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How Organisational Characteristics Explain the Adoption of e-Commerce by the SMEs in Bangladesh?

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Abstract

The exponential growth of internet population fosters the adoption rate of e-commerce in different parts of the globe. In order to utilize the opportunities in developing the economy Bangladesh government has also initiated many programmes and provides different facilities to promote the adoption of the technology in various sectors. This study investigates the effects of organisational characteristics on the adoption of e-commerce by administering a descriptive research design in the context of SMEs in Bangladesh. A survey instrument was utilised to gather data. In total 222 organizations were surveyed which were selected through disproportionate stratified random sampling technique. A regression model was estimated to anticipate the adoption of e-commerce where size of the company, company's business experience, internet usage experience, number of computer literate officers, revenue earnings, and profit percentage of the company considered as explanatory variables while e-commerce adoption as explained variable. The model estimation shows that all of the variables except company's business experience have significant contribution in explaining the adoption of e-commerce by the SMEs in Bangladesh. The model further shows that the number of employees and company's business experience are negatively related to the adoption of e-commerce. The study outlines some policy implications for SMEs in Bangladesh.

Key words: Adoption, B2B e-commerce, organisational characteristics, SMEs

INTRODUCTION

Electronic Commerce, popularly known as e-commerce, has become a popular means of achieving organizational productivity and competitiveness. It is used as a new innovation strategy within many business sectors in order to increase business competitiveness (Peffer and Santos 1998). Competitiveness may be acquired through utilizing benefits of internet in making close contact and direct relationship with customers ensuring one to one service supports. The implications of internet in business sectors has also witnessed a phenomenal development in the pattern of customer relationship management and marketing approaches. Besides the above benefits the UN organisation's voice to develop e-society and implementing programs for bridging the existing digital divide in the different part of the world, pave the way of a strategic shift in business and social transactions which encourages to build a digital environment shifting from the traditionally followed way of communication and exchanges.

The recent trend of individuals and organisations uptake in new digital mediums draws the attentions of the researchers and professionals to undertake studies on the adoption of e-commerce exploring its possible barriers and benefits. Although scarce in developing country context, numerous previous adoption studies investigate the barriers and benefits of e-commerce adoption and its utilisation in achieving organisational competitiveness in the ongoing challenging environment (Tan and Teo, 2000, Kendall et, al., 2001, Sathye and Diana, 2001, Azam, 2006).

Most of the previous studies deal with the benefits and barriers of innovations to explore and anticipate the effects of various barriers and benefits account for the adoption. The organisations characteristics, the important immediate antecedents of organisational readiness, although have great contribution are not examined widely if there exist any significant influence account for positive or negative adoption intention. This is specially scarce for developing countries.

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, its total internet user stands at 657 million or 41.2% of worlds total internet user, while rest of the world grew by nearly 280.7 % in the same period (The Internet Coaching Library 2009). The internet population trend of

Bangladesh is also contributing to the growth of Asian countries which ensured 450% growth in the period of 2000-2007. Launching the internet operation in 1993, although still stays in its infancy level, Bangladesh has established high speed internet connectivity through submarine information super highway in 2005. In order to utilise ICT potentials in the economic development Bangladesh government has declared information technology as a thirist sector of the country and made country's vision to establish digital Bangladesh by 2021. The government has also made some modifications in the national ICT policy 1999 which reiterates establishing e-commerce by 2012 and e-governance 2014.

Like many other developed and developing countries around the world SMEs have significant contribution in the economic development of Bangladesh. SMEs account for about 45% of manufacturing value addition in the country. They account for about 80% of industrial employment, about 90% of total industrial units and about 25% of total labour force. Its total contribution to export earnings varies from 75- 80% based on the Economic Census 2001-2003. SME's provide about 44 per cent employment in Bangladesh (Azam and Quaddus 2009). In order to gain the advantage in global competitive environment how Bangladesh's SMEs can adopt the e-commerce should be considered as an important issue. Thus this study looks at the various organisational characteristics of SMEs in Bangladesh and measures their effects in anticipating the adoption of e-commerce.

