

Effects of Internal and External Factors on Internet-Based Digital Technology Usage by SMEs in a Developing Country

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ABSTRACT

This paper analyses the effects of culture and environment on the adoption and use of Internet based digital technology (IBDT) by small and medium sized enterprises (SMEs) from a developing country perspective. A structural equation modeling is finally employed within a mix method research setting with a cross-sectional dataset of 557 SMEs in Bangladesh. The study reveals a significant association of normative pressures, coercive pressures, power distance, in-group collectivism, Bengali values, perceived usefulness, and perceived ease of use with SMEs intention to use IBDT while intention significantly affects actual usage behavior. The study concludes with some implications of the results.

Keywords: Internet based digital technology, intention and actual usage behavior, technology acceptance model, cultural dimensions, environmental pressures

INTRODUCTION

Internet based digital technology has become an inevitable part of human life in the 21st Century. The wide and rapidly increased adoption and usage of various facets of information and communication technology (ICT) in general and Internet based digital technology (IBDT) in particular, by individuals, government organizations and businesses attract researchers from multidisciplinary field of study to look at its adoption and diffusion phenomena around the world. In the past few years, a bulk of research initiatives have inquired into IBDT adoption and usage, an advanced and extended use of ICT, such as the Internet, online communication, online transactions, e-commerce, e-tax, e-service, enterprise systems and so on, and propose a wide range of research guidelines and theoretical models to look at the issue.

The number of research initiatives looking at ICT adoption and diffusion phenomena, both from individual and from organization perspectives, suggests a new direction of ICT research assuming that the adoption and diffusion related research has reached its saturation stage (Parker & Castleman, 2007). However, notably, the previous researches mostly favor the thought that organizations adopt technology that is useful and provides them with some economic benefit while, although important, the non-economic factors such as cultural and environmental factors

were overlooked (Thatcher, Foster, & Zhu, 2006). Apart from the study contents, most of the theoretical frameworks and conceptual models of the previous ICT studies focus on the developed countries perspective, particularly, an American perspective (Zhu & Kraemer, 2005) while the developing country perspective is not well addressed.

Internet based digital technology usage by individuals and organizations takes an increased pace in the second half of the 1980s with the invention of the Internet as a public network and it achieves a new momentum in the second half of the 1990s when commercial use of the internet protocol is licensed. Until the end of the 1990s, the growth of IBDT usage was observed to be significantly high as in developed countries than in developing countries. Numerous research initiatives were undertaken during this period to look at the phenomena from developed countries' perspectives (Agarwal & Prashad, 1997, 1998, 1999; Davis, 1993; Davis, Bagozzi, & Warshaw, 1989; Kendall, Tung, Chua, Ng & Tan, 2001; Mathieson, 1991; Moore & Benbasat, 1991; Sathye & Beal, 2001; Tan & Teo, 2000; Taylor & Todd, 1995a, 1995b; Venkatesh, Brown, Maruping & Bala 2008; Venkatesh & Davis, 2000, Venkatesh & Morris, 2000, Venkatesh, Morris, Davis, & Davis, 2003). A successful experience of IBDT usage in developed countries, in turn encourages individuals and organizations to adopt the technology in developing countries. In recent years, a phenomenal growth has been observed in the developing countries IBDT adoption and usage.

At the end of 2011, nearly 2.267 billion people or 32.7 percent of the total populations of the world had access to the Internet. This represents an increase of 528.1 percent over the year 2000. Asian countries account for 789.6 percent of the growth while the rest of the world grew by nearly 406.9 percent in the same period; its total number of Internet users stands at 1,016 million or 44.8 percent of world's total Internet users (Internet World Stats, 2012). Internet use in Bangladesh is likewise growing. The total Internet population of the country stands at 100,000 in 2000 (Azam, 2007), and it reached 450,000 in 2007 (Azam & Quaddus, 2009a, 2009b) which indicates a 450% rise in the Internet population. At the end of 2011, the total Internet population reaches 5,501,609 which reflects 3.5 percent Internet penetration.

Further, the country is going to launch Internet based digital technology in various sectors such as e-business, e-tender, e-tax, e-services. The government of the country is dedicated to establishing a digital based society by 2021 in applying ICT potential in the economic development and governance of the country in phases. In response to the government's vision to establish a digital Bangladesh and compliance with the globalized competitive environments, the individuals, government organizations, and businesses growingly involve information and communication technology in their day to operations.

The philosophy of economic development through ICT involves the SMEs in the ongoing research initiatives, as it is one of the most influential parts of the country's development process. Like the developed countries, SMEs in developing countries are also contributing positively. The prospects and contributions of Bangladesh's SMEs to its economic development are enormous. SMEs account for about 45% of manufacturing value added in Bangladesh. They account for about 80% of industrial employment, about 90% of total industrial units and about 25% of the total labor force. Its total contribution to export earnings varies between 75%

and 80% (Azam & Quaddus, 2009c). The number of SMEs and their significant contribution to the national economy in terms of employment generation, GDP contribution, and export earnings thus create a significant research opportunity to look at the adoption and diffusion of information and communication technology.

In view of the above discussion, this study looks at the effects of various internal and external factors on the adoption and diffusion of Internet based technology among SMEs in Bangladesh. A mixed method research approach, an in-depth field study followed by a quantitative survey, is employed to attain the research objectives.

The paper is structured as follows. Section 2 involves conceptual framework and hypotheses development. In Section 3, descriptive information concerning the sample data is provided, and variables in the empirical analysis are defined. The structural equation model specification and bootstrap outputs are also analyzed in the same section. A final section addresses the results and presents some conclusions.

CONCEPTUAL FRAMEWORK AND HYPOTHESES

Numerous theories and a range of research models have been used to inquire into ICT adoption-diffusion behavior in multi-disciplinary fields of study in the past few year, most of them are rooted back to the Theory of Reasoned Action (Fishbein & Ajzen, 1975), Rogers' Diffusion of Innovation Theory (Rogers, 1983), Theory of Planned Behavior (Ajzen, 1985), and Technology Acceptance Model (Davis, 1989).

The literature in the IS domain supports the applicability of the four theories to look at the individuals' innovation adoption phenomena, while the DOI theory is equally applicable to individual and organizational perspectives. However, the TAM framework is widely used in comparison to other theoretical models mainly for its parsimony, which involves individual's perception and cognitive assessment about the ease of operation and usefulness of the technology to address adoption intentions.

