ISSN 2278-3091
Volume 10, No.3, May - June 2021
International Journal of Advanced Trends in Computer Science and Engineering
Available Online at http://www.warse.org/IJATCSE/static/pdf/file/ijatcse1561032021.pdf
https://doi.org/10.30534/ijatcse/2021/1571032021

Post Pandemic World and Challenges for E-Governance Framework

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ABSTRACT

Emergence of cloud computing and rapid development of automation in terms of Internet of Things (IoT), it was evident in the wake of 2019 that world is gradually moving towards a complete digital system from individual to business and ultimately government level. Technology advancements start expanding from smart devices to smart cities, autonomous machines to autonomous cars and expert systems to intelligent robots. These advancements are supported by the swiftly growing communication and networking domain where 5G is introducing new range of expansion and more freedom to creativity and novelty. This new regime of advanced technologies has made the foundation on live digital or internet based structures that transformed into cloud computing with swiftly growing facilities and innovative competitors. Cloud computing penetrates in almost all digital domains from individuals to corporates and to governments as well due to its versatile services, economic modelling and ease of accessibility. Online corporate portals, e-commerce applications and digital marketing are few segments to be mentioned as new domains due to the emergence of online digital world. The most complex system for management is the community system as it consists of many dimensions and layers to cover the direct, mediating and associative parameters. Individual segments like healthcare, education, food supply chain, political operations and many more are available but an accumulative conception of the whole society, focusing on all community layers, their structures and respective functions is a challenging endeavor – that is our focused system for this research i.e. e-governance system. Globally these systems are being developed, deployed and evaluated in versatile formats and configurations from server based conventional architectures to highly distributed serverless cloud models. There are good practices, success stories and research challenges in this vast domain that are making amalgamation of smart cities, governance and artificial intelligence to come up with a broader and robust framework for e-governance. In this regard, e-governance was already on advanced stage and globally attained a certain level of confidence in terms of various digital systems developed, deployed and governed by the respective governments. The recent pandemic has not only exposed the gaps but also put up new questions and research avenues for the domain of e-governance. The most important parameter in this new focus is the human health and well-being; similarly, the connectivity and performance are two vital operational parameters to provide a timely and effective service to the community. This research paper focuses on highlighting the key challenges and the need to modify the monitoring and evaluation parameters of e-governance frameworks.

Key words: E-Governance ,COVID19, Digital Administration, Population Management

1. INTRODUCTION

In human development, governance is the most visible parameter showing itself in the form of public administration, business management, politics, international relations and most recently in technology avenues like cloud computing and internet of things. Specifically looking at public administration the governance is linked with the government, judiciary and political system with the expectations to have a balance community system for the benefits of every individual [1]. However, there are many other mediating parameters, which play their role in developing a significant impact on the quality and dimension of the governance [2]. For a formal and more standardized definition of governance, United Nations Development Program (UNDP) mentioned it as the exercise of the economic, political and administrative authority to manage the various levels of a country's system along with the population. Therefore, we may say

that governance is consisting of three core parameters i.e. economic, political and administrative, the balance between these three elements leads towards defining the concept of good governance [3]. These three pillars are identifiable in every governance system even when we are looking at the digital world where apparently things are different but beneath the surface the philosophy and conceptions are the same. It is important to have the conception of governance and the subjective approach towards the definition of good governance, as these both concepts will help in the identification of evaluation and monitoring parameters.

In the last century, emergence of information technology and swift development towards software systems assisting and various domains has deep impact on almost every process related to humans that includes governance as well. From productivity tools for individuals to the ERP systems for the corporates, all meant to provide governance with the support of technology to make it more cohesive and accessible. The formation of information and communication technology (ICT) made it ideal for the larger systems like governments, public administration and community welfare and service applications. Government applications for the public, departments and service sector are termed as e-governance that provides accessibility through internet and the online application architecture. There are various types, ranks of these applications, which are certainly in accordance with the emerging technological changes in terms of, cloud computing, and software as a service (SaaS) like robust and fast methodologies [4].

The transformation of governance to electronic governance (e-governance) brought in accessibility and convenience, transparency, growth in GDP and reduction in corruption. It has also pave the way for the direct involvement of the citizen in the administrative process and decreased the cost of engagement. The methodology implemented by various countries engaged ICT in an economical, accessible and productive way to deliver basic operations to the citizens e.g. utilities, documentation, complaints, applications and service acquisitions. With the adaptability and system maturity, the quality of information has increased, service provision has been getting improved and that resulted into various types and layers of e-governance for developed, developing and under-developed countries [5].

