

# Evaluating Government Service: A customers' Perspective of e-Government

Subhajyoti Ray and V. Venkata Rao  
Indian Institute of Management, Ahmedabad, India  
[subha@iimahd.ernet.in](mailto:subha@iimahd.ernet.in)  
[vr Rao@iimahd.ernet.in](mailto:vr Rao@iimahd.ernet.in)

**Abstract:** There is a pervasive euphoria in most developed and developing countries regarding the role of information and communication technology (ICT) in transforming the government from a sluggish and non-responsive leviathan to a more efficient and citizen friendly institution. This paper proposes a method to assess in an objective manner the change in service quality as a result of e-Government project implementation. More specifically we propose the analytical hierarchy approach as a tool that can be used to assess e-Government induced changes in public service quality.

**Keywords:** Analytic hierarchy process, service quality, e-Government, evaluation Ahmedabad Municipal Corporation India

## 1. Introduction

There is a pervasive euphoria in most developed and developing countries regarding the role of information and communication technology (ICT) in transforming a government from a sluggish and non-responsive leviathan to a citizen friendly institution. An ICT based government is broadly termed as e-Government. Many authors have recognized the transformational potential of ICT in government (Heeks 1999). Sprecher (2000) considers e-Government as the way technology is used to help automate the transactions between government and other institutions, both government and businesses. e-Government has also been defined as the "one stop non stop" operation of public services (Lawson, 1998). A far more comprehensive definition of e-Government proposes changes in government in two related aspects: 1) transformation of the business of governance, that is, reducing costs, improving service delivery and renewing processes; and 2) re-examination of the functions and processes of democracy itself (Aicholzer and Schmutzer, 2000). Most of the governments are keen on changing the way they function, and find it imperative to adopt a market or customer focused approach in their governance.

### 1.1 Customer centric view of government

The case for e-Government is further strengthened by the widely prevailing view that there is a need to have a customer centric approach in the provision of public services. Wagenheim and Reurink (1991) suggest that a "customer service management" orientation of public service provision will create positive reinforcement cycles through motivation, self-improvement, cost reduction and innovation. Taking a customer centric stance, Hurmerinta-Peltomaki and Nummela (1998) offer the public sector a way to obtain information on current and potential customers of public services. Butler and Collins (1995) advocate the need to conceptualize marketing within the context of public services and identify the relevant structural and process characteristics that impact their marketing. *Centrelink*, the one stop shop for a large number of government services in Australia, is an outstanding example of a successful implementation of customer centric approach in government services (Vardon, 2000).

Clearly new public management concepts and ICT induced reform in government are bringing about a strong customer focus in public service provision. The potential of e-Government in improving delivery of public services can be seen from the following table.

Country	Type of Government Application	Number of days to process before ICT application	Number of days to process after application
Brazil	Registration of 29 documents	Several days	20-30 minutes per document, one day for business licenses
Chile	Taxes online	25 days	12 hours
India, (AP)	Land Registration	7-15 days	5 minutes

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Country	Type of Government Application	Number of days to process before ICT application	Number of days to process after application
India, Gujarat	Interstate Check Posts for Trucks	30 minutes	2 minutes
Philippines	Customs Online	8 days to release cargo	4 hours – 2 days to release cargo

Source: compiled from various sources including World Bank website

Therefore, in achieving their goals of reform and in enhancing the quality of their public service delivery, several governments are increasingly relying on e-Government.

### 1.2 Understanding and measuring public service quality

Unlike quality of products, quality of service is an abstract concept and has three unique characteristics: intangibility, heterogeneity and inseparability of production and consumption (Parasuraman, Zeithaml and Berry, 1985). Pioneering work in measuring service quality was done by Parasuraman et. al. (1988) with the creation of a 22 item scale SERVQUAL, to measure consumer perceptions and expectations of service quality. The scale has been applied to large number of contexts including information systems (Kang and Bradley, 2002) and web sites (Gournaris, 2003; Kou, 2003; Xie 2002).

