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Individual computer usage pattern and perception amongst the public sector officials in a least developed country: A descriptive study

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Abstract

While there has been considerable attention given to individual computer use in the developed world, studies on least developed economies, where the circumstances, context and issues are very different, are very limited. Furthermore, the typical characteristics of public sectors in least developed countries are often far different to those in developed countries, and to the private sector anywhere, particularly in the use of information and communication technologies. This paper explores the typical pattern of individual computer usage of the public servants in a least developed country, Bangladesh, with the help of descriptive data from 251 survey respondents. The broad picture emerging from this descriptive study is expected to help in understanding the perception of computers and the pattern of computer use in this special context, which is likely to contribute to strategizing and designing appropriate information systems and approaches.

Keywords

ICT4D, e-government, least developed country, LDC, Public Sector ICT, Individual computer use

1. Introduction

Information and communication technology (ICT) use in the public sector of least developed countries (LDCs¹) is a recent and evolving phenomenon, which is being recognized as an important agenda for these countries to survive in the 21st century's knowledge economy. However, the adoption and use of ICT in LDCs are not well studied. A stream of growing research on ICT in developing countries is currently emerging (Heeks, 2010). However, a large number of these studies focus on socio-economic and socio-cultural artifacts of ICT at country or organization level. While previous studies on ICT adoption in the public sector, or e-government, mostly focused on organizational capabilities, strategies and leadership issues, little has been explored on how the public servants interact with computers at individual level in LDCs. Similarly, while the pattern of individual use in developed countries is well documented, the same picture for LDCs is still scarce (Walsham, Robey, & Sahay, 2007). The pattern of

¹ LDCs are distinguished by the Economic and Social Council of the United Nations based on three criteria: per capita gross national income (GNI) under \$905, human assets Index (HAI) and composite economic vulnerability index (EVI) (UN OHRRLLS 2012).

individual usage can be expected to be different, because of the sharp differences in the context between developed and developing countries (Chen, Chen, Huang, & Ching, 2006). Many failures in the area of e-government (Heeks, 2003) reiterate the fact it is not the machine but man behind the machine is crucial for technology adoption in the organization.

The context in each LDC is unique in nature (Montealegre, 1999), implying uncertainty in terms of successful application of existing theories, developed and tested in western or developed country context (Higgo, 2003; Hill, Loch, Straub, & El-Sheshai, 1998). As such, context plays a predominant role in studying information systems (IS) in developing countries (Walsham et al., 2007; Weisinger & Trauth, 2002; Yap, Das, Burbridge, & Cort, 2006), where a closer look towards the nature of current use and perception is necessary for understanding the environment within which IT innovation takes place (Madon, 2003; Zafar, 2006). Knowledge of the differences of individual usage and perception is therefore crucial for researchers and practitioners.

There is also an absence of empirical studies in LDCs to describe the context sufficiently to undertake more in-depth and focused studies. Descriptive data helps to paint a contextual picture, which not only detects important issues but also contributes to designing culturally-appropriate strategies and information systems for LDCs. Very limited statistics are available and produced from national or international statistics to capture ICT readiness on a social scale of this nature, which is also difficult to gather because of structural complexity. The data used in this study were collected as part of a wider study (Imran, 2010) on ICT adoption in the public sector of Bangladesh, from the 251 public sector officials of different ranks and ages. This study aims to provide a rich picture of how public sector officials of a least developed country make sense of ICT tools and how it is positioned within their daily business interactions. This study is expected to make some contribution by painting a contextual picture that is missing for Bangladesh and similar countries.

2. Background

The entrenched attitude, values and characteristics of public sector officials in LDCs can be drawn from the Pre and Post-colonial theory (Collier, 1905; Guha, Ranajit, Spivak, & Gayatri, 1988; Rothstein, Huber, & Gaskell, 2006) and cultural theories (Geert Hofstede & McCrae, 2004). Most of the LDCs have inherited a public sector culture from the colonial era, with its strict hierarchical structure and complex multilevel channels of bureaucracy, where the relationship with the citizen is still mostly “govern and rule” (Higgo, 2003; Jamil, 2007; Kelegai & Middleton, 2002). Under strict regulatory frameworks, perceived ‘risks’ serve as an instrument to manage any institutional threats to the prevailing status quo (Rothstein et al., 2006).

While the differences in infrastructure, skill, uptake and literacy in LDCs are commonly understood, the differences in government structure, government culture and business processes that have been institutionalized through historical process are rather difficult to understand and explain. Often such differences are overlooked by IS practitioners, who adopt their familiar terminologies of management roles from the dominant organizational-type IS research (Avgerou, 1996). A particular cultural group is likely to act and behave based on their underlying values, which may be different to other cultural groups in similar situations (Zeffane, 1989).

Culture remains the inherent characteristic that differentiates organizations significantly (Schein, 2004). Of three cultures of organizations described by Lammers and Hickson (1979), the developing countries have the traditional type with paternalistic leadership, rigid rules and lack of boundaries between organizational and non-organizational roles. According to various cultural theories, a number of organizational variables including motivation, innovation and change, and communication are culture-dependent (Geert Hofstede, 2001; Tayeb, 1988; Thompson, Ellis, & Wildavsky, 1990). For example, in collective societies, like most of the LDCs, face-to-face contact is preferred over other forms of communication in official dealings (Higgo, 2003; Scheraga, Tellis, & Tucker, 2000).

