Organizational Health Monitoring Model: Implementation of e-Governance

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ABSTRACT

In recent years e-Governance has become an important area of research for the academicians and IT professionals. At present status, e-Governance has been implemented in most of the developed countries; developing countries are struggling to achieve the due share by implementing it. Several studies show that implementation of e-Governance in developing countries are in slower pace. Implementation of e-Governance needs bold political will, bureaucratic reorganization, and citizen active participation. In this paper, one model has been presented to study the quality of employees firstly, and then quality and health of organization investigating capability indexes such as Attitude, Skill and Knowledge (ASK) of employees which are prime indicators for designing and rolling out of e-Governance successfully. Using the simulation program of the model, one case study has also been presented to validate the model in this paper which will be used as a health checker of an organization for any period such as weekly, fortnightly, monthly or yearly. It will be an effective tool for monitoring of health of an organization.

Keywords: Value of Employees, E-governance Modeling, E-government Efficiency, E-Government Parameters.

1. Introduction

e-Governance has long been seen as a perfect tool for fundamentally transforming the functions of an organization works enabling faster, cheaper, more personalized and more efficient service delivery to citizens and businesses anytime from anywhere. The studies of e-Governance workgroup (A Study, 2001) have been identified and co related a number of key parameters such as value of infrastructure, value to users, value to investors and value of employees for defining e-Government roll out of a nation. The relationship of key parameters for e Governance is shown in Figure. 1. Although there are many studies regarding service oriented model based on value of infrastructure, value to users and value to investors has been done, but the *value of employees* which is one of the crucial parameter for designing and rolling out of e-Governance in an organization, needs more research emphasize (Mittal, 2004; Prasad, 2003; Virili, 2001).

Since, the *Value of Employees* is measured as improvements in employee skills, satisfaction change readiness and retention. The value to employees is measured separately in their respective categories. In the "Value of Employee" dimension (Figure 1) only the effect on employees is measured. For the purpose,

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following indexes are suggested:

- Improved employee skills,
- Increased employee change readiness i.e. the attitude,
- Increased employee satisfaction and capabilities i.e. the knowledge

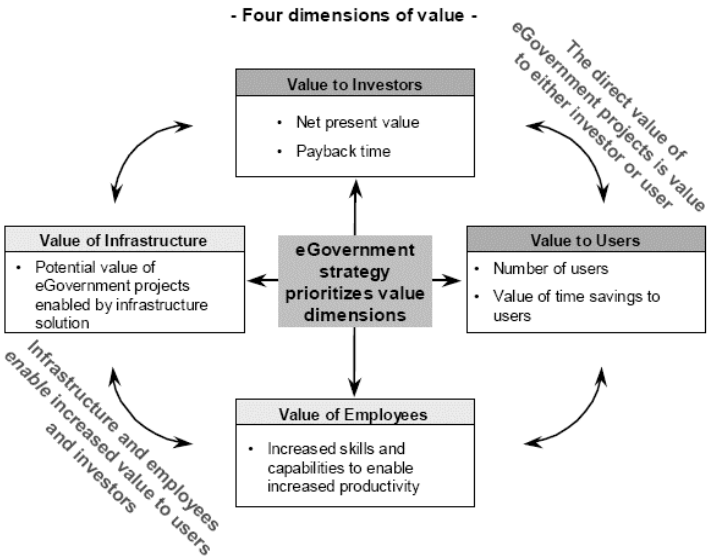

Figure 1: Co relation of e-government parameter

So, in order to maximize value creation in e-government solutions that focus on improving employee satisfaction as an end goal, the *Value of Employees* needs to consider as a crucial parameter. In this paper, one model has been presented for monitoring and analyzing the health of an organization to implement e-Governance in a complex organizational structure base on continuously assessment of the value of employees in terms of various capability indexes such as Attitude, Skill and Knowledge (ASK).

The model is based on the lines of Coulombs law (Millman and Halkias, 1991) and electrical potential superposition theorem (Millman and Halkias, 1991). The variables such as Attitude, Skill and Knowledge are chosen on the basis of e-Governance parameters of an organization as described earlier. Firstly, the model monitors and analyses the bonding between employees and reporting officer. The bonding between employees and reporting officer is proportional to the product of quality of employees and reporting officer and inversely proportional to the square of disagreement between employee to his/her reporting officer, which is on the lines of Coulombs law. Secondly, it monitors and analyses the potential of the department. The potential of the department is the summation of individual potential of the employee which is proportional to the quality of employees and inversely proportional to the dissatisfaction between employees to his/her reporting officer which is on the lines of electrical potential superposition theorem. The potential or efficiency of the organization is the summation of individual potential of the departments which is proportional to the potential of departments and inversely proportional to the dissatisfaction level of the departments which is again on the lines of electrical potential superposition theorem. Using the above sequence of the model, a simulation program has been developed and one case study has been presented in this paper to validate the model which is a useful tool for continuous assessment of health of an organization.