With respect to public services the assessment of quality has been relatively less studied. Most studies for assessing quality of government services have focused on two sectors namely, health and education. A general model for analyzing the preferences, satisfaction and actual cost-benefit valuation of provided health care services as perceived by patients is proposed by Eckerlund and Nathorst (2000). Kanji and Tambi (1999) examine how total quality management (TQM) principles and core concepts can be used to provide a means of assessing the quality of higher educational institutions.

However, both in terms of coverage of public services and the method of evaluation of service quality, there are significant gaps in the extant literature. A large section of the population is in constant interaction with national, sub-national and local governments for various routine services e.g. filing tax returns, obtaining licenses etc. This domain has not been explored adequately from the view point of service quality. A second lacuna with existing research on service quality is to with the conceptual and empirical shortcomings of the SERVQUAL instrument. Conceptual difficulties include the operationalization of perceived service quality as a gap score, the unclear specification of the expectations construct, and the incompleteness of using a single measure of service quality across different industries. Teas (1994) points out that the construct expectation itself is loosely defined in the sense that multiple meanings like desires, wants, ideal standards etc. render the validity of the construct a suspect. On the other hand some of the empirical problems with SERVQUAL include reduced reliability, poor convergent validity, and poor predictive validity (Van Dyke et. al., 1997). A study using SERVQUAL across four different industries by Carman (1990), required addition and deletion of several items from the original instrument, thus highlighting the need for significant customization under different business settings.

It is therefore appropriate to infer that evaluation of public services especially in the light of e-Government projects needs to be carried out not only to enhance the coverage of public services studied, but also to explore the prospect of deploying a different method of service quality evaluation. With this premise, this paper proposes a method of establishing the extent to which e-Government projects are successful in improving service quality. What is the extent of improved citizen experience as an outcome of e-Government project implementation is a question the paper proposes to address?

The authors have studied the automated civic services system implemented by the Municipal Corporation of the city of Ahmedabad, Gujarat State, India for the above purpose. Tax collection and property tax complaint handling, one of the services offered by the above system, is described in the paper. The paper also lists a set of service attributes stated by the users as important in assessing the systems impact. Using these attributes, the paper illustrates the

application of the proposed methodology using hypothetical data on the relative importance of the various attributes.

Section 2 describes the case study mentioned above. Section 3 discusses the Analytical Hierarchy Process (AHP), and illustrates its application for the evaluation mentioned above, through a numerical example using the quality dimensions of the above case. Section 4 concludes the paper.

## **2. Civic Services Centre of Ahmedabad: A case study**

The municipal corporation of Ahmedabad (AMC) is responsible for the governance of nearly 3.7 million people of the city of Ahmedabad in the state of Gujarat, India and relies heavily on tax as a source of revenue. Various kinds of taxes like octroi, property tax and others are levied on businesses and individuals to meet the expenses of the AMC. To fulfill the objective of better service delivery, AMC embarked on the course of e-Government, with "e-City" as the guiding vision. The first and big step in this direction was the setting up of 6 City Civic Centers (CCC) that promises to efficiently deliver citizen services electronically. Each of these centers, first of which started functioning from September 18, 2002 is equipped with 11 state of the art computers that are operated by the staff of the AMC. The application architecture is three tiered comprising of Oracle 9i data base running on Solaris OS on a Sun server and the front end client machines that access the database through the web server. The programming for the front end has been done using Visual Basic (VB) and active server pages (ASP). Dedicated 64 kbps lease lines are used to connect the database at the central office of AMC to the CCCs.

Many services are envisaged to be provided at these civic centers of which property tax collection, licenses issuance for shops and establishments and building plan approval are the major ones. The city of Ahmedabad has nearly 1 million properties and hence the significance of an efficient and transparent property tax collection system can hardly be over emphasized.

