political, legal, trading partners, competitors and IT consultants. The internal barriers that arise within the organizations may be resolved within the organizations, but the external barriers need a lot of supports and interventions from government, private sectors and trading partners since it is beyond organization control. The paper shows how inter-organizational system adoption and diffusion theories and practicalities can be explored for developing the proposed e-commerce adoption framework. It is argued that results from research qualitative approach through case studies using the framework will able to identify the factors influencing the adoption of e-commerce technologies by the SMEs in developing countries.

Categories and Subject Descriptors
H.4.2 [Information Systems Applications]: Adoption of B2B e-commerce- Conceptual framework of barriers and solutions

General Terms
Theory

Keywords
B2B e-commerce, SME, conceptual framework, barriers and solutions.

1.INTRODUCTION
SMEs continue to be one of the major engines of growth for most developing countries in the world. In a global economy where competition is fierce and unforgiving, SMEs must be proactive in raising the quality of their operations and output in order to achieve greater success. The emergence of e-commerce technologies is believed to be able to assists SMEs, which always undergoing fast-paced changes on all fronts, in the business and economic environments. Many refer to e-commerce as a driving force transforming economic, business, commercial activities and socio-political changes in a borderless world. While e-commerce is the driving force in restructuring of information-intense and service-oriented industries, the Internet is moving to the forefront of popular culture and seized great public consciousness. The emergence of the e-commerce has allowed SMEs to compete effectively and efficiently in both domestic and international markets.

This paper use the broad definition given by Kotler [9] as below which identified the two types of Internet component: e-business & e-commerce. Electronic business or e-business describes the use of electronic means and platforms to conduct a company’s business. While e-commerce, is more specific than e-business, it means that in addition to provide information to visitors about the company, its history, policies, products, and job opportunities, the company or their websites also offer facilities to transact or facilitate the selling of products and services online. According to Turban et al [30], e-commerce can be further classified into four main categories as follows:

- Business to business (B2B), where both customer and merchants are businesses
- Business to Consumer (B2C), where the customer is a consumer and the merchant is a business
- Business to administration (B2A) where the customer is connected to transaction and document administration agencies for example business to government.
- Consumer to Administration (C2A), where the concept is similar to B2A, only that it is cater the transaction between consumer to business organization.

Particularly, e-commerce in the context of this paper discussion is defined as any form of business transactions where the buyers and suppliers connect electronically to enhance business efficiency through lowering transactions and communication costs or known as B2B markets. B2B market have fewer partners, closer buyer-seller relationships, better technology and better information exchange than business to consumer markets [30].
Recently, many studies have been conducted exploring the barriers of e-commerce adoption, benefits derived through e-commerce adoption including problems encountered by SMEs in their move towards e-commerce adoption [7, 24, 26, 3, 16]. E-commerce is an exciting area for research, because of its relative novelty and exploding growth. This paper presents a comprehensive review, classifies the barriers of e-commerce adoption based on the past literature which should be of interest to many. In Malaysia, despite attention and initiatives from academics, governments and international organizations to promote adoption of e-commerce, SMEs still fail to realize e-commerce related benefits which raise a lot of mysteries and questions of the cause. In addition, the study of B2B e-commerce in Malaysia is still limited and the real phenomena still not fully known. Thus, the purpose of this paper is to contribute to the existing literature on the framework of e-commerce barriers including its solutions which will give a more comprehensive guide to other researchers. The article presents the preliminary findings of a study conducted with the main purpose of addressing the research questions: “What are the common barriers of business-to-business Internet commerce encountered by SMEs and what are the possible solutions to overcome the barriers?” The results of this research can assist companies in identifying major concerns and, exploring initiatives of e-commerce opportunities in this globalized marketplace.