The technology acceptance model (TAM) was developed by Davis (1989) to explain information technology (IT) usage behavior. It is an adaptation of TRA and states that behavioral intention to use a technology is directly determined by two key beliefs: Perceived usefulness and perceived ease of use. Perceived usefulness assesses the extrinsic characteristics of IT that is task-oriented outcomes such as the prospective users' subjective probability that using specific application will increase his or her job performance within an organizational context. On the other hand, perceived ease of use examines intrinsic characteristics of IT that is ease of use, ease of learning, flexibility, and clarity of interface. It is stated as "the degree of which the prospective users expect the target system to be free of effort" (Davis et al., 1989).

The earlier version of TAM included subjective norms with perceived ease of use and usefulness as antecedents of behavioral intention, which was omitted from the model latter. Social influence has a strong effect in technology adoption in a mandatory setting while it has different effects in

a voluntary setting and in the context of having experience (Venkatesh & Morris, 2000). One key benefit of using TAM to understand system usage behavior is that it provides a framework to examine the influence of external factors of system usage (Hong, Thong, Wong & Tam, 1999).

Various external variables such as computer self-efficacy, social influence, experience, voluntariness, diversity of technology, trust, culture, and relevance, have been added in the context of TAM in different settings to get more insight into technology acceptance in previous initiatives (Agarwal & Prasad, 1999; Davis et al., 1989; Hong et al., 1999; Shih, 2004; Taylor & Todd, 1995a; Venkatesh & Davis, 1996, 2000; Venkatesh & Morris, 2000; Wang, Wang, Lin, & Tang, 2003; Yoon, 2009).

The field study endorses the influence of perceived *usefulness* and *ease of use* on SMEs intention to use Internet based digital technology in Bangladesh and supports extension of the technology acceptance model. As a single person in most cases, the owner holds supreme power of decision making in a small firm, the owner's positive perception, and willingness matter in accepting or rejecting any innovation regardless of its actual benefits or performance. Thus, *usefulness* and *ease of use* are plausibly considered as important factors in anticipating SMEs intention to use Internet based digital technology.

Environmental Pressures

Apart from the individual adoption diffusion phenomena Tornatzky, Fleicher, and Chakrabarti (1990) proposed the technology organization and environment (TOE) framework to look at organizational aspects of technology diffusion. The TOE framework identifies three aspects of a firm's context that influence the process by which it adopts, implements and uses technological innovations.

- i. Technological context refers to the existing technologies, as well as new technologies relevant to the firm.
- ii. The organizational context addresses the descriptive measures about the organization such as scope, size, and the amount of slack resources available internally.
- iii. The environmental context refers to the aspects of how a firm conducts its business, responds to its industry, customers, and competitors, and deals with government.

This framework has received more attention and acceptance from diversified fields of study as it is consistent with Rogers's innovation diffusion theory. Rogers (1983) emphasized technological characteristics, and both internal and external characteristics of the organization, as drivers of technology diffusion.

The impact of environmental factors and their characteristics are well addressed in institutional theory, which needs to be synthesized with the adoption diffusion theories to reach external variables as reflected in the innovation diffusion theory (Rogers, 1983) and subsequent TOE and other innovation diffusion frameworks.

Institutional theories posit that organizations face pressures to conform to these shared notions of appropriate forms of behavior, since violating them may call into question the organizations legitimacy and thus affect its ability to secure resources and social support (DiMaggio & Powel, 1983; Tolbert, 1985).

DiMaggio and Powel (1983) distinguished between three types of isomorphic pressures—coercive, mimetic, and normative— and suggested that coercive and normative pressures normally operate through interconnected relationships while mimetic pressures act through structural equivalence.

The subjective norm is recognized and studied as an important influencer on individual behavior (Azjen & Fishbein, 1980). In organizational aspects, a focal organization is able to learn about an innovation and its associated benefits and costs from other user organizations that are directly or indirectly tied with them, and is likely to be persuaded to behave similarly (Burt, 1982). Many studies consider normative pressure as an influencer of organizational innovation adoption phenomena (Kuan & Chau, 2001; Teo, Wei, & Benbasat, 2003).

Mimetic pressures are the influences of other structurally equivalent organizations that have initiated some innovations and become successful. This pressure may cause an organization to change over time to become more like other organizations in its environment (DiMaggio & Powel, 1983). Mimetic pressures are considered as an important influencer in organizational ICT adoption (Premkumar & Ramamurthy, 1995; Teo et al., 2003).

Coercive pressures address various kinds of powers or influences, informal or formal, exercised by other organizations upon which they are dependent. Dominant customer, supplier or parent organization sometimes exercise their power or coercively influence the organizations to do a certain thing where the dependent organization has no option other than complying with the requirements. Coercive pressures have been considered as an influencer in past ICT adoption studies (Quaddus & Hofmeyer, 2007; Teo et al., 2003).

The field study also explores the positive influence of coercive, mimetic and normative pressures in SMEs intention to use Internet based digital technology in the context of Bangladesh.

Cultural Dimensions

Although limited in number, some previous studies report a significant link between cultural dimension and different facets of IT use (Bertolotti, 1984; Burn, 1995; Erez & Early, 1993; Gefen & Straub, 1997; Harris & Davison, 1999; Hill, Loch, Straub & El-Sheshai, 1998; Ho, Raman & Watson, 1989; Straub, 1994). Erumban and de Jong (2006) find that the national culture and the IBDT adoption rate of a country are closely related. They further report most of the Hofstede dimensions (see Hofstede, 1984; Hofstede, 2001) are important in influencing adoption where power distance and uncertainty avoidance dimensions seem to be most influential. Thatcher et al. (2006) support the outcome in IBDT adoption, particularly b2b e-commerce adoption, in the Taiwanese electronic industry.

This study undertakes a qualitative search to explore and justify the effects of various cultural dimensions in the diffusion of IBDT among the SMEs in Bangladesh. The analysis of the interview transcripts resulted in anticipating the effects of five dimensions of culture such as power distance, uncertainty avoidance, in-group collectivism, ethical culture and Bengali values, on intention of IBDT use, along with the fundamental antecedents of IBDT adoption explained in the technology acceptance model, perceived usefulness and perceived ease of use. In addition to Thatcher et al. (2006), this study anticipates the effects of more three cultural dimensions on SMEs intention to use IBDT: in-group collectivism, ethical culture, and Bengali values.

