An Investigation into Critical Determinants of e-Government Implementation in the Context of a Developing Nation

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Abstract. Over the last decade governments of many developing nations have undertaken initiatives to adopt e-Government. There is evidence that these nations faced many challenges during the phase of implementation. The aim of this research is to investigate the critical determinants associated with the implementation of e-Government in Bangladesh. The results indicate that currently there exist a high degree of political commitment and administrative leadership. What is required is to improve skills of the human resources within the implementing agencies, and to develop awareness of both public agencies and general citizens. The results also highlight that the implementing agencies must develop right organisational structures and formulate appropriate regulatory framework. Previous studies on e-Government predominantly used case studies and qualitative approaches. This is one of the rare studies which applied a quantitative method using data from four categories of stakeholders. The findings of the research can be applied in many developing nations.

Keywords: e-Government, Public sector, Critical determinants**,** ICM analysis

1 Introduction

There is evidence that a successful electronic-Government (e-Government) can facilitate speedy, transparent, efficient and effective interaction with citizens, businesses and other stakeholders [1, 2, 3]. As in developed countries, people and businesses in developing nations also require more efficient services from public sectors. Recently, many developing nations have undertaken initiatives to adopt e-Government. Studies suggest that a coordinated effort by political leaders, bureaucrats, and private entrepreneurs is important to facilitate the growth of e-Government [4].

The aim of this study is to investigate the critical determinants associated with the implementation of e-Government in Bangladesh. The paper is organised as follows. A review of literature on determinants preventing the implementation of e-Government is presented in section 2. Based on the literature review, a conceptual framework for e-Government implementation in Bangladesh is proposed in section 3. An outline of the research methodology is given in section 4. The results of the analysis are given in

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section 5 which is followed by a discussion in section 6. The paper ends with a conclusion and recommendation in section 7.

2 Literature Review

The implementation of e-Government in developing nations faces many challenges. For example, Ndou [5] suggests political commitment as the most important factor for the implementation of e-Government in developing nations. Dalal [6] views laws regarding openness as the backbone of the success for e-Government. Chen and Knepper [7] propose a set of elements for successful adoption of e-Government. Many other authors have contributed to this issue. Literature suggests that a vast majority of the studies used case studies and qualitative approaches. Based on the existing body of knowledge, our research classifies determinants into four categories, e.g. institutional, resource-related, access-related and legal aspects. Each of these categories is briefly discussed in the following sub-sections.

2.1 Institutional Factors

Institutional factors such as political commitment, administrative leadership and organisational structure are considered critical for e-Government implementation. For example, Coursey and Norris [8] and Koh et al. [9] view political commitment and appropriate organisational structure as the two key factors for e-Government adoption. A similar view is expressed by Kettle [10]. According to OECD [11], the most important element for successful reform is the strength and consistency of support from the highest political level. For any reform to materialise, political commitment is considered to be the most important success criterion especially in the context of developing nations [5, 12]. CEG [13, p.7] suggests that 'public sector leaders must embrace e-Government as a tool to transform and improve government and connect it to the people it serves'. Singh [14] asserts that the top officials within a department are the main driving forces for making any sustainable changes. Therefore, it is critical that they have a clear understanding of the definition and scope of e-Government. While political commitment is the milestone of any change, administrative leadership with effective management process is crucial [15]. A summary of the studies related to institutional factors is given in Table 1.

2.2 Resource-Related Factors

Resource-related factors such as technical, financial and human resources are critical for e-Government implementation. The shortage of IT skills is identified as a major constraint for introducing e-Government in developing nations [17, 18, 19]. Moreover, there is a lack of institutional support to develop expertise and skills related to e-Government application. Hence, many e-Government projects in developing nations suffer from acute shortages of skilled human resources [20, 21, 22].