2. E-governance Health Monitoring Model

Traditionally, the administrative structure of Government Departments is vertically driven; command flows downwards and the progress of work flows upwards. Eventually this structure lacks the feedback mechanisms to investigate the issues, such as employee dissatisfaction, integrity, accountability, quality which are in prime importance for development of an organization. Although, there are provisions to monitor the above parameters through maintaining the confidential report once or twice in a year, but the process does not

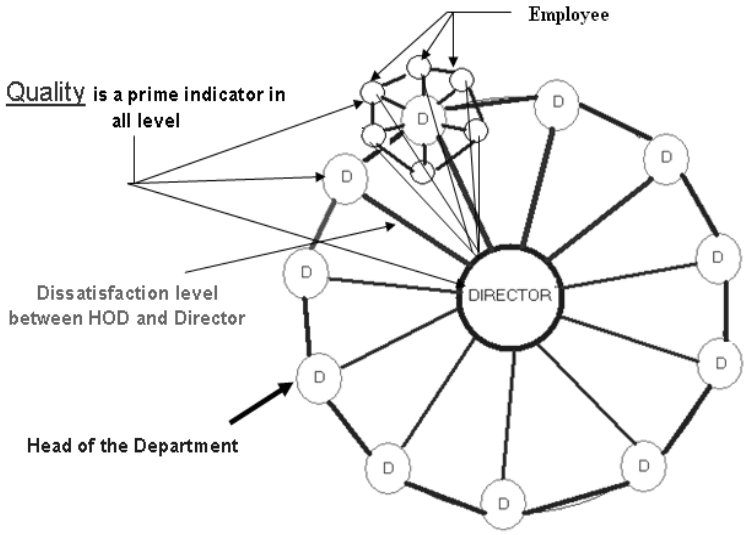

Figure 2: Circular model of the organization

reflect the health of organization. Therefore, the model which is described here will be used for continuous monitoring of health of an organization such as weekly, monthly half yearly, yearly or continuously. The model is structured in such a way that it can monitor the performance in all levels, irrespective of their status in the organization. The administrative structure of the departments and organization are in circular in nature with bonding between individual employees and department respectively, in ideal condition. The department head is the nucleus of the department and it is bonded with other employees of their own department as well as other departments. Finally, the head of the organization is the nucleus of the organization and it is bonded with other employees of his department as well as other departments. The model is shown in Figure 2.

Employee capability indexes such as Attitude, Skill and Knowledge (ASK) are the prime parameters for organizational development. It provides basic inputs to determine the quality of employees which is used for designing and rolling out of e-Governance for any organization. The model is flexible to incorporate the capability indexes other than ASK for the determination of quality of employee.

3. Algorithm and Process Chart of the Model

The model considers the followings:

(a) n numbers of employees in organization connected with k number of departments of that organization.

(b) m numbers of capability indexes are considered towards the evaluation of quality of each employee.

(c) A set of questionnaires are taken from each employee and grade point for individual questions is allotted to evaluate different capability indexes.
(d) The range of grade points varies for different capability indexes.
(e) A set of employees of the organization and the set of Departments can be defined by using the following set:

$$E = \{e_1, e_2, e_3, \ldots, e_n\}$$
$$D = \{d_1, d_2, d_3, \ldots, d_k\}$$

(f) A set of parameters for the capability indexes such as attitude, skill and knowledge and others can be evaluated through questionnaires from the employee to calculate their quality. The set of capability indexes can be defined as follows:

$$P = \{p_1, p_2, p_3, \ldots, p_m\}$$

Each parameter in above defined set will be evaluated using non zero integer grade points. The set of grade points can be defined as follows:

$$G = \{g_1, g_2, g_3, \ldots, g_p\}$$

(g) A valuation session can be defined as matrix of V, where V_{ij} is the grade value given by i^{th} employee on j^{th} parameter. Henceforth, $V_{ij} \in G$, $1 \le i \le n$, $1 \le j \le m$.
(h) The efficiency contribution of any employee in the department depends on his/her quality and the quality will be quantified through the questionnaire evaluation which can be defined as

$$Q_i = \sum_{j=1}^{m} V_{ij} \times W_j \quad \text{----------(1)}$$

Where, W_j is the relative weight of j^{th} capability index in the department.

The quality of an individual employee is relative to other employees in the department itself when it is compared with capability indexes grade point. The significance of the grade on the set of capability indexes varies department to department, so the support of the grade point on different capability indexes may vary in department to department, in which the weight will be relative to that support. With view to the above, relative weight of j^{th} capability indexes is defined as.

$$W_j = [\sum_{i=1}^{d} V_{ij} \times \mu V_{ij}(j)/\mathrm{d}] \quad \text{----------(2)}$$

Where, d is the number of employee in the department and μ is the support of the grade point. The low value of relative weight, W_j of employees in the department can be interpreted as weakness on the j^{th} capability index.