The typical nature of public service culture inherited from the colonial era makes it quite distinct from other organizational innovation research (Imran & Gregor, 2010). Analysis of the case study data also shows that personal attributes such as age, education background and skill influence the attitude and mindset of government officials and people in general for ICT adoption and its use. Rogers (2003) also suggests personal attributes and individual characteristics such as age, gender and level of education often play an important role in the innovation process.

2.1 Country context: Bangladesh

Bangladesh, one of the 48 LDCs, is a thickly populated (162.2 million) small south Asian country. The history of Bangladesh dates back through four hundred years of British influence started through the East India Company in 1612. Bangladesh was officially under British rule from 1858-1947 as part of Indian sub-continent. The British colonial administration, which was imposed from the top, concentrated on establishing a centralized and strong executive administration (Jamil, 2007). The administrative culture of Bangladesh has some important characteristics that affect innovations like ICT initiatives. These characteristics stem from the fact that the bureaucracy of today's Bangladesh inherits its traditions and practices from the colonial period.

After the long British rule, no substantial reforms have been carried out by any government, whether in the Pakistan period (1947-1971) or since liberation from Pakistan in 1971. Political parties in power were reluctant simply because they could use the established institutions as tools for their own narrow and partisan purposes (Karim, 2008). For example, the parliamentary system in Bangladesh works in a very presidential manner. All the governments tended to evoke the imperial style of rule (as distinguished from governance) of the pre-colonial history (Karim, 2008).

In Bangladesh, especially in the public sector, ICT is not necessarily seen as a strategic resource. The perception and use of ICT mostly remains within word processing, as a replacement to manual type-writers. Prior research (Imran & Gregor, 2010) shows an incorrect perception about the novelty of ICT still persists on a large scale. ICT initiatives have been attempted in a piecemeal or an ad hoc fashion, where a comprehensive planning and strategy is missing as regards to how to address the whole issue. The research further showed that senior and mid-level

public servants/ managers play a key role in the successful implementation of new systems. These officers indeed can significantly influence the developing and shaping of an organizational culture that is receptive to new ways of working within the organization (Birchall & Giambona, 2008; Bunker, Kautz, & Nguyen, 2007).

Since a vast majority of the decision-makers in the Bangladesh public service are in the older age groups (above 45 group) with longer length of service, their perception and existing patterns of computer use are crucial for adoption and implementation of ICT in the public sector in Bangladesh, which is still struggling to have a workable modality or clear road map for ICT. As a result, outdated laws from the eighteenth century and age-old record keeping with stacks of paper and files is still a common picture in Bangladesh's public service (Figure 1).



Figure 1. An office desk of a clerk in a government office in Bangladesh
(Photo source: author, Date 04/07/2007)

On the contrary, like many other developing countries the private sector organizations in Bangladesh are much ahead in terms of ICT adoption and use, where many of them are involved in multinational business and outsourcing activities. These variations can also be attributed to their inherent differences in the motivation to compete in the market place, risk avoidance, lack of drive for innovation and legal and bureaucratic barriers (Caudle, Gorr, & Newcomer, 1991; Dawes et al., 2004; Kankanhalli & Kohli, 2009). The institutional inertia formed by the tradition and culture of a public sector organization seem to be deeply ingrained, which influences the public servants to remain contented with the status quo.

3. Method

A descriptive survey method was employed in this study with a view to draw a picture of readiness and current environment in relation to ICT adoption and use in Bangladesh. The advantage of using such survey is that it can accurately document the norm (Gable, 1994). The descriptive questions were designed based on a prior study consisting of a series of focus group

discussions (Imran & Gregor, 2010). The issues that emerged in the focus group were divided into two categories, underlying issues and surface issues. While underlying issues were tackled in another paper, the surface issues are further pursued through this descriptive survey.

3.1 Materials

Most of the questions were multiple-choice; where the questions required an answer on a Likert type five-point scale. Some questions involved respondents' views on how e-government and ICT are affecting working practices or the organization's structure and what is needed to improve its adoption and effective use. The survey questions were developed, improved and verified based on the previous research and also through consultation with research panel experts. The questionnaire was prepared in English as the target audience for the survey had English as second language. A summary of the survey topics used for this study is shown in Table 1.

Questions	Indicators	Purpose
Demography/ Personal characteristics (Section 1)	<ul style="list-style-type: none"> • Profession • Age • Length of service • Field of study • IT orientation 	Description of samples
Organizational Readiness (Section 6)	<ul style="list-style-type: none"> • The goals and objectives of the organization • IT policies and plans within the organization • Existing information systems applications within the org • The potential for IT to achieve a competitive advantage • Management/ Organization support • Top management encouragement • Computer usage in organization • Service/ expert support • Purpose of using a computer in organization 	Organizational readiness Individual IT usage and habit Picture of ICT environment
Individual opinion (Section 7)	<ul style="list-style-type: none"> • Identify most important barrier/ issue • Identify crucial factor in organization • Who should be responsible to manage IT in organization • Type of Human resource needed 	Views on important influences

Table 1. Summary of survey questions

3.2 Participants and data collection procedure

The survey was targeted towards the educated government officials (of various professions) in the expectation that they have some understanding and influence in the decision-making process in Bangladesh. In general, they are important stakeholders both from the receiving and delivery point of view for initial adoption of ICT in the public sector. Because it is usually the educated and upper class society who spearhead any innovation like ICT (Rogers, 2003). Typically, in countries like Bangladesh, the vast majority of the population, who are mostly illiterate with very

minimal understanding of ICT, usually follow the trend that the educated and the decision-makers set for them (Imran, Turner, & Gregor, 2008).

