Typical Perception and Usage of Computers Amongst the Public Sector Officials in a Least Developed Country: Bangladesh Study

Ahmed Imran

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

1   Introduction

ICT use in the public sector of least developing countries (LDCs) is a recent evolving phenomenon, which is being recognized as an important agenda for these countries to survive in the twenty-first century's knowledge economy. ICT investment in infrastructures, training and learning can enable developing countries to increase their competitiveness as external and internal service provider [1]. However, its adoption and use in LDCs are not well studied. A stream of growing research on ICT in developing countries are currently emerging [2].

However, a large number of these researches focus on socio-economic and socio-cultural artifacts of ICT at country or organization level. While previous studies on ICT adoption in public sector or e-government mostly focused on organizational capabilities, strategies and leadership issues, little is explored on how the public sector officials interact with computers at individual level. Many failures in the area of e-government [3, 4] reiterate the fact it is not the machine but man behind the machine is crucial for technology adoption in the organization.

A. Imran (✉)
University of New South Wales Canberra, Canberra, Australia
e-mail: a.imran@adfa.edu.au

Successful e-government is often attributed to 20 % technology and the rest 80 % about people, processes, and organizations [5].

Further, while the individual user pattern in developed countries is well documented, the picture of LDCs is still scarce [6]. Again, the pattern of individual usage is also different, because of the sharp differences in the context between developed and developing countries [7]. Also the context in each LDC is unique in nature [8], implying uncertainty in terms of successful application of existing theories, developed and tested in western or developed country context [9, 10]. As such, context plays a predominant role in studying IS in developing countries [6, 11, 12], where a closer look towards the nature of current use and perception is necessary for understanding the environment within which IT innovation takes place [13, 14]. It was often noted that human infrastructure concerning the attitudes, knowledge and skills, particularly within the public sector are crucial to initiate, implement and sustain e-government initiatives [5, 15, 16]. Knowledge on individual usage and perception of important stakeholders is therefore important for researchers and practitioners.

One of the other motivations was the absence of empirical studies, which describe the context sufficiently enough to undertake more in-depth and focused studies. The descriptive data helps to paint a contextual picture, which not only detects important issues but also contributes in designing culturally appropriate strategies and information systems for LDCs. The study is thus aim to provide a rich picture—on how public sector officials of a least developed country make sense of ICT tools and how it is positioned within their daily business interactions. 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. This survey is expected to make some contribution in filling that gap, particularly for Bangladesh and similar countries.

The data used in this study were collected as additional data as part of a wider study [17] on ICT adoption in the public sector of Bangladesh, from the 251 public sector officials of different ranks and ages.

2 Background

The entrenched attitude, values and characteristics of public sector officials on least developing countries can be drawn from the Pre and Post-colonial theory [18–20] and cultural theories [21]. Most of the LDCs have inherited the 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" [9, 22, 23]. Under the strict regulatory frameworks, perceived 'risks' serve as an instrument to manage any institutional threats to the prevailing status quo [20].

While the differences in infrastructure, skill, uptake and literacy 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 [24]. A particular cultural group is likely to act and behave based on their underlying values, which may be different than other cultural group in similar situations [25].

Culture remains the inherent characteristic which differentiates organizations significantly [26]. Of three cultures of organizations described by [27], 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 [28–30]. For example, in collective societies like most of the LDCs, face-to face contact is more preferred than other forms of communication in official dealings [9, 31].

In particular, the typical nature of public service culture inherited from the colonial era makes it quite distinct from other organizational innovation research [16]. 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 [32] 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,[1] is a thickly populated (162.2 million) small south Asian country. The history of Bangladesh dates back through 400 years of British influence started through the East India Company in 1612. Bangladesh was officially under British rule from 1858 to 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. The administrative culture of Bangladesh has some important characteristics that affect innovation 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 in Bangladesh 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

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[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 OHRLLS 2012).

partisan purposes [33]. 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 [33].

