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Significant barriers to ICT adoption in the public sector in the Least Developed Countries (LDCs): A case study of Bangladesh

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Abstract

Adoption of ICT in the public sector of the least developed countries (LDCs) is still far from satisfactory, despite many initiatives at international and national levels. In addition to perceived barriers associated with LDCs, such as lack of political will and commitment, leadership, infrastructure, human capacity etc, this empirical study has found new evidence of a deep rooted underlying cause, a lack of proper knowledge and awareness as the major barrier to ICT adoption, in the context of Bangladesh. The study also attempts to uncover the relative effect of different barriers and their inter relationships based on focus group data which gives important direction for further study.

Keywords

Least Developed Country (LDC), Information and Communication Technology (ICT), ICT adoption, Public Sector, eGovernment

INTRODUCTION

ICT transfer and adoption as a whole has been quite slow in many LDCs. LDCs are defined based on low national income (gross domestic product under $900 per capita), weak human assets (health, nutrition and education) and high economic vulnerability (UN-OHRLLS, 2006). Only a few out of the 50 least developed countries are transforming to transition economies whereas the majority are lagging behind, most of which are located in sub Saharan Africa and parts of Asia (South Asia) (Rice, 2003, p-74). On the other hand, with the decreasing price of infrastructure, ICT is no longer seen as luxury which only the rich can afford. Rather increasingly it is becoming a tool for economic emancipation of the poor. Adoption of ICT in LDCs could yield significant benefits in improving the economy and has the potential to solve many of the deep-rooted problems like corruption, transparency and governance in the public sector administration. A clearly defined Information System (IS) also could play an integral part in improving business activity and international competitiveness with other nations (OECD, 2003).

ICT adoption and implementation has become a complex issue in LDCs and a generalized theory or model explaining the issue is yet to be seen. Understanding of this problem has become essential, as the need for ICT adoption has reached a critical point and it is an important agenda for these countries to survive in this modern economy. A limited number of studies on ICT adoption in few developing countries can be found and although they provide some useful insight, none of them appear to be sufficiently comprehensive or address all issues.

The public sectors, especially in an LDC can play a leading role in adoption of ICT, being the largest user of computers and also can exert the greatest influence on the diffusion of ICT throughout the country through its policies and regulations (e.g., Flamm, 1987; Nidumolu and Goodman, 1993). Thus it can be argued that diffusion of ICT in the LDC is largely influenced by its adoption and use in the public sectors.

This paper examines the barriers to ICT adoption in the public sector of Bangladesh with a background drawing from previous studies on various developing countries. Analysis of previous studies shows lack of political will and leadership, inadequate infrastructure, socio-economic conditions, human capacity, bureaucracy and typical mindset of government officials are mostly and widely experienced/ known barriers. This empirical study was conducted through a series of focus groups composed of various stakeholders in Bangladesh. Analysis of the qualitative data from the focus groups points to lack of knowledge and awareness on ICT as the principal barrier compared to other barriers commonly known and pronounced before.

The findings of this study will have implications for designing and implementing appropriate strategies for the government sector of Bangladesh. The academic relevance lies largely in its contribution to providing empirical findings in the area of influences on ICT adoption in a LDC. As this research aims at investigating the barriers, it

specifically focuses on the strength of opposing forces and attempts to assess their overall impact. Future studies on other LDCs will be useful to confirm the similarities and differences of influences on ICT adoption among LDCs.

BACKGROUND OF STUDY

Bangladesh was chosen for this study since the researcher has had long experience of working very closely with the ICT sector in the government of Bangladesh. Further experience in the area of Information System in the developed world has put the researcher in a better position to make the link as well as understanding the environment and context better. Bangladesh is also an example of a typical LDC, still under a digital divide and falling much behind in ICT adoption in the public sector. Despite some initiatives, such as the formation of an 'ICT Task Force' with the Prime Minister as the chair person and the formulation of The National Information and Communication Technology Policy 2002, till now only a few ministries and government agencies have adopted ICT in their work process. In 2003, a program entitled "Support to ICT Task Force (SICT)" project was undertaken by the Ministry of Planning to assist the ICT Task Force in realizing various projects related to ICT, particularly eGovernment. However, the study of 45 government ministries, divisions and departments by the Bangladesh Enterprise Institute (BEI) found a lack of serious resolve and drive in its implementation in Bangladesh (BEI, 2004). Experience shows that the legacy of the system inherited from British civil service of having long queues for hours in front of government office is still a regular picture in Bangladesh. Most of the ministries hardly use IT to ease their job and to reach near to the citizen, as such the difference between government and citizen are always increasing resulting in bureaucracy and lack of transparency.