The survey respondents represent a wide range of individuals from different ministries and agencies. The survey questionnaire was disseminated only in a paper version because of the low accessibility to computers and cultural habits of the participants. Survey procedures were designed to assist in maximizing the response rates. Many of the survey forms were filled in while the respondent and researcher were sitting face-to-face and some were handed over to be filled in later. The researcher made no attempt to assist in the completion of the questionnaire, but this method increased survey completion compliance. Some respondents had to be reminded several times to complete the survey and some were not returned within the time frame of the study.

The survey was primarily targeted at senior government officers, which limited the overall population from which to draw a sample of 550. However, with the help of a few influential senior representatives of the government who were motivated and willing to help, 251 completed survey forms were collected from public servants between August 2007 and January 2008, representing a response rate of 46% (=251/550).

3.3 Analysis

Data was analyzed using SPSS which identified specific variables, missing value considerations, and formatting needs. Frequencies and percentages were calculated for different categories based on split files and cross tabulation. Some basic statistics such as the differences between percentages of a particular group and the reference group is used to illustrate the ICT readiness in Bangladesh. For clarity and better representation some graphs were produced using Microsoft Excel, after transferring data from SPSS. The report outputs as well as the derived variables were described, reviewed, and validated using standard SPSS features.

4. Results and Discussion

4.1 Respondents' demographics

Of the total 251 survey respondents, distribution of job roles shows that the majority were from the middle-management group (34%) followed by professional (18%) and executive roles (14%) (Figure 2).

More than 50% of these respondents are aged above 35 and only 6.10% of respondents are less than 25 years of age. While the majority of the respondents can be considered as highly educated, they are found to have very limited exposure to ICT and computers. The survey shows that about 60% respondents are Masters Degree holders and another 40% are graduates. Most of them are graduated from the public universities of Bangladesh (71 %) with the rest graduated from private universities, colleges or overseas.

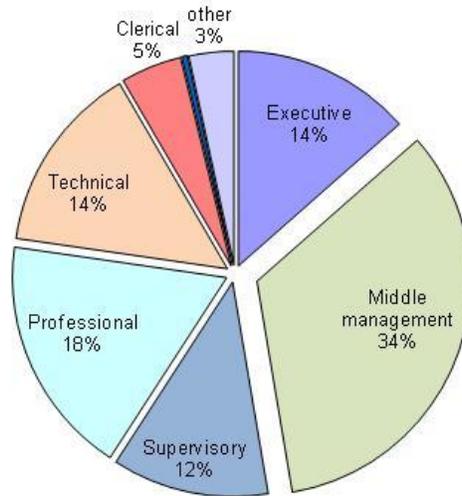


Figure 2. Distribution of job role

4.2 Computer education and skill

Amongst 251 educated government officials about 32% have not used a computer in their educational institution at all, while another 24% had only little interaction. Only 6% of overall respondents had significant computer training as part of their education.

The data shows that there is a correspondence between increasing age and decreasing level of computer education (Figure 3). It is good sign that the most of the younger respondents have received IT/Computer training. From Figure 3, 40% of the age group less than 25 reports a significant amount of IT/Computer training as a part of their education. This suggests that the country is increasingly emphasizing IT in its educational curriculum.

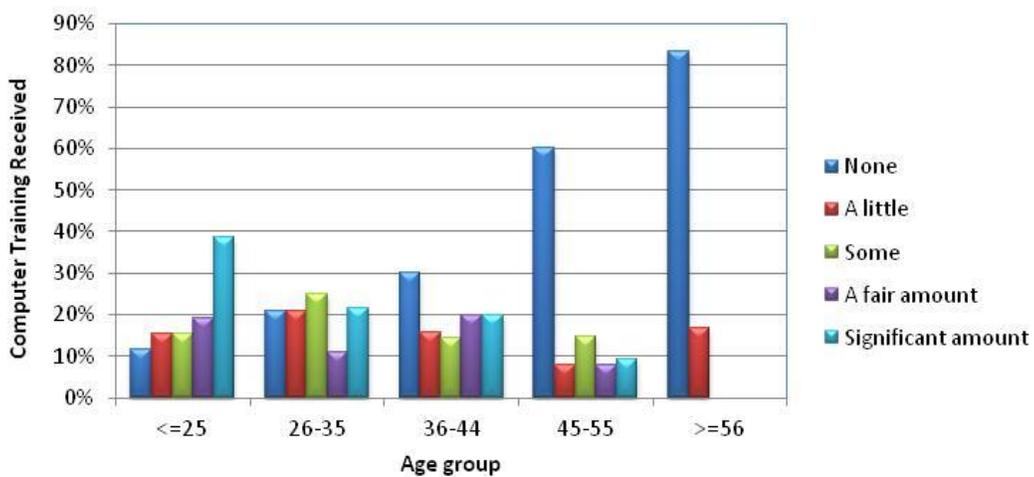


Figure 3. Computer education received by different age groups

Overall, computer skill training and its use, whether as part of education or formal training later, is extremely poor (Figure 4).