The structuring and refinement in e-governance methodologies are also monitored by international organizations like United Nations to standardize the good practices and guidelines to the developing and under-developed countries for the implementation of e-governance systems. The United Nations Department of Economics and Social Affairs (UNDESA) has conducted the e-government survey in 2001 focused on the status and way forward of e-governance initiatives by the governments of different countries. This survey has developed a frequency of re-evaluation after every two years, which proves to be a sufficient duration for the development, refinement and maturity of various e-governance applications and initiatives. The methodology of said survey is based on the literature collection and analytics on the collected data from the member countries [6], on basis of which they have developed E-government development Index EGDI that depicts the inclination and willingness of the governments to engage ICT for the transparent, accessible and convenient services to their respective citizens. This survey incorporates all 193 member countries of the United Nations, in a systemic way to analyze the national websites of ey departments to understand how the government is extending e-governance facilitation to the citizens and how many critical services are being part of e-governance package.

Moreover, international organizations linked the e-governance to a larger canvas i.e. international sustainable development goals (SDGs) declared by United Nations Organization (UNO). Therefore, the global e-governance systems are now having a more specific objective along with transparency, accessibility and convenience and that new element is the sustainable development in terms of systems, human living conditions, education, health, disaster management, environment and food chain.

The concept of sustenance is linked to the development of a cohesive balance between present and future challenging requirements in terms of emerging technologies, environmental changes and other system related aspects. That was the background of global e-governance and its way forward until the January 2020 when World Health Organization (WHO) declared COVID-19 as a public health. A pandemic started from Wuhan and spread in more than 209 countries destroying not only human lives but also local and international systems. COVID-19 brought in a new challenge and opportunity to the e-governance system. On one side, it highlighted the gaps within the system and on the other side; it has exposed the hidden strengths and effectiveness of the e-governance applications. The most effective change in e-governance in the wake of COVID-19 is the emergence of a global online information system launch by WHO to cater public health emergency, awareness and updates about the global situation. EPI-WIN came up as a global e-governance application to manage the epidemic and information availability to all stakeholders [7]. The launch of EPI-WIN proved to be on right time because afterwards within 3 months COVID-19 transformed into a global pandemic. The measures related to the pandemic management like isolation, quarantine, lockdowns and social distancing are the factors which becomes the new parameters for the e-governance systems.

It is also notable that e-governance is closely linked with sustainable development goals that means creating a balance between present and future requirements. As

COVID-19 has changed the economic, social, environmental, technological, political and societal setups and that requires careful tweaking of e-governance systems to cater the future impact of such changes [8]. The economic conditions and actions in response are

2. LITERATURE REVIEW

The acceptance of e-governance among general public and bureaucracy is mainly based on the simplicity, transparency, accessibility and collaborative segmentation. It became a platform for government and people to keep a check on responsibilities, expenditures, facilitation and performance measures on an online platform to have a precise and responsive system [9].

There are multiple layers of e-governance systems starting from core digitization of public utilities to the sophisticated financial automation. These services through online server based applications or by using serverless cloud structures are focused on the provisioning of increasing the quality of services and accessibility which in return increased to trust relationship between citizen and the government. Researchers have proposed many frameworks to address multiple parameters related to e-governance, these frameworks are having pros and cons but important point is that all these frameworks help in moving a step forward in the refinement of e-governance, COBIT, VAL IT and King 3 are few examples of such frameworks [10]. Transparency and public engagement took another step when governments and respective departments start publishing the process chain and decision making structure for public to gain more trust for e-governance systems.

The pillars of e-governance are providing such off-shoots which are critically important in any community, as one of the most important segment of e-governance is the transparency. In a more precise system this transparency leads to corruption perception index (CPI), similarly many other important measures like well-being index, environment ranking etc., are derived from the same e-governance structure. The purpose of CPI is not to highlight countries in a negative perception but to develop guidelines and mechanisms based on the good practices to improve transparency and global ranking [11].

