

Factors Affecting Adoption of E-Business and Organizational Performance: A Proposed Framework

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Abstract—The main purpose of this study is to identify factors affecting E-business adoption and organizational performance. Due to rapid globalization and competition, there is a necessity of change in skills and practices in dealing with customers and suppliers to complete business transaction enhancing productivity, knowledge management and organizational performance. In Libya many enterprises considers technology adoption as an extra cost facing a new challenge of adopting technologies. Firms in Libya are facing competitive pressure that creates urgency of working efficiently in the competitive market. This makes an urgent need of e-business adoption strengthening their capacity and capability. This paper therefore develops a framework for e-business adoption which is composed of five innovation factors. The proposed framework is then used to guide future study in exploring its adoption and organizational performance. The proposed framework will be empirically validated by self-administered survey questionnaire among small and medium enterprises of Libya.

Keywords—Diffusion of Innovation Theory, E-business adoption, organizational performance, Libya.

I. INTRODUCTION

E-business technology (EBT) is defined as usage of technology in an enterprise designed for success and future growth in business through an innovative way to gain strategic and competitive advantage (Hesterbrink, 1999). Adoption of new technology and the investment required gives rise to risky perception of key stakeholders in small and medium enterprises (SMEs). Thus it is important to adopt the technology through its nature of technical perspectives and its association to benefit SMEs (Grant, Edgar, Sukumar, and Meyer, 2014). The definition of e-business is still debated and the relevant literature offers a plethora of definitions and approaches. In some surveys e-commerce is perceived as an equivalent of e-business, ignoring the fact that EBT applications vary in complexity (Matopoulos, Vlachopoulou, and Manthou, 2009).

Many researchers and academicians confirmed the usage of Information and Communication Technology (ICT) brings transformation in doing business (Jeon, Han, and Lee, 2006; Lip-Sam and Hock-Eam, 2011; Sebora, Lee, and Sukasame, 2009). For SMEs, consistent by performing well is a very important driving force for the business uses and is applied

throughout the organization under diverse environments (Etheridge, Hsu, and Wilson Jr, 2001). In Libya many enterprises considers technology adoption as an extra cost facing a new challenge of adopting technologies. Firms in Libya are facing competitive pressure that creates urgency of working efficiently in the competitive market. This makes an urgent need of e-business adoption strengthening their capacity and capability. Due to its broad applicability, EBT implies and requires a change of practice in dealing with customers and suppliers, and the way in which products and services are delivered to buyers, as well as the change in skills of the staff necessary to support it, complete business practice using internal processes such as productivity, knowledge management and human resources (Patel et al., 2010). Yuserrie, Noor Azlinna, and Panigrahi (2014) further argued that, “if the user of the system is not satisfied with the technology, there is very few chance of usage of such technology which in turn leads to failure of the system” (p.202). EBT usage is very limited in Libya. Thus, a committee was established in order to suggest for the requirement of technology development and its efficient practice (Libya Telecom and Technology., 2007). This study thus focuses on the main challenges faced by SMEs in the adoption of EBT in Libya. In addition, an in-depth investigation concerning the impact of technological contexts affecting the adoption of EBT is performed.

II. REVIEW OF LITERATURE

Adoption of EBT has been identified as a distinct, critical, and growing topic in EBT research. Researchers are faced with thousands of EBT adoption articles to refer when seeking and reviewing those that are most relevant to their own projects. Individually, this is very time-consuming and, collectively, it can mean that the “wheel is reinvented” many times. However, most of them either broadly cover all EBT articles (Ngai and Wat, 2002; Wareham, Zheng, and Straub, 2005), or narrowly include a specialized part of EBT adoption research (Mohamad and Ismail, 2009; Zhou, Dai, and Zhang, 2007). While helpful, there remains a need for a concentrated and comprehensive review of EBT adoption research. From the explanation of importance of EBT playing a crucial role in the economy and quality of business it is evident that in order to transform key business processes there is a need of its adoption in the organization.

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A. Underlying Theory on IS adoption

The main goal of underlying theory is to attempt an approach of the literature on EBT and to understand its essential philosophical concepts. In order to explain the EBT model, three theories will be critically discussed. They are (1) Roger’s diffusion of innovation theory, (2) Technology Acceptance Model and (3) Resource based theory.

