

## RESEARCH ARTICLE



### OPEN ACCESS

**Received:** 08.09.2020

**Accepted:** 05.10.2020

**Published:** 08.10.2020

**Editor:** Dr. Natarajan Gajendran

**Citation:** Gill S, Vij P (2020) Future framework of eGovernance architecture : A structural equation modeling perspective. Indian Journal of Science and Technology 13(36): 3754-3761. <https://doi.org/10.17485/IJST/v13i36.1596>

\*Corresponding author.

[pvij40@gmail.com](mailto:pvij40@gmail.com)

**Funding:** None

**Competing Interests:** None

**Copyright:** © 2020 Gill & Vij. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Published By Indian Society for Education and Environment ([iSee](https://www.isee.org/))

**ISSN**

Print: 0974-6846

Electronic: 0974-5645

# Future framework of eGovernance architecture : A structural equation modeling perspective

Sumeet Gill<sup>1</sup>, Priya Vij<sup>2\*</sup>

<sup>1</sup> Supervisor, Department of Mathematics, MDU, Rohtak, 124001, India

<sup>2</sup> Scholar, Department of Computer Sciences and Applications, MDU, Rohtak, 124001, India

## Abstract

The present era of eGovernance is considered as technology-driven which enhance productivity along with amplified failure rates. The process, citizens, technology, and resources are the pillars of eGovernance but the emphasis is only upon technology which postulates for the development of updated integrated eGovernance model for accomplishing future requirements. **Objectives:** The present study endeavors to discover the diverse vital constructs to develop an integrated eGovernance model to augment efficiency and social influence. **Methods:** The NeSDA and OSI methodology are taken as a basis to extract constructs of eGovernance model and attained constructs and relative relationships ascertained through Exploratory and Confirmatory Factor Analysis (EFA and CFA). Structural Equation Modelling (SEM) is applied to develop and propose an integrated eGovernance model to augment efficiency and social influence. **Findings:** The empirical outcome illustrate the significant positive impact of eleven accumulated constructs on Intention to Use and Service Quality of the eGovernance initiative which ultimately augments efficiency and social influence of eGovernance initiatives. **Novelty:** The proposed model makes a significant contribution by integrating vital constructs on the basis of empirical outcomes and applies them to the context of the eGovernance. The suggested model will guide the policymakers and developers of eGovernance systems to focus on identified constructs to maintain and enhance efficiency and social influence.

**Keywords:** Structural equation modeling; intention to use; social influence; competence; transparency; efficiency

## 1 Introduction

eGovernance attempts to realize efficient processes and structures by integrating ICT at all levels of governance for augmenting good governance. The coherent elevation of eGovernance applications in assorted sectors transforms the mode of contact, connect, transact and reconnect between administrators and citizens. Technology brings out

new era of enhanced productivity through collaboration of stakeholders<sup>(1)</sup>. The rapid advancement and adoption of eGovernance technologies along with amplified failure rates instigate researchers towards development of diverse models and frameworks related to eGovernance.

Diverse models viz. Critical flow model, Comparative analysis model, Wider/Broadcasting dissemination model, Interactive service model and Mobilization and lobbying model, D&M Model, TAM, TPB, TRA, Gartner's Model, Layne and Lee Model, UN Model, Onion Ring Model, IBM Model and many more have been applied globally but contrary outcomes are consistently evident due to diverse local requirements and environment.

Knowledge creation, conservation and augmentation is crucial and integral part of eGovernance model development<sup>(2)</sup> whereas process, citizens, technology and resources are the pillars of eGovernance. Rapid acquaintance of state-of-the-art technology reflects emphasis is upon technology whereas it should have been on discovering and assessing the constructs vital for the success of the models. Literature shows that service vision and attitude of service providers and developers are vital for eGovernance and ultimately facilitate in furthering the objectives of eGovernance Initiatives. Depleted intention of the backend service provider to harness the potential of technology is the prime hurdle in enhancing the efficiency of eGovernance projects. Further, the public services quality also plays an equally important role. Security construct restricts the development of eGovernment systems and most of the models stress upon phases viz. Presence, Adoption, Interaction, Transaction, Transformation, Catalogue, Vertical and Horizontal integration, Publish, Automate and many more<sup>(3)</sup>. The validity and reliability of the constructs of mentioned phases have been neglected. The hindrance of operational implementation and usage of eGovernance should be overcome<sup>(4)</sup> to enhance the significant effect of the eGovernance on society.