In Bangladesh especially in the public sector, ICT is not necessarily seen as a strategic resource, where its use and perception mostly remained within word processing, as a replacement to manual type-writers. Prior research shows an incorrect perception about the novelty of ICT still persists on a large scale [16]. Initiatives were done in a piecemeal or on an ad hoc basis. Comprehensive planning and strategy is missing as regards to how to address the whole issue. It was seen, senior and mid level public servant/managers play a key role in the successful implementation of new systems [34]. They can significantly influence in developing and shaping an organizational culture which is receptive to new ways of working within the organization [35, 36].

Since a 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 is 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 of eighteenth century and the age old record keeping with stacks of paper and files still a common picture in Bangladesh's public service (Fig. 1).

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

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 they can accurately document the norm [37].

The descriptive questions were designed based on a prior study consisting of a series of focus group discussion [16]. The issues 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 eGovernment and ICT are impacting on working practices or the organization' structure and what is needed to improve its adoption and effective use.

The survey questions were developed, improved and verified based on the previous findings and also through consultation with research panel experts. The questionnaire was prepared in English as the target audiences of the survey understand basic English. A summary of the survey questions is appended in Table 1.

3.2 Participants and Data Collection Procedure

The survey was targeted towards the educated government officials (of various professions) who have some understanding and influence in the decision-making process in a least developed country, 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 [32]. It is seen in countries like Bangladesh, the vast majority of the population who are mostly illiterate with almost nil or very minimum perception about ICT, usually follow the trend that the educated and the decision-makers set for them.

The survey respondents represent a wide range of individuals from government officials belonging to 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 instantly sitting face to face and some were handed over to be filled in later.

Table 1 Summary of survey questions

| Questions	Indicators	Purpose
Demography/personal characteristics (Section 1)	• Profession • Age • Length of service • Field of study • IT orientation	Description of samples
Organizational readiness (Section 6)	• 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)	• 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

However, some had to be pursued and some were not returned within the time frame of the researcher's stay in the field of study.

The survey was primarily targeted towards government officers, which made it further difficult to have more in numbers. However, with the help of the senior and few influential representatives of the government office (who were motivated and willing to help), 251 completed survey forms were collected from government servants between August 2007 and Jan 2008, with 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 a standard SPSS features.

Fig. 2 Distribution of job role
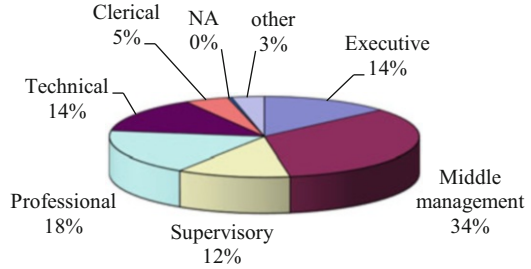
4 Results and Discussion

4.1 Respondents' Demographics

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

More than 50 % of these respondents are aged above 35 and only 6.10 % of respondents are within 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.

4.2 Computer Education and Skill

Amongst 251 educated government officials about 32 % of them 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.

If we dig deeper we can see most of the aged populations have not received any computer education as a part of their education program. However it is good sign that the most the young generations are receiving IT/Computer training. From Fig. 3 we can see around 40 % of the age group less than 25 has received significant amount of IT/Computer training as a part of their education program. This demonstrates that the country is increasingly emphasizing IT in their educational curriculum (Fig. 4).

