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MCDM BASED USABILITY EVALUATION OF E-GOVERNANCE SERVICES USING HUMAN PERCEPTION

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ABSTRACT

E-Governance is the use of information technology (IT) for improving different services provided by the government sector for delivering better and transparent services to the citizens in the trustworthy cyberspace. Information and Communication Technology (ICT) is rapidly changing, and it is almost essential for the government to use IT services effectively in order to provide hassle-free services to citizens. It has the potential to govern with unprecedented transparency and accountability, as well as to significantly reduce the cost of government business operations.Citizens expect their services to be delivered to their door in order to obtain more up-to-date information. Citizens want to access information through government websites as the internet's popularity grows unabated. In order to check the efficiency and reliability of the e-Governance services, various parameters are taken into consideration for decision making. These parameters are taken into account and the decision for the score of usability is verified by use of various Multi Criteria Decision Making (MCDM) Techniques. MCDM technique is applied on the available alternatives for each criterion and are compared also. The focus of the methods is to find out the best alternatives among available features to make the e-Governance Services successful in the upcoming scenarios. This paper is focused on ranking of attributes based on their usability for good e-Governance system using feedback mechanism method in AHP technique.

Keywords: *Analytic Hierarchy Process, E-Governance, Multi Criteria Decision Making, Priority Ranking, Pair-Wise Comparison, Usability.*

1. INTRODUCTION

e-Governance is possibly a popular option for effective governance in developing country like India. Moreover , in India majority of population are based on rural areas and includes many the constraint such as poverty, technical illiteracy, language dominance, unawareness, inequality, infrastructure which may directly influences the design , implementation and strategical planning of Indian e-Governance and m-Governance projects. Governance systems are available through online medium for easy and fast services to the citizens. All the Government workstations are working on various software and internet services for making the system transparent and trustworthy. Therefore, many parameters of e-Governance are individually considered into account and the outcomes are analyzed into some segments respectively. The success of e-Governance can be determined if all the criteria can be evaluated and the alternatives of each criteria has to be analyzed. Therefore, in order to prove the effectiveness of the success of the e-Governance projects, the responsible criteria are calculated using some decision making techniques. This involves taking decision in various segments and multiple criteria. For proper implementation of the software and proper utilization of the services, the parameters required for successful launch of e-Services need to be evaluated and ordered basing on their preferences. The levels are measured using MCDM techniques. AHP (Analytic Hierarchy Process) is one of the MCDM techniques helpful for ranking of parameters. AHP method is applied on various schemes and alternatives available in the design and implementation of e-Governance services and the most prominent factors are arranged for success of online services. The result of this research contributes in providing better judgments by imparting decision information to the decision makers and also illustrates the robustness of this approach.

2. LITERATURE REVIEW

The literature survey is described the survey related to successful implementation of e-Governance in various developing countries using various intelligent techniques and the applications of decision making techniques in various fields mainly in governance systems.

Yao et al. [2] used AHP techniques to evaluate the criteria from citizen satisfaction levels. The authors have taken the e-Governance services available in China as a case study. The assessment process is done to understand the needs of the common person and improve the existing service facilities available in the online portals. The factors responsible for e-Governance services are being categorized into various graded indices. Each grade index is again sub-divided into various categories. Some major criteria taken for the evaluation process are citizen expectation, perceived ease to use, perceived usability, Government image, citizen satisfaction etc. The data was collected through the survey method in form of questionnaire. This paper provides some insights on choosing the criteria for evaluation of e-Governance services from citizen's comfort.

Sultan et.al [3] discovered the reasons in the failure of e-Government projects due to initiatives taken in this regard in Saudi Arabia. The reasons can be economic loss, customer dissatisfaction, late delivery, inflated cost, loss of resources. The authors have approached the multi-criteria decision making problem faced by the managers involved in the projects by the method of Analytical Hierarchy Process (AHP). Authors have defined various threat sources to e-Government like Organizational, technology hardware, software, interface, e-Service, e-mail, Human, natural, environment which act as the various criteria for the AHP approach. After applying the AHP technique on the discovered criteria, it was found that the important factor responsible for the success of e-Governance is of human skill involved in the e-Government Projects.

