

## A comprehensive method of e-government transition for viable development in Iraq

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### ABSTRACT

Now more than ever, the government needs to find out that how well the system of Iraq can be transformed to efficiently offer public services to the citizens for consistent development growth. For many reasons, the answer lies in the development, innovation, and application of the latest technologies in Iraq. The use of electronic technology will offer fast and convenient access to public services and will allow the people of Iraq to participate in decision-making and designing and delivery of the services. These technologies assist in government openness, increasing accountability, and boosting public trust. A comprehensive approach that is based on the 4 key pillars to support the e-government transition of Iraq for consistent development growth is presented in this paper. This approach provides guidelines to the government of Iraq that encourage the application of technology for the betterment of people regardless of their age, sex, religious and political beliefs, financial status, disabilities, and area. It highlights the need of e government transition and provides a plan to focus on the key pillars to develop abilities for viable development growth in Iraq.

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## 1. INTRODUCTION

E-government is short for electronic government. E-government can be defined as the fusion of information and communication technology to expand the ability of the government to fulfill the necessities of the nation [1], [2]. The ideology of e-government is based on collecting and presenting information responsibly, allowing citizens to be involved directly with the government, minimizing corruption, making the government services approachable to its people, improving transparency, assisting societal inclusion, increasing gross domestic product (GDP) rate and using country's resources efficiently. Former models confirmed that e-government can enhance economic growth [3], [4].

Government bodies of different countries are finding ways of transforming the public sector to provide services efficiently and attain sustainable development goals. Electronic/digital technologies and innovation are believed to be the base for attaining sustainable development goals. These technologies can be used to enhance public trust by supporting greater government accountability. However, the application of

such technologies by the government might carry some risks and possibly disturb the privacy of citizens which in turn will emasculate human rights and security [5].

Fewer countries have the facilities to encourage electronic technologies to deliver fast, reliable, and secure services that could empower the citizens via transparent and involved mechanisms. While most countries are yet not ready to recognize and deal with the threats related to electronic technology [6], [7]. E-government plays an important role in national development and growth; therefore, it is essential to develop the abilities towards such transformation. e-government transition demands a comprehensive approach that is strategic and established through every level of government and society to cause fundamental changes in the mindsets of public servants. This transformation should change the way public institutions collaborate with each other and with citizens.

The several European Union (EU) member states acknowledged the importance and embraced e-government in their strategies of public sector modernization and transformation [8]. Nevertheless, the developed plan to carry out these activities are for a short while and several times miss to identify some serious issues. Overlooking such issues creates a hurdle in fulfilling the promise of e-government [9], [10]. Therefore, it is vital to develop and launch a proper roadmap with a holistic approach towards e-government transformation for the development of the nation.

This paper presents a comprehensive approach of developing an e-government system for viable development in Iraq by offering a framework for change. Steps involved in e-government transformation such as situation analysis conduction, visioning exercise, proper planning, and formulating a road map are presented in this paper. Examples of those countries, that adopted e-governance on some of its levels are presented to offer a framework for Iraq's e-government transformation.

## 2. ANALYSIS OF IRAQ'S POSITION IN UNITED NATION E-GOVERNMENT SURVEY

Dedicated professional agencies conduct online e-government surveys, such as the United Nations Department of Economic and Social Affairs (UNDESA) and United Nations Public Administration Network (UNPAN). Also, the Japanese Waseda University carry out country selection based on specific criteria. The UNDESA and UNPAN perform online surveys after every 2 years that covers 193 countries around the globe [11].

The UNDESA and UNPAN survey reflects on three perspectives i.e., human capacity, quality of online services and telecommunication connectivity. The data are collected and analyzed from the country's national website and from the websites of the Ministries of Education, Finance, Health, Labor and Social Services. While assigning values to survey responses, associated portals and subsidiary websites are taken into consideration as well. The duration of assessment of a country depends on the online services of that country, mainly on the contents and functionality of the websites. After the initial assessment the survey is analyzed by the senior researcher and in case of any doubt will be approved by the team leader [11].

Figure 1 (in appendix) shows the magnitude of the e-government survey comparison in Iraq in the last decade. The survey represents the e-government development index (EGDI) and e-participation of Iraq. The e-Government development index of IRAQ was 136 and e-participation was 135 in 2010; EGDI was 137; and e-participation index was 101 in 2012. EGDI was 134, and e-Participation index was 152 in 2014. EGDI was 141, and e-participation index was 104 in 2016. EGDI was 155, and e-participation index was 140 in 2018. EGDI was 143, and e-participation index was 158 in 2020 survey. This analysis concludes that e-government development index was better in 2014 and e-participation index was better in the 2012 survey. The trend towards technology adaptation in Iraq fluctuated in the last decade, therefore it is vital to present a holistic approach that can lead the country towards e-government transformation.