The segregation of e-governance systems is based on four broad segments that are explained in the following section. These segments are representing operational and functional classification of governance i.e. government-to-citizen segment constitutes the framework for the provisioning of online information and connectivity between individual citizen and the government ranging from political voice to the health and education, all such operations that are related to an individual are covered in this segment. From government side this segment makes the public information responsible for the environmental and societal changes and that further trickled down on culture, financial and health related parameters, therefore, the e-governance is getting more close to economic analytics and strategy development[12].

The second segment is also linked with public but engaging a more formal cluster i.e. government-to-business. In this segment the economic policy, government budgets, business rules, focused sectors and facilitation for corporate sector at local and global level are operationalized. E-governance is the best medium to disseminate information, rules and practices about SMEs, start-ups and other entrepreneurial activities [13]. From government perspective this segment is important because of the deployment of regulations, tax collection, business volume and identification of the economy size as a whole or even at a precise domain level. From transparency perspective this segment shares the information about government projects to corporate sector, fairness of project awards, process clearance and project timelines to monitor and evaluate the government performance [14].

As the two initial segments are more focused on the community, the third segment is consisting of the government bureaucracy or government employees and departments. In e-governance, it is also called digital bureaucracy using ICT to provide effective, efficient, transparent and accountable services by the government departments to each other as well as to the citizens of the country [15].

Another perspective of government-to-employee is the deployment of electronic management leads to service quality and good governance that helps in multiple ways like project management, crises management and planning. This segment is also vital in developing the policies for education, health, business, economic growth, environment, strong political institutions, sustainable development and quality service [16].

The last segment of e-governance is focused on internal and external entities i.g. government-to-government. This segment provides inter/intra collaboration among various government entities / departments in terms of sharing information, reducing data and process replication, making process activation chains according to roles and responsibilities to work together in normal situations as well as in developing a successful crises management strategy. Based on the government-to-government segment, different organization, agencies and departments interact with each other that increases the overall performance and efficiency [17].

The background and status of e-governance is important to understand the impact of COVID-19 in positive and negative manner on e-governance systems. As COVID-19 has increased the traffic and demand on e-governance systems, therefore, many systems crashed having poor

planning, infra-structure and conventional deployment methodologies. Similarly, e-governance systems failed due to the insufficient coverage of community systems e.g. having education as part of e-governance but health or business are not completely digitized. As the remote working, lockdowns and self-isolation increased, people and governments become more and more dependent on e-governance, we have seen failures but there are success stories as well which have become good practices for the implementation of e-governance during and post pandemic world [18].

One example is the e-governance system of South Africa that has explored the strengths and weaknesses of e-governance at a new level during COVID-19. In 2012, they have collected data regarding the e-governance system and 73% of the respondents agreed that the e-governance[19].

3. PROPOSED FRAMEWORK

The recent pandemic has exposed the gaps as well as the potential of e-governance mechanism. It is evident that conventional approach and parameters to design, develop and implement an e-governance segment may not be sufficient. The lessons learned from the COVID-19 are pointing out few converged parameters to be considered while evaluating or auditing a system. These parameters are;

- Collaboration
- Data Design
- SaaS

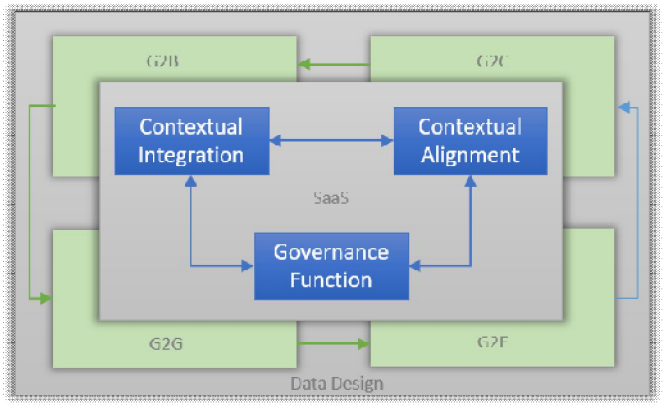

Figure 1: Proposed E-Governance Monitoring

As shown in the proposed framework for e-governance monitoring engine, the COVID-19 lessons highlighted the need of high level of collaboration among four basic segments of e-governance i.e. Government-to-Citizen, Government-to-Business, Government-to-Employee and Government-to-Government. It has been observed that incomplete or inconsistent systems were failed during