PRIOR WORK

No single or widely accepted theory has directly addressed the complex issues of ICT adoption in LDCs, although recently there has been an attempt to draw out the issues of ICT in developing countries from a range of theories from various disciplines (Sahay and Walsham, 2005). Also it is only during the last few years that the developing countries have started exploring the great potential of IT in improving the quality of governance. Until now only a few academic studies have dealt with these issues, (Heeks, 2002, Gregory and Starub, 1998) although a number of international bodies and organizations like UN[1], UNDP[2], World Bank[3] have carried out some investigations related with ICT in LDCs. Kelegai and Middleton (2003, p 114) reported that "IS research in this area has been non cumulative and fragmented, lacking an overarching framework regarding the context in which effectiveness criteria are applied". However, the following theories were examined to provide a conceptual framework for understanding the issues of ICT adoption in general.

- Fishbein and Ajzen's (1980) Theory of Reasoned Actions (TRA)
- Davis's (1989) Technology Acceptance Model (TAM)
- Rogers (1995) Diffusion of Innovations Theory (DoI).

There are some problems as well in using these theories to address this issue. One problem is that they have been developed and tested primarily in the context of developed or western countries and are possibly not relevant in the context of many developing countries and LDCs. Rose and Straub (1998 p. 40) notes that: '*Of the 70 IT based studies which either confirmed or extended the Rogers diffusion of innovation (DOI) model surveyed by Pascot and Conger (1995), none were conducted within developing nation'*. A second problem is that the unit of analysis in many studies is not clearly specified and the complexities of the interrelationships among differing units of analysis are not well understood. Studies have taken as their focal units the individuals in a country, particular projects or organizations, or the country as a whole. Theory on how the government sector in LDCs should operate appears to be almost entirely lacking, although some practical guidelines for e-government are presented by international agencies (World Bank, 2002).

A review of number of prior studies and analysis of multilevel influnces on ICT adoption in developing countries (Imran and Gregor, 2005) shows the following key points:

- Some of the Asian countries and sub Saharan African Countries are falling far behind from the global race of ICT adoption.
- These countries have serious infrastructure problem along with lacking in favourable economic environment.

[1] UN ICT Task Force
[2] Digital Divide to Digital Opportunities for Development
[3] Global Information and Communication Technologies Department

- The environment of each LDC is unique in nature. Socio-cultural aspects are highly influential in the adoption process of ICT which also contradict sometimes with technologies developed as per the culture of west.
- Organization factors and institutional capacity are extremely important for adoption in LDC, where leadership commitment and will appear to be the most influential one.
- Bureaucratic establishments and lack of systematic and modern administrative procedure are major obstacles in the government sectors of LDC for ICT adoption.
- Environment in Bangladesh is highly influenced by the political will and stability, lacking in understanding, planning, initiative which is further aggravated by poor infrastructure and lack of training / skill.

Appendix 1 shows the relevant literature that was surveyed as a background to this study. From this literature a model was developed to show some of the key influences impacting on the adoption of ICT in the government sector in a LDC (see Figure 1).

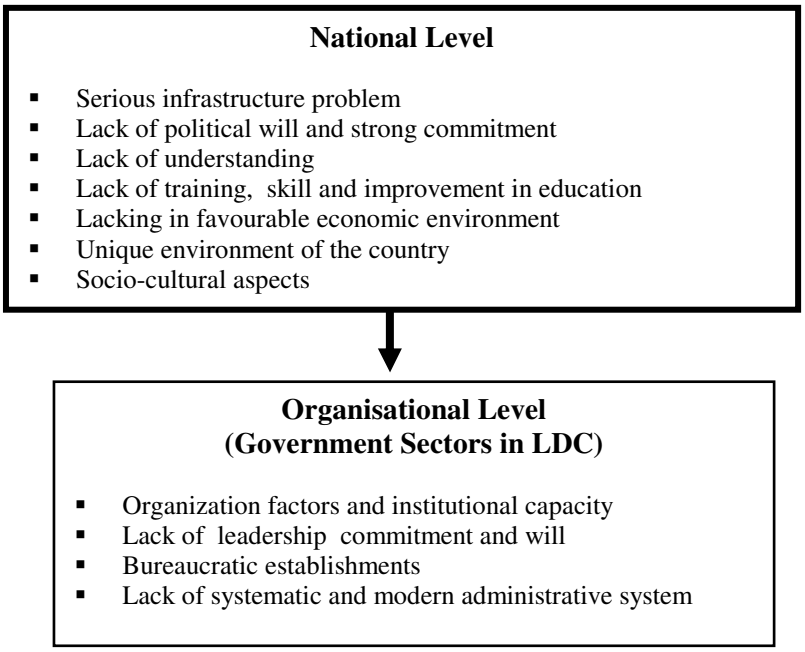

Figure 2: Factors influencing the adoption of ICT in an LDC environment

In this model some of the factors and influences are identified as extraneous in nature and some are exclusively within the organizational factors. Understanding of these elements is necessary for further investigation in the context of a particular country.

