E-governance Parameters Assessment: An AHP Approach

Dr. Monika Arora*
and Anchal Gupta**

Abstract

E-governance is well recognized concept in today's business environment.E-governance provides flexibility to the citizens of the country by shifting government services from tradition form to digital form. In developing country like India, the citizens are also starving towards adoption of e-governance practices. Moreover, Indian government is initiating digitalization rigorouslyin almost all fields. Any e- governance project moves through the three stages i.e. planning, implementation and adaptation by citizen. Usually, e-governance projects starts with discussions with senior government officials after doing deep need analysis and the technicians involved in implementation of e-governance projects and finally, adopted by the citizens of country. E-governance brings more transparency and accountability in the government system.Many e-governance projects in developing countries like India are at different stages of progression. The government developed various e-governance portals as interface to provide their services online as well as offline in adoption phase. The objective of this paper is to understand and analyse the various parameters which make impact on the assessment of e-governance portals.E-governance portals are evaluated on the attributes such as static appearance, features and service quality by the citizens. Under these aspects, many parameters are identified from vast literature review and then shortlisted with the help of expert's opinion. A framework is developed on the basis of shortlisted parameters. Further, aspects and parameters are prioritized by using Analytical Hierarchy Process (AHP). The study identifies the most important aspect for evaluation of e-governance portal is service quality. The findings of the study will be highly useful for the developers of e-governance portals. For more successful e-governance projects, the developers and practitioners may adopt these findings at the time of planning, designing and implementing of e- governance project.

Keywords: E-governance, E-governance portal, Assessment, Analytical Hierarchy Process

Introduction

All things and process becoming automated, having shift from manual to digital in today's competitive world. Due to hectic busy schedule, citizens preferred to get served with high quality of services in minimum possible time.

Citizens started shifting from basic needs to luxury facilities by making use of plastic money and online transactions, so in this type of the concept of e- government. Electronic governance (E-governance) is basically getting the government services electronically. Usually, the benefits of e-governance are availed by public, private agencies, government departments and businesses in order to disseminate static information, offline/ online transactions and may have participatory framework. The idea of e-governance is to bring IT to the common public (Dwivedi et. al., 2013). E-governance brings transparency, increases efficiency, enforcing accountability, optimizes cost and reduces time delays.

The Indian Government has initiated with many citizen-centric e-governance projects. On May 2006, the government came up with National E-governace Plan (NeGP) which comprises of 27 Mission Mode Projects (MMPs) and 8 components. Currently, after revision, 31 MMPs are in process and running at central and state level across the country, The state government has power to start with any five MMPs specific to their individual needs. In India, many existing or ongoing e-governance projects are at

*Associate Professor, Apeejay School of Management, Delhi
**Assistant Professor, Apeejay School of Management, Delhi. marora.asm@gmail.com, gupta_anchal1@yahoo.co.in

different levels of progression. Many projects which specifically implemented to serve needs of urban people like Passport Sewa, online railways ticketing and status updation, filling income tax, e-education and checking availability of doctors and blood at government hospitals etc., to name few. Similarly, many e-governance projects are developed and implemented to cater the requirements of rural people like Agricultural Marketing Information Network (AGMARKNET), Bhoomi (automation of land records), CARD (computer aided administration of registration department) and e-panchayats etc.

The primary delivery models of e-Government can be divided into four categories, that is, G2C (Government to citizens), G2B (Government to Businessman), G2G (Government to Government) and G2E (Government to Employees). All the e-governance projects are designed to serve and connect the needs of all associated stakeholders. Any e-governance project progresses through three stages. Firstly, in the planning stage, government officials and top management conceives the idea of any project then the idea is further implemented by technicians from private or public organizations in second stage. At last stage, the citizens tries to adopt the idea electronically. Normally, it has seen that there is mismatch between policy maker vision of benefitting end users at optimum, implementers understanding about the project and final end users perception about the project.

During adoption stage, the appearance, availability of information, the quality of services and overall processes of e-governance portal make huge impact on satisfaction level of citizens. The user friendliness, accuracy and authenticity of content available with quick feedback generally attracts customer and becomes a responsible reason for satisfaction from services. In this paper, an attempt has being made to identify the various parameters required for evaluation of e-governance portal to make e-governance practices successful. The objective of this study is to prioritiz4e the parameters as per their importance in order to have more successful e-governance projects.

The remaining paper will be as follows. Literature review of e-governance and identified parameters are discussed in section-2. In section-3, the research methodology, Analytical Hierarchy Process (AHP) is discussed. The evaluations have been done using AHP in section-4. The findings and conclusions are discussed in section-5 which is followed by conclusion.