Similarly, the communication between government and the citizen has improved and citizens feel more empowered regarding the government performance and transparency. One important part of e-governance in south Africa is the e-health segment, the formal policy was released in 2012 but in reality this application was active since 2000. E-health was dealing with HIV and TB patients and respective diagnostics. According to the World Health Organization (WHO), the increased use and accessibility of e-health by 2019 and the increased user base due to mobile technology helped the government in an astonishing manner to fight COVID-19 (WHO, 2019). The dissemination of information related to COVID-19, developing health policy, engagement of individual citizens and deployment of quick decisions at G2C, G2B, G2E and G2G levels was highly effective and implicitly developed a highly responsive crises management system at national level [20].
pandemic, as the pressure on the system increased due to lockdowns and remote working, the system went into chaos due to the absence of collaborative modules. Therefore, it is very much desirable to say that even segments with lower level of development, deployment and execution, the reciprocal high range of collaboration and completeness is more important and shell survive the pressure. It is also important that this collaboration is not merely limited to communication but actually this engages contextual integration and alignment among all four segments for a more impactful and smooth governance function.

These two issues have their own vital importance as the concept of collaboration is not complete with managing the both elements i.e. completeness and functional coherence. System will not turn into chaos or failure due to the completeness in case of any crises or even in case of the implementation of a conventional project. The dissemination of information and sharing among all four segments will keep the system intact and let all modules evolve together. The factor completeness is also a necessity for the formal pillars of e-governance i.e. transparency, quality of service and accessibility. If we take COVID-19 under consideration than the factor completeness is the helping factor in transforming the e-governance system into a responsive crises management system. The other factor functional coherence is a compulsion to formulate a systemic approach. The four basic segments are having versatile and unique functions and values though at system level, all four segments are performing one single task i.e. e-governance therefore, it is highly desirable to develop a synergy among four segments. This framework proposed contextual integration and alignment for all the tasks performed in the e-governance system.

This will not only develop the synergy but also enhances the transparency, quality of service and performance because of the built-in integration and alignment of the segments to execute a single function. In other words, the

alignment and integration will ensure the pre-requisites, co-requisites and barred-requisites of every function.

Another observation on the e-governance systems in COVID-19 is related to the data design of the system. Conventional structures were collapsed under pressure or failed to provide required information services. While systems with the conception of volume, variety and veracity have served the users with invaluable information and analytics. In future, the monitoring and evaluation of any e-governance system is going to be focused on the data design, as it is vital to engineer such structures which are able to manage the enormous sums of information generated by four segments with relations and associations. Moreover, the contextual integration and alignment also need a adaptable data design to perform alignment or to find integration / association points.

4. DISCUSSION

The identification of e-governance potential and new parameters for monitoring and evaluation are also visible in the case of Singapore during COVID-19. Instead of going in the history of e-governance in Singapore, just look at the steps government has taken in the wake of COVID-19. Government and health sector develop applications and launch them using cloud. The purpose of such mechanisms are moving around the tracking, monitoring and clustering of the COVID-19 infection. It is notable that these new applications are developed, deployed and used on the existing e-governance system, therefore, the core data related to community, health sector and respective government departments was already available. Another layer of such applications have engaged medical personnel and patients, provisioning of a communication bridge between them to promote tele-medicine and maximum possible guidelines to concerned patients without moving out in danger zone or making danger zones due to their movement. Moreover, instead of crunching numbers, government has provided access to Chinese social media to promote awareness and utilization of first-hand experience of Chinese government. That collaboration has provided rapid awareness and monitoring of the environment that helped in curbing the virus spread. At G2B level, due to the presence of a mature e-governance system, businesses quickly developed policies and let their employees to work from home without risking the health and safety measures or without waiting for the official lockdown instructions. In collaboration with local governments and business,

5. RESULTS

This research paper is presenting a framework highlighting three additional parameters for e-governance evaluation, monitoring and sustenance. The current schemata used by United Nations Department of Economics and Social Affairs (UNDESA) in terms of EGDI (E-Governance Development Index) is a scale to evaluate the willingness and engagement of national ICT for the compliance of e-governance(United Nations E-Government Survey 2018: Gearing E-Government