METHODS

Focus groups were the primary method of data gathering for this particular study. Seven focus groups were conducted between Aug 2005–Dec 2005; one in Canberra and the rest in Dhaka, Bangladesh using the 'Nominal Group Technique' (NGT). NGT was originally developed as an organizational planning technique by Delbecq, Van de Ven and Gustafson in 1971. It is a consensus planning tool that helps to prioritize issues and presents more structure than only the discussion, yet takes the advantage of the synergy created by group participants (Joppe, 2001). During this empirical study the literature findings were not revealed to the participants, instead a broad scenario and the context were presented to provide a clear perception of the problem. The focus group discussion addressed the broad question, *"What are the barriers to ICT adoption in public sector of an LDC, in the context of Bangladesh?"* and had the following steps:

Step-1. Silent Generation of Ideas in Writing. It started with an open ended question which was also displayed on the screen by overhead projector. This allowed each person to spend several minutes in silence individually brainstorming all the possible ideas, without consulting each other.

Step-2. Round Robin Recording of Ideas. In the second step the ideas of group members were recorded on a flip chart, in a round robin fashion which was visible to the entire group.

Step-3. Serial Discussion. The purpose of the third step of was to discuss each idea in turn to comment and give reason for their decision one by one.

Step-4. Voting. Finally, participants were asked to vote which barriers they feel were the most important and rank them according to their relative importance.

The flip chart was then preserved for subsequent analysis of data. There were two implications of the votes. One is how many votes were cast for a barrier, and the other one was to measure the gravity of the problem compared to others as perceived by the voters. To interpret the magnitude of the problem the voting numbers were transformed so that a vote with the highest priority (1) has a value of 5 and so on. The second phase was recommendation and discussion on strategies addressing the problems mentioned in the first phase, which is beyond the scope of this particular paper.

The seven focus groups were conducted between Aug 2005 to Dec 2005, one in Canberra and the rest in Dhaka, Bangladesh. The groups were composed of different bodies, some were extremely involved and some were indirectly involved or concerned with ICT adoption in the public sector of Bangladesh. The list of focus groups is given in table 2.

Group	Location	Composition	Number of participants
FG-1	ANU, Canberra	Bangladeshi expatriate ICT professional in the public sector of Australia + Bangladesh high commission staff	7
FG-2	Dhaka	Software developers of a locally based company	9
FG-3	Dhaka	Academics from the department of Computer Science, Management and Governance and Economics of a reputed university	10
FG-4	Dhaka	ICT for Development experts from an international organization	3
FG-5	Dhaka	Software and ICT industry leaders, Managers	9
FG-6	Dhaka	ICT Journalists	5
FG-7	Dhaka	Support to ICT task force officials, Government of Bangladesh and ICT experts	9

Table 2: Composition of FGDs

RESULTS

Previous studies mentioned different barriers but the apparent weight of those problems were not measured in empirical terms. This study emphasized the prioritization of issues, as it is important for the overall research and subsequent planning. Although many of the problems are closely interlinked, it is assumed that addressing the key issue will make it easy to tackle other barriers as well. As such, the result of this study will have great significance for future direction. People from diverse backgrounds including important stakeholders, had the scope to brainstorm the issue, which some of them reported as first of its kind for them. It also elucidated the interlinking issues within various barriers, some of which are extremely difficult to address separately. Although the participants form various FGDs have brought out some additional barriers and individual experiences, for the sake of this study only the principal barriers were considered and a borderline was drawn to take only those barriers which have commonality among the various focus groups. The rankings from all participants are collected, aggregated and presented in table 3.

Focus Groups	Number of Participants	Infrastructure	Knowledge	Attitude/ Mindset	Socio-Economic Condition	Political will/ Leadership	Planning & strategy	Lack of Experts/ Processionals	Laws/ Rules	Citizen demand	Bureaucratic Business process	Championship/ Model
FG-1 (Canberra)	7	16	15	16	10	-	-	2	5	6	16	-
FG-2 (Software Developers)	9	17	31	18	-	20	29	-	-	-	5	-
FG-3 (Academics)	10	7	18	14	9	8	3	13	3	5	5	-
FG-4 (International Org)	3	3	7	11	-	7	12	-	-	-	-	4
FG-5 (ICT Industry Leaders)	9	10	33	12	-	13	14	-	4	2	16	3
FG-6 (ICT Journalists)	5	-	15	-	-	-	10	-	-	-	-	-
FG-7 (Gov Officials/ Experts)	9	11	33	14	9	31	-	13	8	-	-	-
Total	**52**	**64**	**152**	**85**	**28**	**79**	**68**	**28**	**20**	**13**	**42**	**7**
Ranks		**5th**	**1st**	**2nd**	**7th**	**3rd**	**4th**	**7th**	**8th**	**9th**	**6th**	**10th**

