

Adoption of e-Commerce by the SMEs in Bangladesh: The Effects of Innovation Characteristics and Perceived Risk

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Abstract

The adoption of e-commerce has been widely analyzed in various studies. In fact, e-commerce has become an inescapable fact of life. This study examines Bangladesh's SMEs e-commerce adoption behavior by developing a model utilizing Rogers' innovation diffusion model with an additional of one variable. The study collected data from 171 SMEs through a structured questionnaire. The study reports the effects of perceived compatibility, complexity, observability and perceived risk appear significantly related to the willingness to adopt e-commerce. The paper concludes with implications.

Key words: Innovation diffusion, SMEs, Innovation characteristics, Perceived Risk

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Introduction

E-commerce has become an effective mean of trade and commerce, in general, and marketing and selling, in particular, of diversified products and services around the world. The rapid growth of world's Internet population and adoption of ICT in different sectors have reshaped the way of communication and demand utilizing its potentials to the development of trade and commerce. Cost, convenience, speed, efficiency and other uniqueness of the technology are the stimulating factors of successfully utilizing it in different functional areas.

At the end of 2008 nearly 1,596 million people or 23.8 % of total populations of the world had access to the Internet. This represents an increase of 342.2% over the year 2000. Asian countries account for 474.9 % growth while rest of the world grew by nearly 280.7 % in the same period (The Internet Coaching Library, 2009). The internet users in Bangladesh are also growing. The total internet population of the country stands at 1,00,000 in the Year 2000 and it reaches 4,50,000 in the year 2007 which proclaims 450% rise. The trend of internet population in Bangladesh is consistent with the growth trend of Asian countries exceeding the growth of the countries other than Asia (Digital Bangladesh, 2009). Bangladesh, although, has started internet operation in 1993 and established high speed information infrastructure through submarine information super highway in 2005, still remain in its infancy level.

Despite the existence of diversified inhibiting factors, such as low accessibility, lack of human resources, technological and legal infrastructure etc., (Azam, 2004; Azam, 2006c; Azam & Lubna, 2008; Hossain, 2000; ITRC, 2000; Rahman, 2001), there remains a high potentials of utilizing ICT in B2B sectors in order to ensure economic development. The government, thus, has given highest priority in developing ICT sector, made country's vision to develop Digital Bangladesh by 2021 and initiated modification in national ICT policy 2009 which reiterates establishing e-commerce by 2012 and e-governance by 2014.

Like many other countries SMEs¹ have the positive contribution which accounts for about 45% of manufacturing value addition in Bangladesh. SMEs also account for about 80% of industrial employment, about 90% of total industrial firms and about 25% of total labour force. Its total contribution to export earnings varies from 75- 80% based on the Economic Census 2001-2003 (The New Nation, 2008). According to the Bangladesh Bureau of Statistic, SME's provide about 44 per cent employment of the country. In this context Bangladesh's economic development is largely dependent on the development of SMEs. In order to boost the performance and productivity of SMEs in Bangladesh the adoption and use of e-commerce is considered vital. Thus the overarching research question addressed in this paper is: "what are the significant antecedents of e-commerce adoption by the SMEs in Bangladesh?" Utilizing Rogers' model of innovation diffusion this paper examines the effects of perceived innovation characteristics and perceived risk in explaining the adoption of e-commerce by the SMEs in Bangladesh.

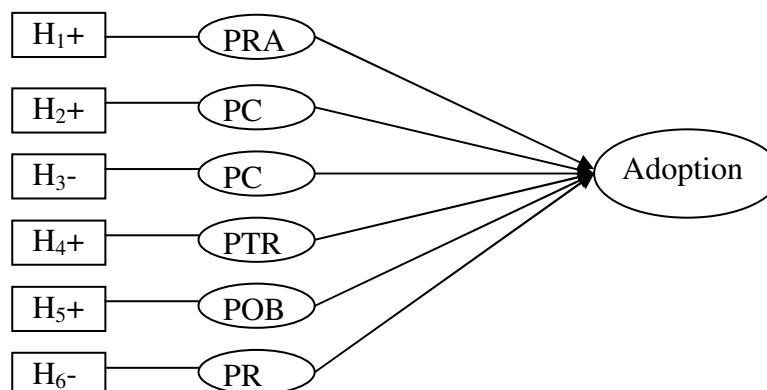
Model specification and hypotheses

Numerous studies have been undertaken and carried out in examining the adoption and usage of technological innovations in different parts of the world (e.g., Agarwal and Prashad, 1997; Agarwal and Prashad, 1998; Agarwal and Prashad, 1999; Cloete, 2002; Davis, 1986, Davis, 1989; Davis, 1993; Kendall *et al.*, 2001; Moore and Benbasat, 1991; Premkumar and Potter,

1995; Rogers, 1983; Rogers, 1995; Sathye and Beal, 2001; Taylor and Todd, 1995; Tan and Teo, 2000). Although a remarkable progress is seen in the research initiatives and successfully utilization of the outcomes in looking at the adoption of newly innovated technologies both from individual and organizational perspective, Bangladesh's contribution in this regards seemed scarce (Azam, 2004; Azam, 2005; Azam, 2006a; Azam, 2006b; Azam and Lubna, 2008; Ramayah *et. al.*, 2003; Ramayah, Jantan and Aafaqi, 2003; Ramayah, Ignatius, and Aafaqi, 2004; Ramayah *et. al.*, 2006).