2.1 Past Framework on Inter-organizational Technology Adoption

Despite advances in e-commerce technology and the wide acceptance by large organizations of such technologies, the same level of adoption is not evident among SMEs [22, 26, 3, 19]. This clearly shows SMEs face significant and unique challenges in adopting information technology (IT) and e-commerce technologies [5, 27, 17, 22, 13, 24, 7]. This low level of adoption, particularly hinder SMEs’ success in developing countries. A fundamental approach to studying the adoption of new technologies is the diffusion of innovations [17, 21]. In order to study adoption of general technological innovation, Tornatzky and Fleischer [29] developed the technology-organization-environment framework, which identified those three aspects of a firm’s context in implementing technological innovation. This framework has been examined by a number of studies on various information System (IS) domain. Following Tornatzky and Fleischer, many studies [24, 31] have investigated explanatory variables for inter-organizational system adoption, information system (IS) and information technology (IT) adoption as well as e-commerce adoption. These studies have looked into the essential influencing factors and factors leading to adoption of IS/IT by SMEs. In terms of inter-organizational system adoption, Iacovoue et al [5] research considered as a pioneer research in the area. The research has identified three major factors that have a significance contribution towards the adoption of EDI. There are organizational readiness, operationalized factors such as financial, technological and human resources of the firm, environment factor which consider competitive pressure and imposition by trading partners and perceived benefits of the technology. Iacovoue [5] in his study of EDI adoption among small organizations, have found that the major reason for small companies to adopt EDI is due to the external pressure by their trading partners. By studying seven case studies of small businesses, Iacovoue came out with conclusion that most of the small organizations have difficulty to see the benefits of integrated systems and lack of organization readiness to adopt the system. research considered as a pioneer research in the area in the study of IT adoption among SMEs, researchers; Thong & Yap [27], Fink [4] and Thong [28] have emphasized on the importance of independent variables which are human capital, infrastructure and technology, top management commitment and organizational culture. Their research emphasize on the importance of knowledge and skills of a firm’s workforce which the results indicated that knowledgeable workers with sound technical knowledge on IT and IS are among the important factors to determine the success of the system being implemented. However, the difference between Thong’s model [29] and other models is that the CEO characteristics are consider one variable on its own, while in most other frameworks they would fall under organizational characteristics. Mirechandi and Motwani [15] investigated factors that distinguish small businesses that are adopters of e-commerce from the results showed that among the relevant factors are IT employee’s knowledge, top management support, e-commerce compatibility with businesses and positive perceptions on e-commerce advantages. Even though the above literature review reveal the different significant factors that affect the adoption of B2B technologies, additional and more relevant perspectives are needed in order to have a more comprehensive factors that match the adoption requirements of companies nowadays. In addition, the main deficiency underlying existing models, from the perspective of developing countries, is that they are designed for developed countries. Thus, some issues that might not be significance to them, might be an important factors to countries like Malaysia. It is undeniable that topic on B2B e-commerce adoption has attracted a lot of research and practitioner’s interests, however, what are missing from the existing literature could still be noted: Limited scope of coverage- Most of the B2B e-commerce studies in developing countries focus on limited internal and external factors. Thus, the framework have limited power in explaining how and what area of development affects specific organizations’ decision in SMEs sector to adopt e-commerce. Specific attention need to be emphasized on different e-commerce adoption indicators based on individual, organizational, industrial and national requirements. The owner, government and other related organizations needs to be guided with a more realistic view of how small and medium firms operate

Limited reference on B2B e-commerce relationships- Since the emphasis on the existing studies tend to determine the e-commerce requirements on SMEs in general, the needs of business – to business organization’s relationships and B2B e-commerce applications are not yet been widely explored especially in Malaysia. As developing countries are continue struggling to address the national infrastructure barriers, SMEs need proper investigation to identify the real barriers and drivers of B2B e-commerce and its success.
2.2 Barriers, Benefits and Solutions of E-commerce Adoption

Research done by Scupola [22] provide a good starting point in understanding the barriers, benefits and use of B2B Internet commerce adoption among SMEs. These studies explored the information systems/information technology adoption and diffusion models for SMEs and identified the essential influencing factors that lead to the adoption of the technologies by the SMEs.

2.2 Barriers, Benefits and Solutions of E-commerce Adoption

Research done by Scupola [22] provide a good starting point in understanding the barriers, benefits and use of B2B Internet commerce adoption among SMEs. These studies explored the information systems/information technology adoption and diffusion models for SMEs and identified the essential influencing factors that lead to the adoption of the technologies by the SMEs.

2.2 Internal Barriers

Barriers which the organization has control over and the ability to change the internal factors within the organizations. The internal barriers are further grouped into two categories. The first category is based on internal organization resources and strategic management factors which relate to knowledge, financial, time, understanding and attitude. Considering the importance of Chief Operating Officer (CEO) or owner characteristics as a person who have full authority on the direction of the company [28], individual characteristics of CEO or owner is considered as a variable per se. Poon and Swatman [18] emphasized the importance of the CEO’s role on e-commerce adoption and diffusion. CEO’s innovativeness and IT knowledge have been found to strongly influence innovation adoption. In this study, additional owner’s characteristics such as age, education, computing experience and working experience are included as barriers factors that might retard the B2B e-commerce. Other factors that relate to organizational culture and business process, required time to change in order to align with technology requirements.

2.2 Internal Solutions

We recommend few solutions to minimize the barriers which are training, resource allocation and appropriate technology infrastructure. Technical training is being identified as a critical success factor of B2B e-commerce. Information system specialist able to assist in implementing, maintaining and educating user of the system. Technical knowledge on IT shouldn’t be limited to subordinates only but also be expanded to owners of the firms as a main key player. A knowledgeable business owner able to recognize opportunities and threats within their chosen target market. SMEs that are likely to adopt new IT will usually have a CEO with a positive attitude, and
who is innovative and knowledgeable about IT [27]. In terms of resource allocation, available infrastructure and technology can influence digital technology readiness of SMEs. The stronger management supports, the more up to date and the higher the availability of infrastructure and technology, thus, the more ready the companies in terms of digital technology readiness. In addition, organization needs to invest in reinforcing their own values, beliefs, and business needs through out the e-commerce adoption process. The failure to develop a suitable planning that takes into account organization conditions and the availability of the internal and external resources might lead to inefficiencies of B2B online transactions. However, technology infrastructure cannot just be depend on internal solutions. Telecommunication infrastructure such as broadband access, the building of regional networks very much depends on government and private companies initiatives.