Alshromani et al. [4] designed a hybrid SWOT-AHP Analysis taking a case study of e-Government in Saudi Arabia . They have categorized the criteria used for AHP into two main factors: Strengths and weakness consists of internal factors of the e-Government Project and opportunities and threats are the external factors. SWOT is a tool widely used for strategic planning for evaluating the internal and external factors. Some alternatives such as Good ICT infrastructure, political willingness and Public Policy, e-Government portal, citizen focused policy and sub-portals availability were taken as the strength of the analysis. Common culture on e-transactions, lack of IT skills and Digital divide problems are taken as weakness of the analysis phase. Similarly, in the opportunities segment strong economy of Saudi Arabia, potential growth in ICT infrastructure, Legal framework, participation of academics to support ICT and better opportunities of employment for IT professionals are taken into consideration. Threats like De-centralized Internet Governance, Individual attitude and social culture, privacy and security of personal information and use of mobile technology are taken into account evaluation as alternatives in the AHP techniques. The analysis used SWOT technique integrated with AHP technique for finding qualitative analysis for the case study. Finally, on analyzing the alternatives for each criteria strategies are considered to be one of the most important factors for adoption of e-Government projects. In future scope of the case study, strategies can be evaluated using Quantitative Strategies Planning Matrix (QSPM) quantitatively.

Oo et.al [5] developed a framework for evaluating the e-Government portals used in Myanmar using AHP technique. The modeling evaluation framework considers the important 10 factors responsible for the e-Government portals. The criteria are Comprehensive Content Coverage (3C), Ease of Navigation (EON), Security Protection (SP), Content Relevancy and Usefulness (CRU), Ease of Online Transaction (EOT), Loading and Processing Speed (LPS), User Friendly Interface (UFI), Up-to-Date and Content (UDC), Interactive Communication (IC) and Proper Multimedia (PM). They have planned the course of research in two phases in pilot technical survey and scientific survey. Questionnaires were used for recording the responses and the respondents are officials from three Government ministries like Commerce, Defence and Science and technology. From the evaluation using AHP technique, UDC, IC and EOT were ranked at the upper half among other factors. The authors have also proposed a model named AHP-based Evaluation Model for e-Government Portal (AEMPEG) for evaluation of the criteria for success of e-Government portals.

Sharmin et al. [6] have described a conceptual

methodology using one of the MCDM Technique , AHP. They have identified ranking and weights of consumer of a major green building using rating of system's categories. Their work can be used by the architrectural and construction companies while promoting sustainable work practices.

Rahman et al. [7] presented the case study of e-Government in Bangladesh by determining the factors responsible for implementation of e-Government using MCDM Approach. AHP technique were used institutional, resource, access and legal as the important criteria for framing the matrix for evaluation of implementation of e-Government services. The major factors are again evaluated against their alternatives for proposing the framework for the implementation. The questionnaire employed for the collection of data was categorized into two parts. One part consists of the questions for the experts who are the decision makers on the important factors to be assessed. The other part of the questions was made to grasp the background of company and experts. The respondents were categorized as Public officials and policy makers, Representatives of International development partners, Government ministries and Education sector. Values were assigned to each criterion and overall priority weights were determined. Sensitivity analyses were performed to investigate small variations in the parameters of the model. The authors have indicated that administrative leadership, political commitment, organizational structure and education as the critical factors for implementation of e-Government services.

Beulah Jeba et al. [8] proposed a simplified MCDM analytical weighted model for ranking classifiers in Financial Risk Diabetes. AHP technique is used and t-test statistical significance test and significant win-loss tables are used for determining the performance scores for each classifier. The criteria weight of AHP is used to compute the weighted sum in WSM and the best classifier has the maximum weighted score. The most important eight classification algorithms namely Naive Bayes, Bayesian, LiBSVM, Logistic Regression, RBF Network, Nearest neighbor with generalizations, Random forest, Simple CART are implemented in WEKA tool. Performance indicators like overall accuracy, True Positive Rate, True Negative Rate, FMeasure, Area under ROC using 10 fold cross validation were used. The result was compared with other MCDM techniques like TOPSIS< VIKOR< PROMETHREE- I for better results.