Research Framework

The adoption and acceptance of technological innovation have been looked into widely by utilizing Rogers' Innovation Diffusion Theory, Theory Reasoned Action, Theory of Planned Behavior, or Technology Acceptance Model in preceding studies. Previous researchers in many cases applied the Roger's adoption decision model in measuring adopters' attitude towards e-commerce considering e-commerce as an innovation. Although there are enough studies adapted Roger's innovation decision model in measuring adoption intention of e-commerce, the performance of this model in explaining adoption intention of e-commerce by the SMEs in Bangladesh has not been tested. Based on the empirical evidences conducted by previous researchers (e.g., Azam, 2007; Davila *et al.*, 2002, Kendall *et al.*, 2001; Lim & Speece, 2002; Mutum & Ghazali, 2006; Ramayah *et al*, 2006; Sathye & Beal, Rogers, 1983; Tan & Toe, 2001; 2001; Wang & Cheung, 2004), a research model was proposed as illustrated in Figure 1.



Note: PRA= Perceived Relative Advantage, PCM= Perceived Compatibility, PC=Perceived Complexity
PTR =Perceived Trialability, POB= Perceived Observability, PR= Perceived Risk

Figure1. Research Model of E-Commerce Adoption

Hypotheses

Basing on the proposed model the following six hypotheses may be surmised:

- H1: Perceived relative advantage has a direct positive effect on the adoption intention of ecommerce.
- H2: Perceived compatibility has a direct positive effect on the adoption intention of e-commerce.
- H3: Perceived complexity has a direct negative effect on the adoption intention of e-commerce.
- H4: Perceived trialability has a direct positive effect on the adoption intention of e-commerce.
- H5: Perceived observability has a direct positive effect on the adoption intention of e-commerce.
- H6: Perceived risk has a direct negative effect on the adoption intention of e-commerce.

Methodology

A descriptive research design was used to test the hypotheses, proposed for examining the effects of perceived innovation characteristics and perceived risk to the adoption of e-commerce, with data collected from different SMEs in Bangladesh through a self administered structured survey instrument. The survey questions were adopted from extensive literature review. A stratified sampling method was used by stratifying the total population into three business categories according to their types of business operation as manufacturing industry, service industry and business enterprise. This study focuses on firms which fall under the definition of Small and Medium Scaled Industries according to the Industrial Policy 1999 of Bangladesh as a population of interest. A total of 200 questionnaires were distributed. However, only 171 companies responded to the survey.

Research Findings

Respondents Profile

In order to make the investigation representative various types of SMEs have been included in the sample. The variations are appeared on the business experience of the SMEs, i.e, year of incorporation, number of employees, number of computer literate officer, revenue earnings of the company, profit of the company, company's internet usage experience etc. 7% of the SMEs included in the study started their business before 1975, 4.1% started in between 1975-1981, 24.6% started business in 1982-1990, 18.1% in 1991-1995 and 39.2% business organizations started their business in 1996-2001 while another 7.0% business organizations started their business after 2002. The study also includes 68.3% organizations with employees more than 50, 42.4% organization having more than 20 computer literate officers and 59.5% organizations securing 5% or more profit on the revenue every year.

Data Analysis

To address six independent variables of the study 20 items were generated, that were fine tuned and validated through the factor analysis and internal consistency of the items were examined using cronbach alpha. For the purposes of this study, items measuring the independent variables were simultaneously subjected to a principal components factor analysis with varimax rotation. The result yielded a 6 factor solution with eigen-values greater than 1.0. The factor analysis further reveals that all the items were retained within the 6 factors with satisfactory factor loadings (Hair *et. al*, 1995) which cumulatively explained 71% of the total variance.

The reliability statistics among study variables are presented in Table 1. As shown in the table, the internal reliabilities of scales were between .61 and .89 which is acceptable (Nunally, 1978) for further analysis.

The regression model shows a good fit with F value 23.679 ($p < .01$) and R^2 value of 0.551 indicating 55.1% of the variation in the adoption intention can be explained by the independent variables. Perceived Complexity, Perceived Compatibility, Perceived Observability and Perceived Risk are statistically significant in explaining the intention to adopt e-commerce. The model result indicates that Perceived Complexity and Perceived Observability are the stronger predictors followed by Perceived Compatibility and Perceived Risk. It is noted that Perceived relative advantage and Perceived trialability did not have

significant relationship with Adoption intention. However, the relationships of these variables were positive.