Power distance refers the degree to which members of a collective expect power to be distributed equally.

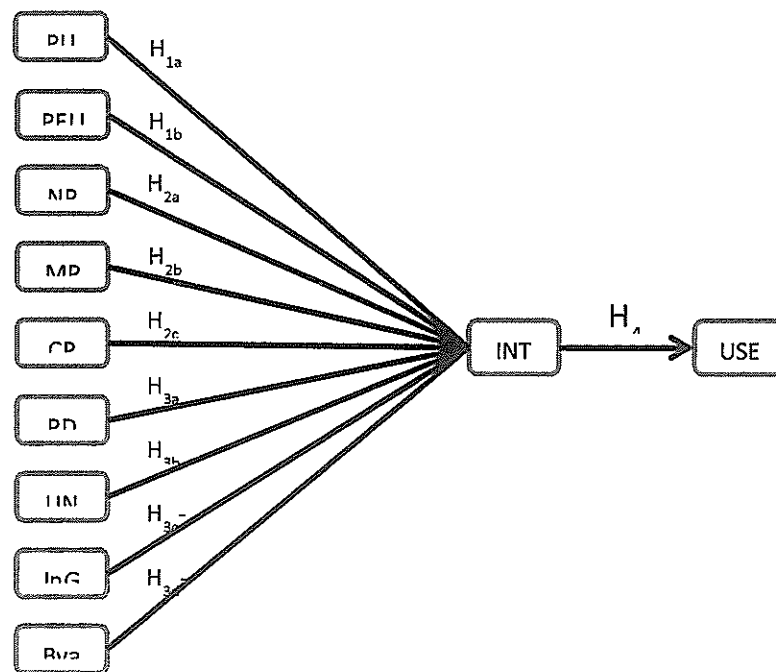
Uncertainty avoidance refers the extent to which a society, organization, or group relies on social norms, rules and procedures to alleviate unpredictability of future events. In-group collectivism refers the degree to which individuals express pride, loyalty, and cohesiveness in their organization and family.

Bengali values is also another added cultural dimension, which strongly guides and shapes human behavior and communication. The field study explores peoples' deep feeling and respect for the language martyrs and a sentiment of upholding the Bengali language everywhere in the country¹.

It is also explored that the people in different working environment feel comfortable in communication through the Bengali language and love to maintain face-to-face communication and a close social bond. Unlike in-group collectivism as stated in a globe study (House, Hanges, Javidan, Dorfman, & Gupta, 2004), these phenomena imply some other aspect of social collectivism is an important aspect of culture as reflected in many interviews during the field study and thus, have been coded as Bengali values typical for Bengali culture.

Bengali value may be explained as the values that guide or motivate the individuals to maintain a very close and social bond and become respectful to the Bengali language. This construct, although not explained in previous cultural studies, is an important aspect of Bengali culture. The exploratory search also anticipates negative structural relations between cultural dimensions and SMEs intention to use IBDT. Figure 1 illuminates the study constructs and their hypothesized relationships.

¹ The field study results are furnished in detail in subsection *Field Study and Final Model Specification* under *Research Methodology and Findings* section



Note: *PU*=perceived usefulness, *PEU*=perceived ease of use, *NP*=normative pressures, *MP*=mimetic pressures, *CP*=coercive pressures, *PD*=power distance, *UN*=uncertainty avoidance, *InGr*=in-group collectivism, *Bval*=Bengali values, *INT*=intention to adopt IBDT, *USE*=use of IBDT

Figure 1: Conceptual Model.

Hypotheses

Based on the above discussion the following hypotheses are proposed:

- H_{1a}: Perceived usefulness has a direct positive effect on SMEs intention to use Internet based digital technology
- H_{1b}: Perceived ease of use has a direct positive influence on SMEs' intentions to use Internet based digital technology
- H_{2a}: Greater normative pressures lead to a greater intention to use Internet based digital technology among SMEs
- H_{2b}: Greater mimetic pressures lead to a greater intention to use Internet based digital technology among SMEs
- H_{2c}: Greater coercive pressures lead to a greater intention to use Internet based digital technology among SMEs
- H_{3a}: Power distance has direct negative effects on SMEs' intentions to use Internet based digital technology
- H_{3b}: Uncertainty avoidance has significant direct effects on SMEs' intentions to use Internet based digital technology
- H_{3c}: In-group collectivism has direct negative effects on SMEs' intentions to use Internet

- based digital technology
- H_{3d}: Bengali value has direct negative effects on SMEs' intentions to use Internet based digital technology
- H₄: Intention has a direct positive influence on SMEs' Internet based digital technology usage behavior

RESEARCH METHODOLOGY AND FINDINGS

Research Method

This study applies a mixed method research approach, which involves an in-depth field study followed by a quantitative survey. The field study explores the study constructs and anticipates the structural links among them. The primary research model, developed through literature reviews, is fine-tuned and contextualized during this phase of research. The field study uses NVivo version 10 to analyze the field interviews. Eleven owners or managers of different SMEs are interviewed during the qualitative phase of the study (see Table 2).

To test the conceptual model, a survey instrument is designed for data collection. The measures used to address the constructs included in the proposed model are adapted from relevant prior studies, with slight modification and expressional changes to fit them to the targeted context and explored through the intensive field study. The questionnaire is fine-tuned via several runs of pre-test, revisions, and pilot tests. After finalizing the questionnaire a cross sectional survey is administered to the SMEs in Bangladesh. All of the items are measured using five point Likert-type scale with anchors on strongly agree and strongly disagree, respectively (see Appendix for survey question items).