LITERATURE REVIEW

Many studies defied e-governance as an emerging field in developing countries, which can be evidenced through clearly rcognizable benefits to the mango people of the country. Heeks (2001) defined e-governance as making use of information, communication and technology to deliever government services in more convient manner. According to Schwester in 2009, the basic idea with which e-governance concept starts is to disseminate information by converting offline to online but later, the e-governance takes place as an interactive platform where an individual can make online transactions and can develop participatory framework.

Three main contributions of e-governance are to improve government processes (e-administration), to connect citizens (e-citizens) and to create awareness (e-services). E-governance brings comfort and more accountability to the citizens of the country. Various framework of e-governance has been developed by many authors and reflects the same understanding on good governance. Many models are developed in order to study the acceptance of e-governance by end users (Saxena, 2006)

The citizens are more involved at the adoption stage of any e-governance project. It is very important for developers and implementers to understand the exact needs of citizens while using any e-governance portal. The categories and parameters which are critical and observed by every individual when they access any e-governance portal. From three vast literature review, 25 parameters ar identified and after discussing with experts, 12 parameters are finalized by combining common ones and ignoring less important parameters. Then these parameters are categorised into three categories namely, static appearance, features and service quality of e-governance portal. All the parameters are discussed in detail along with their references in table 1.

S.No	Parameter	Sources
1.	Outlook	Park and Gretzel (2007), Hausman and Siekpe (2008)
2.	User friendly	Park and Gretzel (2007), Hausman and Siekpe (2008)
3.	Design	Gilbert et. Al (2004), Delopoulous(2011) Bhatnagar(2002)
4.	Navigation	Flavian et al. (2009), Unwin et al. (2010)
5.	Relevant Information	Liang and Lai (2002), Iqbal et. Al(2006) Delopoulous(2011),
6.	Content Quality	De Wulf et al. (2006), N.P. Rana(2010), Chae et al.(2002)
7.	Query Handling	Park and Gretzel (2007), Rose et al. (2010)
8.	FAQ	Agarwal and Venkatesh (2002)
9.	Accountability	Jothimani et al. (2014), Kaynak et al. (2014)
10.	Responsiveness	Gefen (2002), Reix (2003)
11.	Accuracy	Yeung et al. (2012), Markovic(2006),
12.	Security/ Privacy	Korgaonkar and Wolin (1999), Alsheri et Al(2010), Gilbert et. Al(2004) Schwester(2009). Huizingh et. Al (2003),

Table1: Parameters for evaluation of e-governance portal

RESEARCH METHODOLOGY

Multi-criteria decision making method was developed by Satty (1980) known as Analytical Hierarchical Process (AHP). Analytical hierarchy process is a flexible and structured technique to manage complex decisions. It provides a broad and intelligible approach to structuring the problem, quantifying the elements related to the objectives of the problem. It also helps in evaluating alternative solutions of the problem. AHP is used in various fields such as government, commerce, health, industry and education. It has been used in many decisions in the field of management, economy, energy, environmental, industry, transport, agriculture and military. AHP method as a decision making model based on flexibility of situations, it clarify the problems which have several potential solutions. AHP uses the expert method which is mathematical, it divides the main problem into sets of possibility and go to more detailed alternatives.

The decision by AHP method can be subdivided into three different levels i.e. hierarchy, priorities and consistency

Hierarchy: The hierarchy structure is designed for the decision process by consulting with the group of experts their criteria and alternatives. The tree structure is prepared.

Priorities: After sorting using literature review and experts comments their criteria's are finalized and establish in hierarchical structure at all levels of assessment, and also various alternatives or criteria of assessment are considered. The result is given by the weight in proportion to the scale of alternatives and criterions are examined using AHP.

Weight allocation: The correct determination of the individual sub-scales of assessment criteria is one of the key tasks in solving multi-criterial problems. It is therefore necessary to know the solved issue well and know the importance and impact of the criteria used to evaluate the result achieved

AHP is well-defined and structured process. It helps in dealing with both quantitative and qualitative techniques. AHP evaluates on set of criteria, it takes the final decision of selecting best alternative among all the alternatives taken for study. AHP methodology to attune the numeric scale for the measurement of quantitative as well as qualitative performances. The scale ranges from 1/9 for least valued than, to 1 for equal, and to 9 for absolutely more important than covering the entire spectrum of the comparison 9 as shown in table 2. Some key and basic steps involved in this methodology are (Saaty, 1980)

Option	Numerical value(s)
Equal	1
Marginally strong	3
Strong	5
Very strong	7
Extremely strong	9
Intermediate values to reflect fuzzy inputs	2, 4, 6, 8
Reflecting dominance of second alternative compared with the first	Reciprocals

Table 2: Scale for quantitative comparison of parameters

The decision maker can express his preference between each pair of elements verbally as equally important, marginally strong, strongly, very strong, and extremely strong. These descriptive preferences would then be translated into numerical values 1, 3, 5, 7, 9, respectively, with 2, 4, 6 and 8 as intermediate values for comparisons between two successive qualitative judgments. Reciprocals of these values are used for the corresponding transposed judgments.