Overall, computer skill training and its use, whether as part of education or formal training later is extremely poor (Fig. 4).
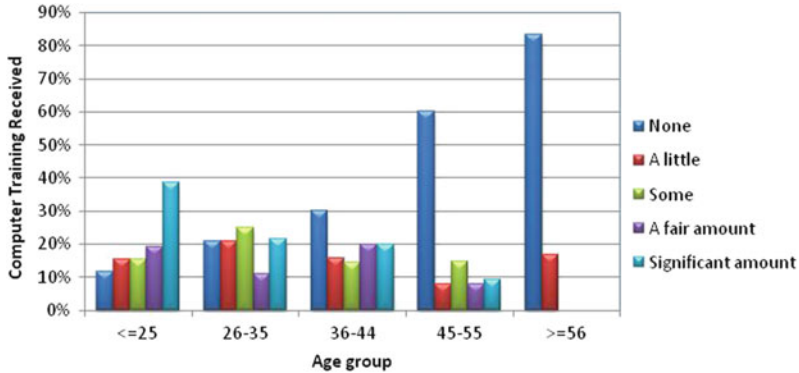
Fig. 3 Computer education received by different age groups
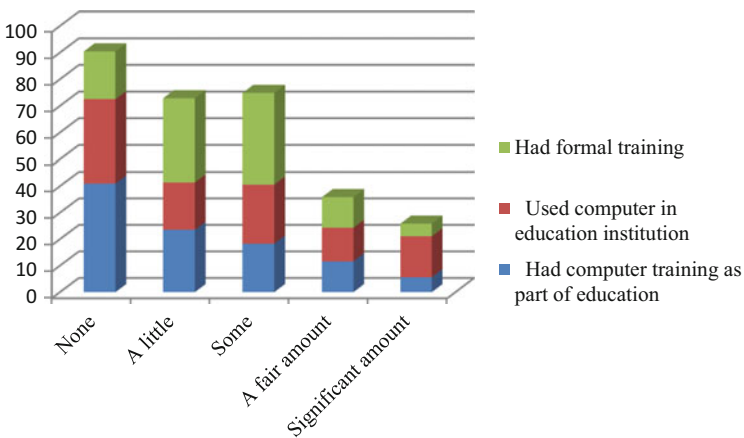

Fig. 4 Computer skill training and use as part of education and formal training

From another perspective, if we look at their sources of computer skill (ranging from little to significant), predominantly it is driven by self initiative rather through existing education system or organizational and vendor training (Fig. 5). This highlights the lack of supply side training as well organizational effort on capacity building of public sector officials in the area of IT.

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, interestingly a large number of these respondents (71 %) have a computer in their home and in the work place (71 %).
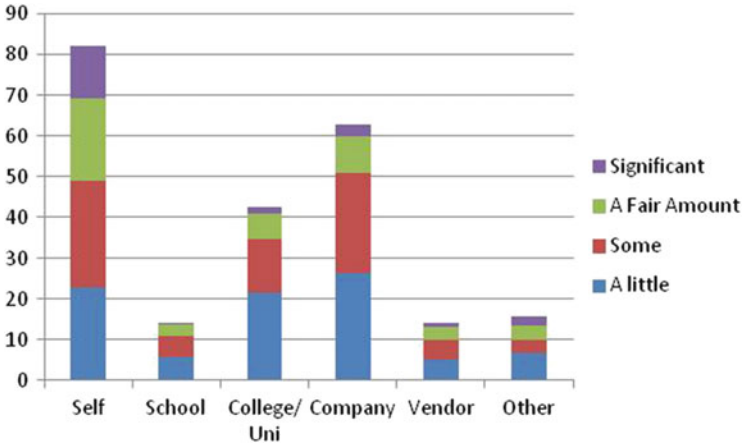
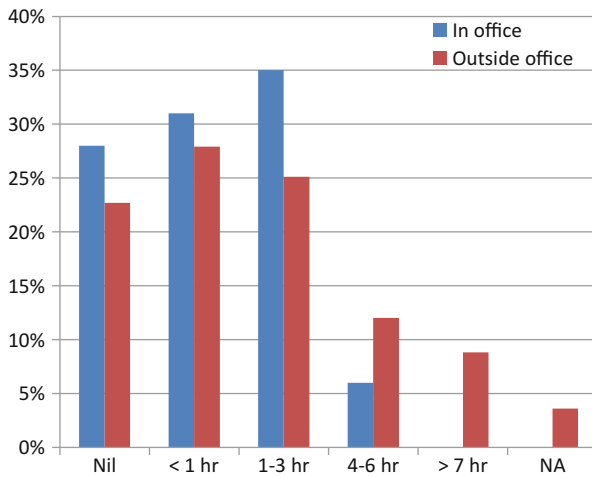**Fig. 5** Source of existing computer skill amongst public sector officials