Lee et al. [9] prepared a techno-policy paper where it represents the policymakers' view for success of e-Government services. They have taken the e-Services available in Pakistan as their case study. The authors have approached their problem statement through AHP technique. The official survey was undertaken among the policy makers and the stakeholders who have invested their time for consulting, developing, implementing, promoting and using the e-Government services. The main criteria for evaluation consist of Governance, Management, Resources and Socio-Economics. Survey method was used for collection of data from the ministries and users involved in the process. The ranking of the alternatives were found from the AHP method and the most important factor for the success of e-Services was also determined.

Kubler et al. [10] used AHP process for comparison of metadata quality available in open data portals. Information storage and retrieval is a very vital work in this era of e-Services. Open data is getting its demand as the information becomes transparent to the public and private organizations. The authors have prepared an Open e-Government benchmark model which consists of basic data set indicators, data openness indicator, transparency, participation and collaborations. Basic data set indicators contains 9 categories like Finance & Economy, Environment, Health, Energy, Transportation, Employment, Infrastructure, and Population. Data Openness indicators contain eight criteria such as Complete, primary, timely, accessible, machine processable, Non-Discriminatory, Non-Proprietary and License free. Government transparency and data transparency including reliability, understandability and usability are the two indicators in transparency criteria. Participation of citizens, business and government bodies with e-Government services are some criteria. Finally the collaborations are decided by the user feedback and feedback influence as criteria for decision making. An Open data Portal Quality (ODPQ) dashboard is designed by the authors to map the platform-specific metadata information onto a generic scheme. The quality assessment and the comparison technique made allows portal providers to have a view of their data.

Nguyen et al [18], explored the major

elements and particular indicators of the TQM 4.0 model deployment in manufacturing businesses were investigated using Delphi and analytic hierarchy process (AHP) approaches resulting in 10 factors along with 41 indicators. Through an examination of the AHP approach, the study weighted the relevance of each element and indicator. Social variables were shown to be more relevant than technical elements in the study.

Tran et al [12], presented study on Internal organization, operational clusters, and industrial supports are all used to assess the state of e-procurement institutionalization in the construction sector. The AHP approach was used to give weights to measures based on data acquired through in-depth structured interviews with senior managers from a sample of 31 Vietnamese construction enterprises. Such finding may be utilized to develop an effective action plan for e-procurement sophistication, and government policymakers can use the findings to develop targeted support programs for e-procurement in the Vietnamese construction industry.

Tseng et al [13], based on past information/e-commerce system success models and a hospitality website quality rating model, the study provided a model for selecting amongst third-party booking systems from a customer perspective. The relative relevance of each factor impacting customers' choice of third-party booking platforms is disclosed using the analytic hierarchy process approach. The analytic hierarchy process technique is used to reveal the relative importance of each aspect influencing customers' choice of third-party booking platforms.

Mukherjee et al. [16] have used the fuzzy based MCDM techniques for selection of cluster head in sensor based cloud environment. Fuzzy AHP and fuzzy ANP techniques are used and the improvement in performance are evaluated.

Gupta et al [17], proposed a multidisciplinary approach to discover the many benefits of crowdfunding using the Buckley fuzzy-AHP approach to priorities the benefits, therefore expanding academicians' and entrepreneurs' knowledge bases. The study emphasized the important financial and non-financial benefits of crowdsourcing, which might assist entrepreneurs gain a better understanding of the benefits of crowdfunding.

Oh et al [14], analyzed the relative importance of priority based on blockchain technology characteristics using AHP technique. In order to improve the efficiency of new blockchain technology applications by businesses, the technical parameters of high relative relevance were examined. From the standpoint of the system hierarchy, the technical features of the blockchain found in earlier study were reclassified, and sub-factors of the technical characteristics were generated.

Kumar et al [15], presented a comparison of machine learning and the Fuzzy-AHP approach for groundwater potential mapping. To construct the groundwater potential score, the fuzzy-analytical hierarchy process (fuzzy-AHP) was utilized to assign weights to the most commonly used hydrological conditioning parameters. Machine learning (ML) methods such as support vector classifier, K-nearest neighbors, and random forest classifier were employed to forecast groundwater potential. Based on 208 well yield data, the models were trained, evaluated, and deployed. Remotely sensed data was used to generate all of the influencing parameters. When compared to fuzzy-AHP based weighted overlay analysis, ML models failed to identify the groundwater potential zones.