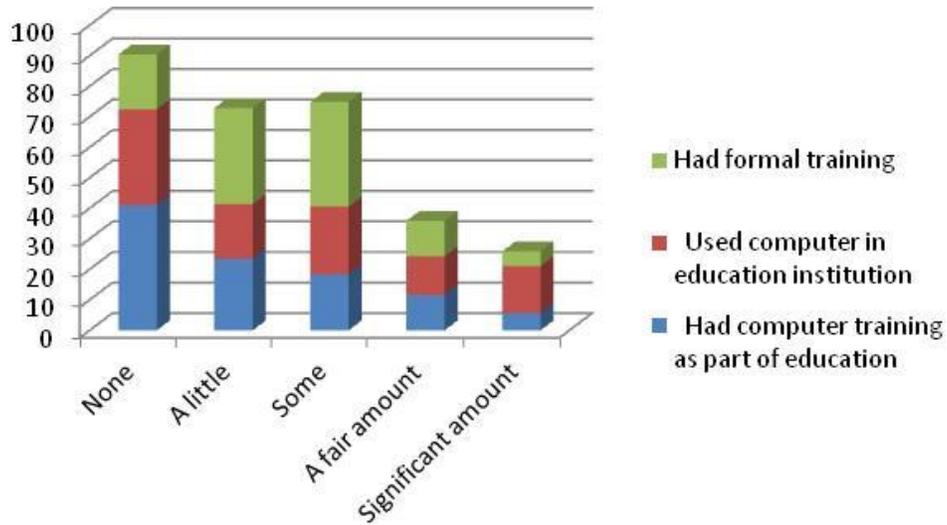


Figure 4. Computer skill training and use as part of education and formal training

From another perspective, if we look at where computer skill was derived, predominantly it is driven by self-initiative rather through the existing education system or organizational and vendor training (Figure 5). This may indicate the lack of a supply-side of training as well as a lack of organizational effort in capacity building of public sector officials in the area of IT.

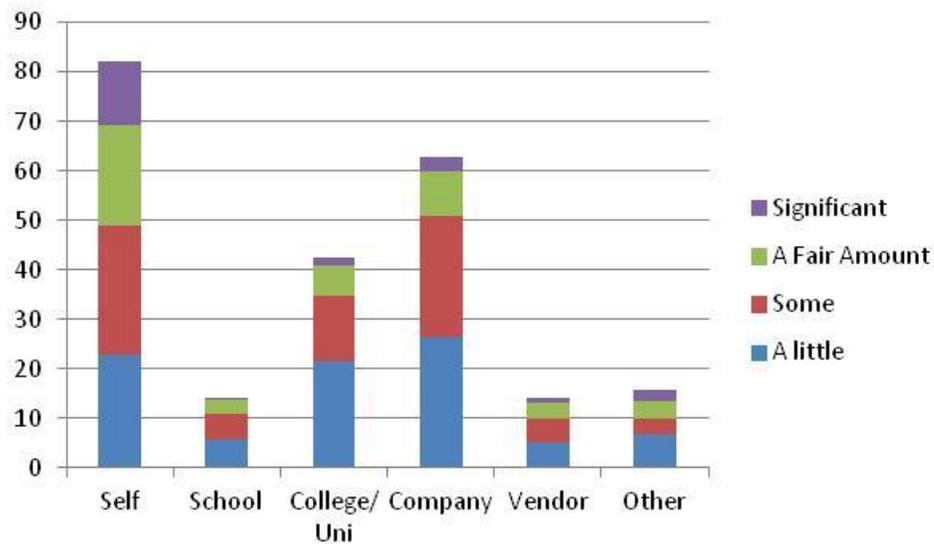


Figure 5. Source of existing computer skill amongst public sector officials

4.3 Individual interactions with computer

While a large number of respondents (32%) did not receive any computer training nor used computers during their education, a large number of these respondents (71%) have a computer in their home and in the work place (71%). This reflects that the computer is becoming essential home and office equipment in most of the educated and moderately solvent household and offices in Bangladesh. However, the question remains about its effective use and purpose, which is discussed in the following sub section.

4.3.1 Use of computer

Daily usage of computers across the office and out of office hours is shown in Figure 6. Government employees report relatively low use of computers. Their highest percentage of use in the office (35%) is confined to 1-3 hours per day. Office hours in Bangladesh are 8 hours a day. So, only one third of employees spend about a quarter of their office time with computer related work.

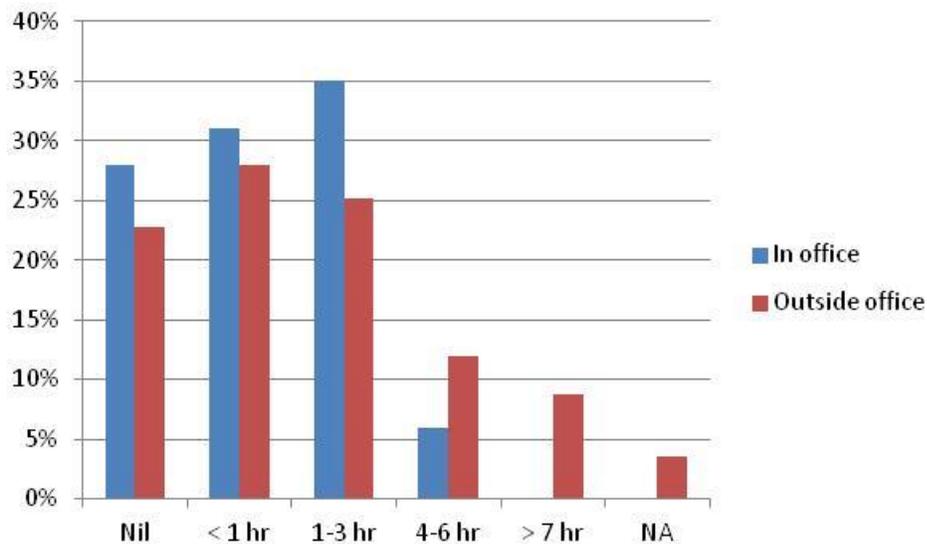


Figure 6. Computer use in a day (inside and outside office)

A good number of government officers spend time with computers outside office hours (1-3 hr, 25% and <1 hr, 27%). However, a significant number of government officials do not use computer at all either at office (23%) or outside the office (28%). The reasons for not using the computers are discussed later (Table 2).