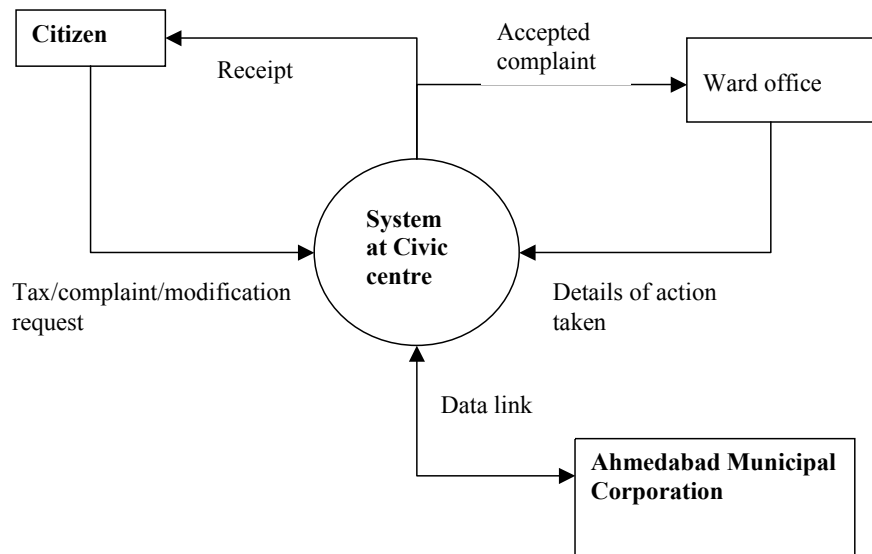
### **2.1 Property tax collection**

Property tax is collected from every building standing within the jurisdiction of the AMC. Tax assessment requires the data of various characteristics of the property like its usage, area and value. Furthermore, every year properties change hands, undergo additional construction and change in usage, among various other modifications that need to be updated from time to time. This increases the complexity and scope of the work of AMC. The whole process of tax assessment used to be so cumbersome that it was beyond the easy understanding of the ordinary citizen. The following steps outline the property tax collection procedure existing under the manual system administered at the ward (lowest unit of city administration) level.

- Citizen approached the ward office to request for challan or lodge a complaint
- Ward officer locates old records in files for past details
- Tax liability is calculated based on past records
- The approval is taken from higher authority
- Tax paid is by the citizen and the receipt is issued to the citizen.

An examination of the above process reveals that there are three stages at which delay gets institutionalized in the system. Firstly, the work does not get started if the tax collector is not present at the time the citizen approaches the ward office thus making the reliance on the tax collector complete and inevitable. This unavoidably means making multiple visits to the ward office. A second problem area is the process of locating old files and records, which opens up opportunities for delay and discreteness on the part of the concerned official and hence the opportunity for rent seeking behaviour. Finally the tax and interest calculation done under the old system, posed the following kinds of problems: 1. the calculations were wrong, 2. the calculation details were never spelt out clearly, nor were understood by the citizens. This led to disagreements between the citizen and the ward office regarding the exact amount due. This lack of transparency led to evasion of tax by some citizens. In other words, the system was heavily dependent on the concerned official in this case the tax collector at ward offices and was therefore vulnerable to all kinds of malpractices.

Before the CCC interface was initiated there were drastic changes made in the tax assessment rules. The process of paying property tax now involves visiting any of the service centers and paying in check or cash or paying online by credit card. The assessment is done by a simple formula understandable to all and is automated. In case of wrong assessment or modification to property characteristics the citizen can fill up the prescribed form and submit at the civic center. The complaint is automatically directed to the appropriate ward office and needed action taken. While the need for physical verification remains the same and the approval for changes have to be done by the officer of level Assistant Manager or Deputy Assessor of taxes there has been significant gains from the current system. Easy availability of past data, routing of complaints to the right ward and reduction in the number and types of wrong assessments are some of the easily visible benefits.



**Figure 1:** Tax collection and property tax complaint system

Figure 1 describes the current tax collection and complaint addressing system. The issuance of tax receipt is instantaneous and calculation transparent thus providing great relief to the citizen.