Table 1. Literature related to institutional determinants

Higher level determinant	Determinants	Source
Institutional	Political commitment	Bonham et al. [4]; CEG [13]; Coursey and Norris [8]; OECD [11]; Kettle [10]; Koh et al. [9]; Mahmood [12]; Ndou [5]
	Administrative leadership and commitment	Coursey and Norris [8]; Kettle [10]; CEG [13]; Mahmood[12]; Koh et al. [9]; Singh [14]; Bonham et al. [4]
	Organisational structure	Hasan [16]; Koh et.al [9]; Coursey and Norris [8]; O'Dell and Garyson [15]

Generally, e-Government projects are inter-sectoral or inter-organisational in nature. Dawes and Pardo [23] suggest that inter-organisational projects often lack adequate financing. Caffery [24] highlights that resource-shared projects are often implemented on an ad-hoc basis where financial and man power supports are generally inadequate to sustain these projects. A similar view has also been expressed by Edmiston [25] and Norris et al. [26].

Technical capability is related to the computer hardware, software, and expertise required for implementing projects. E-initiatives demand investments for securing hardware, software, and expertise. Bonham et al. [4] and Bourn [27] indicate the lack of technical infrastructure as a significant barrier to deliver e-services. The ICT (information and communication technology) infrastructure in developing nations is generally weak and at the same time the use of ICT is low [28, 29]. Hence, the e-Government adoption becomes more challenging when sub-optimal use of available infrastructure is added to inadequate technical infrastructure [21, 30]. A summary of the relevant literature regarding resource-related determinants is given in Table 2.

Table 2. Literature related to resources issues

Higher-level determinant	Determinant	Source
Resource	Technical	Bonham et al. [4]; Bhatnagar and Bijorn-Andersen [28]; Bourn [27]; Dawes and Pardo [23]; MOSICT [30]; Taifur [21]; Yong [29]
	Human resources	BEI [22]; Chen and Gant [18]; Dawes and Pardo [23]; Heeks [17]; Moon [19]; Morshed [20]; Taifur [21]
	Financial	Caffery [24]; Dawes and Pardo [23]; Edmiston [25]; Norris et al. [26]

2.3 Access-Related Factors

Access related determinants in the context of e-Government implementation include education and basic technical knowledge, awareness, and purchasing capacity. According to UNDP [31] e-Government implementation efforts in Bangladesh have been facing challenges in three A's areas: Access, Awareness, and Applications. This report highlights that ICT (e-mail and the Internet) is still considered to be something meant for the elites in the society and the majority of the people are ignorant about the usefulness of ICT in their lives. The effective use of ICT requires not only literacy but also technical skills, computer literacy and language skills [32]. The importance of education and purchasing capacity has been highlighted in many studies [16, 20, 33, 34]. Heeks [35] suggests that e-Government has little relevance for a developing nation like Bangladesh where it is hard to satisfy the basic economic needs. While implementing e-Government in developing nations, the ability of the users to make use of the benefit of e-Government needs to be considered. For example, according to Thomas and Streib [36], digital divide may hinder users' willingness to use the websites. Further, Rice [37, p.74] cautions that the 'Digital divide among the LDCs appears to be widening despite globalisation, which are failing to keep pace with the growing ICT race of OECD countries'. Table 3 provides a summary of the studies related to accessibility issues.

Table 3. Literature related to accessibility issues

Higher-level determinant	Determinant	Source
Access	Education and technical knowledge	Fors and Moreno [32]; Rice [37]; Thomas and Streib [36]
	Awareness	Heeks [35]; Rice [37]; Thomas and Streib [36]; UNDP [31]
	Purchasing capacity	Cecchini and Raina [34]; Morshed [20]; Hasan [16]; Hossain [33]; Thomas and Streib [36]

2.4 Legal Factors

Legal barriers include regulatory framework, privacy and security. A sound legal or policy guidance with clear indications regarding accessibility of information and issues related to risk and trust is essential [38, 39]. The absence of legislation hampers a congenial environment for knowledge sharing. The regulatory framework for e-Government in Bangladesh is not adequate. An e-mail has no official value in the existing government and legal system. Cyber crime, electronic authentication are not protected by laws. Dalal [6] views laws regarding openness as the backbone of success of e-Government. Transparency and accountability mechanisms should be strengthened in the form of legislation, regulation and policy.