THEORETICAL FRAMEWORK AND MODEL SPECIFICATION

Adoption of innovation has attracted enormous attention in the previous research initiatives (Rogers 1983, Davis 1986, Davis 1989, Davis 1993, Davis, Baggozi and Warshaw 1989, Moore and Benbasat 1991, Premkumar and Potter 1995, Agarwal and Prashad 1997, Agarwal and Prashad 1998 Agarwal and Prashad 1999, Taylor and Todd 1995, Tan and Teo 2000, Kendall et. al. 2001, Sathye and Diana 2001). Both, individual and organisational perspectives of technology innovation diffusion have obtained bulk of researchers' attention in previous as well as in on-going studies (Ramayah et. al. 2003, Ramayah, Jantan and Aafaqi 2003, Azam 2004, Ramayah, Ignatius and Aafaqi 2004, Azam 2006a, Ramaya et. al. 2006, Azam 2006c). The previous studies utilised different models to address innovation adoption particularly technology adoption, mostly derived from Rogers Innovation diffusion theory (Rogers 1983), Theory of reasoned action (Aizen and Fishbein, 1980), Theory of planned behaviour (Ajzen 1991) or Technology acceptance model (Davis, 1986). Most of the researchers consider innovation characteristics and some other benefits and barriers of the innovation as predictors in their studies. The adopters demographic characteristics in individual level of adoption or organisational characteristics in case of organisational adoption, although have been discussed as important determinants for favourable or unfavourable adoption of innovation (Premkumar et. al 1997, Thatcher et. al 2006, Gibbs et. al 2004, Karakaya and Khalil 2004), have not been widely investigated..

Conceptual Framework

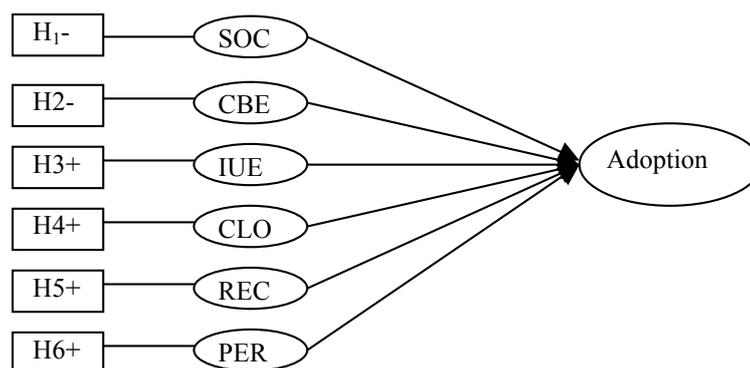
A general problem of administering a research on adoption of innovation is the lack of comprehensive model, due not to including all important variables, which can bring together the results of existing studies, and implicates future research efforts. Rogers (1983) have proposed a model about how an innovation can be adopted through a communication channels.

Understanding innovation adoption models developed earlier and studying other related empirical studies it has been observed that Rogers' model of innovation decision process has widely been utilised in many countries measuring the SMEs adoption attitude towards technological innovations particularly e-commerce (Kendall et al. 2001, Limthongchai and Speece 2002, Sathye and Beal 2001). As one or two persons reserve the decision making power in SME is the rationale of utilisation of the model. In adoption study carried out in the previous years researchers prove the applicability of Rogers' innovation decision model in explaining the SMEs adoption intention of an innovation thus may be used as the basis of developing a new research model. There are enough experiences on applicability of Rogers' innovation decision model in measuring adoption intention of e-commerce in different countries around the world. The performance of this model in explaining adoption intention of e-commerce is also evident in Bangladesh (Azam 2004, Azam 2005, Azam 2007). Rogers' model (1983) explains how an innovation may be adopted through a communication channel starting from knowledge stage to decision stage and finally implementation stage. Rogers addresses different adoption situation in various stages of the communication channel. He suggests that the actual intention to the adoption of an innovation is formed in persuasion stage where the 5 perceived characteristics of innovation play key roles to form adopter's intention. The model further reports that the perceived characteristics of innovation can explain 49% to 85% adoption behaviour. Rogers further expresses that actual intention of adoption an innovation is formed in persuasion stage which further proceeds for the next stage for decision where some other variables such as competition, demographic characteristics, and other infrastructural factors affect the decision that may be appeared as positive or negative.