## 2.2 Property tax payment system: Service quality dimensions

The following is a list of service quality dimensions regarding property tax system that emerged from the interviews and has been classified into three broad categories.

### Service level expectations

- Less time required for getting service (LT)
- Less Number of visits (LV)
- The system has accurate records (AR)
- Quick and clear answer to query (QQ)
- Service points easily accessible (EA)
- Reduction/elimination of speed money (RB)

### Empowerment

- Access to information and knowledge of procedures (AI)
- Knowledge of person to be contacted for service (KP)

### Anxiety reducing

- Service staff are sympathetic and reassuring (SA)
- Service staff are dependable (SD)

- Appealing physical facilities (AF)

As is clear from the list there are elements that are tangible and measurable e.g. service time, reduction in speed money while there are many others that are intangible e.g. service staff are dependable, appealing physical facilities etc. satisfaction levels of which are very hard to quantify. Therefore the questions that we try to answer here are what priorities does a citizen have regarding the service quality dimensions and to what extent there has been an improvement if any in the level of satisfaction of these attributes after e-Government project implementation.

### **3. Analytical Hierarchy Process**

AHP is a decision tool that structures a complex decision problem in a hierarchical fashion, allows comparison of both tangible and intangible factors and sets priorities among alternative course of action for synthesis (Foreman and Gass, 2001). Paired comparison is used to quantify relative weights of alternatives through a hierarchy of the decision problem.

Four major steps in applying the AHP technique are:

- Develop a hierarchy of factors impacting the final decision. This is known as the AHP decision model. The last level of the hierarchy is the candidate alternatives.
- Elicit pair wise comparisons between the factors using inputs from users/managers.
- Evaluate relative importance weights at each level of the hierarchy.
- Combine relative importance weights to obtain an overall ranking of the candidate alternatives.

Since the development of AHP the number and variety of applications that have used this technique have grown rapidly. Specifically in the information systems domain AHP has been used to select from alternative enterprise information systems (Sarkis and Sundarraj, 2001), arrive at priority ratings of various computer aided software systems (Ayag, 2002), comparing public key infrastructure (PKI) and virtual private network (VPN) for security and privacy criteria (Wagner, 2002), selecting the right website for a company to launch its advertising (Ngai, 2003) and to evaluate information system performance based on assessment by clients, the candidate alternatives being inhouse development, outsourcing and situational (Shah, 2001).

#### **3.1 The hierarchy for service quality assessment**

The first level of the hierarchy contains the overall goal which is to assess the change in service quality brought in by e-Government project implementation. The second level of the hierarchy consists of the 11 service quality dimensions mentioned in section 2.2.

Evaluating e-Government project induced service quality changes, the two candidate alternatives are service quality under e-Government and the service quality under the manual system of working. Thus the leaf level of the AHP tree comprises of two nodes namely e-Government system and manual system. The difference between the weights of the two leaf level nodes can be interpreted as the change in service quality. Figure 2 represents the hierarchy relevant for evaluating the property tax system.