The survey instrument is administered to the sample, which is determined through a probability sampling method. A stratified random sampling technique is used to collect equitable responses from leading industries and emerging industries in both manufacturing and service industry sectors. In the manufacturing sector, RMG is the leading industry, which contributes a significant portion of the country's export earnings, and Leather industry is an emerging industry having high potential in exporting. On the other hand, ICT and telecommunication service organizations are the leading industries while tourism has high potential. The leading and emerging industries contribute roughly 75 percent and 25 percent respectively to the total export in the corresponding sectors. Basing on this logic, 275 business units under manufacturing industry category are selected comprising 220 firms from the Readymade Garments industry and 55 firms from the leather industry. On the other hand, 275 samples are selected from the service industry. The distribution is in a similar ratio with the 275 samples from the service industry being comprised of 220 ICT and telecommunications firms and 55 Tourism firms. During the survey, a group of trained surveyors conducted random survey from the respective industry's member lists. The responses are stratified through screening questions. Owners or managers (decision makers) of different SMEs or their delegated representatives constitute the population of the survey. An organized, structured, and methodical survey results in a collection of 566

complete responses from manufacturing (283 responses) and service (283 responses) industries (see table 2). The survey is conducted during September 2011-August 2012.

The sample is checked for consistency and scrutinized in view of removing invalid responses. A careful review screened out eight surveys, as the number of employees working in those firms, are higher than the upper limit of SMEs. Finally, 557 surveys are considered appropriate for the purpose of the analysis. PLS software is used to analyze the quantitative data.

Sample Profile

As the study uses a probability sampling technique, different types of SMEs have been included in the sample, which brings in the logical ground for generalizing the inferred outcomes. The study investigates the opinions and perceptions of the owner or owner manager or manager (decision maker) or delegated representatives of SMEs located at or adjacent to Dhaka city. Dhaka has been selected as the sampling area considering the fact that high industry concentration is evident in or near to Dhaka. The Internet penetration is also high in Dhaka, which comprises around 80 percent of the country's total Internet users. The sample consists of 50.6 percent manufacturing industry and 49.4 percent service industry (see Table 2).

Most of the firms surveyed (98 percent) have their own home page operation; a majority (65.7 percent) have a product cataloguing-capable homepage; most (58.3 percent) have experience in e-commerce; and approximately one third (29.1 percent) have enterprise resource systems. A small number of firms (13.1 percent) enjoying preferences as SMEs, and only 12.9 percent have received any grants or subsidies for ICT.

	Description	Frequency	Percent
Industry	Manufacturing	282	50.6%
	Service	275	49.4%
Sector	Readymade Garments	225	40.4%
	Lather	57	10.2%
	ICT and telecommunications	217	39.0%
	Tourism	58	10.4%
Business Size	Small	401	72.0%
	Medium	156	28.0%
ICT Status	Homepage	546	98.0%
	Online cataloguing	366	65.7%
	Participate in online commerce	325	58.3%
	ERP	162	29.1%
SMEs preferences	Received preferences as an SME	73	13.1%
	No preferences received	484	86.9
ICT grants	Received subsidies or ICT grants	72	12.9%
	No grants or subsidies received	485	87.1
Nature of customer	Geographically diverse customer	509	91.4%
	Customers not geographically diverse	48	8.6%

Internet connectivity	Dial-up/DSL	29	5.2%
	Broadband (cable and mobile)	511	91.7%
	Mobile broadband	293	52.7%
Operating offices or stores	Operating single office or stores	11	2.0 %
	Operating at least two offices or stores	437	78.5%
	More than two offices or stores	18	3.3%
ICT Experience	Started ICT before 2000	150	26.93%
	Started ICT in or after 2000	407	73.07%

Table 1: Survey Sample Profile.

Each of the respondents is using some sort of ICT. This survey confirms that the firms surveyed have Internet and ICT usage experience to conduct online banking and communication with major suppliers. Most of the firms (91.7 percent) have cable broadband connectivity; slightly over half (52.7 percent) have mobile broadband, while only 5.2 percent of firms are connected with Internet via dial-up or ADSL. Just over a quarter of the firms (26.93 percent) started ICT operations prior to 2000, while 73.07 percent started after 2000. Of the firms surveyed, 72 percent were small and 28 percent medium (see Table 2 for details about the sample firms).

The distribution of the sample into various types of companies and their staffs results in the strength of generalizability of the sample survey's outcomes.

Firm ID	Type of SME	No. of Employees	Size	Market Position	Revenue
A	S	35	Small	Good	Increase
B	M	96	Small	Good	Increase
C	S	21	Small	Extremely good	High Increase
D	S	47	Medium	Good	High Increase
E	S	9	Small	Good	Increase
F	S	5	Small	Good	Substantial Increase
G	M	21	Small	Good	High Increase
H	S	92	Medium	Bad	Steady
I	M	35	Small	Neither good nor bad	Increase
J	M	35	Small	Very good	High Increase
K	M	89	Medium	Very good	High Increase

Note: Type of SMEs S=Small enterprise, M=Medium enterprise Source: Field study

Table 2: Field Study Sample Profile.

Field Study and Final Model Specification

The field study employs direct, face to face and in-field interviews with the persons selected for qualitative surveys (see sample profile for the field study as given in Table 2). The interviews are organized and recorded with the consent of the interviewees. The qualitative data are analyzed employing the content analysis technique (Siltaoja, 2006). The field study undertakes both inductive and deductive methods to compare the qualitative data with the theoretical framework and develop a causal relationship between the constructs under study (Berg, 1989).

NVivo-10 is used to organize and analyze qualitative interviews. The interviews are transformed into the interview transcripts before administering the analyses of the interviews by NVivo.

Numerous free nodes are created by naming each segment of the data with a label at the initial phase of the qualitative analyses. Each 'free node' bears some characters of a theme and accounts for each concept about the data. Those concepts finally provide the basis for developing various tree nodes comprising similar free nodes. The tree nodes are developed by a number of relevant free nodes with a similar concept from the immediate earlier stage.

Analyses of all interview transcripts are guided by the interpretative research philosophy. However, The outcomes of the field study are complementary to the extension of the technology acceptance model which also endorse the influence of perceived 'usefulness' and 'ease of use' on SMEs intention to use Internet based digital technology in Bangladesh. As a single person, in most cases the owner, hold supreme power of decision making in a small firm, the owners' positive perception, and willingness matter in accepting or rejecting any innovation regardless of its actual benefits or performance. Thus, 'usefulness' and 'ease of use' are logically considered as important factors in anticipating SMEs' intention to Internet based digital technology. For example, Firm G admits that they would like to use the technology as "*It (the technology) is entertaining. It is providing the scope of documentary evidence than telephone and other media. It is interactive, reasonable and easy...*" and "*...when customers send some documents which is easy to check, send or forward to the appropriate departments. It helps the employee confident....*" Firm K and Firm E also feel alike. Table 3 shows the results of the field study related to usefulness and ease of use.