1. Problem definition statement.
2. Decide the Broaden categories or consider all actors that defined the categories objectives.
3. discuss the criteria that defines the broad categories.
4. Structure the problem in a hierarchy of different levels constituting goal, criteria, and alternatives.
5. Compare each element in the corresponding level and calibrate them on the numerical scale. This requires n(n - 1)/2 comparisons, where n is the number of elements with the considerations that diagonal elements are equal or '1' and the other elements will simply be the reciprocals of the earlier comparisons.
6. Perform calculations to find the maximum Eigen value, consistency index CI, consistency ratio CR, and normalized values for each criteria/alternative.

Where λ max is the maximum eigenvalue of the judgement matrix. This CI can be compared with that of a random matrix, RI. The ratio derived, CI/RI, is termed the consistency ratio, CR. Saaty suggests the value of CR should be less than 0.10.

$$CL = (\lambda_{max} - n)/(n-1)$$

RI values	N	2	3	4	5	6	7	8	9	10
	RI	0.00	0.58	0.90	1.12	0.12	1.32	1.41	1.45	1.51

Table -3 : RI values

7. If the maximum Eigen value, CI, and CR are satisfactory then decision is taken based on the normalized values; else the procedure is repeated till these values lie in a desired range.

Proposed Framework

A user when access any e-governance websites / portals then three major categories are main reasons responsible for his/her selection of website. From literature review, features, static appearance and service quality are considered to be three broader categories for selection. Further, from past scholarly articles, it has been observed that it is one deciding factor for attracting and retaining customers for long term. Relevant Information, Content Quality, Query Handling and FAQ are responsible to evaluate features of any e-governance portals. The parameters outlook, user friendly, design and navigation responsible for Static Appearance of the portal. After discussing with experts and from literature, it is found that Accountability, Responsiveness, Accuracy and Security/ Privacy are important features under Service Quality. It is something which worked as order winner rather than order qualifier. Organizations usually give utmost preference to serve customers with best quality. These are the main parameters which should include under service quality as justified from past studies also.
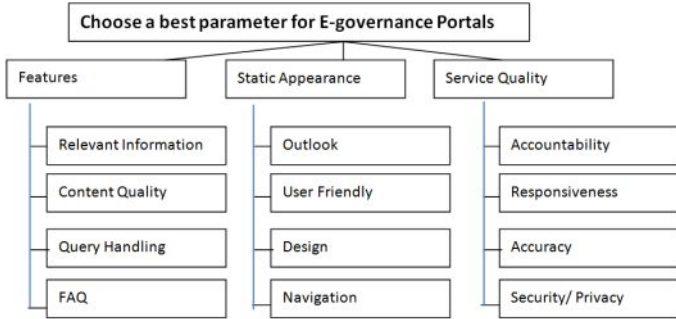
Fig 1. Proposed Framework for selection of best parameter for e-Governance Portals

Findings and Results

In this analysis, the identified parameter from literature under Features, Static Appearance and Service Quality category are prioritized by using AHP methodology as discussed in section 3. The data for the study is collected from 100 consumers. The findings of the evaluation by using AHP are shown in this section. In Table 4 the pairwise comparison matrix of three major categories required for selection of best e-Governance Portal is shown.

	Features	Static Appearance	Service Quality	Weighted Sum
Features	0.16	0.27	0.15	3.04
Static Appearance	0.05	0.09	0.11	3.01
Service Quality	0.79	0.64	0.74	3.14
			Lambda =	3.07

Table 4: Evaluation of weights for three main categories

CR is 0.057, which is acceptable. According to our findings by using AHP, Service Quality (3.14) is most important category for selection of e-commerce website. Service Quality is followed by Features (3.04) and then Static Appearance (3.01). The results are in lined with past studies. It can be easily validated from past studies and also looking at e-governance citizen centric trends, users give first preference as Service Quality then to Features and give last preference to Static Appearance of portals.