## 3. BASIC STRUCTURE OF E-GOVERNMENT TRANSITION FOR VIABLE DEVELOPMENT IN IRAQ

For e-government transition, it is important that the citizen of Iraq, its organizations, data of institutions, country's resources and the latest technology are all aligned. All these should be associated to bring out the transition within the public sector for producing public value. European countries like Denmark, Finland, Sweden, and Ireland have already adopted e-government transformation. United Kingdom of Britain, Australia, and Canada have embraced it as well and Asian countries like the Republic of Korea and Singapore have also recognized the importance and worked on the transition of e-government for national development [12], [13].

The approach for e-government transition should be taken in a way that it should not be affected by the incremental changes and accepts the systemic changes in Iraq. To increase sustainable development growth, the approach should consider the local knowledge of the country as well as take good examples from the rest of the world [14], [15]. The transition should make sure that they are carried out to generate equal

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opportunities for all Iraqi citizens to access consistent and quality services. The approach should consider the feedback and knowledge of the people to ensure quality service delivery and management and identifies actual problems of the society. This approach should also be highly collaborative as the interlinkage among the society, public sector and government are very important [12]. Basic important characteristics of a feasible approach are shown in Figure 2.

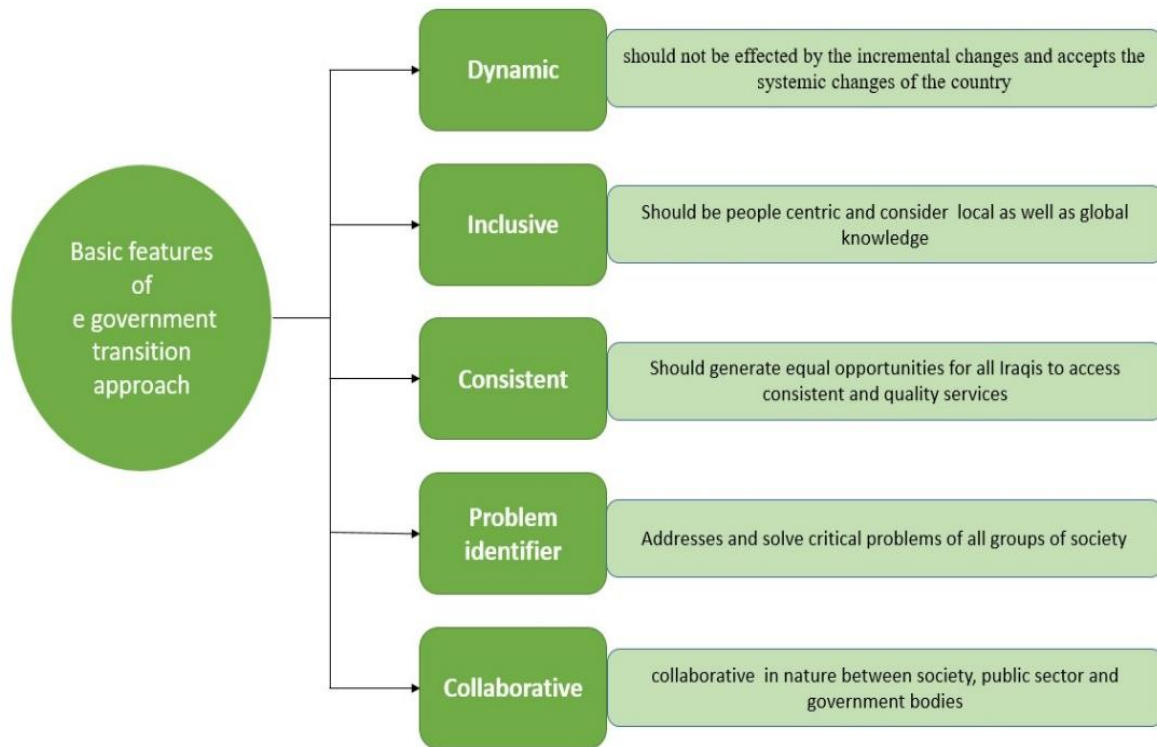


Figure 2. Basic features of e-government transition for viable development

#### 4. A COMPREHENSIVE APPROACH FOR E-GOVERNMENT TRANSITION

In several countries, e-government is spreading through private sectors and governments have adopted the use of information and communication technologies to provide better services among the ministries, organizations, institutions, and citizens [16], [17]. Singapore has launched a comprehensive approach for the Smart Nation program and e-government transition. By following their approach, Singapore has shifted from a silo-based to an ecosystem approach. This program was launched by starting a chain of strategic projects at a national level that involved launching “Ideas!” platform for direct communication between government and people, achieving a one-stop-shop approach through National Digital Identification project, the Moments of Life initiative, and alliance with other countries for emergency aid and reports. Pakistan has launched a Life portal in 2018 that aims at direct communication between government bodies, organizations, and citizens. The portal was established to interconnect about 4000 government offices, parliamentarians, and national and overseas citizens through 20 different categories and provides services for billing, job applications and notifications, national information, and problem identification and solution in any department of the country. This program was also aimed to help the