The field study reveals that power distance, uncertainty avoidance, in-group collectivism, and Bengali value have significant effect on SMEs intention to use Internet based digital technology in Bangladesh. For example, Firm J quotes as "*...we are using online technology for our day to operation and try to serve our parties through it. Now, if the country is not using the technology we face some problem in widening its scope. As (we feel) the societal norms and practice deter (in many counts) automated and non-personal exchanges, we are facing trouble going with upgraded and wide use of the technology.*"

The environmental pressures, such as coercive, mimetic, and normative pressures, are explored as positively related with SMEs intention to use Internet based digital technology in the context of Bangladesh. For example Firm C quotes as "*we are encouraged to use better technology and upgrading our existing systems when we see our competitors and suppliers use better ICT.*"

We also feel deterred in using and upgrading our technological standard when we see our customers are not having adequate technological fit, and they are not receptive or compatible with ICT and our systems.”

Factors/Variables	Participants										
	A	B	C	D	E	F	G	H	I	J	K
Usefulness											
Useful in the organization								✓		✓	✓
Increases productivity		✓	✓	✓		✓		✓	✓	✓	✓
Enables performing tasks more quickly			✓	✓		✓		✓			
Helps increase chances of getting a rise	✓	✓							✓		
Ease of use											
The system is easy to use		✓		✓		✓	✓				✓
Easy to become skillful in using the system				✓						✓	
We find the technology easy to use										✓	✓
Learning to operate the technology is easy			✓					✓		✓	✓

Table 3: Field Study Results for Perceived Innovation Characteristics.

Factors/Variables	Participants										
	A	B	C	D	E	F	G	H	I	J	K
Coercive Pressure											
Conformity with parent corporations practice			✓					✓	✓		
Dominance of customer adopters					✓				✓		
Mimetic Pressure											
Competitors use ICT					✓		✓	✓			
Competitors are benefitted from ICT			✓	✓			✓				
Normative Pressure											
Customers use ICT	✓	✓	✓			✓	✓		✓	✓	✓
Suppliers use ICT & important business partners		✓				✓	✓	✓	✓	✓	✓

Table 4: Field Study Results for Environmental Pressure.

A detailed statement of field study results related to culture environmental pressures are shown in Table 4 and table 5 respectively.

Factors/Variables	Participants										
	A	B	C	D	E	F	G	H	I	J	K
In-group Collectivism											
Group members take pride in individual accomplishments of their group managers					✓		✓	✓		✓	
Group managers take pride in individual accomplishments of their group members					✓		✓	✓		✓	✓
Power Distance											
Power is highly concentrated at the top		✓				✓				✓	✓
Employees blindly follow their leader	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Uncertainty Avoidance											
Orderliness and consistencies are not apparent			✓			✓	✓	✓	✓	✓	✓
Lack of standard operational rules and procedures which are important to meet any new and unforeseen situations				✓	✓	✓					✓
Bengali Value											
Face-to-face communication is vital in daily lives		✓					✓			✓	✓
Employees respect and prefer to communicate through Bengali language					✓		✓	✓		✓	✓

Table 5: Field Study Results for National Culture.

The qualitative field study, thus, justifies the primary model developed in Section 2 where, actual usage behavior (*B*) has been modeled as a direct function of behavioral intention (*BI*). *BI* is in turn, a weighted function of perceived usefulness (*U*), perceived ease of use (*E*), power distance (*P*), uncertainty avoidance (*A*), in-group collectivism (*C*), Bengali value (*V*), Normative pressure (*NP*), Mimetic pressure (*MP*), Coercive pressure (*CP*) and error term (*e*).

$$B = w_1 BI + e \tag{1}$$

$$BI = w_2 U + w_3 E + w_4 P + w_5 A + w_6 C + w_7 V + w_8 NP + w_9 MP + w_{10} CP + e \tag{2}$$

Data Analysis and Results

The structural equation modeling is appropriate to analyze the data in accordance with the proposed conceptual framework. A growing number of researchers are adopting causal or structural equation modeling as it allows the analysis of complex networks of constructs, each construct typically measured by multiple variables. Understanding the nature of the study and its

practical implications, the data gathered from the survey were analyzed by partial least squares (PLS) based structural equation modeling (Barclay, Higgins, & Thompson, 1995).

Measurement model. The measurement model was first assessed by a confirmatory factor analysis through a PLS graph software. The model, therefore, was assessed for evaluating the psychometric properties of the measurement model in terms of reliability, convergent validity, and discriminant validity (Fornell & Larcker, 1981). The nature of the constructs, i.e., reflective or formative, are identified before the measurement model assessment.

Constructs	Items	Loadings	SE	t-Statistics	CR	AVE
Perceived Usefulness	PU1	0.953	0.005	199.03	0.971	0.895
	PU2	0.961	0.004	222.96		
	PU3	0.953	0.007	136.77		
	PU4	0.919	0.009	105.87		
Perceived Ease of Use	PEU1	0.956	0.005	197.98	0.972	0.898
	PEU2	0.965	0.003	287.50		
	PEU3	0.961	0.005	210.11		
	PEU4	0.908	0.012	78.42		
Intention	INT1	0.799	0.016	49.44	0.928	0.721
	INT2	0.869	0.012	75.67		
	INT3	0.907	0.007	127.32		
	INT4	0.850	0.013	63.20		
	INT5	0.820	0.014	57.89		
Use	USE1	0.842	0.014	59.29	0.865	0.682
	USE2	0.865	0.009	92.18		
	USE3	0.771	0.025	30.56		
Power Distance	POWDIS1	0.942	0.024	39.56	0.964	0.900
	POWDIS2	0.969	0.007	130.72		
	POWDIS3	0.930	0.015	61.39		
Uncertainty	UNAVOID1	0.914	0.129	7.19	0.960	0.922
	UNAVOID2	0.930	0.157	6.29		
Ingroup Collectivism	INGROUP1	0.580	0.065	9.05	0.831	0.628
	INGROUP2	0.871	0.021	42.58		

Note: AVE=Average variance extracted, CR=Composite reliability

Table 6: Loadings and t-Statistics for Reflective Constructs.