Nair et al [11], presented GIS-based analytical hierarchical process (AHP) approach, for exploring numerous geo-environmental characteristics for identifying groundwater potential zones in the Chittar basin, Tamil Nadu. Each of the thematic layer is mathematically analyzed for normalized weights and geometric mean in order to produce its rule for identifying possible groundwater possibilities at the pixel size (10 x 10 m). The conclusion is supported by field-estimated groundwater optimal yields for 24 open wells scattered throughout the research region, 17 of which are closely associated with the calculated data.

Gyani et al [19], provided a review of several MCDM decision-making strategies. Furthermore, the advantages and disadvantages of various MDCM strategies are examined in order to inform scholars about current decision-making trends along with description of the MCDM methodologies utilized for Cloud service selection (CSS). Further, it provides various research article discusses many ways for obtaining priority vectors from a Pairwise Consistency Matrix (PCM) in the Analytic

Hierarchy Process (AHP) technique that have been employed in recent years.

Sahoo et al [20] have used various MCDM technques for ranking of various attributes for better e-Governance systems. TOPSIS WSM and WPM techniques are applied on the criteria for ranking them in order to establish relation among the attribute and criteria for better e-Governance.

3. PROPOSED FRAMEWORK

The proposed framework is based on various concepts of e-Governance evaluation as surveyed in the literature. The evaluation of various e-Governance models are done using various MCDM techniques, but the most widely used method is AHP. The importance of using AHP is to analyse the responsible parameters in each level for efficiently judging the crucial criteria or alternatives.

In Fig-1, the parameters are aligned in a hierarchical structure where the goal is in the highest level which describes the success of e-Governance in India. The next level describes the broad criteria responsible for the success of the goal which consists of Governance, Resources, Management and promotion. The next level describes the various sub-criteria like ministerial and parliament which is covered in Governance, technical and non-technical resources, administrative and opportunities in management criteria and social media and advertisement under the promotion criteria.

The next level for evaluation consist of alternatives to each sub-criteria like- policy maker, strategy planner, legal framework and stakeholders under the Ministerial sub-criteria, Political willingness, information sharing, scope and collaborations under the Parliament sub-criteria, administrative policy, administrative strategy, financial budget and evaluation under the Administrative sub-criteria, user-friendly, design and navigation, leadership and economy under the opportunities sub-criteria, ICT infrastructure, software development, security and privacy and accuracy under the technical sub-criteria, support staff, awareness, disaster recovery and help-desk under the non-technical sub-criteria, promoting the e-Services through Facebook, WhatsApp, Twitter, google share under social media sub-Criteria and using print media, television, hoardings and air shows under advertisement sub-criteria respectively.

4. METHODOLOGY

In many cases, it becomes difficult to evaluate the governance systems taking into account all the conflicting parameters together. Therefore, Analytic Hierarchy Process(AHP) is commonly used to design the problem in various levels of possible affecting parameters or criteria. This in turn gives the best qualitative solution from the available alternatives. AHP approach was proposed by Thomas L Saaty in 1977 [1]. AHP is robust and flexible decision making methodology for better decision making in complex and multiple criteria problem. It has the benefits of dividing the complex structured problem into various sub-modules and arranging them in hierarchical structure. In such type of structure, each criterion is again mapped against their available alternatives to help in decision making. Moreover, the pair-wise comparison leads to a better comparative analysis. This process provides easy decision making to determine relative preferences by linguistic values. Decision making for any e-Governance system is a complex problem as it contains multiple criteria and each criterion is also have various available exceptions and alternatives. AHP is suited best for managing e-governance decision making. Other decision making methodologies do not provide such easy and simplex methods for finding a solution to any complex problem. Multi-Criteria Decision Making process provides best ranking scheme of the alternatives and the most preferred alternative is ranked as the first and the least preferred alternative is ranked towards the bottom. It can be generalized as the ranking of alternatives are ranged from 0 to 9 where 0 is assigned for the least preferred parameter or alternative of the criteria and 9 is assigned to the highest promised criteria's alternatives. In AHP scale, the numbers 1, 3, 5, 7 & 9 describes the equal-, moderate-, strong-, very strong-, and extreme importance; whereas the numbers 2, 4, 6 & 8 describes the weak-, moderate plus-, strong plus-, and very very strong importance respectively. Analytical Hierarchy Process (AHP) deals with criteria ranking in the various levels [1].