Roger’s Diffusion of Innovation Theory

The Diffusion of Innovation Theory (DIT) was first discussed historically in 1903 by the French sociologist Gabriel Tarde who plotted the original S-shaped diffusion curve, followed by [Ryan and Gross \(1943\)](#) who introduced the adopter categories that were later used in the current theory popularized by Everett Rogers. DIT sees innovations as being communicated through certain channels over time and within a particular social system ([Rogers, 1995](#)). Members of each category typically possess certain distinguishing characteristics. Below figure 1 shows the categorized factors for diffusion innovation model:

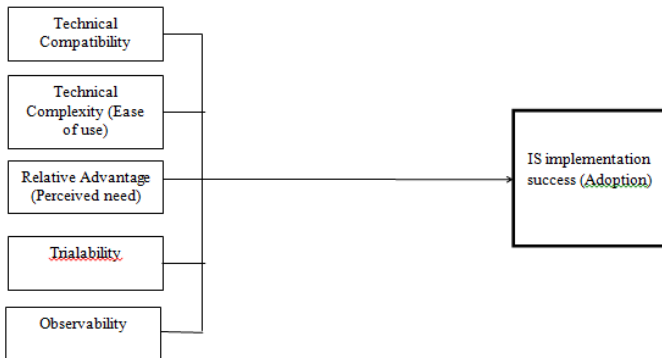


Fig.1: Information System (IS) Diffusion variance model ([Rogers, 1962](#); [Rogers and Shoemaker, 1971](#))

Rogers identified four main elements that coalesce to form the theory of diffusion of innovation: innovation, communication, time, and the social system. Rogers’ diffusion theory states that potential adopters’ perceptions of the characteristics of an innovation influence their adoption decisions ([Rogers, 2010](#)). By studying the diffusion of innovation in developing countries it was realized that the diffusion of innovation is less influenced by culture. According to [Kaminski \(2011\)](#), the diffusion of innovation refers to the process that occurs as people adopt a new idea, product, practice, philosophy, and so on. Diffusion implies communicating new ideas, technologies or processes ([Russell and Hoag, 2004](#)). It models the adoption of innovation and provides measurable factors that will be surveyed during the research as a method of determining the adoption of EBT in SMEs ([Bradford and Florin, 2003](#)). After reviewing Roger’s DIT model, new ideas of technology spread through innovative way is the similar concept that is required for this study. Thus DIT is deeply accepted in this study to investigate the technological factors provided by DIT like compatibility, complexity and relative advantage in the context of influencing EBT adoption and performance of SMEs in Libya.

Technology Acceptance Model

Information technology (IT) acceptance and usage represent central concerns in recent information systems research.

Although several theoretical models have been proposed to describe the phenomenon of IT acceptance, the Technology Acceptance Model (TAM) is increasingly recognized as a robust yet parsimonious conceptualization. The TAM proposed by Davis (1989) is based on constructs and relationships in the theory of reasoned action ([Fishbein and Ajzen, 1975](#)).

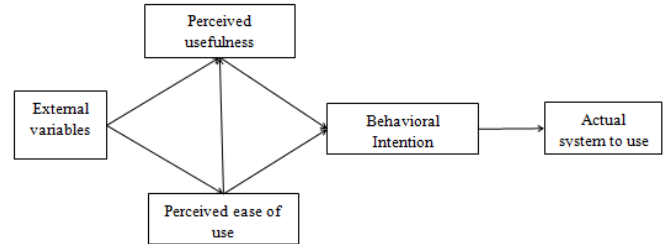


Fig. 2: The Technology Acceptance Model ([Davis, 1989](#))

TAM focuses on the attitude explanations of intention to use a specific technology or service; it has become a widely applied model for user acceptance and usage. There are a number of meta-analyses on the TAM that have demonstrated that it is a valid, robust and powerful model for predicting user acceptance ([Bertrand and Bouchard, 2008](#)). In studying user acceptance and use of technology, the (TAM) is one of the most cited models ([Chuttur, 2009](#)).

Comparing TAM to research grounded in DIT, it was found that empirical studies in the latter tradition have used a more complex set of beliefs to predict adoption and usage. Based on studies of multiple innovations in various domains, Rogers (1983) proposed that adoption behavior is influenced by beliefs related to relative advantage, compatibility, complexity, triability, and observability. Perceived usefulness in TAM is equivalent to Rogers' relative advantage while ease of use is equivalent to complexity (EOU is the direct antonym of complexity).

Resource Based Theory

This study takes the theoretical foundation of the organization through resource based view. Resource based view is classified into three types as provided by [Barney, Wright, and Ketchen \(2001\)](#): physical resources, human resource and organizational resources. Recently, there has been growing interest for the effective usage of organizational strategy by the firms and had renewed interest about business strategy. SMEs suffer lack of technologies and knowledge on to how to use technologies approaching to specific market is limited.