The Gartner, Layne and Lee, United Nations, World Bank, IBM and many more eGovernance models merely guide policymakers in reengineering processes and the same shall not be referred to as standard. eGovernance is not only web based service which refurbishes government functioning with transparency<sup>(5)</sup> but has larger influence than someone's revelation. Personal and social factor, proxied to the competencies of governance and may affect performance of the government<sup>(6)</sup>.

The present era is considered to be technology driven and organizations advocate the use of cloud based technology in accelerating the transformation of citizen oriented services<sup>(7)</sup>. The cloud computing through SAAS, PAAS and IAAS provides solutions pertaining to eGovernance infrastructure development at lower cost and swiftly<sup>(8)</sup> though it neglects construct identification at any layer. Nevertheless, it is a fact that technology remains as assisting tool and human and other services related constructs need to be conceived judiciously. Feedback interface guides the institutions to deal with debatable and problematic gaps to enhance the efficiency of the working models<sup>(9)</sup>.

Only few models open avenues for direct participation of individuals in governance processes to bring in greater objectivity and transparency<sup>(10)</sup> but no model puts forward participation of end users at the time of inception and development to identify the significant constructs which leads to model efficiency enhancement. Being an integrated system eGovernance enables institutions to assess the performance<sup>(11)</sup> however the gaps of eGovernance models remain unaddressed. Significant gaps in the existing technology oriented eGovernance models evident through research outcomes<sup>(12)</sup>. Melioration of existing eGovernance model is essential for improved coexistence of government and stakeholders<sup>(13)</sup>.

The present study is an attempt to discover the diverse vital constructs to develop integrated eGovernance model to augment efficiency and social influence.

## 2 Materials and Methods

### 2.1. Statistical Analysis

The model development compass different phases i.e. accumulating eGovernance constructs by referring National eGovernance Service Delivery Assessment 2019 (NeSDA), UNDESA Online Service Index (OSI) eGovernment Survey<sup>(14)</sup>, and extensive literature review in first phase. In second phase, twelve accumulated eGovernance constructs were ascertained by applying Exploratory Factor Analysis (EFA) on the basis of responses of respondents. In third stage, extracted constructs and relative relationship confirmed through Confirmatory Factor Analysis (CFA) and in fourth stage, Structural Equation Modelling (SEM) was applied on the basis of extracted constructs and relative relationship to develop integrated eGovernance model to augment efficiency and social influence. The responses were tabulated and analyzed using open source software Jamovi Version 0.9.5.12.

#### 2.1.1 Sample Status

In total, six hundred (600) respondents including software developers, system analysts, front and back end service providers, citizens and end users were selected (using snowball method) and interviewed during February 2019 to December 2019. Only those respondents who were having hands-on knowledge of eGovernance technologies and applications and were ready to interact and participate were included in the study. The respondents were apprised regarding the objective of the research

before starting the interview. Further, the respondents were assured that their identity shall not be revealed.

### 3 Results and Discussion

The Kaiser-Meyer-Olkin (KMO) test value of sampling adequacy (.903) and significant value of Bartlett's Test of Sphericity (0.00) endorse application of EFA [ Table 1 ]. Principle Components Analysis (PCA) technique were applied to execute EFA [ Table 2 ] on 49 statements. All the constructs having Eigen value >1 were extracted and retained for further analysis. 28 statements were extracted due to communality value less than 0.50. Further, data adequacy (KMO .897) and existence of relationship among the 21 remaining statements were also depicted and final EFA was applied [ Tables 3 and 4 ].