E-commerce entails the digital devices and highly sophisticated technological environment to ensure communication, transaction and exchanges. Favourable legal and financial infrastructure and skilled human resources are vital for implementation of e-commerce. Along with the higher perceived benefits and lower barriers the adopters characteristics, hence, considered as organisational ability and readiness have significant effect on SMEs adoption of ICT based transaction, communication and information systems (Premkumar et. al, 1997, Thatcher et. al, 2006, Gibbs et. al, 2004, Karakaya and Khalil, 2004). Several studies prove that organisational characteristics have also the direct effect on firms' adoption of e-commerce as like as the innovation characteristics (Huff and Yoong 2000, Wang and Cheung 2004).

Firm Size (Thong and Wap 1995, Thong, 1999, Premkumar et. al 1997, Thatcher et. al 2006, Gibbs et. al 2004, Karakaya and Khalil 2004), IT resources i.e, Employees' knowledge on IT and internet experience (Wang and Cheng 2004, Thong and Yap 1996), Company's financial slack i.e revenue earnings and company profit (Wang and Cheng) were hypothesized to be correlated with adoption intention of ICT based transaction and communication and information systems. Elizabeth, Wilson, and Myers (2002) initiated a study to investigate the relationship in-between stages of e-commerce and firm size, company turnover, firm's business experience. In contrast to the studies some of the popular myths are surrounding e-commerce, such as, "...e-commerce has been exploited to the greatest extent by smaller, more nimble companies or that adoption has been led by younger companies since older firms are more resistant to adopting the new ways of working represented by e-commerce" (see Elizabeth, Wilson, and Myers 2002 p. 264)

Basing on the previous studies and taking the popular myths of e-commerce onboard it is predicted that the size of the organisation, the business experience of the organisation, internet usage experience of the organisation, organisations IT resources (number of computer literate officer), the financial strength of the organisation or the revenues earning of the organisation, and the profit as percentage of the revenue have the direct effect on SMEs adoption of e-commerce. Thus the above mentioned discussions are summarised in the model illustrated in Figure-1.



Note: SOC = Company size, CLO = No of computer literate officer,
CBE = Company business experience, REC = Revenue earnings of the company,
IUE = Internet usage experience, PER = Profit earned as percentage of revenue

Figure 1: model of the study

Hypotheses

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

Hypothesis: 1 Size of the company has direct negative effect on the adoption intention of e-commerce.

Hypothesis: 2 Company's business experience has direct negative effect on the adoption intention of e-commerce.

Hypothesis: 3 Company's Internet usage experience has a direct positive effect on the adoption intention of e-commerce

Hypothesis: 4 Number of computer literate officer of the company has a direct positive effect on the adoption intention of e-commerce.

Hypothesis: 5 Company's revenue earning has direct positive effect on the adoption intention of e-commerce.