government to plan merit-based policies to promote or demote the government officials based on their performance. This portal can be used through the mobile application and computer desktops. Azerbaijan initiated a program called MyGov to offer its citizens personal accounts. These accounts can be used for an individual’s educational, health, and financial information as well as to access government services. MyGov identifies individual’s necessities in real-time using the data-driven predictive digital government. The citizen can access several different category services by a single login system.

Lao People’s Democratic Republic launched an e program that uses the term eVisa (electronic visa) to connect the Ministry of Public Security’s Department of Immigration and Foreign Affairs Ministry. Uruguay connects the birth certificates of its citizens with the Ministry of Public Health and hospitals. It also

interlinks the citizens with eID-issuing administration and offers families social services. The Kenya digital transformation Programme is established to provide access to a variety of services on one platform. It was established through platforms like call centers, mobile phone apps, web services, and a payment gateway. Some countries have launched digital projects to achieved specific targets, like Mexico City initiated the Mapatón project to allow 4000 users to participate in a digital competition for developing intercity bus maps. Several countries followed a user-driven method to offer public service access to their nationals at the local level. Forum Virium Helsinki is affiliated with the European Network of Living Labs—spaces. This network is established for private and public sectors to work with each other to produce public service solutions.

Establishing profound capacities is essential to build a comprehensive approach for e-government transitions. According to The United Nations development group definition, ‘capacity’ is the strength of the nation, society, institutions, and organizations as a whole to accomplish their goals effectively [11]. Extensive capacity development is required to design and implement a reliable approach for e-government transition at individual, institutional and organizational levels [18]. Changing mindset at every level in all departments of society is equally important. Recruitment of the best talent for e-government transformation to build digital capacities in government is another requirement [17]. It is vital to reinforce the abilities to produce integrated approaches, increase citizen’s involvement in public affairs and bring changes at an organizational level. Effective data management, resources mobilization, and identifying problems of information and communication infrastructure and its solution is also a requirement in a comprehensive approach. Figure 3 shows the comprehensive roadmap of e-government transition for viable development in Iraq. This approach can be used to recognize the features and steps for e-government transition on the national and local levels. The presented approach consists of four essential blocks that are explained in detail in the following sections.