**Table 1.** KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy		.903
Bartlett's Test of Sphericity	Approx. Chi-Square	4100.306
	Df	138
	Sig.	.000

**Table 2.** Statements/Items related to eGovernance constructs

Sr. No.	Statements/items	Initial	Extraction
1.	Portal shall accomplish tasks more quickly and improve productivity. Performance Expectancy	1.000	.401
2.	Portal shall remove redundancy of data.	1.000	.773
3.	Portal shall provide integrate data related to all departments.	1.000	.807
4.	Portal shall enable data recovery quickly and easy.	1.000	.437
5.	Portal shall be compatible with traditional manual process. Compatibility	1.000	.489
6.	Portal G2C services shall be portable with legacy systems.	1.000	.791
7.	Using portal shall not require special training and skills.	1.000	.674
8.	Portal shall be relevant to my job profile. Job Fit	1.000	.825
9.	Portal shall not require significant changes in my existing work routine.	1.000	.309
10.	Portal shall supply 24 x 7 anytime and anywhere information to handle citizen quires and backend support	1.000	.403
11.	Availability of resources required to use portal. Facilitating Conditions	1.000	.661
12.	Availability of 24 x 7 high speed internet connectivity.	1.000	.349
13.	Top Down guidance and support as and when required	1.000	.664
14.	Portal shall improve my skills and competency Intention to Use	1.000	.717
15.	Govt. and HEI Legislation compulsion to work through portal.	1.000	.329
16.	Portal shall save time and cost and enhance convenience.	1.000	.429
17.	Navigation on Portal shall be easy and quick.	1.000	.467
18.	Using portal shall be more secure as compare to the previous system	1.000	.802
19.	Portal shall provide services on time in a given time frame. Reliability	1.000	.706
20.	Portal shall performs services correctly every time.	1.000	.401
21.	Online transactions through portal shall always accurate.	1.000	.417
22.	Citizen's shall rapidly retrieve the real time information as and when required using portal	1.000	.466
23.	Portal shall provide services promptly Responsiveness	1.000	.379
24.	Portal shall quickly resolves problems as and when encounter.	1.000	.632
25.	Citizen's shall receive prompt responses to my requests by email, SMS or other means.	1.000	.387
26.	The Front and Back-End of portal shall be able to handle the problems as and when arise. Competence	1.000	.829
27.	The Front and Back-End of portal shall have knowledge to answer my quires.	1.000	.406
28.	Citizen's shall not encounter online jam in searching for information.	1.000	.462
29.	Portal shall be qquick and easy to complete transaction and access results	1.000	.392
30.	Portal shall require Low Loading Time and maintain Low Queuing Time	1.000	.776
31.	The organisation and structure of online content available on portal shall be easy to follow. Easy to Use	1.000	.298
32.	Portal shall requires low effort and technical knowledge to assess and operate.	1.000	.654
33.	Navigating and search desired information on portal shall be easy.	1.000	.701
34.	User Interface of the portal shall be well organized and appealing appearance	1.000	.703

*Continued on next page*

Table 2 continued

35.	Citizen's shall feel confident while working on computer even if there is no one around to tell me what to do.	1.000	.401
36.	Portal shall provide wide ranges of services. Product Portfolio	1.000	.327
37.	The services offered through Portal shall be as per requirement.	1.000	.819
38.	The Portal shall provide many useful free services (e.g. message board, eMail, eLinks, eResources, Dashboard etc.)	1.000	.393
39.	Portal shall not misuse citizen's personal information. Security	1.000	.768
40.	Citizen's shall feel secure operating Portal for online transactions.	1.000	.414
41.	Citizen's shall feel secure in sharing sensitive information (e.g. bank details, phone no etc.) during online transactions through portal.	1.000	.476
42.	The portal shall have well defined Privacy Policy.	1.000	.842
43.	When some transaction error occur on portal citizen's shall feel secure	1.000	.436
44.	Citizen's shall feel the risk associated with online transactions using portal in low.	1.000	.414
45.	The online services offered by Portal shall save time and cost and also enhance convenience. Usefulness	1.000	.726
46.	Portal shall provide 24x7 anytime, anywhere online services and support.	1.000	.465
47.	Web Content shall be available in Local Language on Portal.	1.000	.644
48.	Govt. and HEI Legislation forced me to use website.	1.000	.401
49.	Portal Services shall be useful in diverse ways.	1.000	.417

Table 3. KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy		.880
	Approx. Chi-Square	3700.017
Bartlett's Test of Sphericity	Df	113
	Sig.	.000