Hypothesis: 6 Company's profit as percentage of revenue has a direct positive effect on the adoption intention of e-commerce

METHODOLOGY

Descriptive research design was used to test the hypotheses with data collected from different SMEs in Bangladesh through a self administered structured survey instrument. The questions have been developed as to get responses specific to hypotheses that are proposed to test. The questionnaire was divided into two parts where Part A contains questions to understand respondents' intention or usage behaviour of e-commerce, Part B incorporates questions related to demographic variables. Several factors were brought into consideration in determining the population for this research. The population was limited to only firms which fall under the definition of Small and Medium Scaled Enterprises according to the Industrial Policy 1999 of Bangladesh. Stratified sampling method was used in classifying the total population into three business categories according to their types of business operation as: Manufacturing Industry, Service Industry and Business Enterprise. Total 222 sample units were considered for survey. The firms located in Dhaka were selected for investigation. The selection is logical the internet penetration⁹ in Dhaka is high as well as maximum organizations have the coordinating unit at Dhaka which is the capital of Bangladesh. The study utilises disproportionate stratified sampling technique as the number of units under Service Industry, Manufacturing Industry and Business Enterprise are different. It supports the suggestion that the disproportionate stratified random sampling method is better than the proportionate stratified method in the study where the differences in numbers among groups are large (Blalock 1960)¹⁰. The SMEs listed in the Publications of Bangladesh's SMEs Fair 2005, Export Directory and Bangladesh Garments Manufactures and Exporters Association (BGMEA) directory constitute the population of the study. Respondent profiles are depicted in table 1.

Table: 1 Respondent's profile

Description	Frequency	Percent
Number of Employees		
Up to 10	17	7.7
11-25	30	13.5
26-50	39	17.6
51-80	30	13.5
81-100	106	47.7
No. of Computer Literate officer		
Up to 5	74	33.3
6 – 10	17	7.7
11-20	44	19.9
21-30	19	8.6
31-40	25	11.3
41 and Above	43	19.4
Revenue of the Company		
Up to 5,00,000	48	21.6
5.00,000-1000,000	30	13.5
“10-15 Lakh”	6	2.7
“15-20 Lakh”	9	4.1
“20-30 Lakh”	12	5.4
More than 30 Lakh	117	52.7
Profit of the Company		
profit 5% or more	142	64.0
profit less than 5%	53	23.9
break even	15	6.8
loss more than 5%	12	5.4
Nature of the Company		

⁹ 80% of the country's internet users are concentrated at Dhaka (Azam, 2006a).

¹⁰ Although it was not possible to determine what are the extent of differences exist among the said three SMEs Categories because only two categories, Service Industry and manufacturing Industry, are described under SMEs definition in the Industrial Policy 1999 of Bangladesh.

Service Industry	94	42.3
Manufacturing Industry	79	35.6
Enterprise	49	22.1
Company's Internet Experience		
upto 2 Years	36	16.5
3 Years – 4 Years	59	27.1
5 Years – 6 Years	63	28.9
7 Years – 8 Years	54	24.8
9 Years and Above	6	2.8
Mode of Internet Usage		
Dial up	91	41.0
Broad Band	153	68.9
Office Automation	56	25.2

The psychometric property of study construct was analysed through principle component analysis and varimax rotation and inter-item correlation. Performing the validity and reliability of the data a multiple regression model has been estimated to examine the effects of various organisational factors on e-commerce adoption by the SMEs in Bangladesh.

RESULT AND ANALYSIS

Factor analysis was administered in order to identify underlying construct and investigate relationships among key survey questions to address adoption intention of e-commerce by the SMEs. Principal Component Analysis followed by varimax rotation with Kaiser Normalisation was used for data validation and fine tune the study constructs. KMO test has also been administered to test the adequacy of sampling. The loading value exists in between 0 to 1. According to Hair et. al., 1995, KMO statistic .6 and above can declare an adequate sample. The study finds KMO value .683 (chi-square value 1996.290; p value .000) which is acceptable. The adoption intention has been assessed through respondents' perceptions which have been distilled through factor analysis considering factors loadings. Hair *et al.*, 1995 suggest that factor loading greater than .3 is considered significant; loading greater than .4 more significant and loading greater than .5 is very significant. Principle component analysis results show that 4 items used for explaining the dependent variable are comprised in same construct and the factor loadings of all items are observed above .5 are acceptable, therefore, used as the exogenous variable in the regression model. Table 2 shows the results.