Table 3: Distribution of aggregated values within different barriers

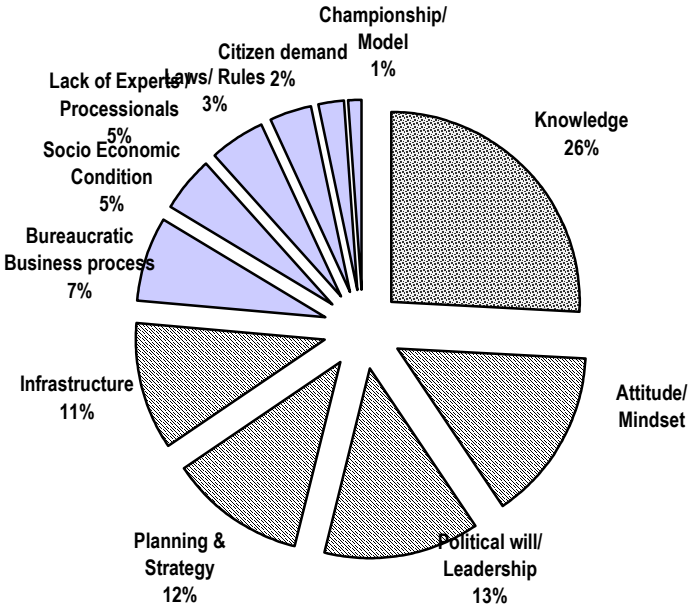

Figure 1: Cluster formed by major barriers (as per values)

The barriers clustered in three groups, 'Lack of Knowledge' (26%) by far being the strongest identified barrier. The next cluster consists of attitude and mindset of decision makers (2nd), lack of political will and leadership (3rd), lack of planning and strategy (4th) and infrastructure (5th). The third cluster was formed by other barriers, 'bureaucratic business process (6th), lack of expertise and professionals and socio-economic condition (7th) followed by lack of laws and rules, lack of citizen demand and lack of championship which occupied 8th, 9th and 10th position respectively. Similar calculation was also carried out based on number of votes and the result did not have much variation.

(1) Lack of Knowledge. Lack of knowledge was overwhelmingly rated as the most important barrier with 152 points, almost twice of the second barrier, attitude and mindset (85 points). Lack of knowledge entails not only the basic knowledge and education on ICT but also implies the perception and awareness amongst the leaders, stakeholders, government officials and the general public as a whole about its use and implications. The following sub categories have been merged to form this group as identified and agreed upon by the respondents of different groups.

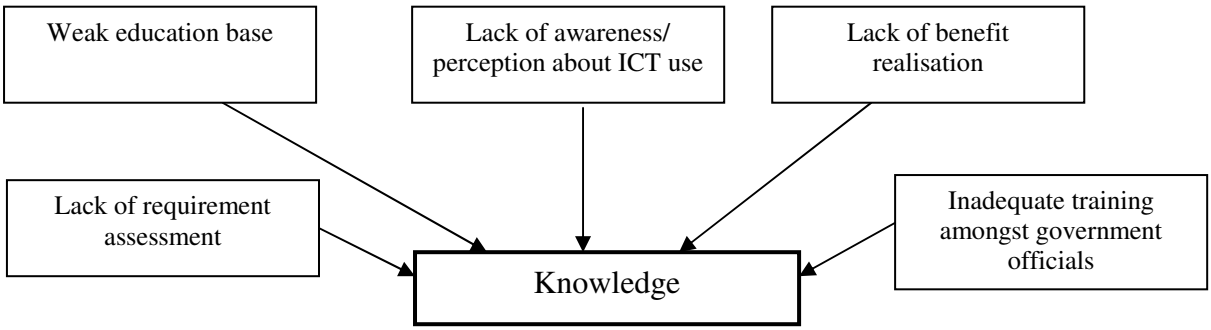

Figure 4: Components of Knowledge barrier

It was interesting to note that most of the discussions although resumed with other commonly known barriers, many of which ultimately ended up in lack of awareness and correct knowledge about ICT and its use, specially during the process of prioritization and evaluation. Some participants (FGD-2 and 3) cited the example of missing the great opportunity to be connected with the world by submarine cable in 1992, when AT& T offered free access to Bangladesh. It was due to the lack of correct knowledge and awareness, this milestone proposal was turned down based on the comment of government officials who thought it might be a security risk. Now after a decade, spending about 800 crore Taka it was connected recently. Thereby the country not only lost costly foreign currency but lost all these years which have taken country a lot behind in international race.