The period of use shows that 72% (174) of respondents used a computer in the work place for the last 5.9 years (on average). This reflects computer use as a recent trend. However, their pattern of use widely varies, with 9.6% of respondents using a computer less than once in a month, 6.6% only a few times a month, and 14.8% a few times a week (Figure 7).

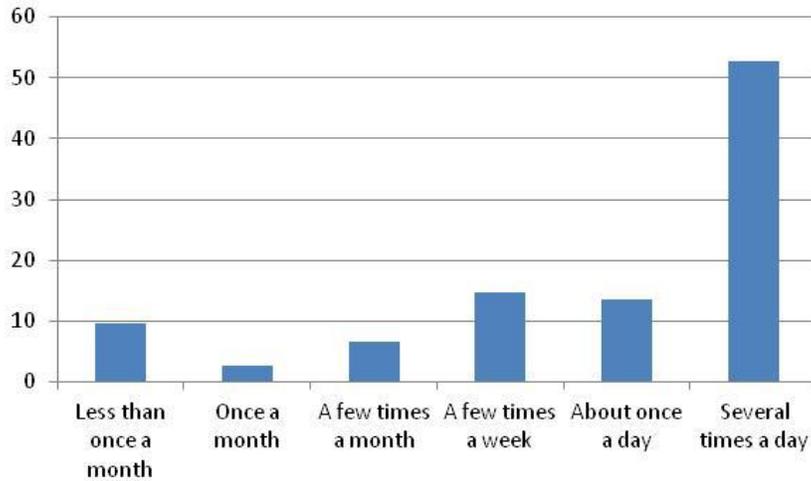


Figure 7. Use of computer for job-related work

Table 2 identifies the main reasons for not using a computer in the work place, where government servants' use of a computer has been hindered by lack of individual allocation and provision of computers (64.9%) followed by lack of computer skill and training (11.7%). The low percentage of category b and c (1.3% and 5.2%) is encouraging where government officials demonstrated a positive attitude towards computers. However, a number of people (9.1%) are concerned about the time and effort needed to develop skill in using computers. This suggests a more user friendly approach is needed to lower the burden of learning to use a computer.

Reason	Percentages
a. My organization does not provide me with a computer	64.9%
b. I do not know how a computer could help me in my organization	1.3%
c. I think computers cost too much to purchase	5.2%
d. I do not have the skills or training to be able to use a computer	11.7%
e. It would take too much of my time to learn to use a computer	9.1%
f. Other reason	7.8%

Table 2. Main reasons for you not using a computer at work

While the highest number of computer users in the work place fall in the above-45 age group (m=1.35), they are the lowest in their use of computers in job-related work (m=4.75). This statistic implies that the above-45 age group can more easily afford to have computers in their office or are provided with a computer for their rank, but they do not always have any official use of it.

4.3.2 Use of Internet

The statistics associated with the use of the Internet are provided in Figure 8. Use of the Internet did not vary significantly across age groups. However, 23% of total respondents still do not use the Internet at all for any purpose. Email was found to be extremely popular for Internet users, where only 46% use the Internet for work purposes. However, about 60% of them do not use email on a daily basis. The non-users were mostly divided between 'no accessibility' (42%) and

their ‘ignorance to use it’ (44%), when asked about the reason for not using Internet. Only 8% were found not interested.