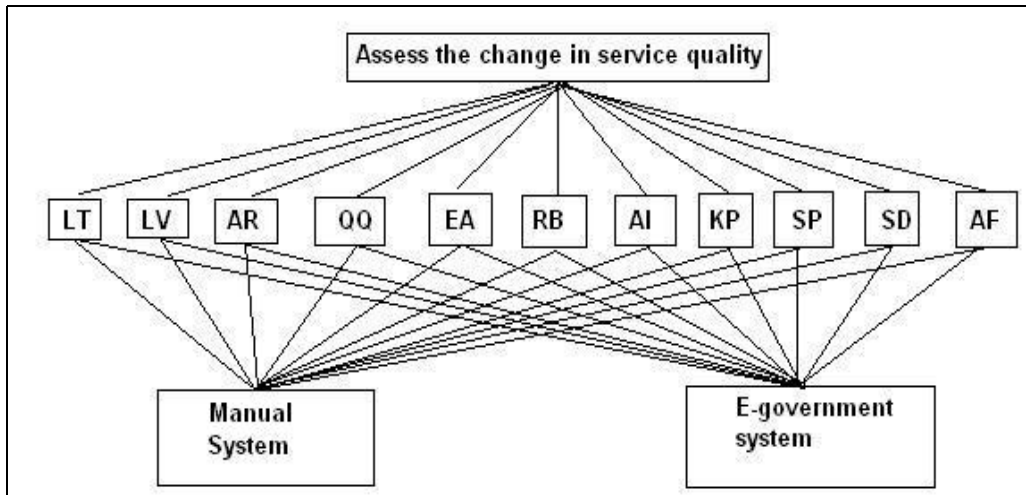


Figure 2: Decision hierarchy to assess change in service quality

### 3.2 Illustrative example

In order to illustrate the working of the method we use a smaller size problem with less number of service quality dimensions. The extension to the actual 11 attribute problem is straightforward and only involves more computations. A detailed questionnaire for the full fledged proposed study is included in appendix A.

Figure 3 represents the situation where three attributes of service namely time for service (LT), Access to information and knowledge of procedures (AI) and service staff are sympathetic and reassuring (SA) are being considered for assessing change in service quality. The hierarchy has to be solved by a series of pair wise comparison. The value assigned to a comparison can range from 1/9 to 9, where 1/9 would imply that the one element is extremely less important than the other and 9 implies that the element is extremely more important than the other (Saaty, 1980). A case of equal importance is indicated by the value 1. Finally we combine relative importance weights to obtain an overall ranking in terms of weights of the candidate alternatives in this case the manual system and e-Government system.

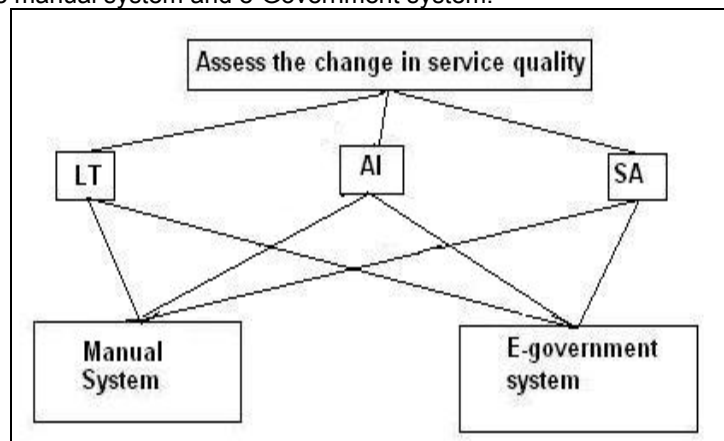


Figure 3: Reduced version of the hierarchy

The difference in weights of these two alternatives will be the measure of change in service quality level. Thus if both manual system and e-Government system have same weights i.e. 0.5 then it will indicate no change in quality of service while a weight distribution of 0.4 and 0.6 for manual and e-Government system respectively will indicate a 50% increase in quality of service.

While comparing two elements we follow the simple rule as recommended by Saaty (1980). Thus while comparing two attributes X and Y we assign the values in the following manner based on the relative preferences of the decision maker in this case the citizen.

- a) 1 if X and Y are equally important
- b) 3 if X is weakly more important than Y
- c) 5 if X is strongly more important than Y
- d) 7 if X is very strongly more important than Y
- e) 9 if X is absolutely more important than Y

Assuming that LT is strongly more important than AI, AI weakly more important than SA and that LT is very strongly more important than SA for the citizen with respect to service quality.

The following comparison matrix then constructed based on these observations

	LT	AI	SA
LT	1	5	7
AI	1/5	1	3
SA	1/7	1/3	1

The normalized Eigen vector corresponding to the largest Eigen value of the matrix is (0.7306, 0.1884, 0.0809)

We move to the next level to compute weights for the manual and e-Government system for each of the quality attributes.