Breach of privacy and security may harm public trust in e-Government. Generally, trust determines whether or not users will choose to receive services through the Internet. Hence, organisations need to be aware that they have to be trustworthy in handing all information during the delivery of services. Kubicek [40] cautions that in order to achieve the goal of transparency and openness, the risk of breaking citizens' privacy may arise from ethical and legal perspectives. Another important aspect is the maintenance of official secrecy for the sake of so called national security and integrity. Regulatory provisions are often in place to control information flow and maintain confidentiality. Table 4 gives a summary of the literature related to legal issues concerning e-Government.

Table 4. Literature related to legal issues

Higher-level determinant	Determinant	Source
Legal	Regulatory framework	Dalal [6]; Lane and Buchanan [38] ; Marquette [41]; Rousseau et al. [39]
	Privacy	Dawes [42]; Dalal [6]; Edmiston [25]; Marquette [41]; Kubicek [40]; Rousseau et al. [39]
	Security	Belanger et al.[44]; Coursey [43] ; NECCC [45]

3 Conceptual Framework

Based on the discussion in section 2, a conceptual framework is proposed to assess critical determinants of e-Government implementation in Bangladesh. The framework is shown in Figure 1 which is described by twelve determinants and four higher-level determinants.

Four higher-level determinants are institutional, resource, access, and legal aspect related. Determinants included in the institutional, resource, and legal category represent the supply-side while determinants within access category represent the demand-side of e-Government implementation. Institutional weakness can be seen as lack of political commitment, administrative leadership, and unaligned organisational structure to introduce e-Government. Resource implies shortage of human resources in terms of skilled and trained professional, inadequate ICT infrastructure, and lack of financial support. Legal aspect includes inadequate regulatory framework and privacy-security concerns, and access denotes lack of education and technical skills, and awareness among the general people about ICT and lack of economic capacity.

4 Research Methodology

4.1 Respondents

The aim of this research is to identify critical determinants of e-Government implementation in Bangladesh. To address this objective from the real-world perspective,

respondents were chosen on the basis of their capacity to generate information ensuring that research objectives are met. Using a survey questionnaire a total of 65 senior officials was interviewed. These respondents hold key positions and work closely with broad range of e-Government efforts of the government of Bangladesh, including formulation of e-Government strategy, management of e-Government projects and development of change management programs. They were selected using convenience sampling plan and they belong to four categories of organization such as public officials and policy makers, implementing agency, ICT task force and development partners. The distribution of respondents is shown in Table 5. The survey was conducted in late 2008.