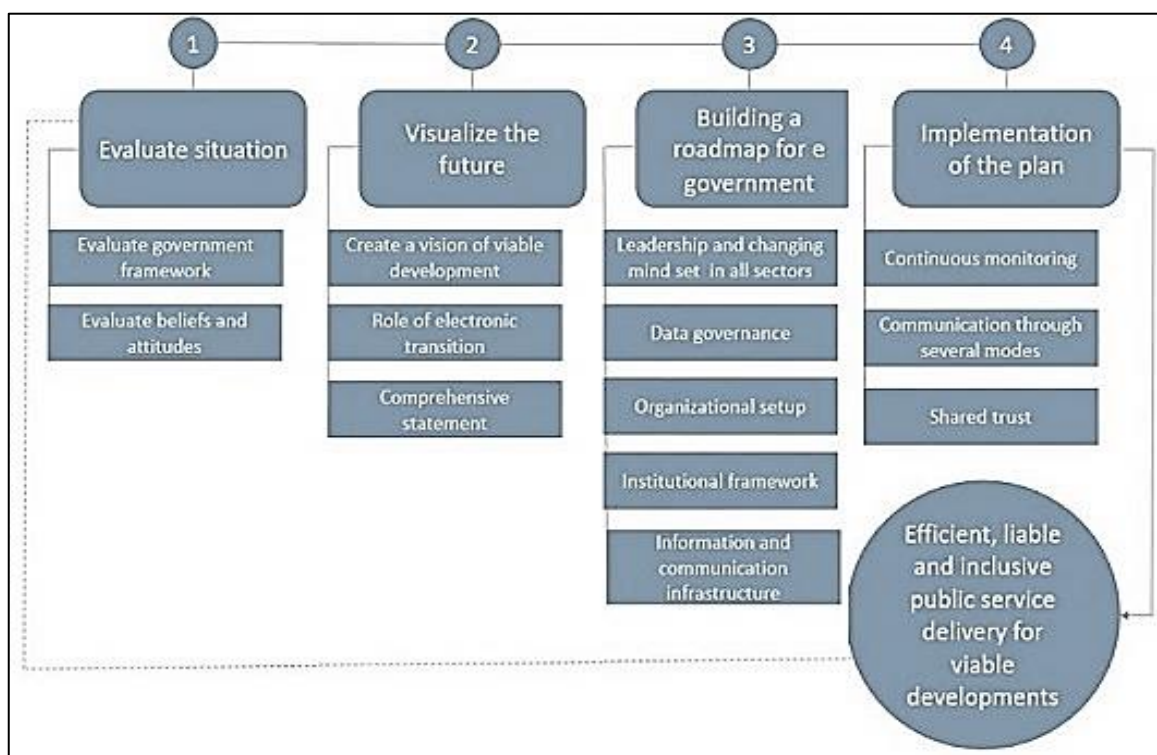


Figure 3. Comprehensive roadmap of e-government transition for viable development in Iraq

#### 4.1. Evaluation of the situation

The first block of a comprehensive approach to e-government transitions is the evaluation of the current situation. This evaluation should be done to find out the necessity of the situation at the government level and to find the impact of the leadership in bringing transformation. It is important to recognize the values, nature, and beliefs of the government and people to find out the best application of the e-government transition in the favor of the country. The evaluation of the government obligations towards digital transition and the identification of the related challenges and its solution and affordability is essential. The evaluation

of the situation will assist in finding the objectives for the development of Iraq and the importance of the role of technologies to back the developmental vision of the nation. It will allow the government to find the motivation for the e-governance transition which is important because leaving it for the information technology (IT) experts only will reduce the participation and commitment of the government bodies. Government should identify the areas where IT experts, application of artificial intelligence, and digital security is needed so that the resources, talent, and interest of the nation can be aligned with those gaps. To evaluate the situation based on the ground realities, the government of Iraq can gather data from all government and private sectors using online portals/ surveys. Government can also conduct workshops with the help of different organizations at a different levels.

#### 4.2. Visualizing the future

The second block of a comprehensive approach to e-government transitions is visualizing the future of Iraq. Visualizing the future helps to identify the direction of the country and its future goals and how electronic transition will assist to achieve those goals for the national development of Iraq. This block investigates the visioning exercise for e-government transition and points out suitable capacity development tactics.

It is essential that the future vision should be based on Iraq's strategic development objectives and not only on e-governance. No matter how latest the technology is, it does not provide services on its own, rather it can be used as means for transformation when there is a certain political commitment, a complete plan with implementation directions, and suitable capacities to influence change. The future vision plan must have defined rules and ideologies for governance, specific national goals for development, short and long-term plans, and e-government values. Figure 4 shows nine codes of operative governance for development that may offer directions to Iraq development. Workshops based on collecting ideas and envisioning the future of Iraq would be valuable for attaining unanimity on a desired future state of affairs. Also, design thinking methods can be implemented to allow Iraqi citizens to identify and solve problems and define future needs.