The recent pandemic has highlighted the effectiveness and accessibility of cloud services, more specifically software-as-a-service (Saas). All such e-governance system based on only conventional server environment were collapsed because the load was never calculated with a COVID-19 like scenarios therefore, the whole systems were crashed and were not able to sync with the dynamically changing environment. Cloud computing has already flourished successfully among the corporate sector due to cost effective, accessible and coherent service models. The e-governance system on cloud are scalable with service variants and with multiple options of accessibility, therefore, it is more appropriate to consider SaaS as a quality parameter to monitor and evaluate an e-governance system. Considering the security and secrecy of G2G and G2E level segments a hybrid approach can also be considered which may engage server based more controlled environment backed by cloud computing to ensure the system survival in case of any crises.
government has launched another application on e-governance system named “TraceTogether” on cell phones to identify the virus spread, the application data was populated by the citizens and this way they have provided the actual ground status of their community in a transparent and effective manner[21].

It is also notable that existing e-governance system has provided the structural and operational basis to the crises management applications and policies, surveillance mechanism were deployed over the existing e-governance system. SafeEntry application has deployed as a national check-in system to all business, commercial and entertainment locations for the tracking of individuals health vitals, living origin and family history with the help of a QR code. It is evident that this data was already available in the e-governance system and projected to new applications with a new objectivity and framework to serve as crises management core data. It is not always new applications and systems, generic applications like WhatsApp have also been used to track individuals under quarantine, the data is linked with e-governance GIS application to develop a relation between existing data and live stream received from WhatsApp. All these segments and evidences helped us in understanding such analytical units that are not only helpful but actually taking the e-governance system to next level. The case study of Singapore is showing the new dimensions for e-governance systems, similar case studies are available for China and South Korea where e-governance system has been used as a crises management system.

to Support Transformation towards Sustainable and Resilience Societies | PreventionWeb.Net, n.d.)(UN E-Government Ranking - Knoema.Com, n.d.). The EGDI is calculated on the basis of three elements i.e. Online service index (OSI), Telecommunication infrastructure index (TII) and Human capital index (HCI) and the range for EGDI are as follows (2018 UN E-Government Survey | Multimedia Library - United Nations Department of Economic and Social Affairs, n.d.);

EGDI	Value
Very High	< 0.75
High	From 0.50 to 0.75
Medium	From 0.25 to 0.50
Low	> 0.25

Table.1. E-Government Development Index

These factors are important and provides a good proxy closer to the reality, only if we consider the pre-pandemic era. The results for EGDI survey in 2018 shows promising results in terms of aforementioned scale. European nations are leading the e-governance growth, while Asia and America are in close contest. Similarly Africa is showing lack of potential scoring on the table(United Nations E-Government Survey 2018: Gearing E-Government to Support Transformation towards Sustainable and Resilience Societies | PreventionWeb.Net, n.d.).

Table.2. EGDI base on region

Region	EGDI	EGDI Group
Europe	0.77	Very high
Americas	0.59	high
Asia	0.58	high
World	0.55	high
Oceania	0.46	Middle
Africa	0.34	Middle

Even with the high score, the e-governance of Europe could not produce the same success stories and systems collapse all over the region. Same is applicable on high scores as when we look at the countries in those regions, the performance of the e-governance during pandemic or in other words during high-load and maximum capacity, e-governance systems failed or crashed or could not produce meaningful information. All parameters in the EGDI are important, our research presents three more parameters i.e. collaboration (completeness, functional coherence), Data design and finally SaaS enablement. As discussed in this paper, these three parameters are linked to the system survival and transforming the system into a crises management system with the potential of information and functionality, it is already holding.

6. CONCLUSION

The premise of this research paper is based on the monitoring and evaluation parameters review in the context of COVID-19 or in other words a scenario in which e-governance systems have been facing capacity load and processing challenges. COVID-19 has pushed the world towards the need of more robust and modular e-governance systems, therefore, evaluation and monitoring parameters need to be reconsidered. We have proposed three critical parameters aligned with the existing pillars of e-governance systems. The three new parameters are identified with the objectivity on development of contextual integration and alignment for e-governance functions. Two case studies are taken and explained to support the new parameters, which most recent in terms of fight against pandemic through existing e-governance systems. These case studies show the collaboration, data design and the engagement of cloud services played a vital role in making e-governance more productive, evolvable and provide contextual functionality in terms of crises management system.

ACKNOWLEDGEMENT

Thanks to our families and colleagues who supported us morally.

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