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

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 Fig. 6. Government employees are found to be far lacking in this regard, where their

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

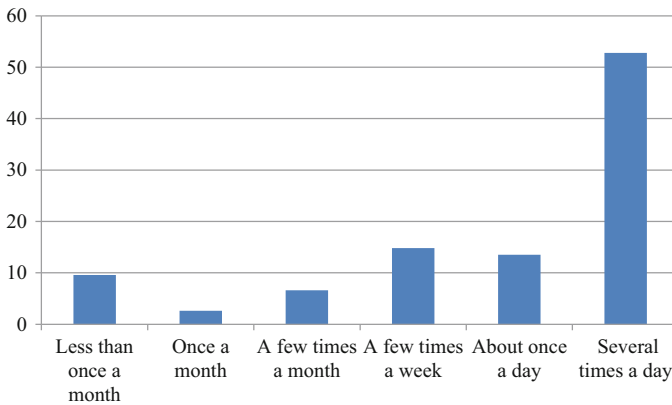| Reason	Percentages
a. My organization does not provide me with a computer	64.9
b. I do not know how a computer could help me in my organization	1.3
c. I think computers cost too much to purchase	5.2
d. I do not have the skills or training to be able to use a computer	11.7
e. It would take too much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

Fig. 7 Use of computer for job-related work

highest percentage of use in the office (35 %) is confined within 1–3 h in a day. If office hour in Bangladesh is 8 h a day, it is only one third employees spend their quarter of office time with computer related work.

However, a good number of government officers spend time with computers beyond their office hour (1–3 h, 25 % and <1 h 27 %). Still 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 dealt later in Table 2.

Another statistical measure (not shown in figure) reveals that 72 % (174) of respondents used a computer in the work place for the last 5.9 years (on average). This reflects computer use is a recent trend. But their pattern of use widely varies where 9.6 % of respondents use it less than once in a month, 6.6 % few times a month, 14.8 % few times a week (Fig. 7).

Table 2 identifies the main reasons for not using 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
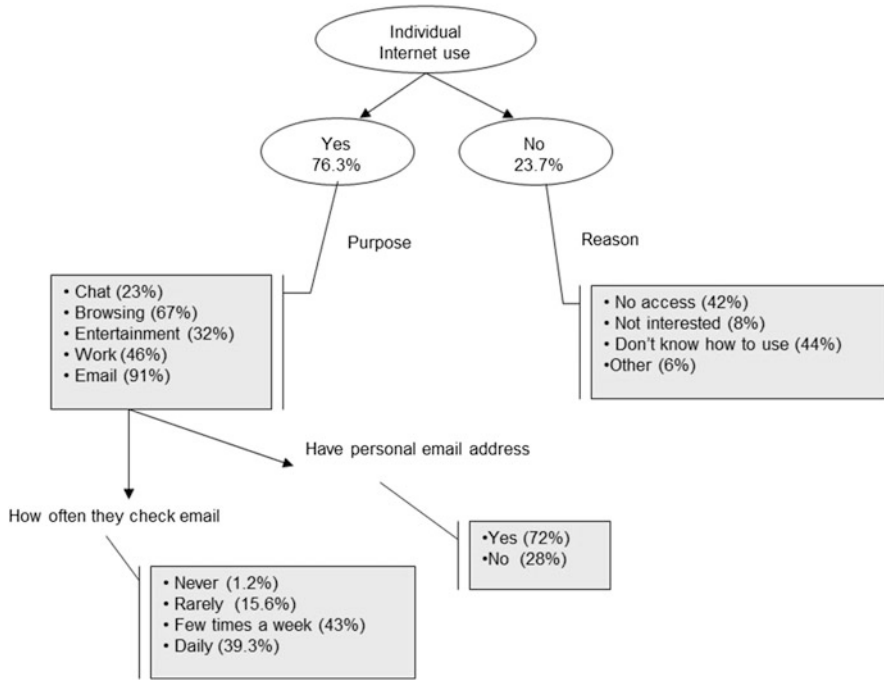
**Fig. 8** Classification tree of Internet use by the respondents

a more user friendly approach is needed to lower the burden of learning to use a computer.