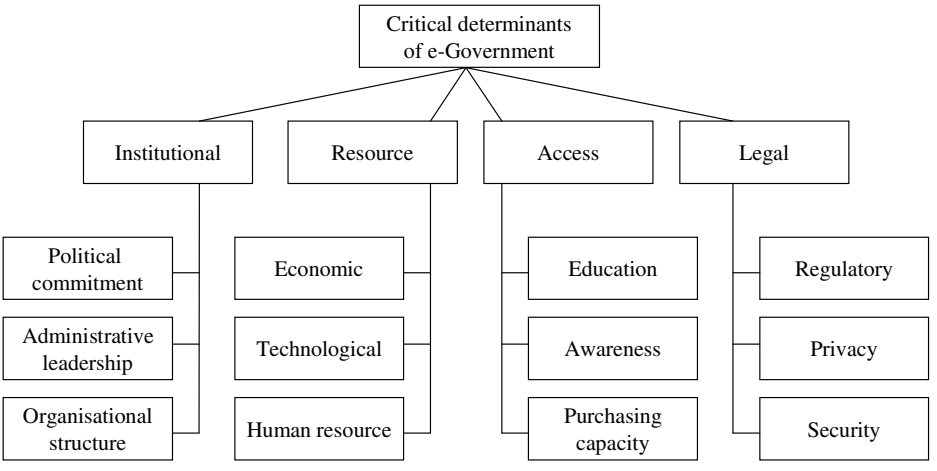

Fig. 1. The proposed conceptual framework

4.2 Data Analysis Method

Importance-Commitment Matrix Analysis. An Importance-Commitment Matrix (ICM) analysis uses a 2 X 2 format. An example is shown in Figure 2. The vertical axis represents the perceived importance of the determinants from low to high, and the horizontal axis represents the perceived commitment of the determinants from low to high. Thus, it generates four quadrants such as 'low priority', 'possible overkill', 'concentrate here', and 'keep up the good work' (Figure 2). This is one of the more widely known importance-performance gap-based methods proposed by Martilla and James [46]. The utility of the ICM analysis lies in its capacity to represent both importance and commitment perspectives with regards to the relative improvement priorities required in a competitive environment. In recent times the method has been applied widely in service operations. For example, Clarke [47] and Skok et al. [48] applied ICM type gap analysis to develop marketing strategies for organisations within the health care industry. Babakus et al. [49] applied the method to assess the perceptions of customers in order to improve the service quality of a catering firm and Lai and Cheng [50] applied ICM type analysis to assess supply chain performance in transport logistics.

Table 5. Distribution of respondents

Respondent category	Member	Description	Number of Respondents
Category-1	Public officials and Policy makers	Senior public officials who work closely with broad range of e-Government efforts of the government, including formulation of e-Government strategy, management of e-Government projects, and development of change management programs	44
Category-2	Implementing agencies		10
Category-3	Member, ICT Task Force and others	Representatives from the National ICT Task Force (highest ICT policy making body of the country). They are responsible to identify and priorities ICT-related needs. Within others are the representatives from selective professional groups such as Transparency International (Bangladesh), Anti-corruption Commission	7
Category-4	Representatives, Development partners	They are the representatives from different development partners who are actively involved in e-Government implementation in Bangladesh. They belong to organisations such as UNDP, World Bank, Asian Development Bank, and Asia Foundation.	4

The respondents were asked to provide their perception on the level of importance and commitment for each of the twelve determinants. A likert scale of 1 – 5 was used to measure the levels of importance and commitment.

5 Results of Analysis

The ICM analysis was applied to twelve determinants of e-Government implementation in Bangladesh. The analysis was conducted in the following manner. The mean

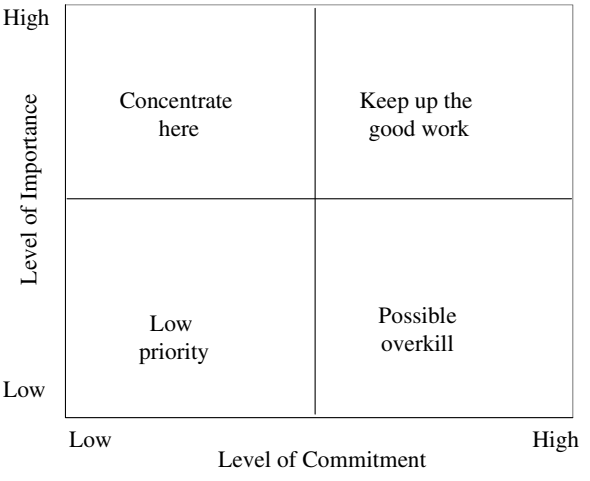

Fig. 2. Importance-Commitment matrix [46]

values for twelve assessment determinants on importance and commitment were calculated. A *t*-test was conducted to ascertain the significance of difference between what is important and what has so far been committed for e-Government implementation as perceived by the respondents.

As is apparent from the analysis that the top three determinants as perceived by the respondents are 'political commitment' (mean = 4.88), 'human resource' (mean = 4.80), and administrative leadership (mean = 4.37). From the commitment perspective, the top three determinants are political commitment (mean = 3.46), economic resource (mean = 3.24), and administrative leadership (mean = 3.05). Overall, the mean importance values of all determinants are higher than the mean values of commitment except for the 'economic resource' and 'technical resource' determinants. These differences are found to be statistically significant for all determinants except for the 'technical resource' determinant (see Table 6).