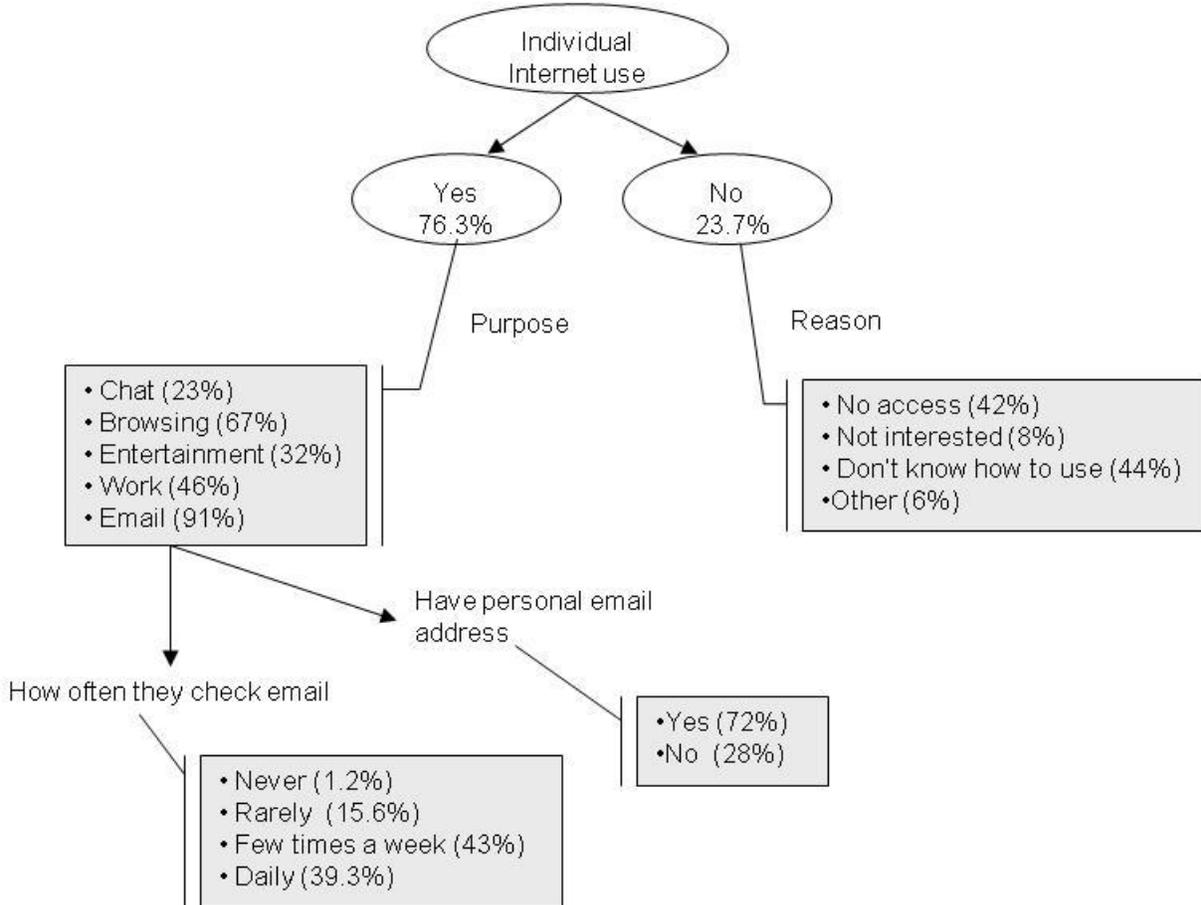


Figure 8. Classification tree of Internet use by the respondents

About 72% of the respondents have a personal email address, which was not common even a few years ago. However, it was interesting to note that the majority of the government officials use Yahoo! mail accounts (86%), whereas only 6 % use their organizational email address (Figure 9). It is common to find Yahoo! or other third party email domain in the official business cards of many bureaucrats and top officials.

4.5 Views on important influences

Often there is significant variation on perceptions, need and potentialities of ICT in the public sector and e-government between the policy makers, implementers and the primary user groups, i.e. the public servants. This variation of concept and perception significantly affects the outcome of e-government projects and often may lead to failure (Heeks, 2003). This section captures the respondents’ views on some important influences and issues surrounding ICT adoption in Bangladesh to confirm and increase our in-depth understanding of the reality.

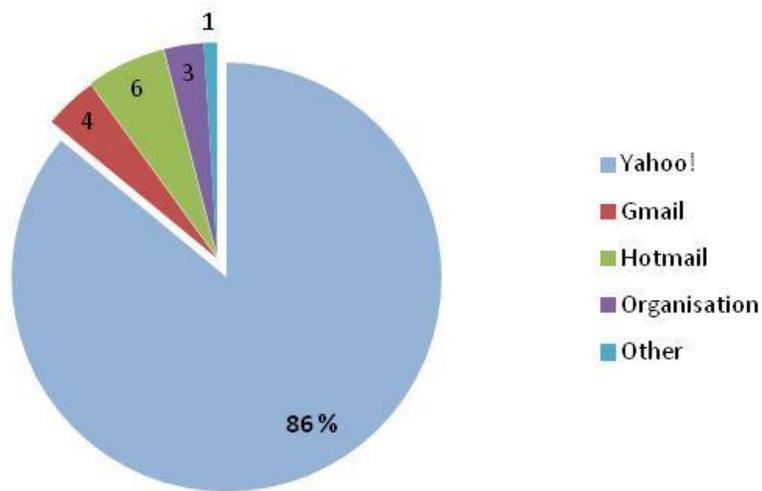


Figure 9. Distribution of email account used by the respondents

The respondents were asked eight questions on their personal views, which were designed based on the arguments from a previous qualitative study (Imran, 2010). The respondents were asked to choose one of four different options (found from previous studies and experiences) against the question how they view ICT. The options were (1) ICT is a tool for accessing information; (2) ICT is a combination of hardware and software, (3) a tool to achieve a particular task and (4) a super type-writer.

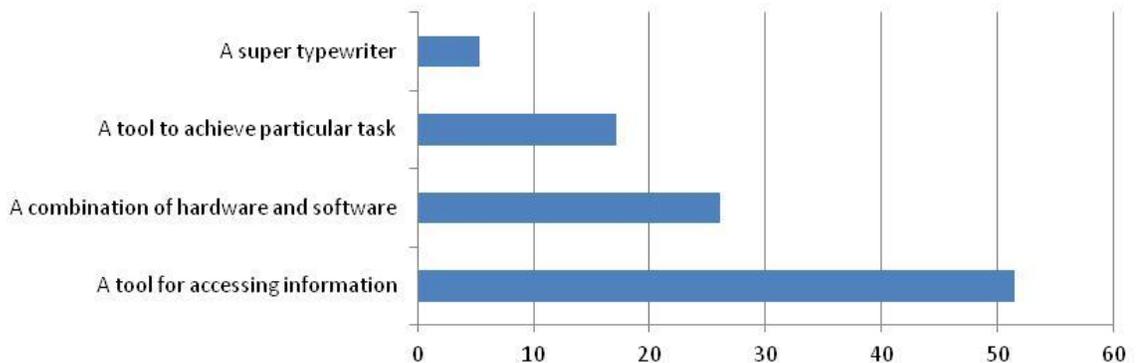


Figure 10. Statements that best explain ICT

Figure 10 shows the majority of respondents (52%), who are considered as the most informed population of the country of 162 million, view ICT more as a storehouse of information instead of a tool to perform a particular or complex task. This also reflects the use of the computer in the country which is, today, at the initial level of the information stage. Still, a significant number of respondents (26%) view ICT as the combination of hardware and software only, where a portion (6%) still think it as a super typewriter.