It is interesting to note while the highest computer users in the work place is 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 the above 45 age group can afford more to have computers in their office, although not always they use it for any official purposes.

4.3.2 Use of Internet

The statistics associated with the use of the Internet are provided in Fig. 8. Use of the Internet did not vary significantly with the younger group 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 it 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.

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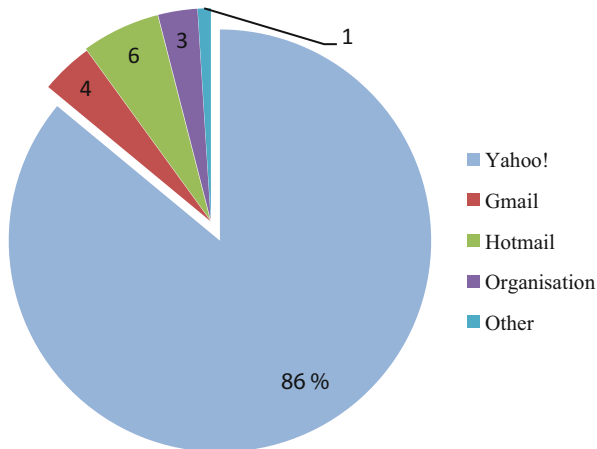
About 72 % of the respondents have a personal email address which was not
common even a few years ago. However, it was interesting to note that the majority
of the government officials use Yahoo mail accounts (86 %), whereas only 6 % use
their organizational email address (Fig. 9). It is common to find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

Only 20 % respondents have rated their Email skill as high and about 21 % rated
their skill as nil. Others were spread in between with low skill 11 %, medium 19 %
and fair 28 %.

4.4   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 impact the outcome of e-government project and often may
lead to failure. 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.

The respondents were asked eight questions on their personal views, which were
designed based on the arguments from a previous qualitative study [17].

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
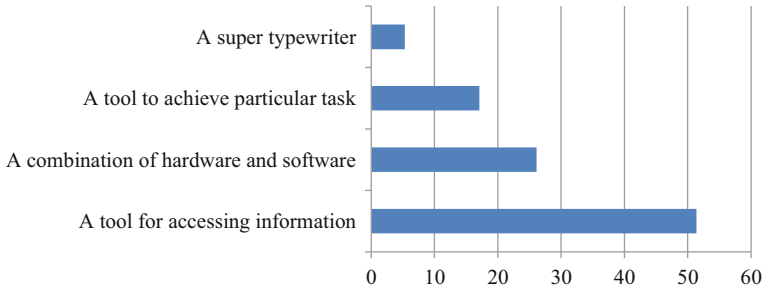hardware and software, (3) a tool to achieve a particular task and (4) a super type-
writer.

Fig. 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 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.

Although ICT use in the public sector is lagging, the basic idea about e-governance is not as bad as expected amongst the public sector officials. In response to a similar question on their view on e-government gave an encouraging impression about their awareness on this relatively new concept, where 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'. Thirty six percent of the respondents believe in the popular misconception that eGovernment activities are limited to connecting citizens through online services.

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

On another measure against the question (not shown in figure) 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 rest (8 %) either don't know or chosen other.

Against the question who should develop and manage the IT system in their organization, the majority of the government respondents think a dedicated government organization should be responsible (46 %) followed by a reasonable string support for in-house IT cell (33 %) (Fig. 12).