Thus with respect to LT we observe that e-Government system is very strongly more satisfying than manual system thus yielding the following matrix of comparison between manual and e-Government system with respect to LT attribute

	Manual	e-Government
Manual	1	1/7
e-Government	7	1

The relevant normalized Eigen vector of the matrix is (0.125, 0.875)

We assume following matrix of comparison between manual and e-Government system with respect to AI attribute (i.e. strongly more satisfying)

	Manual	e-Government
Manual	1	1/5
e-Government	5	1

The relevant normalized Eigen vector of the matrix is (0.1667, 0.8333)

Finally we assume following matrix of comparison between manual and e-Government system with respect to SA attributes (i.e. weakly more satisfying)

	Manual	e-Government
Manual	1	1/3
e-Government	3	1

The relevant normalized Eigen vector of the matrix is (0.25, 0.75)

Once the Eigen vectors for all the comparison matrices are available we compute the absolute weights of the two alternatives i.e. manual and e-Government system through a synthesis procedure demonstrated below

The priority weight of manual system is  
 Weight of manual system with respect to LT \* importance weight of LT + Weight of manual system with respect to SA \* importance weight of AI + Weight of manual system with respect to SA \* importance weight of SA

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$$= 0.125*0.7306 + 0.1667* 0.1884 + 0.25*.0809$$
$$= 0.1430$$

Similarly the priority weight for the e-Government system is 0.8570

Hence there has been significant improvement in service quality induce by e-Government project implementation.

#### **4. Conclusion**

e-Government projects operate in an open environment having multiple stakeholders and varied understanding of benefits and costs. Here a model based on the AHP technique has been proposed for assessing the change in service quality brought in by e-Government project. While the paper describes a particular case of assessment of citizen gains from e-Government project, we believe that a similar assessment procedure can be used in other e-Government projects where the benefits or service quality dimensions are a mix of tangibles and intangibles and where quantification is difficult if not impossible. In a multiple stakeholder scenario of e-Government projects where evaluation methods would most likely differ from stakeholder to stakeholder, the methodology proposed here can be part of the overall assessment framework for e-Government projects. There are significant advantages of using the method proposed here. Firstly the method provides a convenient and robust way to compare tangibles and intangibles and thus provide a valid assessment of the overall change in service quality. Secondly the method prioritizes the service quality dimension from the citizen point of view along with the change in satisfaction level of those service attributes. This information can significantly help in improving the project as periodic evaluations can provide inputs to government agencies regarding the priorities of the citizens and their current level of satisfaction of those priorities. Finally when assessing change on a periodic basis is important and not just the assessment of current level of service, the method provides a very convenient tool to e-Government project managers to monitor the progress made and focus on areas where improvement is required.

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## Appendix A

Property tax system at Ahmedabad Municipal Corporation: Citizen Survey questionnaire to assess change in service quality affected by e-Government.

### Part 1

Please fill in the column 3 as per the following rule: Fill in

- a if item in column 1 is absolutely more important than item in column 2
- b if item in column 1 is very strongly more important than item in column 2
- c if item in column 1 is strongly more important than item in column 2
- d if item in column 1 is weakly more important than item in column 2
- a if item in column 2 is absolutely more important than item in column 1
- b if item in column 2 is very strongly more important than item in column 1
- c if item in column 2 is strongly more important than item in column 1
- d if item in column 2 is weakly more important than item in column 1
- e if item in column 1 is equally important to item in column 2