The Fig-1 represents the various levels of alternatives useful for making decision for success of e-Governance services in India. Now for each criteria, a set of alternatives are taken into consideration and the decision matrix for each criteria is created by the method of AHP [6]. A MCDM problem is expressed in the form

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of a matrix as represented below:

Steps involved in AHP process:

i.The first step is to structure the hierarchy model for inter-related decision elements which includes the most important criteria for evaluation of the problem statement. Each criterion again has some possible alternatives to be evaluated in various levels in the hierarchy.

ii.The next step includes pair-wise comparisons for providing judgments among the criteria at one level and the alternatives are being compared at different levels.

iii.The last step includes synthesizing the priorities among the alternatives and finding the best optimal solution among the available alternatives.

The set of criteria (C) is designed which contains all the criteria responsible for the evaluation process. C= { Cj | j= 1,2,3,……,n}. Each criterion is compared in a pair-wise fashion forming a Square matrix (n x n).

$$A=\begin{bmatrix} a_{11} & . & . & a_{1n} \\ . & . & . & . \\ . & . & . & . \\ a_{n1} & . & . & a_{nn} \end{bmatrix} \quad (1)$$

Normalized Matrix is generated by the following equation:

$$v_{ij} = \frac{a_{ij}}{\sum_{i=j}^{n} a_{ij}} \quad (2)$$

After the normalization matrix is obtained, Criteria weight for each alternative is calculated by the method:

$$\text{Criteria weight} = \frac{\sum_{j=1}^{n} v_{ij}}{n} \quad (3)$$

The consistency of the pair wise comparison judgment relates to the output of the AHP method. The consistency among the entries is defined by

Consistency = Criteria Weight * a_{ij} (4)

$$\text{Weighted Sum Value} = \sum_{j=1}^{n} v_{ij} \quad (5)$$

The criteria matrix are normalized and relative weights are derived. Eigen vector (V) gives the relative weights corresponding to the largest eigenvalue (λ_{max}).

$$\lambda_{max} = \text{Avg}\left(\frac{weightedsumvalue}{criteriaweight}\right) \quad (6)$$

Finally, Consistency Index (CI)

$$CI = \frac{\lambda_{max} - n}{n-1} \quad (7)$$

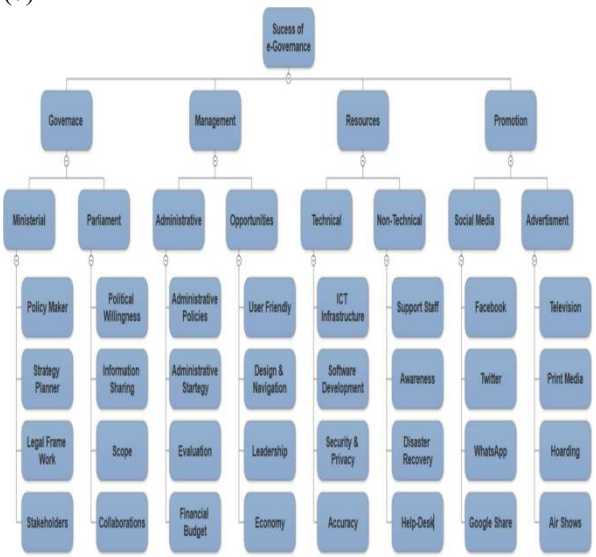

Fig-1: Proposed layout of e-Governance evaluation

5. COMPARSION AND RESULTS

The survey was made on various available e-Governance services and policies. The review of services includes various parameters from the stakeholders side as well as from the developers part. The survey was made in form of questionnaire which covered all the aspects taken into consideration for success of e-Governance systems in a developing country like India. The questionnaire were circulated among the students, professionals and

Government office bearers. The following results are recorded in a tabular form and the weighted value of each criteria makes it stand prior to other available alternatives.