A weak and inadequate education system, especially in IS/ IT, is failing to produce the required and suitable workforce for the country. Also the public sector environment and institutional resource are not promoting such knowledge, as one of the respondents wrote "there's no knowledge base for supporting the eGovernment concept within the government". Some justification of this claim was observed in another FGD where a mid level government official raised the question "water resource ministry where there is no direct citizen dealing how eGovernment can be applied there?" Although in some cases clarification of such basic doubts used much of the FGD time, but it also reflected the general and similar perception held by many government officials. The common misconception has emerged largely because of the weak footing of the education system where ICT curriculum is still very limited and in most of the disciplines it is totally absent. As such, business value of IT and IS are not commonly understood even within the many tertiary educated people of the country as they still consider ICT a luxury. A respondent from the IT industry group (FGD-5) said "weakness in basic education system is a major barrier due to which graduates are not capable enough to take over the challenges of IT industry". Many of the government officials, who join the public service after studying in public universities, hardly come in contact with computers. As a result computer shyness and ignorance multiplied with existing work environment and business process inherited by legacy system. Even if some of them have interest usually they do not get support form superiors who are mostly traditional believer and non IT savvy. According to the international experts working in Bangladesh " The major problem with the legacy education system and the high officials in the public sector were educated 30-40 years back , when ICT didn't play any role, it is their kids and grand kids who are getting some ICT education…….". Continuing this discussion another participant said,

> *'Incidentally one of the most interesting cases we have when we get an email address from secretary, typically it is their son or daughter who checks the email for them, so when we have to send a confidential document or letter, we know inevitably their sons or daughter will check the email for them. So for them…., at their level, they feel they are not really integrated with technology or they should….". (FGD-4, 18 Dec 2005)*

There were plenty of examples cited about lack of awareness amongst top level government officials, where many of them either consider computers as a super typewriter or as a threat to their system. Another participant (FGD-4) said "Most of the government officers who are known as pro ICT they are actually pushing for hardware; more computers to use it mainly as typewriter and not beyond that". The same respondent went on saying "Leaders are not serious because there is no public awareness, if you look at the newspapers, ICT occupies a very unimportant corner that too mostly about hardware, many people think it's the kids play ……"

On the citizen side language appeared to be a major obstacle as English is not given much importance in the current education system, where computer's basic language is 'English'. The software industry leaders informed that they are loosing many international markets because of the language barrier, where neighbouring countries are taking lead in the competition. On the other hand many academics also do not feel comfortable with computers because of their skill and knowledge on IT. A participant concluded by saying,

> *"It is not necessarily lack of willingness or lack of sincerity, most people are very sincere about ICT but it is more of an understanding from management perspective of what these tools can bring to you as value … "(FGD-4, 18 Dec 2005)*

(2) Attitude and Mindset. After knowledge, lack of attitude and mindset was identified as second most important barrier by most of the groups, which includes the following sub factors:

- Motivation
- Confusion about novelty
- Resistance to change
- Not ready to accept new ideas
- Fear of unknown
- Fear of loosing job
- Lack of initiative.

The typical mindset especially amongst the decision makers and government officials are holding back ICT adoption in the public sectors, who are yet to be tuned with the modern ICT environment and work process. One respondent (FGD-4) termed mindset as an "operational arm" where another participant (FGD-2) commented "The government officials do not want to be under any controlling system like software".

(3) Political will and Leadership. Lack of political will and leadership scored the third highest point 79, where in terms of number of votes it was positioned 4th. A senior participant commented "Amongst all our leaders discussion about IT is a sexy thing; for last ten years they were giving lip service only, but hardly we see any change". Due to the lack of political commitment this sector is being ignored and given less priority in terms of financing and national strategy, as another respondent (FGD-7) said "There are lots of interests amongst junior level but the drive has to come from the top. Many a times junior's initiative dies down due to the lack of political will from the top".

(4) Lack of Planning and Strategy. ICT expert group of an international organization rated this one as the major problem where they emphasized on proper policy with implementable objectives in Bangladesh. Overall this barrier scored fourth. Although there is an ICT policy in place which is lacking in proper action plan and follow up. Absence of a long term and short term vision to make eGovernment a reality is still not seen. ICT is yet to be integrated with national strategy or plan a participant (FGD-4) commented "ICT unfortunately is not seen as a strategic resource here".