Component	Total	Initial Eigenvalues(a)			Extraction Sums of Squared Loadings	
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Raw 1	2.661	66.514	66.514	2.661	66.514	66.514
2	.686	17.148	83.663			
3	.397	9.920	93.583			
4	.257	6.417	100.000			

Extraction Method: Principal Component Analysis.

Dimensions	Alpha	Items	Corrected Item total Correlation	Alpha if Item Deleted	Factor loading
Adoption Intention	.8294	Y1	.7037	.7658	.696
		Y2	.6385	.7928	.807
		Y3	.7513	.7427	.888
		Y4	.5546	.8274	.830

After yielding the construct data reliability has been examined through inter-item correlation. The reliability coefficient for the construct (alpha .8294) was observed very satisfactory and acceptable (Nunnally 1978, Normark and Oslerby 1995, Tan and Toe 2000, Magal, Carr and Waston 1988, Azam 2004, Van de Van and Ferry 1979).

	intention of e-commerce.	
Hypothesis:2	Company's business experience has direct negative effect on the adoption intention of e-commerce.	Rejected
Hypothesis:3	Company's Internet usage experience has a direct positive effect on the adoption intention of e-commerce	Accepted
Hypothesis:4	Number of computer literate officer of the company has a direct positive effect on the adoption intention of e-commerce	Accepted
Hypothesis:5	Company's revenue earning has direct positive effect on the adoption intention of e-commerce.	Accepted
Hypothesis:6	Company's profit as percentage of revenue has a direct positive effect on the adoption intention of e-commerce	Accepted

The model analyses different organisational aspects in view of addressing e-commerce adoption by the SMEs in Bangladesh and produces results of the study in a formal and systematic manner. The outcome of data analysis and the model fit illustrates the effects of different organisation related factors in explaining the willingness of e-commerce adoption by the SMEs in Bangladesh may be stated as the function below:¹²

$$Y = 3.518 - .460X_1 - .013X_2 + .189X_3 + .607X_4 + .223X_5 + .176X_6 + \epsilon$$

DISCUSSIONS AND CONCLUSIONS

The purpose of the study was to examine the influence of various organisational factors account for adoption of e-commerce by the SMEs in Bangladesh. In attaining the objectives this study undertakes exploratory search and review literature of various aspects of innovation adoption. This study also analyses outcomes of previous studies looking at the concepts and develops constructs under the study and then investigates the roles of the theoretical constructs in explaining adoption of e-commerce by the SMEs in Bangladesh. In order to attain the objectives the study explores present status of e-commerce activities and its adoption by the different business categories within the scope of SMEs in Bangladesh. The study examines the effects of the factors, particularly organisational characteristics for the purpose of this study, in explaining the adoption of e-commerce by the SMEs in Bangladesh according to the model specified for the research.

The model was developed emphasizing demographic characteristics of the organisation as predictors of the study. A linear regression model was estimated to examine e-commerce adoption by the SMEs in Bangladesh which includes 6 organisational characteristics, size of the organisation, business experience of the organisation, internet usage experience of the organisation, organisation's IT resources (number of computer literate officer), financial strength of the organisation or revenue earning of the organisation, and profit as percentage of the revenue, as indigenous variables where e-commerce adoption intention is used as exogenous variable of the model. The study surveyed SMEs in Bangladesh about their e-commerce adoption and the organisational characteristics affecting it.

The study explores that company size, company business experience have negative correlation while internet usage experience of the organisation, number of computer literate officer, revenue earnings, and profit as percentage of revenue have positive correlation with the adoption intention of e-commerce. The regression analysis reports that a significant positive correlation exist in-between internet usage experience of the organisation, number of computer literate officer, revenue earnings, and profit as percentage of revenue which means the positive perceptions of these characteristics led to higher adoption rate. On the other hand, company size is negatively correlated with adoption rate, which refers that more the number of company's officers and employees, the lower is the adoption rate of e-commerce.