Table 4. Statements/Items related to eGovernance constructs

Sr. No.	Statements/items	Initial	Extraction
1.	Portal shall remove redundancy of data. Performance Expectancy	1.000	.773
2.	Portal shall provide integrate data related to all departments.	1.000	.807
3.	Portal G2C services shall be portable with legacy systems. Compatibility	1.000	.791
4.	Using portal shall not require special training and skills.	1.000	.674
5.	Portal shall be relevant to my job profile. Job Fit	1.000	.825
6.	Availability of resources required to use portal. Facilitating Conditions	1.000	.661
7.	Top Down guidance and support as and when required	1.000	.664
8.	Portal shall improve my skills and competency Intention to Use	1.000	.717
9.	Using portal shall be more secure as compare to the previous system	1.000	.802
10.	Portal shall provide services on time in a given time frame. Reliability	1.000	.706
11.	Portal shall quickly resolves problems as and when encounter. Responsiveness	1.000	.632
12.	The Front and Back-End of portal shall be able to handle the problems as and when arise. Competence	1.000	.829
13.	Portal shall require Low Loading Time and maintain Low Queuing Time	1.000	.776
14.	Portal shall requires low effort and technical knowledge to assess and operate. Easy to Use	1.000	.654
15.	Navigating and search desired information on portal shall be easy.	1.000	.701
16.	User Interface of the portal shall be well organized and appealing appearance	1.000	.703
17.	The services offered through Portal shall be as per requirement. Product Portfolio	1.000	.819
18.	Portal shall not misuse my personal information. Security	1.000	.768
19.	The portal shall have well defined Privacy Policy.	1.000	.842
20.	The online services offered by Portal shall save time and cost and also enhance convenience. Usefulness	1.000	.726
21.	Web Content shall be available in Local Language on Portal.	1.000	.644
Extraction Method: Principal Component Analysis			

Cumulative percentage of variance (70.407) inferred that 70 percent of eGovernance portals efficiency is explained by accumulated twelve eGovernance constructs during the second and third stage. The factor wise statements accrued through EFA were tabulated and CFA was applied for overall construct validation [ Table 5 ] on twelve dimensions and twenty-one (21) statements. The outcome of CFA is exhibited via Figure 1. The model fit indices [ Table 6 ] and GFI, CFI, NFI and RMSEA values are incorporated in Table 7. The value of CFI (0.9) testified strong unidimensionality and GFI (0.904) reflected best fit of model, and RMSEA value (.080) were also makes the model acceptable. The inter relationships among statements and constructs found significant and strong. Further, all the relevant assumptions of SEM were satisfied and framework of eGovernance architecture was proposed at Figure 2 using SEM.

**Table 5.** Factor loading and coding eGovernance construct statements

Sr. No.	Factor	Coding	Statements/items	Factor Loading
1.	Performance Expectancy	PE1	Portal shall provide integrate data related to all departments.	.848
		PE2	Portal shall remove redundancy of data.	.805
2.	Compatibility	C1	Portal G2C services shall be portable with legacy systems.	.796
		C2	Using Portal shall not require special training and skills.	.709
3.	Job Fit	JF1	Portal shall be relevant to my job profile.	.867
4.	Facilitating Conditions	FC1	The HEI shall provide all necessary resources required to use portal.	.807
		FC2	The HEI shall provide Top Down guidance and support as and when required	.765
5.	Intention to Use	IU1	Using Portal shall be more secure as compare to the previous system	.890
		IU2	Portal shall improve my skills and competency.	.805
6.	Reliability	REL1	Portal shall provide services on time in a given time frame.	.746
7.	Responsiveness	RES1	Portal shall quickly resolves problems as and when encounter.	.790
8.	Competence	COM1	Portal shall require Low Loading Time and maintain Low Queuing Time	.810
		COM2	The Front and Back-End of portal shall be able to handle the problems as and when arise.	.798
9.	Easy to Use	EU1	User Interface of the portal shall be well organized and appealing appearance	.790
		EU2	Navigating and search desired information on Portal shall be easy.	.757
		EU3	Portal shall requires low effort and technical knowledge to assess and operate.	.719
10.	Product Portfolio	PP1	The services offered through portal shall be as per requirement.	.817
11.	Security	SEC1	The portal shall have well defined privacy policy.	.890
		SEC2	Portal shall not misuse my personal information.	.864
12.	Usefulness	USE1	The online services offered by portal shall save time and cost and convenience.	.837
		USE2	Web Content shall be available in Local Language on Portal.	.784