Table 6. Mean and standard deviation of determinants' importance and commitment ratings

	Determinant	Importance		Commitment		Performance - Commitment	
No.		Mean	SD	Mean	SD	Mean	t-value
1	Political commitment	4.88	0.33	3.46	0.71	1.42	14.59*
2	Administrative leadership	4.37	0.49	3.05	0.81	1.32	11.22*
3	Organisational structure	4.14	0.58	2.11	0.36	2.03	23.91*
4	Economic resource	2.98	0.60	3.24	0.49	-0.26	-2.64 **
5	Technical resource	3.03	0.47	3.04	0.44	-0.01	-0.10 +
6	Human resource	4.80	0.50	2.50	0.50	2.30	26.23*
7	Purchasing power	3.10	0.30	2.80	0.60	0.30	2.96**
8	Education	4.00	0.30	2.40	0.60	1.60	19.66*
9	Awareness	4.70	0.60	2.70	0.60	2.00	18.10*
10	Regulatory framework	3.98	0.33	1.90	0.61	2.08	24.31*
11	Security	3.91	0.34	1.68	0.77	2.23	21.32*
12	Legal	3.74	0.44	1.64	0.65	2.10	21.60*

* significant at 0.001; ** significant at 0.01; + not significant.

Similar analysis was conducted for the higher-level determinants. The results show that the most important higher-level determinant is 'institutional' issues (mean = 4.46), followed by 'access' (mean = 3.93) and 'legal' aspect of e-Government implementation (mean = 3.88). The least important higher-level determinant is 'resource' (mean = 3.60) (Table 7), whereas, the current commitment- level is highest for the 'resource' determinant (mean = 2.93), closely followed by the 'institutional' determinants (mean = 2.87). The respondents perceived that currently the least commitment is being given to the 'legal' aspects of e-Government (mean = 1.74). The difference between means of importance and means of commitment are statistically significant expect for 'resource' (Table 7).

Table 7. Mean and standard deviation of higher-level determinants' importance and commitment ratings

	Higher-Level determinant	Importance		Commitment		Importance - Commitment	
No.		Mean	SD	Mean	SD	Mean	t-value
1	Institutional	4.46	0.38	2.87	0.4	1.59	3.49*
2	Resource	3.60	1.04	2.93	0.38	0.67	1.06+
3	Acecess	3.93	0.80	2.63	0.21	1.30	2.71*
4	Legal	3.88	0.12	1.74	0.14	2.14	19.83**

* significant at 0.001; ** significant at 0.01; + not significant

The overall mean values of importance and commitment were calculated. The low and high values used to draw the vertical and horizontal axis were decided based on the relative rather than the absolute levels of importance and commitment. The position of the cross-hairs that divide the matrix into four quadrants is critical as it since influences the interpretation of the results (Figure 3). Since mean and median values are close, mean values were used as the dividing points in this study, to avoid discarding useful information [46]. Twelve determinants of e-Government implementation that were located in the four quadrants of importance-commitment map are shown in Figures 3. The analysis shows that two determinants fall into quadrant 'low priority', three into 'possible overkill', two into 'keep up the good work', and five into 'concentrate here' category. Figure 3 also shows an iso-rating line, where commitment equals importance. The distance from the iso-rating line is the gap identified in Table 6.

6 Discussion

This study provides an assessment on the determinants of e-Government implementation in Bangladesh. The results indicate that the current commitment level perceived by the respondents is lower than the importance level. Ten out of twelve determinants' commitment ratings are lower than their corresponding importance ratings. The gap between importance and commitment of a specific determinant indicates its strength or weakness. The largest two gaps identified are for determinants such as 'human resource' and 'security'.

The distribution of twelve determinants is shown in Figure 3. Determinants in the quadrant 'high importance and high commitment' indicates that existing system have strengths in these determinants and it is government's responsibility to make sure that