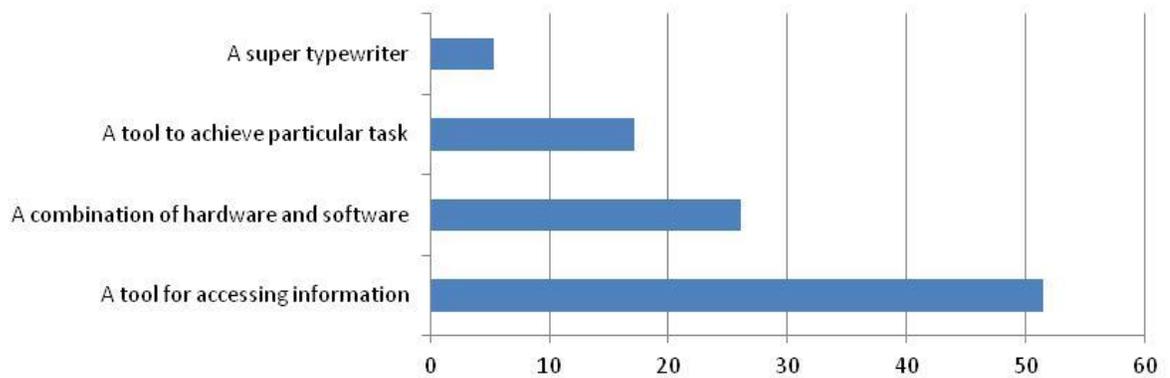


Figure 10. Statements that best explain ICT

Although ICT use in the public sector i.e. e-government is lagging overall, the basic concept about e-government is not as bad as might be expected amongst the public sector officials. In responses to the question on e-governance, respondents gave an encouraging impression about their awareness of this relatively new concept. A majority of the respondents (60%) chose the most appropriate definition out of the four; i.e. “increasing the efficiency of government service through the use of ICT”. 36% of the respondents believe in the popular misconception that e-government activities are limited to connecting citizens through online services.

The follow-up questions regarding the objective of e-government shows that the respondents have given priority to increasing efficiency and transparency compared to reducing corruption, which was third. The traditional view of government officials (that ICT is about developing infrastructure; i.e. techno-centric) has started to shift from the pre-conceived notion that gave more importance to building institutional capacity, to the development of knowledge structures and the creation of awareness. This change in their focus is encouraging (Figure 11).

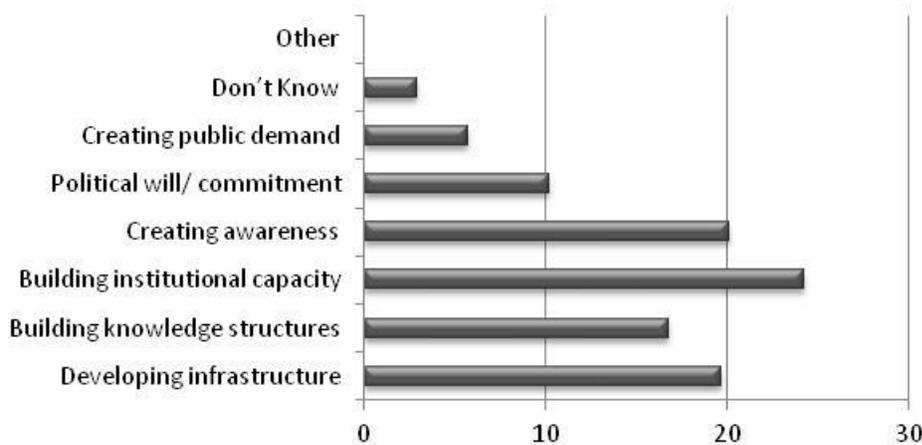


Figure 11. The most important issue for the organization

Against the question, “what is most crucial for ICT adoption at the organizational level”, top management decision was overwhelmingly regarded as the most crucial issue (50%), followed

by ICT infrastructure (20%), financial position (10%), demand (8%), business goal (4%) and the rest (8%) chose either don't know or other.

Against the question, “who should develop and manage the IT system in your organization”, the majority of the government respondents think a dedicated government organization should be responsible (56%) followed by reasonably strong support for in-house IT cell (33%) (Figure 12).

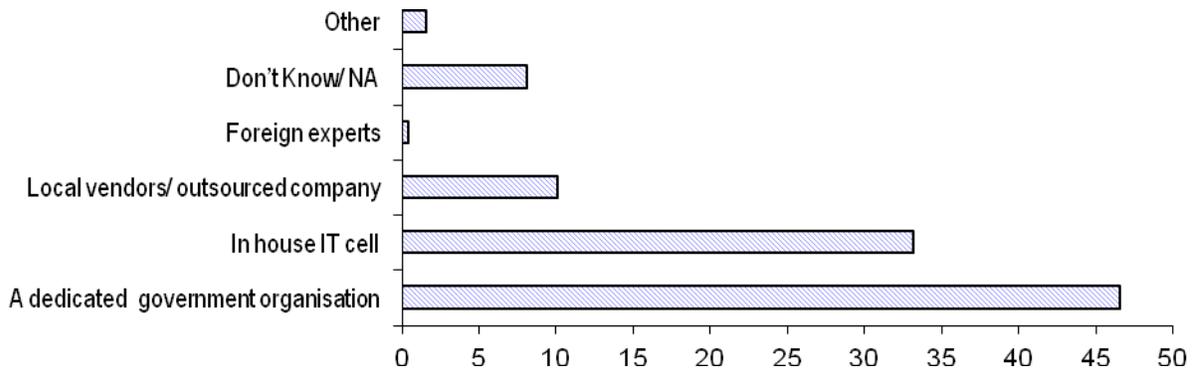


Figure 12. Who should develop and manage the IT system in an organization

In response to the question, “which ICT human resource is the most important and required in your organization”, the largest groups of the respondents (33%) have given the importance to software specialists, which presumably are based on the pre-conceived cultural notion that software specialists are able to solve all ICT problems. A good number of them (20%), however, identified the need for IT Strategists and policy makers. Hardware specialists were given low preference compared to the IT project manager, and system architect, while a number of respondents (12%) expressed their inability to identify the most important ICT human resource required for their organization (Figure 13).