Regression analysis further investigates which factors best predict the adoption intention of e-commerce in terms of degree, magnitude and significance. The results show that size of the organisation and number of computer literate officers are equally important in explaining the adoption intention of e-commerce by the SMEs in terms of degree and significance ($P < .001$) followed by company revenue earnings and internet usage experience.

¹² Where X_1 is defined as Size of the organisation, X_2 as Company's business experience, X_3 as company's internet usage experience, X_4 as no of computer literate officer of the organisation, X_5 revenue earnings of the company and X_6 is defined as profit earnings of the company as percentage of revenue, and Y is denoted as Adoption Intention.

In analysing the results it is observed that age of the organisation was hypothesized to be inversely related with e-commerce adoption, which was not supported. The case of rejecting the hypothesis may be discussed in the way that the hype of e-commerce adoption by the SMES in Bangladesh are not concentrated in a certain category of the organisation in terms of age.

Internet usage experience of the organisation is another predictor to explain the adoption of e-commerce by the SMEs in Bangladesh. The hypothesis is supported. The result proves that the higher experience of internet usage refer to the higher adoption rate of e-commerce. Similarly organisations' technologically competent human resources have also the positive effect on the adoption of e-commerce. Since e-commerce is an information and commutation technology driven transactions, the technological skill and competency of the organisations' human resources was predicted to be positively related to the adoption of e-commerce. The hypothesis was supported.

The study also examined whether the revenue earnings of the organisation had any significant co-relation with the adoption of e-commerce. Thus the revenue earnings of the organisation was hypothesised to be positively correlated with the adoption of e-commerce. In addition the study hypothesized that profit earned as percentage of revenue to be positively correlated with the adoption intention of e-commerce by the SMEs. The regression result supports both the hypotheses. The result of the hypothesis testing, further, may be discussed in the way that the e-commerce operation or adoption is required to invest a sum of amount as start-up cost. So the company those are not able to secure a sound income fails to invest the amount necessary for establishing the technological support such as computer, internet, intranet, homepage etc.

Finally the result of the size of the company may be described as inversely correlated with the adoption of e-commerce. Although contradictory to many previous studies (Thong and Wap 1995, Thong 1999, Premkumar et. al 1997, Thatcher et. al 2006, Gibbs et. al 2004, Karakaya and Khalil 2004) it clarifies that more the number of employees of the organisation lower is the adoption rate of e-commerce. The hypothesis is supported as a strongest predictor in terms of degree and significance. It means that the company those are willing to operate e-commerce are technology dependent ultimately they have a limited number of officers and employees since the technology performs multiple activities without having any error that hold back the number of employees. So the organisations those are laggard in technology adoption and involved in labour intensive works are employing a large number of officers and employees, their operations are mostly observed as manual. It implies that the organisations with a large numbers of employees are less interested to the adoption of e-commerce due to their incompatibility with the technology and its usage.

The study explores positive outcomes in addressing the adoption behaviour of e-commerce by the SMEs in Bangladesh. Although a few in number, some studies have been initiated previously to investigate adoption of innovation, in Bangladesh (Azam 2005, Azam 2007, Azam and Akhter 2007). The previous studies used Innovation Diffusion Model (Rogers 1983), Technology Acceptance Model (Devis 1986), Theory of Reasoned Action (Aizen and Fishbein 1980), Theory Planned Behaviour (Ajzen 1991) in examining different information technology adoption. As per the scope of the model the organisational characteristics and other strategic variables, although have significant effects, were not considered. Thus this study has great value which proves the organisational characteristics have significant effects in predicting adoption behaviour of b2b e-commerce by the SMEs in Bangladesh. It is hoped that the professionals, concerned governmental departments and academic proponents would accept the outcome of the study and undertake necessary steps to foster the adoption rate of b2b e-commerce basing on the research which would push forward the situation of SMEs in Bangladesh and of course, help promote the country's economic development.

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