**Table 6.** Model Fit Indices

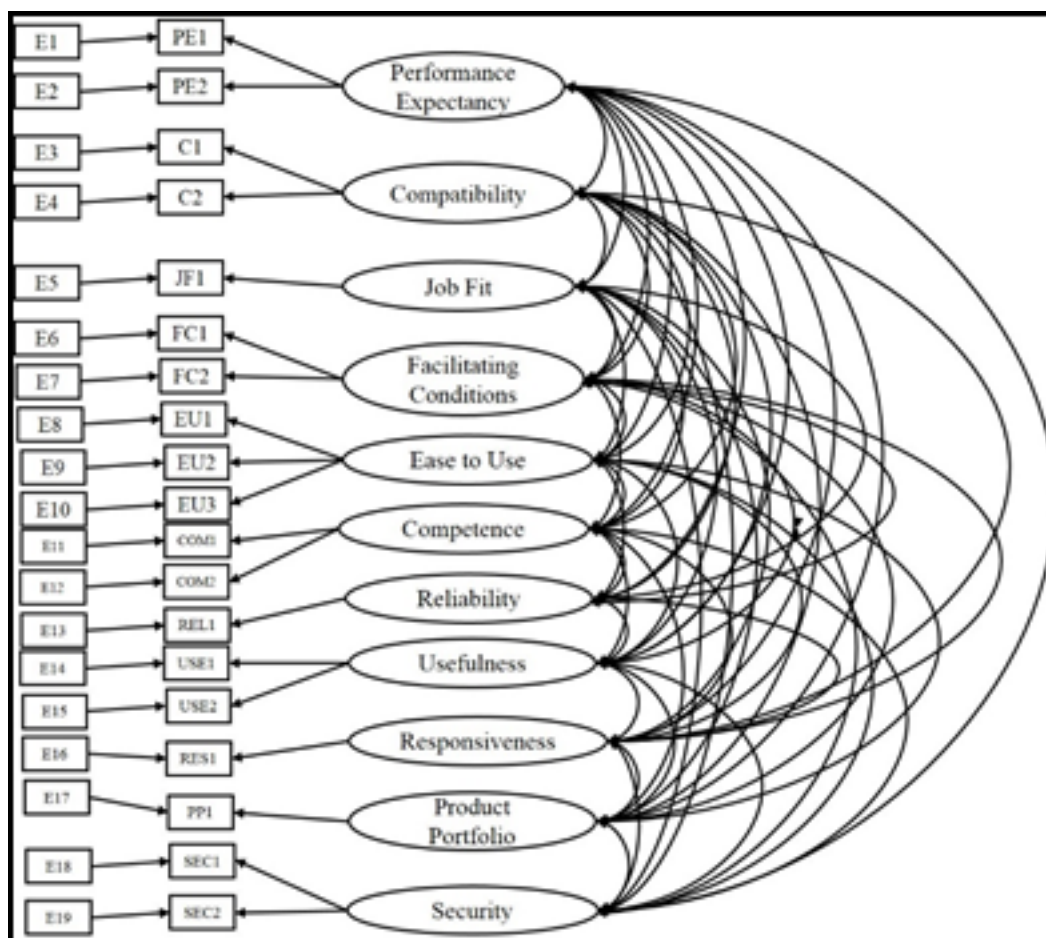
Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	35	277.806	85	.000	3.269
Saturated model	120	.000	0		
Independence model	15	3884.553	105	.000	36.997

**Table 7.** Model Fit Indices

Model	GFI	CFI	NFI	RMSEA
Default model	.904	.950	.929	.080

(GFI: Goodness of Fit Index; CFI: Comparative Fit Index; NFI: Normed Fit Index; RMSEA: Root Mean Square Error of Approximation)

The outcome depicts significant positive impact of eleven accumulated eGovernance constructs “Performance Expectancy”, “Compatibility”, “Job Fit”, “Facilitating Conditions”, “Ease of Use”, “Competence”, “Reliability”, “Usefulness”, “Responsiveness”, “Product Portfolio”, and “Security” on Intention to Use and Service Quality which ultimately augment efficiency and social influence of eGovernance.