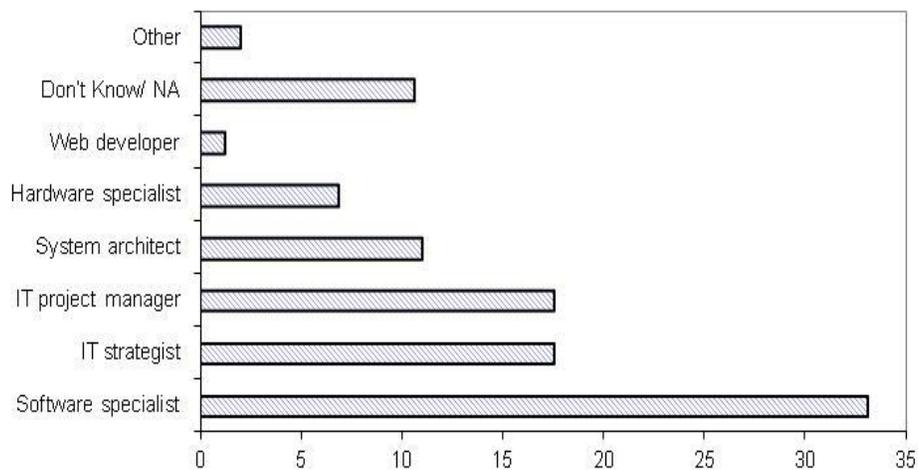


Figure 13. ICT human resources that is the most important and required in their organization

5. Discussions and Conclusions

The study gives a comprehensive overview of individual computer usage patterns and perceptions among the public servants in Bangladesh. Surveys of this nature are useful in portraying a snap shot of national ICT readiness and the environment prevailing in a country, which helps to address strategic and implementation issues more objectively. While a cross-sectional analysis has inherent limitations, the range of data presented here enables one to generate important insights into the current context. The various dimensions of statistics paint a typical perception of a public sector official in Bangladesh in regards to ICT adoption and its use.

Overall, ICT use in the work place was found to be a new and recent innovation in the public sector in Bangladesh, where its relevancy in the work context is still viewed with lot of skepticism, fear of the unknown and fear of losing authority and control. Specially the senior decision makers and the older generation (above 45) group, who had very limited knowledge and exposure to ICT, do not feel confident with ICT based business processes and automation of services (Imran & Gregor, 2010). However, a good percentage of the newer generation who had some exposure to ICT and ICT oriented training during their education, are found to be keen and interested in ICT based business processes and the use of ICT in their working environment.

Computer skill training both through formal organizational training as well as education system was found to be inadequate. However personal interest and self training amongst all level of officials were noticeable. While computer access is available in many cases, the officials do not necessarily spend much time performing any task through computer or making good use of the computers in the office. This may be due to the absence of ICT related business processes and systems beyond word processing, which is usually done mostly by clerical staff. The low rate of computer usage in the office suggests that most of the government business processes are non ICT based or manual systems. More attention was usually given to techno-centric approaches like buying hardware and computers for the office and not to the value-oriented business process reengineering and system automation (Imran & Gregor, 2010). Techno-centric view about hardware software even super typewriter still exists amongst many. As such use of ICT as strategic resource or an important vehicle of service operation and delivery is yet to be seen.

A public sector official in Bangladesh still works in a silo, not in a connected world, where about 60% of them do not use internet on a daily basis. This could be strikingly different than any public sector official in a developed country in this age. While about two thirds of government officials use internet in some form either in office or home, only 46% of them mentioned that they use it for work related purpose. Email is still not considered as an official document and most of the officials both for personal and official purposes use third-party email addresses like Yahoo!(86%), instead of using organizational email address or domain name.

More than half of the public servants (52%) conceive computer as “information store house” rather than a tool to accomplish complex tasks. While household computer availability amongst the public sector officials is on the rise (71%), their continued low level of use at work suggest that household computer use is restricted to other family members.

However with growing awareness about e-government, the message about the concept of e-government seems to be going through, where building of institutional capacity scored high preference followed by awareness and infrastructure. A dedicated government organization to oversee the e-government effort was preferred as the key requirement by most of the respondents to manage their ICT operation of the organization. On the other hand, the need for software specialists, IT strategists and IT project managers was considered as the priority human resources to help in transition to the e-government in Bangladesh.

While the computer usage is significantly low, it is not entirely uncommon for any early adopters of technology, as experienced by some of the developed countries during their early adoption phase. However, the deep-rooted culture and institutional inertia prevailing in the public sector organizations in LDCs need a long-term, slow institutional intervention rather than a 'quick win' radical change. The lack of training and lack of institutional initiative in developing proper human resources call for long-term institutional approaches and strategies to overcome IT adoption problem in the public sector of LDCs. Thus, the complexity of public sector organizational environments requires multiple and new approaches to increase understanding.

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