By definition, reflective items measure the same underlying dimensions and should be correlated, while formative indicators *cause* the latent construct, which is explained as a function of the formative measures. Although tests for construct reliability and validity are considered as fundamental requirements for reflective constructs, these are not necessary requirements for formative constructs (Jarvis, MacKenzie, & Podsacoff, 2003; Rai, Patnayakuni, & Seth, 2006) as the items are not correlated and do not measure the same underlying dimension. The reflective

constructs are assessed mainly through the loadings while the formative constructs consider indicators weight. The measurement model assessment excludes the reflective indicators with low loadings for further analysis. However, all of the formative indicators, irrespective of their significant or non-significant weights, are considered for final estimation in order to ensure measuring the entire domain of the construct and the content validity (Bollen & Lennox, 1991).

The formative constructs are detected examining whether the following decision rules hold:

(i) the direction of causality is from indicators to constructs, (ii) the indicators need not to be interchangeable, (iii) co-variation among indicators is not necessary, and (iv) the nomological net of indicators can differ (Jarvis et al., 2003; Petter et al., 2007; Rai et al., 2006). By using the decision rules, normative pressures, mimetic pressures, coercive pressures (Teo et al., 2003), and Bengali values are found to be formative while all other constructs are reflective. The measurement model assessment statistics for reflective and formative constructs are shown separately in Table 6 and Table 7.

The reliability of the constructs was assessed by considering composite reliability. Construct reliability for all of the factors in the measurement model was above 0.70, an acceptable threshold suggested by Nunnally and Bernstein (1994).

Construct validity was evaluated by examining the factor loadings within the constructs as well as the correlation between the constructs (Anderson & Gerbing, 1988). The factor loadings on all of the constructs were highly satisfactory in the expected direction with satisfactory critical ratio and level of significance (i.e. ranged from .568 to .989), thus providing evidence of satisfactory item convergence on the intended constructs (see Table 6).

The indicators' weights, *t*-statistics, reliability, and AVE for the formative constructs are shown in the Table 7. The AVE although not required for formative constructs are also satisfactory as per recommendation of Chin (1998).

Constructs	Items	Weight	SE	t-Statistics	AVE
Normative Pressure	NP1	0.198	0.071	2.57	0.516
	NP2	0.998	0.003	370.23	
Mimetic Pressure	MP1	0.732	0.040	18.53	0.620
	MP2	0.837	0.028	29.57	
Coercive Pressure	CP1	0.999	0.002	632.62	0.536
	CP2	0.275	0.052	5.16	
Bengali Value	BENVALU1	0.993	0.010	102.59	0.498
	BENVALU2	0.028	0.105	0.35	

Note: AVE=Average variance extracted, CR=Composite reliability

Table 7: Weights and *t*-Statistics for Formative Constructs.

This study used the square root of the AVE and cross loading matrix to assess the discriminant validity as suggested by Igbaria, Guimaraes, and Davis (1995) and Barclay et al. (1995). According to Barclay et al. (1995), the model is assessed to have acceptable discriminant

validity if the square root of the AVE of a construct is larger than its correlation with other constructs. The results are detailed in Table 3 with the square roots of the AVEs shown in the main diagonal of the table. The off diagonal elements represent the correlations between the latent variables. Table 4 indicates that the discriminant validity of the latent variables was met, which means that all the latent variables are different from each other.

Discriminant validity of the measures has also been cross checked through the cross loading matrix (Barclay et al., 1995). Results of the cross-loading analysis showed that all items loaded higher on the construct that they were measuring than they did on other constructs in the model (Barclay et al., 1995). To save space, the cross-loading matrix is not presented in this paper.

	PU	PEU	INT	Use	PD	UN	InGr
PU	0.946						
PEU	0.642	0.947					
INT	0.732	0.539	0.849				
Use	0.613	0.499	0.691	0.825			
PD	-0.189	-0.188	-0.131	-0.073	0.948		
UN	-0.011	0.016	-0.034	-0.161	-0.114	0.96	
InGr	0.110	0.030	0.280	0.143	0.199	-0.206	0.792

Note: Square root of the AVE on the diagonal and construct correlations on the off-diagonal; PU=Perceived usefulness, PEU=Perceived ease of use, INT=Adoption intention, Use=Use of IBDT, PD=Power distance, UA=Uncertainty avoidance, InGr=In-group collectivism. The formative constructs are excluded from the assessment of discriminant validity (Jarvis et al., 2003; Rai et al., 2006).

Table 8: Discriminant Validity.

Structural model. The structural model deals with testing the hypothesized relationships. A bootstrap method has been used to test the hypotheses. The results detailing the path coefficients and *t*-statistics are summarized in Table 5.

It is observed that among the primary hypotheses H_{1a} , H_{1b} , H_{2a} , H_{2c} , H_{3a} , H_{3c} , H_{3d} and H_4 were supported (significant *t*-values), while hypotheses H_{2b} and H_{3b} were not supported (insignificant *t*-values). According to Santosa, Wei, and Chan (2005) the nomological validity or explanatory power of the proposed model can be assessed by observing the R^2 values of the endogenous constructs. The model explains 58.6% of the variance (R^2) in intention to use Internet based digital technology and 81.7% of the variance (R^2) in SMEs actual Internet based digital technology usage behavior. All R^2 values exceeded the minimum required value of 0.10 as suggested by Falk and Miller (1992) (see Table 4). Thus, the results reveal that the proposed model is applicable in a developing country setting, like Bangladesh, to explain intention to use, as well as actual use of, Internet based digital technology by SMEs.

The structural equation estimation further shows that all constructs under the model are related in expected direction according to the proposed theoretical framework except in-group collectivism. The in-group collectivism is positively related with intention to use IBDT, which was proposed as negatively related.