(5) Infrastructure. Expatriate Bangladeshis have identified it as the number one barrier along with attitude and mindset, which was interestingly not considered within first four by any of the groups in Bangladesh. Although some participants mentioned about legal infrastructure, knowledge infrastructure, and business infrastructure, but this group mainly consists of physical infrastructure, network backbone capability, broadband, internet connectivity, teledensity etc. Infrastructure although used to be considered as the most important barrier by many specially in the LDCs, the result in this study shows above mentioned barriers as more important than infrastructure.

(6) Bureaucratic Business Process. The legacy business process and the accountability of the public sector were identified as a problem by at least 10 respondents (about 25%) and ranked 5th in terms of its gravity. The components of this group are:

- Lack of Accountability
- Multi tier decision making process in public sector
- Corruption

(7a) Lack of Expertise and Professionals. Lack of experts and professionals was identified as an important barrier by academics and government group in translating and implementing of ICT projects. According to them, lack of skilled resources in system architecture and system planning, along with experienced

and skilled workforce in service support and troubleshooting are posing problem in implementing and sustaining the ICT use.

(7b) Socio-economic Condition. Another commonly known problem, socio economic condition of LDCs also did not get much prominence against other barriers where it was ranked 6th with 10 votes (24%). While discussing about economic condition of the government a top official (FGD-7) stated very strongly that "Resource is not a problem, your willingness is most crucial".

(8) Law and Rules. In one of the FGDs one government official raised doubt about the feasibility of ICT use as it contradicts with government rules and procedures including official secret acts which have been carried along from the British period and as such appear to be difficult to change. Legal infrastructure and administrative reform is a precondition for proper implementation of ICT oriented business process, which was more or less agreed upon by most of the discussants.

(9) Citizen Demand. Some participants, especially academics from other disciplines considered this as a major barrier, since the vast majority of people are struggling to fight for basic needs of life such as food, shelter, medicine etc. On the other hand the same participants where found not to be aware of the huge impact of ICT on overall economy. According to them, the voters and vast majority are yet to expose to ICT and its benefit and as such the politicians do not consider ICT as a strategic tool. But the discussants also acknowledged people use ICT when they are given proper exposure and when they see sure benefit in it. When the last SSC (Secondary School Certificate) exam result was given first time online in Bangladesh, many people had a skepticism that hardly anyone will use it, but experience shows there were long queues in front of the call center and cyber cafes wherever it was available across the country. Similarly when US DV Lottery procedure (Diversified Immigration Lottery) was changed into online submission of application from paper based, villagers traveled to district headquarters to send it through online. One ICT industry man also added that they had to import thousands of scanners overnight due to the huge demand, as photo scan was required for the visa application.

(10) Championship and Models. Lack of Championship and models was ranked 10th in this study where respondents from ICT industry and the international organizations only identified it as a barrier, where they argued that creating champions amongst the government officials with proper recognition can show path to others. It is the ICT champions from government officials in many other developing countries have created significant impact. But such championship amongst the government officials here is rarely seen. One respondent emphasized "demonstration through quantifiable measurement" which in turn can convince others and would create awareness.

In addition, participants also mentioned about weak focus on work process redesign and reengineering the systems, lack of reward and punishments, ownership problem due to the transfer of government officials, lack of IT support services, lack of commitment, absence of a dedicated organization to oversee the eGovernment/ ICT adoption, vested interest in project creation and implementations as other hindrances for ICT adoption in Bangladesh.

RELATIONSHIP AND INTERDEPENDENCE OF VARIOUS FACTORS

Through the extensive brainstorming discussion in different FGDs, all the possible barriers emerged, many of which ultimately led to lack of awareness and knowledge. A further analysis of different themes out of the discussions and qualitative data helped to build up the concept map (Figure 3) which shows the interdependence of various factors.