### 2.3 External Barriers

External barriers are the barriers that cannot be resolved by the SMEs alone. The organizations have no control over these, and are forced to work within the constraints. According to Kuan and Chau (2001), the environment consists of the conditions that foster contrasting orientations toward stability or search for change within organizations. In his paper, he mentioned the elements under environment that consist of political, cultural, economic and other environmental factors that specific to a certain country. Other conditions are the lack of information and skills required to use new technology between users and producers of the technology. External pressure from competitors and trading partners that are e-commerce technology enable will influence small firms to be more inclined to adopt the technology compared to those who do not encounter such pressure. In the specific context of e-commerce adoption in SMEs, other factors are relative to the insufficient roles of government and external consultants, unsuitability of economic conditions and lack of related e-commerce regulations.

### 2.4 External Solutions

The barriers that relate to external factors could be addressed by the SMEs working together, and can get together irrespective of the industry sector to form groups to share expenses, resources and facilities. Alternatively, government interventions may be required. In this study, the factors of the technological context have been developed based on technology infrastructure, e-commerce shop facility, e-commerce standard, security concern and technology change.

Government is a main key players of enhancing interest among SMEs on e-commerce development. SMEs desired intervention from the government, in terms of subsidies, financial incentives such as training, tax exemption and others, but particularly in terms of information campaigns and awareness creation. Broad government functionality will involve ICT policy model framework, legal infrastructure, technology infrastructure, financial assistance and advisory center. In Malaysia, National SME Development Council (NSDC) was formed with the purpose to strengthen the enabling infrastructure for SME development, building SMEs’ capacity and capabilities, and improving the access to financing by SMEs the NSDC serves as the highest policy making body to set the strategic direction for the Government policies on SME development so as to ensure coordination and effectiveness of government programmes [14]. Beside the important role of government, experience shows that private sector has been the most innovative player and the major driving force behind e-business and ICT deployment. In addition, trading partners also can be an important change agent to increase the circulation of e-commerce technology. SMEs will be more likely to follow their actions due to pressure or competition among them.

Summing up the four contexts along with their factors will depict the B2B e-commerce adoption framework shown in Figure 1. The first level portrays the external and internal barriers based on various factors which have different impacts of the adoption decision for e-commerce among SMEs. Whether such relationships would lead to e-commerce adoption will depends on the solutions taken which show at the second layers of the circle. Thus, the first level will depict how the current and potential adopters and non adopters generally viewed the slow adoption of B2B e-commerce. While, the second level will depict motivators criterion which based on the actions and initiatives taken by the key players: government, trading partners, industry key players and top management. The barriers and solutions highlighted in this paper can be a reasonable indicators of potential success factors for startup B2B e-commerce ventures in a developing economy. The proposed framework as in Figure 1 is expected to highlight the impact of the various contexts and their motivator factors on B2B e-commerce adoption within organization or within external environment context.

### 3. Discussion

This paper proposed the need of better understanding and recognizing the internal and external factors that might effect the slow penetration of B2B e-commerce adoption among SMEs. A framework for analyzing barriers of e-commerce adoption is provided along with some guidelines of solutions that can be applied to most SMEs seeking for competitive advantages in the business market. This research attempts to utilize e-commerce adoption and diffusion theories in identifying essential influencing factors on e-commerce usage within Malaysia’s SMEs. Many agreed [2, 10, 21, 28, 29] that the adoption decisions for any technological innovation like e-commerce rely on organizational characteristics and hence, a link between the innovation and the organizational factors will provide an essential insight into the adoption criteria for e-commerce among SMEs. This should not contradict with the importance of other influencing factors like the effect of the environment and technology.
This article highlights the external and internal barriers as well as the recommended solutions for business to business market participants of e-commerce have identified multidimensional implication to variety of business activities. Since e-commerce has a great potential to modify the business environment, all participants in the markets are likely to be affected by these technology, regardless of whether they are proactive about adoption or not. The impact on B2B e-commerce technology need to be analyzed on a case specific basis for future research.

More research are needed in the area of e-commerce, particularly on B2B e-commerce adoption between businesses. Testing of this framework, and identification of further technology adoption issues, would be useful for practitioners and researchers alike. Faith and E. U. Michael [2], note that there is a lack of consistent, detailed research into how and why SMEs need to re-evaluate every aspect of their internal, external and contextual perspectives so they can quickly adapt their working models to incorporate e-commerce as an essential factor for their success. Currently, there is limited research on business-to-business e-commerce in developing countries which covers wide-ranging issues beyond contextual imperatives. The next stage in the research process will be combination of qualitative and quantitative testings of the conceptual model developed in this research. A series of in-depth interviews with CEOs or owners of small firms in Central Malaysia or known as Klang Valley area will be carried out. Both quantitative and qualitative data analysis will allow for addition and identification of useful information from which it is possible to create new themes.

4. REFERENCES


[23] Scupola, A., 2003,“The Adoption of Internet Commerce by SMEs in the South of Italy: An Environmental, Technological and Organizational Perspective,” Journal of Global Information Technology Management, 6, 1, 51-71