Static Appearance	Outlook	User Friendly	Design	Navigation	Weighted Sum
Outlook	0.10	0.05	0.13	0.07	4.03
User Friendly	0.30	0.15	0.13	0.21	4.08
Design	0.50	0.75	0.66	0.64	4.29

Table 5: Evaluation of weights for parameters under Features

CR is 0.096, which is acceptable. According to our findings by using AHP, Content Quality (4.45) is most important parameter for selection of e-Governance portal under Features category. As shown in table-5, Relevant Information, FAQ and Query Handling having weights 4.30, 4.20 and 4.09 respectively.

Static Appearance	Outlook	User Friendly	Design	Navigation	Weighted Sum
Outlook	0.10	0.05	0.13	0.07	4.03
User Friendly	0.30	0.15	0.13	0.21	4.08
Design	0.50	0.75	0.66	0.64	4.29
Navigation	0.10	0.05	0.07	0.07	4.06

Table 6: Evaluation of weights for parameters under Outlook

CR is 0.043, which is acceptable According to our findings by using AHP, Design (4.29) is most important parameter for selection of e-commerce website under Static Appearance category. As shown in table -6, User Friendly, Navigation and Outlook having weights 4.08, 4.06 and 4.03 respectively.

Service Quality	Accountability	Responsiveness	Accuracy	Security/ Privacy	Weighted Sum
Accountability	0.13	0.19	0.05	0.10	4.08
Responsiveness	0.38	0.58	0.75	0.50	4.66
Accuracy	0.38	0.12	0.15	0.30	4.20
Security/ Privacy	0.13	0.12	0.05	0.10	4.13
				Lambda =	4.27

Table 7: Evaluation of parameters under Service

CR is 0.099, which is acceptable, according to our findings by using AHP, Responsiveness (4.66) is most important parameter for selection of e-commerce website under Service Quality category. As shown in table -7, Accuracy, Security/ Privacy and Accountability having weights 4.20, 4.20 and 4.08 respectively.

Parameters	Local Weights	Weightage	Global Weights	Rank
Responsiveness	4.66	3.14	14.63	1
Content Quality	4.45	3.04	13.96	2
Design	4.29	3.01	13.48	3
Relevant Information	4.30	3.04	13.52	4
Accuracy	4.20	3.14	13.21	5
FAQ	4.20	3.04	13.19	6
Security/ Privacy	4.13	3.14	12.97	7
User Friendly	4.08	3.01	12.83	8
Accountability	4.08	3.14	12.81	9
Navigation	4.06	3.01	12.76	10
Query Handling	4.09	3.04	12.85	11
Outlook	4.03	3.01	12.65	12

Conclusion

Analytical Hieratical Process is a multidimensional criteria technique most convenient approach suitable for this study. The parameters accountable for selection of e-governance websites are identified through massive literature review. Based on experts' discussions, 12 parameters are finalized under three categories. Features, Static Appearance, Service Quality are the three broader categories which make impact on final decision of selection of e-governance website. The pairwise comparison matrices for all categories and parameters are generated on the basis of expert opinion. Then, by using AHP, the local and global weights for all parameters are calculated. Based on the results, Service Quality is found to be

most important category among all. Responsiveness is found to be most important parameter considered while selecting e-governance website. Content Quality is second important criteria desired by users. Then users also give importance Design, Relevant Information, Accuracy and FAQ as well. Although the results discussed in table 8 reflects minor difference in average values. All the e-governance websites are doing well. The study is very useful for decision makers to plan and design their websites as per the ranking shown in results. This study can be extended by considering more categories and parameters.

REFERENCES

1) Agarwal R., Venkatesh V. (2002). "Assessing a firm's web presence: a heuristic evaluation procedure for the measurement of usability", Information Systems Research, Vol. 13, No. 2, pp. 168-186.

2) Alshehri, Mohammed and Drew, Steve J. (2010), "E-government principles: implementation,advanatges and challenges", International Journal of Electronic Business, Vol. 10, N0.10, pp.1-17.

3) Bhatnagar, Subhash (2002),"E-government: Lessons from Implementation in Developing Countries",published in Regional Development Dialogue, Vol. 24, UNCRD, autumn 2002 Issue.

4) Chae M, Kim J., Kim H., Ryu H. (2002). "Information quality for mobile internet services: a theoretical model with empirical validation", Electronic Markets, Vol. 12, No. 1, pp. 38-46.

5) De Wulf, K., Schillewaert, N., Muylle, S. and Rangarajan, D. (2006). The Role of Pleasure in Web site Success. Information & Management, Vol. 43, No. 4, pp. 434-446.