The support of i^{th} grade point in m^{th} capability index can be defined as,

$$\mu_i(m) = F_i(m) / d \qquad \text{where, } 0 \le \mu \le 1$$

Where, $F_i(m)$ is the frequency, number of user supported to i^{th} grade for m^{th} capability index and 'd' is the number of employees in the department.

(i) The efficiency of the Department (η_d) and organization (η_o) can be defined as:

$$\eta_d = [\sum_{i=1}^{d} K \times Q_i / r_i] / d \text{ --------(3)} \qquad \eta_o = [\sum_{i=1}^{k} K \times Q_k / r_k] / k \text{ ----------(4)}$$

$$Q_k = \sum_{i=1}^{d} Q_i / d \text{ -------(5)}$$

Where, Q_i and Q_k are the quality of i^{th} employee and k^{th} department, r_i and r_k are the dissatisfaction level of i^{th} employee and k^{th} department , $0.01 \leq r_i \leq 1$ and $0.01 \leq r_k \leq 1$, K is constant with a typical value of 0.01.

The dissatisfaction level r_i and r_k can be defined by using empirical relations,

$r_i = 0.01 + D_{ij}$ and $r_k = \sum_{i=1}^{d} r_i / d$ where,

$$Dij = [\sum_{i=1}^{d} (G_{max} - V_{ij}) \times W_j] / d \text{ ----------(6)}$$

Where, D_{ij} is dissatisfaction level of i^{th} employee on j^{th} capability index. G_{max} is the maximum grade point value of j^{th} capability index.

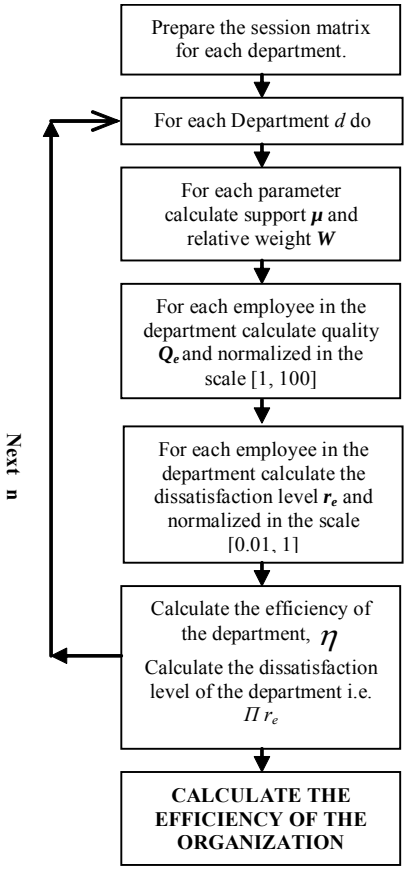

Figure 2: Circular model of the organization

(j) The bonding between employee and reporting officer can be defined as:

$$B_{er} = k[Q_e \times Q_r] / r_{er}^2 \quad \text{----------(7)}$$

Where, k is a constant with a value of 0.01, B_{er} is the bonding between employee and reporting officer Q_e is the quality of employee and Q_r is the quality of reporting officer r_{er} is the dissatisfaction level between employee and reporting officer, it varies from 0.1 to 1. The process chart for implementation of above algorithm is shown in Figure. 3. The quality of the department and organization are evaluated on the lines of Electrical superposition theorem which is given in Eq.3 and Eq.4. The bonding among any two employees is evaluated on the lines of Coulombs law of electrical theory which is given in Eq. 7. In both the cases, quality is compared with charge and distance between the charges is compared with dissatisfaction level.

As an example, r_{er} is 0.1, Q_e and Q_r is 1, then bonding between those will be very strong, in opposite case, r_{er} is 1, Q_e and Q_r is 1, then bonding between those will be very weak which is having a direct impact on the development of any organization. Therefore, dissatisfaction level is an important parameter for monitoring of an organization. The continuous monitoring of bonding among employees and bonding among the departments are the prime indicators for development of an organization.

4. Case studies

One recent questionnaires set of data of United Bank of India, Kolkata is used to evaluate the efficiency of employee, department and overall the organization by using the proposed model. The evaluation has been done on twenty (20) number of employees connected with three number of departments and twenty numbers of capability index parameters. The capability index parameter has been evaluated in the form of questionnaires by each employee of each departments using three non numeric grade points {never / sometimes / always} which has been converted as numeric Grade Points G = {1, 2, 3}. Three examples of sample questionnaires are as follows:

p_1: Do you have available sufficient manpower to do the job?
p_2: Do you make decisions quickly?
p_3: Do you insist that work must be done properly and refuse to allow poor workmanship?