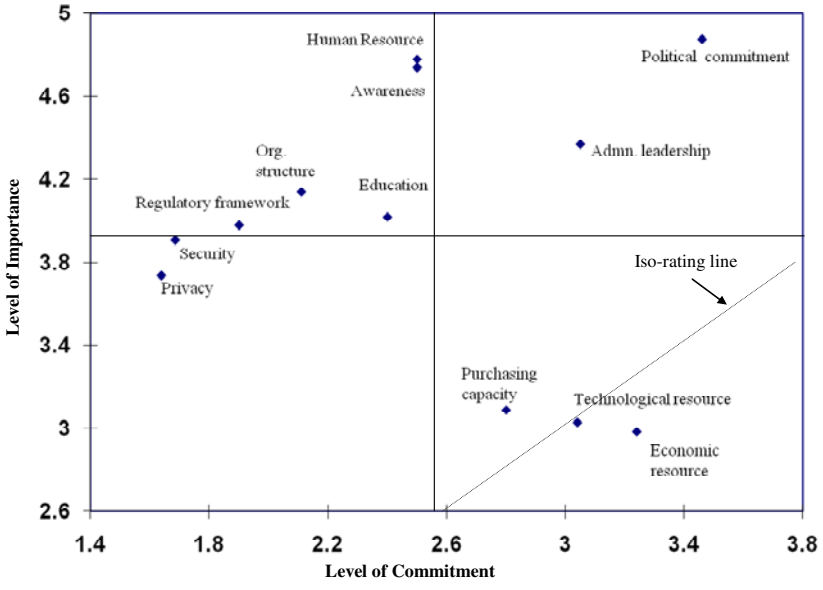

Fig. 3. An importance-commitment matrix for e-Government in Bangladesh

these important determinants remain in this quadrant. This quadrant is termed as 'Keep up the good work'. Determinants such as 'political commitment' and 'administrative leadership' fell in this quadrant.

On the contrary, two determinants such as 'security' and 'privacy' fell in the 'low priority' (low importance and low commitment) quadrant which indicates that at the current situation the policy-makers are not required to assign a great deal of importance to these two determinants while implementing e-Government in Bangladesh.

The 'concentrate here' quadrant of the ICM map represents the determinants which needs more attention. Determinants such as 'human resource', 'awareness, 'oganisational structure', 'education' and 'regulatory framework' fell into this quadrant**.** These determinants are highly rated in importance but were rated low in commitment scale, and hence should be given top priority. What it means is that for successful implementation of e-Government in Bangladesh a further improvement of skills of human resources within the implementing agencies, and development of awareness of both public agencies and general citizens through education and training is critical. The results also indicate that the implementing agencies must develop appropriate organisational structure for e-Government implementation and formulate appropriate regulatory framework for monitoring the system. In general, implementation of e-Government urgently requires the determinants belong to 'concentrate here' along with the factors under the 'keep up the good work' quadrant.

Finally, the quadrant 'possible overkill' denotes low importance and high commitment. Out of twelve determinants employed in this study for e-Government implementation, three determinants fell in this quadrant. These are 'purchasing capacity', 'technological resource', and 'economic resource'. This shows that relatively more resources than necessary are committed towards these determinants. It would be more useful to divert some of the resources from these determinants to elsewhere.

7 Conclusion and Recommendation

Based on extensive literature, a framework for e-Government implementation has been proposed with twelve determinants and four higher-level determinants. Data were collected against these determinants using 65 respondents who belong to four categories of organisations such as government policy makers and public officials, development partners, implementing agencies, and ICT task force members. Twelve determinants of the proposed e-Government framework were subjected to the ICM analysis. This research is one of the rare studies which apply a quantitative approach using data from four categories of stakeholders.

The results indicate that from the supply perspective the critical determinants of e-Government are political commitment, administrative leadership, human resource, organisational structure and regulatory framework. The critical determinants from the demand perspective include education in general and education in IT in particular, and awareness. It appears from the results that currently there is a high degree of political commitment, and administration leadership to introduce e-Government in Bangladesh. From these results the following recommendations can be suggested:

- build awareness of e-Government among government officials through training.
- develop awareness and improve access to citizens: e-Government to be accessible to all users, the government should invest resources and introduce necessary policies to extend ICTs.
- recruit ICT skilled human resource in government agencies to ensure the sustainability of the projects.
- Develop appropriate organisational structures for e-Government implementation and formulate appropriate regulatory framework for monitoring systems.
- results of this research can easily be transferred to other developing nations.

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