6) Delopoulous(2011) Delopoulos, Haroula N., (2011), "Barriers and Opportunities for the Adoption of E-Governance Services", Word Academy of Science, Engineering and Technology, Vol 60.

7) Dwivedi, Yogesh K., Rana,N.P. and Simintiras A.C.(2013), "E-government : Potential and Challenges",Governance and Technology, YOJANA, November 2013, pp.30-33.

8) Flavian, C., Gurrea, R. and Orús, C. (2009). Web Design: A Key Factor for the Website Success. Journal of Systems and Information Technology, Vol. 11, No. 2, pp. 168-184

9) Gefen D. 2002. Customer loyalty in E-commerce, Journal of the Association for I.S., Vol. 3, pp. 27-51.

10) Gilbert, D., Balestrini, P. and Littleboy, D, (2004), "Barriers and Benefits in the Adoption of E-Government", Intenational Journal of Public Sector Management, Vol 7, Issue 4, pp 286 – 301.

11) Hausman A., Siekpe J. 2008. The effect of web interface features on consumer online purchase intentions, Journal of Business Research, In Press, Corrected Proof, Available online 4 March 2008,1-9.

12) Heeks, R., "Information Systems and Developing Countries: Failure, Success and Local Improvisations." The Information Society, Vol. 18, No. 2, pp. 101-112 (2001).

13) Huizingh E., Hoekstra J. 2003. Why do consumers like websites?, Journal of Targeting, Measurement and Analysis for Marketing, Vol. 11, No. 4, pp. 350-361.

14) Iqbal, Atif and Bagga, R K (2006), " E- Governance : Issues in Implementation", Source: academia.edu.

15) Jothimani, D. and Sarmah, S.P. (2014), "Supply chain performance measurement for third party logistics", Benchmarking: An International Journal, Vol. 21,No. 6, pp. 944-963.

16) Kaynak, R and Avci, S. B. (2014), "Logistics services accountabilities and their effects on service buyer's trust", Procedia- Social and Behavioral Sciences,Vol. 111, pp. 731-740.

17) Korgaonkar P., Wolin L. 1999. A Multivariate Analysis of Web Usage, Journal of Advertising Research, March-April, Vol. 39, No. 2, pp. 53-68.

18) Liang T-P., Lai H-J. 2002. Effect of store design on consumer purchases: an empirical study of on-line bookstores, Information & Management, Vol. 39, pp. 431-444.

19) Markovic, S. (2006), "Expected service quality measurement in tourism higher education", ,NaseGospodarstvo,Vol. 52, No. 1/2 , pp. 86-95.

20) Park, Y.A. and Gretzel, U. (2007). Success Factors for Destination Marketing Web sites: A Qualitative Meta-Analysis. Journal of Travel Research, vol. 46, No. 1, pp. 46-63.

21) Rana N.P.,Y.K. Dwivedi and M.D. Williams, "Analysing challenges, barriers and CSF of egovadoption",People, Process and Policy, Vol. 7, No. 2, pp. 177-198 (2011).

22) Reix R. 2003. Evaluation des sites Web: nouvellespratiques, anciennesthéories, 8ème colloque de l'AIM Grenoble 23 et 24 mai, pp. 1-12.

23) Rose et. Al (2010) Rose Wade R.,Grant, Gerald G.(2010), "Critical issues pertaining to the planning and implementation of E-Government initiatives", Government Information Quarterly, Vol. 27, pp. 26-33.

24) ROHÁČOVÁ, I., MARKOVÁ, Z. Analýzametódy AHP a jejpotenciálnevyužitie

25) vlogistike. In ActaMontanisticaSlovaca, 2009, roč. 14, č. 1, s. 103-112.

26) Saaty T.L.(1980), The Analytic Hierarchy Process, McGrawHill, 1980

27) Saxena, K.B.C. (2006), "Towards excellence in e-governance", International Journal of Public Sector Management, Vol. 18, No. 6, pp. 408-513.

28) Schwester,Richard (2009), "Examining the Barriers to e-Government Adoption",Electronic Journal of e-Government, Vol.7, Issue 1, pp 113-122.

29) Unwin, T., "ICTs, Citizens, and the State: Moral Philosophy and DevelopmentPractices", The Electronic Journal on Information Systems in developingcountries, Vol. 44, No. 1, pp. 1-16.

30) Yeung, K., Zhou, H., Honggeng ,A., Yeung, C. L. and. Cheng, T. C. E. (2012), "The impact of third –party logistics providers' capabilities on exporters' performance", International Journal of Production Economies ,Vol,. 135, pp. 741-753.