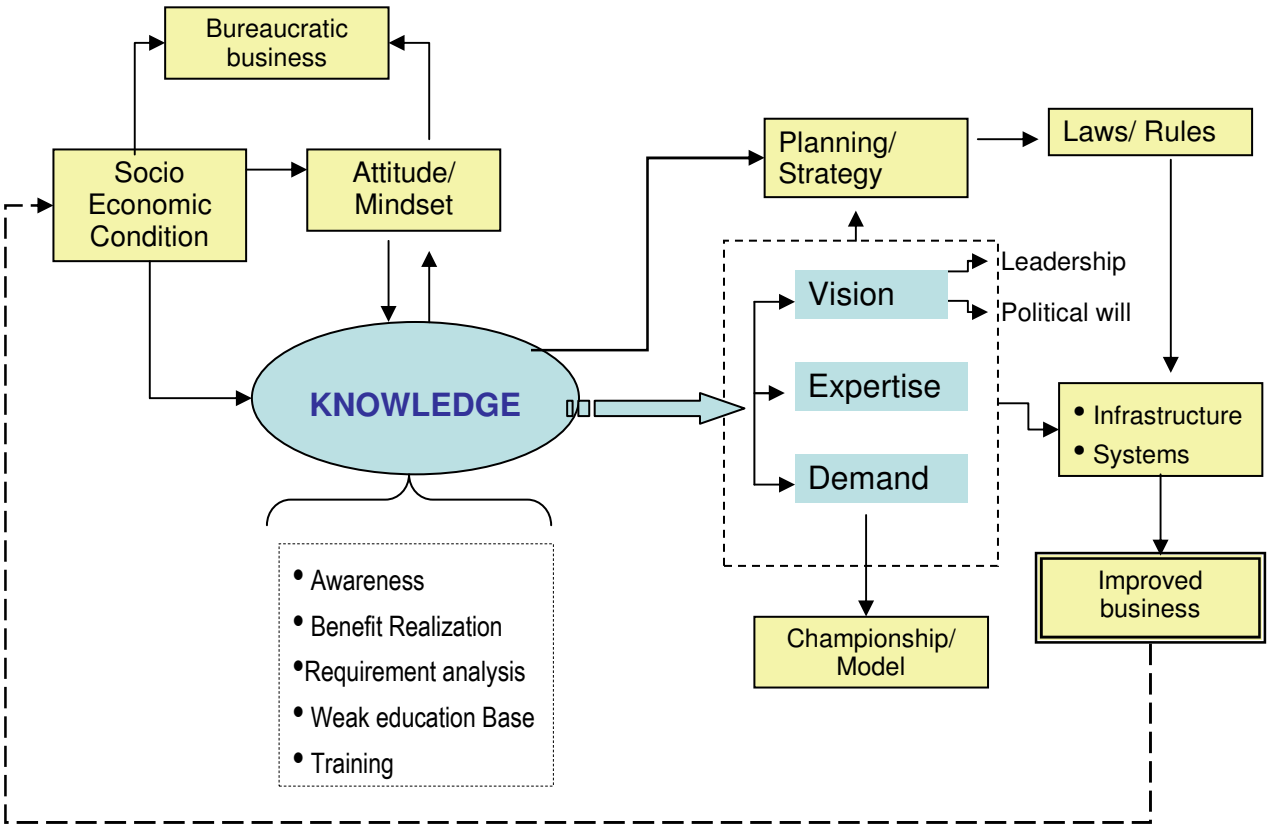

Figure 3: Relationship and interdependence of various factors

It may be mentioned here that only the factors and barriers which emerged from the different FGDs are used in this concept map. Knowledge is the center of focus which largely influenced by two factors; these are socio economic condition and attitude / mindset, whereas all other factors believed to be directly or indirectly the byproduct of knowledge factor. For example, lack of vision and strategy, which was commonly known as a major barrier in the context of LDCs, now appears to have close link with knowledge, as knowledge promotes vision and to formulate strategies good knowledge is essential. The question arises which comes first, is it 'knowledge' or 'vision'. Obviously many will argue with logic that knowledge is also a precondition of vision. The factors were also closely interlinked with each other, as one respondent said, "Infrastructure problem will be automatically solved if the demand is there, but to create demand training is required, people need to understand and see the benefit out of it" (FGD-7, 2005)

All these dependant variables (barriers or factors) contribute to build proper infrastructure and system which gives better output in the form of improved business process. This in turn through a reverse cycle improves the socio economic condition of the country which is usually the ultimate goal of any country.

CONCLUSION

This empirical study brought out new dimension in addressing the challenges of ICT adoption in the public sector of LDCs. The magnitude and prioritization of barriers helped in drawing a conceptual model showing their interdependency on each other. Lack of knowledge and awareness, which was found to be overwhelmingly the most influential barrier in this study, need to be addressed adequately to succeed in ICT adoption in the public sector of Bangladesh. However, the scope of this study did not permit to address more than one LDC and as such a comparative study from country to country could not be drawn. Moreover many other associated issues with ICT adoption in LDCs will remain unexplored in this study as it addresses on influences and barriers of the ICT adoption on public sectors only. Following this study it is anticipated that further studies will be conducted in more detail with regard to the interaction, dependency and coordination characteristics among various factors and players.