The first step involves the pair-wise comparison among the alternatives to each criterion as described in the tables given below.

Table 1: Comparison Matrix for Parliament Criteria

	Political Willingness	Information sharing	Scope	Collaborations
Political Willingness	1	5	0.14	9
Information sharing	0.2	1	0.20	7
Scope	7	5	1	9
Collaborations	0.11	0.14	0.11	1

Table 2: Comparison Matrix for Ministerial Criteria

	Policy Maker	Strategy Planner	Legal framework	Stakeholders
Policy Maker	1	7	0.20	9
Strategy Planner	0.14	1	6	8
Legal framework	5	0.16	1	7
Stakeholders	0.11	0.13	0.14	1

Table 3: Comparison Matrix for Administrative Criteria

	Administrative Policies	Administrative Strategies	Evaluation	Financial Budget
Administrative Policies	1	0.5	9	7
Administrative Strategies	5	1	1.8	0.11
Evaluation	6	8	1	0.125
Financial Budget	8	9	0.11	1

Table 4: Comparison Matrix for Opportunities Criteria

	User Friendly	Design & Navigation	Leadership	Economy
User Friendly	1	0.14	8	0.2
Design & Navigation	7	1	0.17	8
Leadership	0.125	6	1	6
Economy	5	0.125	0.16	1

Table 5: Comparison Matrix for Technical Criteria

	ICT Infrastructure	Software Development	Security & Privacy	Accuracy
ICT Infrastructure	1	7	9	0.14
Software Development	0.14	1	0.14	9
Security & Privacy	0.11	7	1	8
Accuracy	7	0.11	0.125	1

Table 6: Comparison Matrix for Non-Technical Criteria

	Support Staff	Awareness	Diasaster recovery	Help Desk
Support Staff	1	0.17	5	0.125
Awareness	6	1	0.14	6
Diasaster recovery	0.2	7	1	5
Help Desk	8	0.16	0.2	1

Table 7: Comparison Matrix for Promotion Criteria

	Facebook	Twitter	WhatsApp	Google Share
Facebook	1	7	8	0.2
Twitter	0.14	1	0.2	6
WhatsApp	0.125	5	1	8
Google Share	5	0.16	0.125	1

Table 8: Comparison Matrix for Advertisement Criteria

	Television	Print Media	Hoardings	Air Shows
Television	1	8	7	0.2
Print Media	0.125	1	8	7
Hoardings	0.14	0.125	1	8
Air Shows	5	0.14	0.125	1

Table 9: Comparison Matrix for all Criteria at level 2

	Parliament	Ministerial	Administrative	Opportunities	Technical	Non-technical	Promotion	Advertisement
Parliament	1	0.2	5	7	5	0.2	0.2	0.25
Ministerial	5	1	0.2	0.14	0.17	0.2	0.25	0.33
Administrative	0.2	5	1	5	3	6	7	9
Opportunities	0.14	7	0.2	1	7	5	5	5
Technical	0.2	6	0.33	0.14	1	7	9	9
Non-technical	5	5	0.17	0.2	0.14	1	5	5
Promotion	5	4	0.14	0.2	0.11	0.2	1	9
Advertisement	4	3	0.11	0.2	0.11	0.2	0.11	1

Table 10:Comparison Matrix for all Criteria at level 1

	Governance	Management	Resources	Promotion
Governance	1	9	0.14	9
Management	0.11	1	5	0.14
Resources	7	0.2	1	7
Promotion	0.11	7	0.14	1

The next step involves Normalized Pairwise matrix for each comparison matrix. Some example of such Normalized Pairwise matrices are presented in the following tables.