In response to the question which ICT human resource is the most important and required in their organization, the majority (33 %) of the respondents have given the
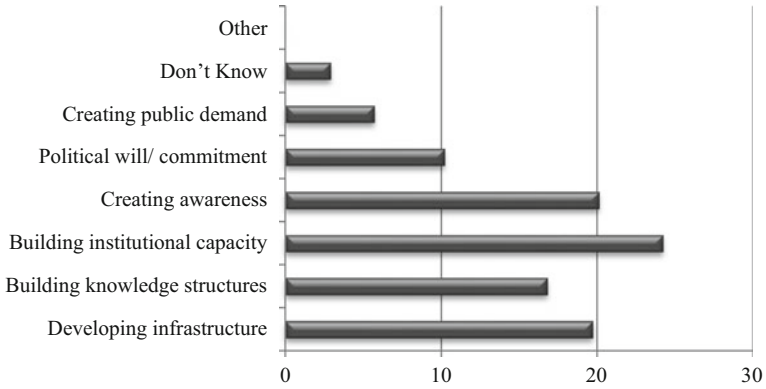
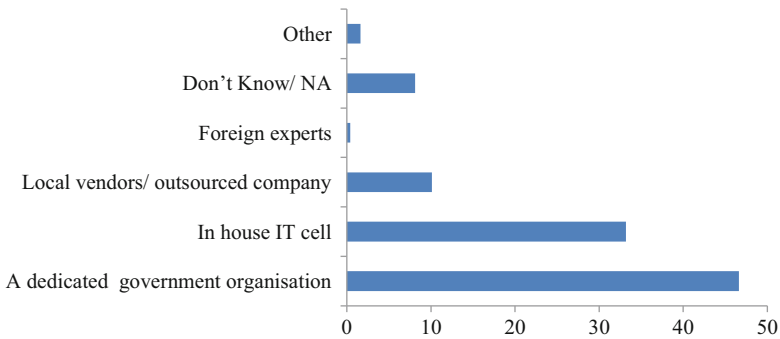**Fig. 11** The most important issue for the organization

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

importance to software specialists, which presumably is based on the pre-conceived cultural notion that—software specialists are able to solve all ICT problems. A good number of them (18 %) 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 also expressed their ignorance (12 %) to identify the most important ICT human resource required for their organization (Fig. 13).

5   Conclusions

The study gives a comprehensive overview on individual computer usage pattern and perception amongst the public sector in Bangladesh. Surveys of this nature are useful in portraying a snap shot of national ICT readiness and the environment prevailing in the country, which helps to address the issues more objectively.
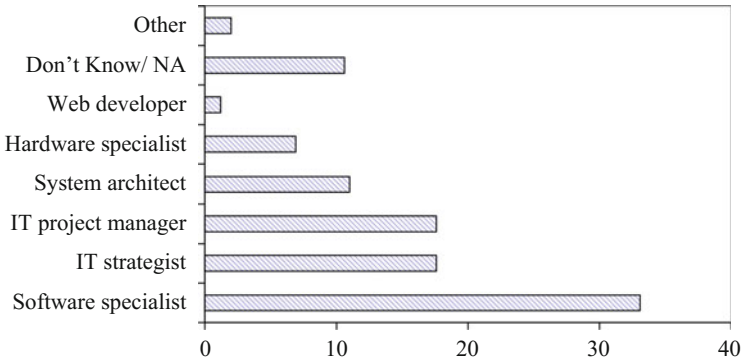
Fig. 13 ICT human resources that is the most important and required in their organization

While a cross-sectional analysis has inherent limitations, the quality of the data presented here enables to generate important insights into the reasons. The study as such was expected to serve as a source of rich detail for future studies.

While computer availability is on rise (71 %) but its use and purpose is far from satisfactory. This is largely because significant amounts of business process are still done through traditional and manual systems. Attention was usually given more on techno-centric approaches like buying hardware and computers for the office and not at the value oriented business process reengineering and system automation. A vast proportion of computer use still remained within the word processing or as replacement of typewriters.

While the lacking is huge it is not entirely uncommon for any early adopters of technology as experienced by some of the developed countries during the early adoption. 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 and 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.

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