**Fig 1.** Confirmatory factor analysis model outcome



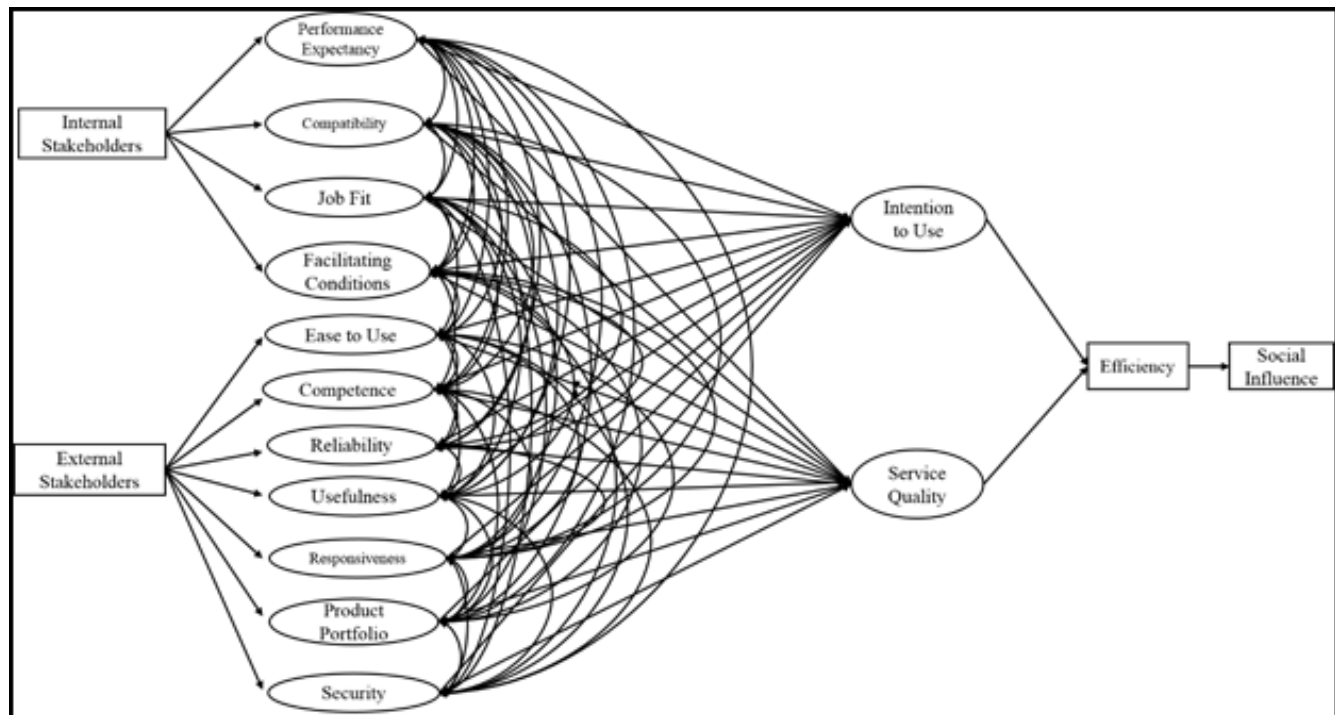


Fig 2. Proposed eGovernance conceptual model

## 4 Conclusion

The availability of diverse eGovernance related technologies and related impact on efficiency of eGovernance projects have come up with opportunity for research. This study focused on discovering the diverse vital constructs to develop integrated eGovernance model to augment efficiency and social influence. The proposed model makes significant contribution by integrating vital constructs on the basis of empirical outcomes and applying them to the context of the eGovernance. The model shall impart significant transformation at development as well as implementation level and bring in a new era for end users and service providers. The suggested model will guide the policy makers and developers of eGovernance systems to focus on identified constructs to maintain and enhance efficiency and social influence.