Table 11: Normalized Pairwise Matrix for Parliament Criteria

	Political Willingness	Information sharing	Scope	Collaborations
Political Willingness	0.12	0.45	0.10	0.35
Information sharing	0.02	0.09	0.14	0.27
Scope	0.84	0.45	0.69	0.35
Collaborations	0.01	0.01	0.08	0.04

Table 12:Normalized Pairwise Matrix for Ministerial Criteria

	Policy Maker	Strategy Planner	Legal framework	Stakeholders
Policy Maker	0.16	0.84	0.03	0.36
Strategy Planner	0.02	0.12	0.82	0.32
Legal framework	0.80	0.02	0.14	0.28
Stakeholders	0.02	0.02	0.02	0.04

Table 13:Normalized Pairwise Matrix for Administrative Criteria

	Administrative Policies	Administrative Strategies	Evaluation	Financial Budget
Administrative Policies	0.05	0.03	0.76	0.85
Administrative Strategies	0.25	0.05	0.15	0.01
Evaluation	0.30	0.43	0.08	0.02
Financial Budget	0.40	0.49	0.01	0.12

Table14: Normalized Pairwise Matrix for Opportunities Criteria

	User Friendly	Design & Navigation	Leadership	Economy
User Friendly	0.08	0.02	0.86	0.01
Design & Navigation	0.53	0.14	0.02	0.53
Leadership	0.01	0.83	0.11	0.39
Economy	0.38	0.02	0.02	0.07

Table 15: Normalized Pairwise Matrix for Technical Criteria

	ICT Infrastructure	Software Development	Security & Privacy	Accuracy
ICT Infrastructure	0.12	0.46	0.88	0.01
Software Development	0.02	0.07	0.01	0.50
Security & Privacy	0.01	0.46	0.10	0.44
Accuracy	0.85	0.01	0.01	0.06

Table 16:Normalized Pairwise Matrix for Non-Technical Criteria

	Support Staff	Awareness	Disaster recovery	Help Desk
Support Staff	0.07	0.02	0.79	0.01
Awareness	0.39	0.12	0.02	0.49
Disaster recovery	0.01	0.84	0.16	0.41
Help Desk	0.53	0.02	0.03	0.08

Table 17: Normalized Pairwise Matrix for Promotion Criteria

	Facebook	Twitter	WhatsApp	Google Share
Facebook	0.16	0.53	0.86	0.01
Twitter	0.02	0.08	0.02	0.39
WhatsApp	0.02	0.38	0.11	0.53
Google Share	0.80	0.01	0.01	0.07

Table 18: Normalized Pairwise Matrix for Advertisement Criteria

	Television	Print Media	Hoardings	Air Shows
Television	0.16	0.86	0.43	0.01
Print Media	0.02	0.11	0.50	0.43
Hoardings	0.02	0.01	0.06	0.49
Air Shows	0.80	0.02	0.01	0.06

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Table 19: Normalized Pairwise Matrix for Level-1

	Parliament	Ministerial	Administrative	Opportunities	Technical	Non-technical	Promotion	Advertisment
Parliament	0.05	0.01	0.70	0.50	0.30	0.01	0.01	0.01
Ministerial	0.24	0.03	0.03	0.01	0.01	0.01	0.01	0.01
Administrative	0.01	0.16	0.14	0.36	0.18	0.30	0.25	0.23
Opportunities	0.01	0.22	0.03	0.07	0.42	0.25	0.18	0.13
Technical	0.01	0.19	0.05	0.01	0.06	0.35	0.33	0.23
Non-technical	0.24	0.16	0.02	0.01	0.01	0.05	0.18	0.13
Promotion	0.24	0.13	0.02	0.01	0.01	0.01	0.04	0.23
Advertisment	0.19	0.10	0.02	0.01	0.01	0.01	0.00	0.03

Table 20: Normalized Pairwise Matrix for Criteria

	Governance	Management	Resources	Promotion
Governance	0.12	0.52	0.02	0.53
Management	0.01	0.06	0.80	0.01
Resources	0.85	0.01	0.16	0.41
Promotion	0.01	0.41	0.02	0.06

The next steps involves assigning criteria weights for each alternatives and criteria in the gives hierarchy model and this gives priority ranking for each criterion and the respective alternatives.

Table 21:Normalized Pairwise Matrix for Parliament Criteria

Political Willingness	Information sharing	Scope	Collaborations
0.25	0.13	0.58	0.04

From table 21, Scope has the highest priority and is the most critical factor for Parliament sub-criteria followed by Political willingness , information sharing and collaborations respectively.