(1)	(2)	(3)
Less time required for service	Less number of visits	
Less time required for service	Accurate records	
Less time required for service	Quick and clear answer to query	
Less time required for service	Service points easily accessible	
Less time required for service	Reduction elimination of speed money	
Less time required for service	Access to information and knowledge of procedures	
Less time required for service	Knowledge of person to be contacted for service	
Less time required for service	Service staff are sympathetic and reassuring	
Less time required for service	Service staff are dependable	
Less time required for service	Appealing physical facilities	
<b>Less number of visits</b>	Accurate records	
Less number of visits	Quick and clear answer to query	
Less number of visits	Service points easily accessible	
Less number of visits	Reduction elimination of speed money	
Less number of visits	Access to information and knowledge of procedures	
Less number of visits	Knowledge of person to be contacted for service	
Less number of visits	Service staff are sympathetic and reassuring	
Less number of visits	Service staff are dependable	
Less number of visits	Appealing physical facilities	
Accurate records	Quick and clear answer to query	
Accurate records	Service points easily accessible	
Accurate records	Reduction elimination of speed money	
Accurate records	Access to information and knowledge of procedures	
Accurate records	Knowledge of person to be contacted for service	
Accurate records	Service staff are sympathetic and reassuring	
Accurate records	Service staff are dependable	
Accurate records	Appealing physical facilities	
Quick and clear answer to query	Service points easily accessible	
Quick and clear answer to query	Reduction elimination of speed money	
Quick and clear answer to query	Access to information and knowledge of procedures	

Quick and clear answer to query	Knowledge of person to be contacted for service	
Quick and clear answer to query	Service staff are sympathetic and reassuring	
Quick and clear answer to query	Service staff are dependable	
Quick and clear answer to query	Appealing physical facilities	
Service points easily accessible	Reduction/elimination of speed money	
Service points easily accessible	Access to information and knowledge of procedures	
Service points easily accessible	Knowledge of person to be contacted for service	
Service points easily accessible	Service staff are sympathetic and reassuring	
Service points easily accessible	Service staff are dependable	
Service points easily accessible	Appealing physical facilities	
Reduction/elimination of speed money	Access to information and knowledge of procedures	
Reduction/elimination of speed money	Knowledge of person to be contacted for service	
Reduction/elimination of speed money	Service staff are sympathetic and reassuring	
Reduction/elimination of speed money	Service staff are dependable	
Reduction/elimination of speed money	Appealing physical facilities	
Access to information and knowledge of procedures	Knowledge of person to be contacted for service	
Access to information and knowledge of procedures	Service staff are sympathetic and reassuring	
Access to information and knowledge of procedures	Service staff are dependable	
Access to information and knowledge of procedures	Appealing physical facilities	
Knowledge of person to be contacted for service	Service staff are sympathetic and reassuring	
Knowledge of person to be contacted for service	Service staff are dependable	
Knowledge of person to be contacted for service	Appealing physical facilities	
Service staff are sympathetic and reassuring	Service staff are dependable	
Service staff are sympathetic and reassuring	Appealing physical facilities	
Service staff are dependable	Appealing physical facilities	

**Part 2**

Please fill in the column 2 as per the following rule. Fill in

a if e-Government system is absolutely more satisfying than item in manual system with respect to item in column 1

b if e-Government system is very strongly more satisfying than item in manual system with respect to item in column 1

c if e-Government system is strongly more satisfying than item in manual system with respect to item in column 1

d if e-Government system is weakly more satisfying than item in manual system with respect to item in column 1

-a if manual system with respect to item in column 1 is absolutely more satisfying than e-Government system

-b if manual system with respect to item in column 1 is very strongly more satisfying than e-Government system

-c if manual system with respect to item in column 1 is strongly more satisfying than e-Government system

-d if manual system with respect to item in column 1 is weakly more satisfying than e-Government system

-e if item in column 1 is equally satisfying as item in column 2

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<b>(1)</b>	<b>(2)</b>
Less time required for service	
Less number of visits	
Accurate records	
Quick and clear answer to query	
Service points easily accessible	
Reduction elimination of speed money	
Access to information and knowledge of procedures	
Knowledge of person to be contacted for service	
Service staff are sympathetic and reassuring	
Service staff are dependable	
Appealing physical facilities	