The resource based theory has been one of the main approaches to analyze the sustainable competitive advantage. The main theme of the resource based view is to make the firm compete on the basis of resource and capabilities. The resource and capabilities of the firm for the long term depends on the market conditions and other environmental factors ([Peteraf and Bergen, 2003](#)). The issue of organizational performance has been the main focus in the research strategy and management of such strategy. SMEs must rely on standard strategies and must utilized available resources the same as large enterprises.

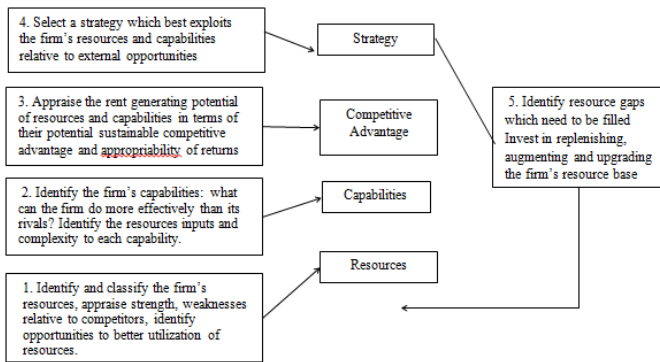


Fig. 3: Resource based approach towards strategic analysis (Feurer and Chaharbaghi, 1995)

The three theories will be compared in the next section. In terms of adoption of technology it was noticed that Roger's DIT is the most reliable theory to follow when it comes to technological contexts and its adoption. The detailed description for the acceptance of DIT is explained in the next section.

B. Review on EBT Adoption

There are many theories like resource based theory (RBT), TAM, TPB and Porter's competitive model that have been utilized by previous researchers in order to examine the impact of EBT towards organizational decisions. But all of them are inadequate to examine the complexity of adoption of EBT. This study follows that work done by Dwivedi, Papazafeiropoulo, Parker, and Castleman (2009) who performed theoretical comparison in their study and confirmed DIT to be more explanatory for the adoption of EBT. The finding concluded that theories like RBT, Porter's competitive advantage models were not sufficient to explain the adoption goals.

DIT was also appropriate for the EBT adoption due to their focus on learning process and EBT solutions. Most of the studies have highlighted the barriers that influence owner's adoption decisions (Gibbs, Sequeira, and White, 2007; Gilmore, Gallagher, and Henry, 2007; Roberts and Toleman, 2007). Lin and Kuo (2007) analyzed the critics of theories in relation to adoption of EBT in SMEs and found that no theory was able to confirm the value of EBT adoption in SMEs. It was also reported that organizational learning and skills can play a significant role between adoption of technology and organizational performance.

Marasini, Ions, and Ahmad (2008) attempted to investigate the assessment of EBT adoption in SMEs of manufacturing companies. Through a case study approach it was found that due to complex and inflexible system the adoption of EBT is still undeveloped. EBT knowledge and home use of the internet by family has been found to provide the impetus for adoption in some small firms. Chong, Ooi, Lin and Tang (2009) examined the influence of inter-organizational relationship on the adoption on EBT in the supply chain of SMEs of Malaysia. The study found that inter-organizational relationships such as communication, collaboration and information sharing were found to be significantly affecting the adoption of EBT in SMEs of Malaysia. Matopoulos et al (2009) considered adoption of EBT as an internal issue of the

company. Some of the issues that were identified were negligence of complexity, cost, availability of financial resources, availability of human resources, and nature of relationships. It was found from this research that compatibility and the level of collaboration were the major factors affecting EBT adoption. Oliveira and Martins (2010) mentioned that innovation becomes complex for many organizations and that limits them to adopt the technology. In order to promote EBT adoption it is crucial to clarify the factors and drivers. The finding suggested that perceived benefits, technology readiness, competitive pressure and trading partner collaboration are the factors that influence EBT adoption.

Similarly, Gilbert and Cordey-Hayes (1996) found that knowledge acquisition and application are important factors for technology adoption and innovation. In discussion, it was also noted that employees are not comfortable to discuss or share their knowledge with colleagues due to afraid of being promoted at their expense. Roger's Diffusion of innovation theory suggested that the adoption of EBT is based on five factors: relative advantage, compatibility, complexity, trialability and observability. But the most influenced factor found from the previous studies was compatibility, complexity and relative advantage. Diffusion innovation theory that is adopted for the study is heavily demanded by innovators, early adopters, early and late majority and laggards for innovative decision process.