Table1: Regression and Reliability Analysis

Variable	No. of Items	Reliability (Cronbach alpha)	Dependent = Intention Standardized Beta
Perceived Complexity	5	.81	-0.409**
Perceived Relative Advantage	4	.89	0.101
Perceived Compatibility	4	.77	0.271**
Perceive Trialability	3	.65	0.058
Perceived Observability	2	.61	0.540**
Perceived Risk	2	.79	-0.285**
Intention	4	.86	
R ²			0.551
Adjusted R ²			0.527
F Value			23.679**

** p< 0.01, * p< 0.05

Discussions and conclusions

The purpose of the research was to examine the influence of various factors affecting the adoption of e-commerce by the SMEs in Bangladesh. This study analyses various factors that affect the adoption of e-commerce adapted from Rogers Theory of Innovation. Finally the study examines the effects of the factors in explaining the adoption of e-commerce by the SMEs in Bangladesh according to the model specified for the research.

Six perceived characteristics of innovation, namely, Perceived Relative Advantage, Perceived Compatibility, Perceived Complexity and Perceived Trialability, Perceived Observability, and Perceived Risks were used as indigenous variables where E-Commerce Adoption Intention was used as exogenous variable of the model.

As hypothesized, Perceived Relative Advantage, Perceived Compatibility, Perceived Trialability, and Perceived Observability have positive correlation with the adoption intention of e-commerce whereas Perceived Complexity and Perceived Risk have negative correlation with the adoption intention of e-commerce. In addition to that, regression analysis has also indicated significant correlations between Perceived Compatibility, Perceived Complexity, Perceived Observability and Perceived Risk with the adoption intention of e-commerce. It is also observed that Perceived Observability and Perceived Compatibility have significant positively correlation which means that the positive perceptions of these two characteristics led to higher adoption rate. On the other hand, Perceived Complexity and Perceived Risk have significant negative correlation with the adoption intention, which means that the perceptions of more Complexity and Risk led to lower adoption intention of ecommerce.

The analysis of the study contradicted with previous researchers who have found relative advantage as one of the best predictors of an innovation's rate of adoption (Azam, 2004; Azam, 2005; Azam, 2007; Kendall *et al.*, 2001; Lim and Speece, 2002; Sathye and Beal,

2001). Nonetheless, the result complements the findings of an innovation adoption research conducted in Malaysia (Ramayah *et al.*, 2001).

Compatibility emerged as an important factor affecting the adoption of e-commerce by the Bangladesh's SMEs. The compatibility issue is significant because it deals with their perception on the importance of the innovation to various tasks to be performed at present and future. If e-commerce is compatible with the traditional way of performing various activities of the business enterprises, the existing values and mentality of the professionals, different communication parts involving day to day operations and their future development, higher rate of adoption would be occurred.

Complexity inversely affects the adoption intention of e-commerce by the SMEs in Bangladesh. This implies that business enterprises perceived conducting business through online with high complexity. This may be due to the low level of IT infrastructure and various support facilities. As stated by previous researchers, complexity of available e-services and insufficient access to strategic resources is one of the barriers for adopting e-commerce (e.g., Bodorick, Dahliwal, and Jutla, 2002; Pavic, Koh, Simpson, and Padmore, 2007).

On the other hand, the result did not offer any support for a relationship between perceived trialability, the degree to which an innovation is capable of being tried on limited basis, and the adoption intention of e-commerce. Perhaps it is due to the fact that grants or subsidies do affect individuals' decision to adopt e-commerce (Kendall *et al.*, 2001).

Significant relationship was found between perceived observability and the adoption of e-commerce. This clearly indicated that various beneficial operations of e-commerce may influence SMEs' decision making in adopting the technology. As stated by Bandura (1986), people learn by watching others. Nonetheless, the finding of this study contradicted with previous researchers (Ratten and Ratten, 2007) where they found that observability does not affect the adoption of e-services. The reason of finding significant relationship of observability with the adoption intention of e-commerce could be due to the fact of the immaturity of e-services in that country.

Perceived risk was hypothesized to be inversely related with e-commerce adoption. It is observed as a crucial factor since various kinds of uncertainties and insecurities are normally associated with e-commerce operation in different levels from negotiation to transaction. As asserted by past researchers (Ortega, Martinex, and De Hoyos, 2007), the learning process undergone would diminish the perception of risk associated with the implementation of a new program, which further create an overall compatibility which will affect the degree of future development.

E-commerce has received a lot of attention in the last few years. This paper has highlighted the issues of innovation characteristics and the adoption intention of e-commerce uptake among a group of selected SMEs in Bangladesh. The research has shown that the challenges for SMEs are in realizing the importance of the perceived compatibility, complexity, observability, and perceived risk. It is believed that this prototype model could help SMEs to manage the transition period of adopting e-commerce in Bangladesh.

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¹ SMEs, Small and Medium Sized Enterprises, have been defined elaborately in the Industrial Policy of Bangladesh 1999 which is well accepted and cited by different professionals and academicians. According to Industrial Policy 1999 the SMEs are defined as the manufacturing and service industries and other business enterprises those have employed 10 to 99 labour forces in order to maintain the organisation and /or total investment not more than 30 crore or 300 million taka (Approximately 4.5 million US Dollar in the current exchange rate).