	Weight	SE	t Statistic	Comments
PU→INT	0.353	0.032	10.93**	Supported
PEU →INT	0.069	0.031	1.98*	Supported
NP→INT	0.105	0.043	2.41*	Supported
MP→INT	0.033	0.025	1.08	Not Supported
CP→INT	0.383	0.042	9.02**	Supported
PD →INT	-0.046	0.022	2.18*	Supported
UA→INT	0.014	0.021	0.77	Not Supported
InGr →INT	0.162	0.025	6.45**	Supported
BVal →INT	-0.053	0.020	2.69**	Supported
INT →USE	0.692	0.019	35.42**	Supported

** indicates $p > .01$, * indicates $p > .05$ Note: R^2 for INT = 0.736,, R^2 for USE =0.477

PD=Power distance, *UA*=Uncertainty avoidance, *InGr*=In group collectivism, *BVal*=Bengali value, *NP*=Normative pressure, *MP*=Mimetic pressure, *CP*=Coercive Pressure, *INT*=Adoption intention, *Use*=Use of IBDT

Table 9: Structural Model Estimates.

The fundamental component of TAM, perceived ease of use and perceived usefulness were found to have strong significant effects on SMEs intention to use Internet based digital technology. The result is complementary to some of the previous studies (Chau, 1997; Chau & Hu, 2002; Subramanian, 1994; Szajna, 1996). The result is also complementary to the fundamental assumptions of TAM as supported by many previous studies (Davis, 1989; Davis et al., 1989; Mathieson, 1991; Szajna ,1996; Taylor & Todd, 1995a; Venkatesh & Davis, 2000; Yoon 2009).

As postulated cultural dimensions have also significant influence on SME's intention to use Internet based digital technology and actual usage behavior. Among the four predicted cultural dimensions, power distance, in-group collectivism, and Bengali values were found to have strong and significant influence on the intention of IBDT use, while uncertainty avoidance, did not produce any significant contribution to SMEs IBDT usage intention.

Finally, the structural model depicts intention as a strong and significant determinant of actual behavior, which refers actual use of the Internet, based digital technology among SMEs in Bangladesh. The finding supports previous theories and empirical studies (Ajzen & Fishbein, 1980; Azam & Quaddus, 2009b; Chang, 1998; Fishbein & Ajzen, 1975; Mathieson, 1991; Taylor & Todd, 1995a; 1995b; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000).

DISCUSSION AND CONCLUSION

The structural equation model explains the joint effects of all constructs used in the model. The study depicts the magnitude and degree of the effects of the antecedent factors of IBDT usage among SMEs in Bangladesh. The study found that perceived usefulness, perceived ease of use

normative pressures, coercive pressures, power distance, in-group collectivism and Bengali values have strong direct effects on behavioral intention while mimetic pressures and uncertainty avoidance didn't produce any significant effects. Thus, hypotheses H_{1a} , H_{1b} , H_{2a} , H_{2c} , H_{3a} , H_{3c} , H_{3d} and H_4 are accepted, while H_{2b} and H_{3b} are rejected. Besides, each of the cultural dimensions has produced negative association with intention except in-group collectivism and uncertainty avoidance. In-group collectivism has strong and significant effects while uncertainty is not significant but positively related to intention.

Consistent with the prior technology acceptance studies, perceived usefulness has a positive direct effect on behavioral intention, thus hypothesis H_{1a} is supported. As postulated in hypothesis H_{1b} perceived ease of use also affects behavioral intention. The respondents or subjects of this study, in general the owners or managers of the firms, show their intention to use Internet based digital technology considering that the technology is easy to operate by their employees. They also show their intention to use the technology in considering its advantages, benefits, and effectiveness. The structural equation estimates show that the environmental pressures are also supportive to the SMEs intention to use IBDT.

The results indicate that normative pressures have a positive direct effect on behavioral intention, thus hypothesis H_{2a} is supported. This effect refers stakeholders (such as partner, supplier, customers etc.) influence on SMEs intention to adopt Internet based digital technology. The result is consistent with Kuan and Chau (2001), Premkumar et al. (1997) and Teo et al. (2003).

The partner organizations, such as the suppliers or the customers, that have already adopted Internet based digital technology expect their peers and associated organizations would use the technology to acquire the full advantages and utility of the technology. The results also support the outcomes of Zhu, Dong, Xu, and Kraemer (2006) and Zhu and Kraemer (2005) that normative pressures arising from partner's readiness are positively related to the firm's digital transformation.

Despite insignificant mimetic pressures, coercive pressures significantly influence SMEs intention to adopt Internet based digital technology. Consistent with Teo et al. (2003) this study shows that parent companies, suppliers or customers' play the powerful and dominating role to force SMEs in adopting Internet based digital technology. As the sample, firms are small in size and capital they have no option but to comply with the requirements of the big and powerful suppliers and/or customers. The SMEs involved in export-import activities are linked with the companies that are being operated in high technology based environments and are not able to work with manual based SMEs. As a result the SMEs operate through a technology based working environment obtain competitive advantages over the firms operated in a manually managed working environment. Thus firms, although not interested in adopting Internet based digital technology, and are compelled to install the technologies according to the requirement of the dominant suppliers or customers.

The structural model estimates further show that the culture of Bangladesh is also supportive to SMEs intention to use IBDT. The in-group collectivism, hypothesized as negatively related to intention, was found to be positively related. This happened as the in-group collectivism was

measured through overall collectivism phenomena. The measurement items consider whether the managers encourage group loyalty, if the employees feel proud of the managers' individual accomplishment and vice versa. During the field study the in-group collectivism phenomena was reflected as a collective bargaining agent or various groups or subgroups within an organization. Those phenomena typically inhibit IBDT adoption and implementation, thus the construct was hypothesized to have a negative association with IBDT adoption and use. In this study group performance, teamwork or a sense of group loyalty are indicated under the in-group collectivism, which finally encourages and fosters the pace of IBDT usage in the organization.

The uncertainty avoidance dimension was found to have a positive association with intention, which infers that most of the SMEs in Bangladesh are having some rules and regulations to face the future uncertainties. The organizations have also been developed with some structured procedures and methods to perform their day-to-day activities and thus adoption of IBDT is not deemed contradictory in their existing working procedure. Uncertainty avoidance although positively related to IBDT, having an insignificant result suggests that the working rules-regulations and procedures are not adequately developed to foster the adoption and usage of Internet based digital technology among SMEs in a formal, structured and transparent working environment.

The Bengali values are negatively related to IBDT usage intention, which reveals that the people of Bangladesh are respectful to their language and language martyrs so they feel honored and comfortable with a communication through Bengali. As the user interface of digital technology is mainly English based, it is not easy to maintain social exchanges and interaction by using online communication and networking through their own (native) language, thus the construct exhibited a negative association with intention.