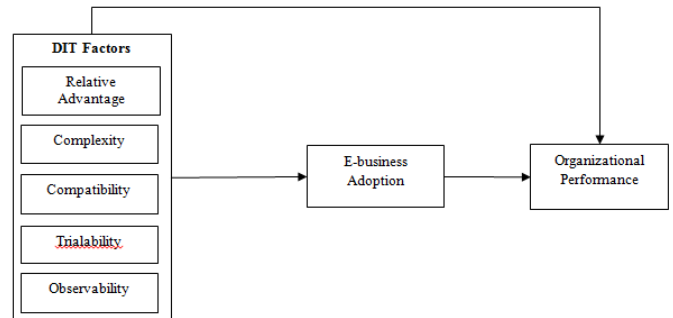


Fig. 4: The proposed research model of EBT adoption by SMEs

Thus in conclusion, by examining the innovation variables like compatibility, complexity and relative advantage in this study, the innovative decision for the adoption of EBT in the SMEs of Libya can be fulfilled which in turn can lead the firm to increase their performance and gain competitive advantage. Based on the literature review, the proposed framework (Figure 4) captures the potential factors that influence EBT adoption and organizational performance by SMEs. A discussion on each construct in the proposed research model is presented in next section.

III. DIT FACTORS AND EBT ADOPTION

A. Relative Advantage

Relative advantage is a multi-dimensional belief (Van Slyke, Johnson, Hightower, and Elgarah, 2008), in as the norm in Information Technology studies and focus on its usefulness aspect. Ahasanul Haque, Arun Kumar Tarofder, and Yasmin (2012) defined relative advantage as the degree to which an innovation is comprehended as being better than the idea it

supersedes. Relative advantage is defined as the degree to which an innovation is considered as being better than the idea it replaced.

Studies found relative advantage variable to be positively related to the adoption of IS innovations (Grandon and Pearson, 2004). When an IS innovation is perceived to offer relative advantage over the firm's current practice, it is more likely to be adopted. Technology provide many benefits to adopters in terms of accommodating business growth, improving business processes and reducing business operating and administrative costs (Markus and Tanis, 2000). In a highly competitive marketplace, these benefits make significant motivations for adopting these technologies. Furthermore, Ramdani, Kawalek, and Lorenzo (2009) found Relative advantage to be a significant factor influencing SMEs' adoption of ES. This is consistent with results from previous research that have found relative advantage to be a significant variable in the adoption of other IS innovations (Kuan and Chau, 2001). Thus it is hypothesized that:

H1: Relative Advantage has positive influence on E-business adoption by SMEs in Libya

B. Complexity

[Rogers \(2003\)](#), defined complexity as "the degree to which the technology is perceived to be difficult to understand and use". Complexity is "the degree at which an organization members positively relating to high level of knowledge and expertise". According to [Oliveira and Martins \(2011\)](#), complexity of information system is the internal characteristics utilized in the form of innovativeness to achieve better understanding of the adoption of IT. The more complex the product is to understand and use, the slower is the adoption rate ([Geissler, 2006](#)). Increase in product complexity leads to increase in loyalty as many consumers perceives that the trust that is developed is with the help of product complexity. Complexity of IT is considered a silent killer of business performance. This is the reason why [Tornatzky and Klein \(1982\)](#) confirmed that complexity of IT is negatively associated to adoption and implementation in firms. In order to help the SMEs manage their IT complexities, they must be able to leverage an integrated suite of business applications to make effective decisions and increase performance. Many E-business adoption projects fail to deliver agreed performance due to its complex applications. Some of these issues are provided by [Shetty and Sarojadevi \(2012\)](#) are among which are inadequate demand estimations, poor performance specifications, unbalanced planning, inefficient scheduling, unmonitored systems, insecure communications, and issues related to server hardware. Thus it is hypothesized that:

H2: Complexity has positive influence on E-business adoption by SMEs in Libya

C. Compatibility

Compatibility according to [Rogers \(1983\)](#) is defined as "the degree to which using an innovation is perceived as consistent with the existing socio-cultural values and beliefs, past and present experience and needs for potential adopters". Compatibility has been widely accepted and used as the needs of a potential adopter, and taps into the aspects of relative

advantage since an innovation cannot be viewed as advantageous if the technology does not meet user's needs. Additionally, according [O'Connor \(2007\)](#) the degree of the consistency of an innovation must coincide with the existing values, past experience, and needs for potential adopters. If an idea is inconsistent with the values of society, it will not be adopted in the same rapidity as when it is compatible. According to [Ghobakhloo, Hong, Sabouri and Zulkifli \(2012\)](#) a lack of IT investment decisions concerning compatibility and security issues can lead to a significant debilitating impact on the performance of SMEs.