Using the above questionnaires the valuation session matrices were formed for three departments and as an example, valuation session matrices of Department-1-3 is shown in Table – 1.

Table 1: Valuation matrices of Dept -1-3

Department	**p_1**	**p_2**	**p_3**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**p_{20}**
Dept-1	2.138	1.556	0.695	1.556	2.138	1.556	2.138	.	.	3	3	0.695	3
Dept-2	3	3	1.313	1.813	1.813	3	1.813	.	.	3	3	1.813	3
Dept-3	2	2	1.32	3	2	3	3	.	.	3	3	1.2	3

The relative weights W_j of each capability index parameters for the different departments were calculated by using Eq. 1 and are shown in Table – 2. The quality (Q_e), dissatisfaction level (r_e) and efficiency (η_i) of each employee in three departments were calculated by using Eq. 1 and Eq. 6 and are shown in Table 3. Initially, quality (Q_k), dissatisfaction level (r_k) and efficiency (η_d) of departments were calculated by using Eq. 5, Eq. 6 and Eq. 4 respectively. Finally, the efficiency of organization (η_o) was calculated using Eq. 3 and all the results are shown in Table – 4.

It is observed from the results that *Dept-1* has highest dissatisfaction level among all departments and it is

shown in Table 4. It implies that the employees of *Dept-1* are comparatively more dissatisfied to other departments and it is reflected in the low grade of capability index parameters, as a result the relative weight of those parameters for the specific department will be low. Therefore, it is possible to analyze the capability index parameters from the results and low valued capability index parameters of employees can be identified for specific reformation requirements to enhance the efficiency of the department as well as for organization. As an example, in this case study, the low valued capability indexes like p_3, p_{19} and p_{11} of Dept-1 should be taken care of for reformation of the said department. Therefore, capability indexes (p_i) such as Attitude, Skill and Knowledge (ASK) of employees which are prime indicators for designing and rolling out of e-Governance successfully is possible to monitor and reform for any organization by using the model.

Table 2: Relative Weight of each capability indices in Department 1-3

Department	Employee	Qi	r_i	$\eta_i = K*Qi/ r_i$
Dept-1	e_1	113	0.218	5.198
	e_2	114	0.199	5.737
	e_3	115	0.185	6.202
	e_4	118	0.100	11.83
	e_5	114	0.212	5.359
	e_6	116	0.165	7.004
Dept-2	e_1	140	0.170	8.258
	e_2	144	0.074	19.495
	e_3	141	0.151	9.347
	e_4	142	0.125	11.376
Dept-3	e_1	136	0.205	6.619
	e_2	137	0.176	7.777
	e_3	138	0.139	9.954
	e_4	136	0.188	7.253
	e_5	137	0.176	7.777

Table 3: The quality and dissatisfaction level of each employee in each department

Employee	p_1	P_2	p_3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	p_{20}
e_1	3	2	2	2	3	2	3	2	3	3	3	3	3	3	2	3	3	3	3	3
e_2	3	3	1	3	3	3	2	3	3	3	3	2	3	3	3	2	3	3	2	3
e_3	2	3	2	3	3	2	3	3	3	3	2	3	3	3	2	3	3	3	2	3
e_4	3	3	1	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	1	3
e_5	3	2	3	3	2	3	3	3	3	2	3	3	3	3	2	3	3	3	1	3
e_6	3	3	2	2	3	3	3	3	3	3	1	3	3	3	3	2	3	3	2	3

Table 4: Quality, dissatisfaction level, efficiency of Departments and efficiency of organization

Department	Quality of Department	Dissatisfaction level of Department	Efficiency of the Department
Dept-1	114.950	0.180	6.392
Dept-2	141.994	0.130	10.923
Dept-3	136.832	0.177	7.739
Efficiency of Organization			**8.351**

6. Concluding Remarks

In the above model, the efficiency contribution of an employee towards the overall efficiency of the department and organization highly depends on co-employee's efficiency. As an example, a department comprises of many highly efficient employees and one or very few employee with low efficiency, can still

exhibit high efficiency. On the other hand a department comprises of many low efficient employees and one or very few employee with high efficiency, will exhibit very low efficiency. Henceforth, the efficiency contributions of the employees need to superimpose onto the calculation of departmental efficiency which is relative in nature. The model which includes the evaluation of efficiency and bonding among employees provides the continuous information regarding the scope of development of capability indexes as well as dissatisfaction level. The online periodical evaluation of the bonding and quality of an employee are important tools for periodical assessment and it can be introduced as a health checker of an organization, in view of human resource management through e-governance.

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