## Acknowledgement

The authors acknowledge the help of open source society for providing software access required for statistical analysis. The study was self-funded and there is no conflict of interest.

## References

- 1) Weir G. Technology bringing about a new era in education and collaboration. 2019. Available from: <https://www.itworldcanada.com/article/technology-bringing-about-a-new-era-in-education-and-collaboration/416201> Date accessed: 02/09/2020.
- 2) Khalid A. The E-Governance (E-GOV) Information Management Models. *International Journal of Applied Information Systems*. 2016;11(1):10–14. Available from: <https://dx.doi.org/10.5120/ijais2016451567>.
- 3) Jain V. Design of secure e-governance model for India. *Journal of Engineering and Technology*. 2018;4(2):33–41. Available from: <https://www.gyanvihar.org/journals/index.php/2018/11/21/design-of-secure-e-governance-model-for-india/>.
- 4) Dickhaus T, Stange J, Demirhan H. On an extended interpretation of linkage disequilibrium in genetic case-control association studies. *Statistical Applications in Genetics and Molecular Biology*. 2015;14. Available from: <https://dx.doi.org/10.1515/sagmb-2015-0024>.
- 5) Noman AM, Hebbar CK. E-Government Development Models: Concepts Overview. *International Journal of Latest Trends in Engineering and Technology Special Issue SACAİM*. 2016;115(120). Available from: <https://www.ijltet.org/journal/147895420920.pdf>.
- 6) Haliah H, Nirwana N. The development of good governance model for performance improvement. *International Journal of Excellence in Government*. 2019;1(1):21–36. Available from: <https://dx.doi.org/10.1108/ijeg-09-2018-0004>.
- 7) McCann D. IBM's new Cloud Modernization Centre accelerates the transformation of citizen services. IT world Canada. 2020. Available from: <https://www.itworldcanada.com/sponsored/ibms-new-cloud-modernization-centre-accelerates-the-transformation-of-citizen-services> Date accessed:

02/09/2020.

- 8) Kumar M, Shukla M, Agarwal S, Pandey GN. An E Governance model using cloud computing technology for Developing Countries. 2013. Available from: [https://www.researchgate.net/publication/262105425\\_An\\_E\\_Governance\\_model\\_using\\_cloud\\_computing\\_technology\\_for\\_Developing\\_Countries](https://www.researchgate.net/publication/262105425_An_E_Governance_model_using_cloud_computing_technology_for_Developing_Countries).
- 9) Rajput V. E-Governance culture in institutions of higher education. *International Journal of Educational Planning & Administration*. 2017;7(1):1–4. Available from: [https://www.ripublication.com/ijepa17/ijepav7n1\\_01.pdf](https://www.ripublication.com/ijepa17/ijepav7n1_01.pdf).
- 10) Competitive exams : Models of eGovernance. Examrace. 2020. Available from: <https://www.examrace.com/Study-Material/Public-Administration/E-Governance-Models.html>.
- 11) Krishnaprabu S. E-governance in Education Sector. *International Journal of Recent Technology and Engineering*. 2019;8(1C2):958–961. Available from: <https://www.ijrte.org/wp-content/uploads/papers/v8i1C2/A11650581C219.pdf>.
- 12) Alawneh A, Al-Refai H, Batiha K. Measuring user satisfaction from e-Government services: Lessons from Jordan. *Government Information Quarterly*. 2013;30(3):277–288. Available from: <https://dx.doi.org/10.1016/j.giq.2013.03.001>.
- 13) Bayona S, Morales V. E-government development models for municipalities. *Journal of Computational Methods in Sciences and Engineering*. 2017;17(1):S47–S59. Available from: <https://dx.doi.org/10.3233/jcm-160679>.
- 14) Department of administrative reforms and public grievances (India). National e-Governance Service Delivery Assessment 2019, e-Governance Landscape - India's Transformative Journey. New Delhi : Department of administrative reforms and public grievances, Ministry of personal grievances and pensions, Government of India. 2020. Available from: [https://www.nesdaportal.in/NeSDA\\_2019\\_Final\\_Report.pdf](https://www.nesdaportal.in/NeSDA_2019_Final_Report.pdf).