Furthermore, [Southern and Tilley \(2000\)](#) mentioned that, in order to improve quality issues and fulfill their requirements, SMEs must be encouraged to implement E-business to improve their performance. However, managers or owners of SMEs must realize that E-business which are compatible with their requirements must be supplied by government agencies or other external sources along with incentives and assistance so as to ease the adoption of this technology. In other words, SME managers or owners must realize that E-business directly influences firm performance by augmenting critical organizational capacities like integrated supply chain processes, coordinated business processes and green management. Thus it is inferred that compatibility as a technological aspect is a common concern of SMEs when it comes to adopting E-business. Therefore, the third hypothesis is:

H3: Compatibility has positive influence on business performance of SMEs in Libya

D. Trialability

Trialability is the degree to which innovation may be experimented on a limited basis. Trialability is much more concerned on changes or modification of technology by the adopters. Thus it is after the implementation stage. [Hsbollah and Idris \(2009\)](#) investigated the perception of lecturers regarding the adoption of e-learning. Factors like relative advantage, complexity, compatibility, trialability and observability was considered in the investigation. It was found that compatibility and trialability positively influences the adoption decision. [Kuckertz and Breugst \(2009\)](#) further explored the relationship between organizational readiness and E-business adoption using a survey questionnaire and concluded that when provided with an alternative rationale for variations in levels of E-business adoption across countries, not only do factors related to management, such as perceived usefulness or perceived ease of use, are crucial but policy-related factors do matter as well; cultural effects and technological effects also take place. This is the main reason that trialability was not found to be the major factor during the technology adoption stage. This study includes trialability as contributing to the theoretical gap identified from previous studies on the role of trialability towards technology adoption. Thus it is hypothesized that:

H4: Trialability has positive influence on business performance of SMEs in Libya

E. Observability

Observability is the degree to which innovation is visualized by others. Peer observation is important as the motivational factor in the adoption of technology. But previous studies like Soh et al (1997); Pankratz, (2002) found that observability is not always been significantly associated with the adoption of technology in SMEs. If the observed effects are perceived to be small or nonexistent, then the likelihood of adoption is reduced. Thus it is hypothesized that:

H5: Observability has positive influence on business performance of SMEs in Libya

Thus it can be confirmed that not many studies have considered all the aspects of technology adoption. It also seems that there is theoretical gap exists in the technological contexts for the rate of adoption. Very few studies have included all five technological aspects of DIT in both developed and developing countries. [Soh, Mah, Gan, Chew, and Reid \(1997\)](#) mentioned that maximum of participants has performed the trial of technology and their observation before adoption. Similarly, [Shah Alam, Khatibi, Ismail Sayyed Ahmad, and Bin Ismail \(2008\)](#) performed the study in United States found positive correlation between trialability, observability and rate of technology adoption. Whereas, [Hsbollah and Idris \(2009\)](#) was investigated in Malaysia and found that trialability and observability has positive influence on adoption decision. Furthermore, no study was found to have been performed in the Libyan contexts or even in the African countries or the Middle East, highlighting the importance of DIT factors on adoption decisions. Thus in order to fill the theoretical gap of technological aspects this study includes all the five innovation variables provided by Roger and attempts to investigate their influence on E-business adoption in Libyan SMEs.

IV. CONCLUSION

Adoption of EBT and its related services is of importance for both researchers and academicians and industry practitioners. A deeper insight is required to better understand the aspects of technological contexts that deprive the SMEs to adopt EBT and proposed framework that can be fulfilled for SME's to gain competitive advantage. Previous studies on EBT confirmed that for the organization to be performing well in the competitive business environment must be innovative. For the firm to be innovative must be able to utilize modern technology business with high quality performance as compared to its competitors. Thus this study focuses on the innovation variables like compatibility, complexity and relative advantage as explanatory variables affecting EBT adoption among SMEs of Libya. Roger's Diffusion of innovation theory suggested that the adoption of EBT is based on five factors: relative advantage, compatibility, complexity, trialability and observability. Furthermore, by examining the innovation variables like compatibility, complexity and relative advantage in this study, the innovative decision for the adoption of EBT in the SMEs of Libya can be fulfilled which in turn can lead the firm to increase their performance and gain competitive advantage.

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