Table 22: Normalized Pairwise Matrix for Ministerial Criteria

Policy Maker	Strategy Planner	Legal framework	Stakeholders
0.35	0.32	0.31	0.02

In Ministerial criteria in table 22, Policy makers has more impact than strategy planner followed by the legal framework and the stakeholders.

Table 23: Normalized Pairwise Matrix for Administrative Criteria

Administrative Policies	Administrative Strategies	Evaluation	Financial Budget
0.42	0.12	0.21	0.25

In administrative criteria in table 23, Administrative policies rank prior to evaluation, financial budget and administrative strategies respectively.

Table 24: Normalized Pairwise Matrix for Opportunities Criteria

User Friendly	Design & Navigation	Leadership	Economy
0.25	0.30	0.33	0.12

In opportunities in table 24, leadership ranks at higher position followed by design and navigation, user friendliness and economy.

Table 25: Normalized Pairwise Matrix for Technical Criteria

ICT Infrastructure	Software Development	Security & Privacy	Accuracy
0.37	0.15	0.25	0.23

In technical criteria in table 25, ICT infrastructure is given high priority followed by security and privacy, accuracy and software development.

Table 26: Normalized Pairwise Matrix for Non-Technical Criteria

Support Staff	Awareness	Diasaster recovery	Help Desk
0.22	0.26	0.36	0.16

In non-technical criteria in table 26, disaster recovery is given high priority followed by awareness, support staff and help desk respectively.

Table 27: Normalized Pairwise Matrix for Social Media Criteria

Facebook	Twitter	WhatsApp	Google Share
0.39	0.13	0.26	0.22

In social media criteria in table 27, Facebook is given high priority followed by whatsApp, google share and twitter respectively.

Table 28: Normalized Pairwise Matrix for Advertisement Criteria

Television	Print Media	Hoardings	Air Shows
0.37	0.26	0.15	0.22

In advertisement criteria in table 28, Television has been given more weight-age followed by print media, air shows and hoardings respectively.

Table 29: Normalized Pairwise Matrix for Sub-criteria

Parliament	Ministerial	Administrative	Opportunities	Technical	Non-technical	Promotion	Advertisment
0.20	0.04	0.21	0.16	0.15	0.10	0.09	0.05

In table 29, the sub criteria are ranked as Parliament with highest weightage followed by administrative, opportunities, technical, non-technical,promotion, ministerial and advertisement.

Table 30: Normalized Pairwise Matrix for Criteria

Governance	Management	Resources	Promotion
0.30	0.22	0.36	0.12

Finally, from table 30 it is concluded that resources plays a crucial role followed by governance, management and promotion respectively.

5. CONCLUSION

There are various responsible criteria for proper Implementation of e-Governance Services. In the literature, various authors have implemented various techniques for evaluating the parameters of e-Governance services in various parts of the globe like India, China, Pakistan, Saudi Arabia, Turkey, Tanzania etc. Each country has its own parameters for the evaluation process. India is a developing country which is facing several issues in the political, managerial, leadership, financial and awareness of technical knowledge sectors. Developed countries are more successful in implementation of e-Government services because they have well designed infrastructures for the online services with least threats to its security and theft. In case of developing countries, like India, infrastructures are not reached to the satisfaction; security is a major challenge as online transactions are prone to fraud risk. Management and administration also plays a vital role in developing countries as fewer people are involved in the process on online service creation and delivery to the user end. The most important factor can be the promotion of the e-Services as many citizens are unaware of such online service delivery. As the concept of online delivery of Government services would be new for countries, the policy makers and the strategy makers have to take important decision regarding the establishment of e-Services. Moreover, awareness should be provided regarding the security issues and the online financial transactions. MCDM techniques provide the overall criteria and the alternatives for calculating the parameters for e-Services. Therefore, it is very important to assess all these sectors properly for a successful e-Governance. In this paper, the e-Governance services are analyzed through a feedback mechanism. The feedback included all the criteria like user friendliness, design and layout, opportunities and scope, governance and management, promotion and technical support. The governance parameters are analyzed and are given priority ranking as per their usability in the e-Governance system. Many attributes like accessibility keeping the physically challenged users in view, color combination of user interface for better visualization, language and emotions of users can be analysed for better decision making as a future scope of work.

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