Finally, a strong and significant effect of behavioral intention on actual usage behavior is found. Thus, hypothesis H4 is supported. This result indicates that the positive and strong intention would foster the use of Internet based digital technology at the firm level.

The SMEs are considered incubators of the national economy. The economic development of any country is largely dependent on the development of small and medium enterprises. Adoption and utilization of Internet based digital technology may help develop SMEs with an increased operational efficiency to stay competitive in the globalized market environment.

This study reveals that both internal and external factors matter in the adoption by SMEs of Internet based digital technology. The effects of various cultural dimensions, particularly power distance, uncertainty avoidance and Bengali values, are not complimentary to the adoption of IBDT in Bangladesh which suggests that the move to establishing a digital based SMEs are not straightforward or attuned with the cultural norms and values. The SMEs are also not provided with competitive advantage by the adoption and use of IBDT. Thus, the strategic reasons such as increase sales, competitiveness, market expansion, or experimentation have not become the motivational factors of IBDT adoption, which is also not complementary to the digital entry of small firms in a developed country (Beard, Madden & Azam, in press; Madden, Azam & Beard, 2013). Remarkably, the results suggest that the SMEs are not self-motivated but using the

technology under compulsion. Hence, the IBDT adoption by SMEs may not contribute to the firms' performance growth or productivity.

Theoretical Contribution

This study is an initiative to examine Bangladesh's SMEs Internet based digital technology usage behavior through utilizing technology acceptance model with external environmental variables such as culture and environmental pressures. Although, TAM is a widely researched theoretical framework for technology acceptance studies, most of its application is focused on developed country perspective. This research endorses the applicability of the theoretical framework in developing country perspective. This paper also modifies the version of TAM and combines with two new external environmental variables such as culture and environmental pressures in a same row as antecedents of behavioral intention. The TAM framework has received bulk of researchers' attention as it provides the scope for examining the external variables influences on the perceived ease of use and usefulness to mainly examine individual's technology acceptance behavior. This paper is also an application of TAM in looking at SMEs technology acceptance behavior. This study logically includes, Bengali values, a context related new variable which makes the theoretical framework comprehensive for assessing the impact of culture on IBDT usage by SMES in Bangladesh. The environments of different developing countries are alike. Thus, this research framework and outcomes may be applicable to other developing counties to address the diffusion and usage of IBDT by small and medium sized enterprises.

Practical Contribution

With its theoretical contribution, the study has some practical contribution. The study provides a clear picture how internal and external factors affect the Internet based digital technology usage by SMEs in a developing country. The practical contribution of the paper is to characterize the SMEs those are using IBDT such as the study shows that the SMEs having high perception of usefulness, ease of use of the technology, collective culture with a lower Bengali value based culture and those are demanded to use IBDT by their strong customer or parent organizations seem to be the high users of the IBDT technology. This study urges the management of a business enterprises and the government to look at the environmental and cultural factors in view of achieving IBDT usage success, which may foster the country's economic development. Initiating some strategic adjustments to improve the organizational practice by eliminating the traditional power distance inside the organization as well as introducing formal working procedures by implementing necessary rules and regulations may result in a productive use of the technology. Furthermore, the application of a Bengali user interface may help ensure the productivity of IBDT use by SMEs in Bangladesh.

Limitations and Future Directions

This study although has a substantial contribution of studying SMEs IBDT usage in a developing country perspective, by nature it doesn't answer the question of whether the IBDT adoption impacts the performance growth of SMEs which may be indicated as an important issue for

future research. Furthermore, this study includes environmental pressures and culture as external environmental forces as antecedents of IBDT use while although important the country readiness constructs—such as national technology infrastructure, national human infrastructure, financial infrastructure, legal infrastructure, government policy and subsidy—are not included in the model which is a limitation of the study. Finally, this study uses a cross-sectional data, which are collected at a single time-point, thus unable to assess the impact of the antecedents and the development of IBDT usage by SMEs in different time points. A thorough analysis of an expanded model to be developed with new variables including performance of SMEs by collecting cross-sectional data in several time points might produce a holistic picture of the internal and external factors and their impact on Internet based digital technology usage as well as SMEs performance.

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Appendix

Measures for Key Variables

Constructs	Indicators
Perceived Usefulness (1-5 Likert scale)	I find ICT useful in our organization Using the technology enables us to accomplish tasks more quickly Using the technology increases our productivity I feel that using the technology will increase our chances of growing or developing the organization
Perceived Ease of Use (1-5 Likert scale)	I think our interaction with the technology is clear and understandable It is easy for us to become skilful at using the technology We find the technology easy to use Learning to operate the technology is easy for us
Coercive Pressures (1-5 Likert scale)	Our parent company/major suppliers direct us to use ICT Our major customers demand we use ICT
Mimetic Pressures (1-5 Likert scale)	All of our competitors have already adopted ICT Our main competitors that have adopted ICT have benefitted a great deal
Normative pressures (1-5 Semantic scale)	What is the current extent of ICT adoption by your firm's customers? What is the current extent of ICT adoption by your suppliers/important business partners?
Power distance (1-5 Likert scale)	Employees are expected to obey and follow their leader without question Power is concentrated at the top management Employees blindly follow their leader
Uncertainty avoidance (1-5 Likert scale)	Organizations have orderliness and consistency to face any future uncertain events Standard operational rules and formal procedures are important to meet any new and unforeseen situations
In-group collectivism (1-5 Likert scale)	Group members take pride in the individual accomplishments of their group managers Group managers take pride in the individual accomplishments of their group members
Bengali Values (1-5 Likert scale)	Face to face communication is vital among the employees in day to day operation Employees respect and prefer to interact through Bengali language
Intention (1-5 Semantic differential scale)	Basic computer operation (computing and emails) Internet with own home page (static homepage) Interactive homepage which supports product cataloguing and order processing (Online order receiving and processing) Interactive home page which supports online transaction and account management (E-business) Complete digital communication and exchanges within and outside

the organization (ERP)

IBDT Use
(1-5 Semantic
differential scale)

Interactive homepage which supports online order receiving and processing
Interactive home page which supports online transaction and account management (E-business)
Complete digital communication and exchanges within and outside the organization (ERP)