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APPENDIX 1 CATEGORIES OF STUDIES AND THEIR FOCUS

Developing Country Environment

Studies	Methodology	Geographic Setting	Study Focus/ Factors
Wong, P ,IEP, 2002	Regression analysis	Asia	Despite high share of global production of ICT goods **Asian countries lag** in ICT adoption comparison to non Asian countries
Zahoor, H , IGPJGIM , 1994	Field Case study	Pakistan	**Environmental related factor** often constrain the utilization of IT in LDC
Global Report, UN 2004 and 2005	Survey	World	**South and Central Asia** as a region is well below the world average e-readiness in including a greater **part of Africa**.
Montealegre, R, JMIS,1999	Multiple case study	4 Latin countries	**Every situation in LDC regarded as unique**, 221
Economy			
Korpela, M , IT4D, 1996	Case Study	Nigeria	The main difference of DC and LDC **is not the culture but of political economy.**
Rodriguez, F & Wilson , Infodev working paper , 2000	Case study	World	**Lack of economic environment** conducive to investment and a climate of civil liberties conducive to research and expansion of communication
Infrastructure			
Mbarika. V , EJISDC (2002)		Africa	**Teledensity infrastructure** is the precursor to the diffusion of ICT
Wresch, W, Idea 2003	Case analysis	LDCs	UNDP demonstrates **serious infrastructure problems** in each of the LDCs
Culture			
Hill & Straub, JGIB, 1998	Focus Group study	5 Arab countries	**Technologies are culturally biased** in favour of developed countries, hence socio culture conflicts occur while implementing in developing countries
Hagenaars, M, IICD 2003		Jamaica and Tanzania	**Socio- cultural aspects can be highly influential** in the adoption process of ICT
Straub, Hill, JGIM 2001	Survey	Arab Countries	Cultural beliefs and values differ markedly in terms of how they **construct meaning of technology** This study represents a viable new approach that **differs significantly from the Hofstede- styled cultural variables** studies.
Organizational Factor and/ Leadership			
Kandelin, Lin, Muntoro, JGIB, 1998	Survey	Indonesia	**Top managers' support** is considered by all to be the most important key factor for the successful development of IS.
Kalathil, 2001, FS Journal		Asia	**Authoritarian regime** shape the growth an diffusion of ICTs to their political advantage by exerting control an censorship
Summer, L, World Bank	Experience		Key difference between developed and developing nations is **institutional capacity**
Jain, Omega 1997	Case Study	Five SE Asian Countries	**Organizational factors contribute** IS Success in the context of LDC
Kelgai and Middleton , ITIRA 2003	Case Study	PNG	**Organizational and external factors have strong influence on** IS success **Lack of understanding, enthusiasm and literacy on IS among top management** leads to poor strategic decision.
Bhatnagar, S, EJISDC, 2000	Case Study	India	Major stumbling block is the **poor quality of governance and lack of participation by the poor in governance.**
Montealegre, R JMIS,1999	Multiple case study	4 Latin countries	**Institutional actions are valuable contributor** in all phases ICT adoption in LDC, 221

Serour and Seler, IFIPwg8, 2002	Case Study/ action research		Understanding the **existing organizational culture** has a direct and positive impact on the change ; Higher the percentage of people share **the org value** the less is the chance people resisting the change
OECD, 2003			**Leadership and commitment**, both political and administrative levels are crucial to managing change.

Bangladesh in Particular (Environment)

Studies	Methodology	Geographic Setting	Study Focus/ Factors
Rahman, A , JSTOR, 1974		Bangladesh	**Administration** (its values, patterns, leaders) dominated East Bengal's political environment from the beginning of British days whereas, now **the political party and interest groups control the administration.** Conflict: 1. **Ideology vs. technocracy** 2. Democratic aspirations vs. partisan institution building
BEI, 2004	Case Study of 45 Government department	Bangladesh	Lack of serious resolve , **sincere initiative and drive** were found to be significant problem; **proper planing** and genuine execution is also lacking
Taifur, 2004	Survey	Bangladesh	Lack of Adequate training (69%), Lack of adequate hardware (59%), Insufficient maintenance (55%), Lack of Telecomm facilities (37%)
Akbar, ITIra , 2002		Bangladesh	Efforts are being hindered due to lack of **strong and genuine political commitment at national level**
Ahmed, N			**Strategic planning** is essential to realize the vision of eGovernment ; firm commitment from political leaders is pre-requisite to embark on e-government

Govt Sectors of LDC's

Studies	Methodology	Geographic Setting	Study Focus/ Factors
Higgo, EJISDC, 2003	Case Study	Sudan	Lack of **systematic principle and procedures** in the manual and broader environmental system Embodies a complete **change in the working procedures**, managerial style and the culture of the organization. **-human resource management policy**
Avgerou, 1990			**Bureaucratic establishments**, pose virtually insurmountable obstacles for introducing and ensuring sustained use of IT
Ahlert, C. DOT, 2001		Asia	close relationship **between e-Government and administrative reform**

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