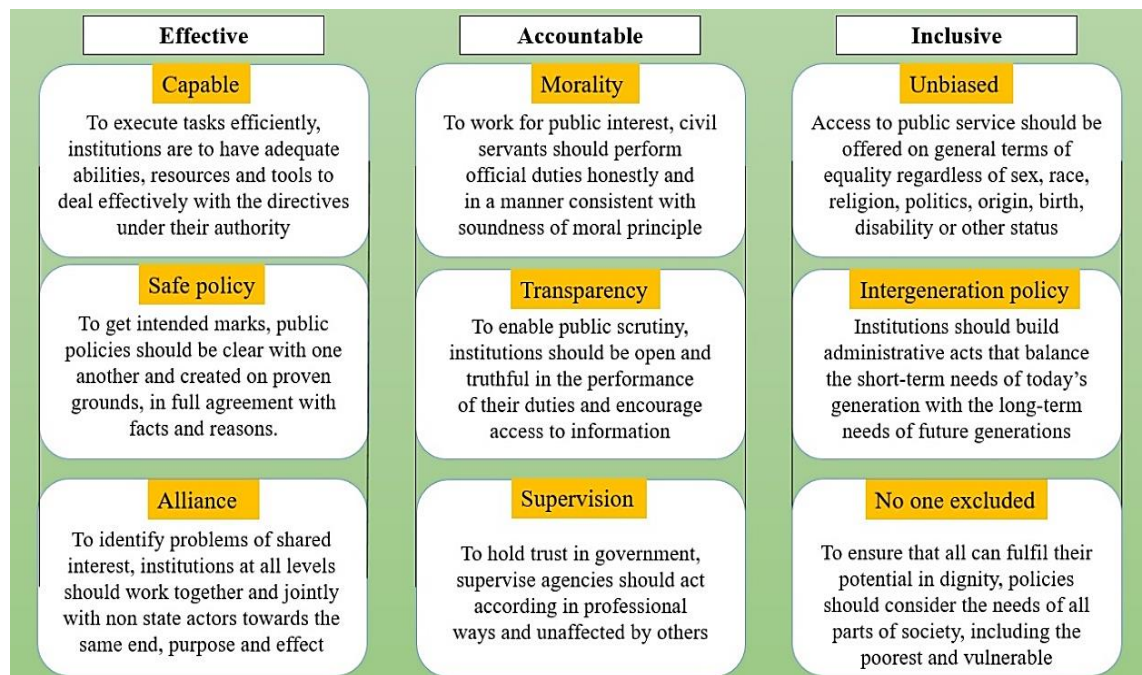


Figure 4. Elective principles of effective governance for a viable development of Iraq

#### 4.3. Building a roadmap for e-government

Once the evaluation of the situation and envisioning the future of the country assists in analyzing and identifying the essentials, principles, priorities, and objectives, the policy and road map for e-government transition in Iraq can be made around the 7 key points emphasized in Figure 2. This segment presents the key pillars of the e-government implementation road map and plan. The plan for e-government transition in Iraq



should be focused on the seven key pillars that assist to encourage effective, accountable, and inclusive e-government transition.

#### 4.3.1. Leadership and changing mindset in all sectors

It is important that the implementation plan of e-government transition is aligned with the Government of Iraq's overall development plan and with subnational policies to make sure that local views are assimilated with national plans. The roadmap of the e-government transition must have specific actions that assist in the transition of the Iraqi government into a collaborative and connected organization structure based on the model of integrated services. These actions may involve: i) reducing the administrative burdens on different levels of Iraq's government; ii) simplification of processes; iii) enhancing the ability of computerized networks to exchange information within the organizations, and iv) and reinforcement of data and knowledge management. Having the national budget in mind, it is essential to establish a firm connection between institutional directives, delivered services, and employment mechanisms. The government in Iraq should start with projects that are easy to complete in a short time and then proceed to medium-term and long-term projects. The success of short-term projects will promote the citizen's buy-in and it will support the transition process.

One of the most challenging part in e government transition in Iraq is developing mindsets including changing attitudes. Three types of mindsets are important to move forward with the understanding of the developing growth i.e. evidence-based mindset, digital mindset, and collaborative mindset [19].

Supporting an evidence-based mindset will allow the Iraqi officials to make country policies based on established facts, reliable statistics, and proven evidence. It will lead to localize, recover, analyze and use the information for solving Iraq's problems. Evidence based mindset will assist in achieving development growth by allowing public access to information and defending freedom in agreement with national legislation.

Digital mindset will allow Iraqi officials to think of innovative methods in which digital technology can improve processes and find inventive solutions. It is vital for public employees to understand and use the growing latest technologies. Iraqi officials must know the ways how the latest technology will affect the e-government transition. They should be capable of identifying the related risks and restrictions. While acquiring the related digital skills to offer services, the Iraqi government should keep the end user in mind.

The collaborative mindset of Iraqi officials will help to find out common problems. It will lead to mutual discussions, collaborations, cooperation, and networking to solve those problems. To enable network-based governance, it is essential that public servants must have the skills to apply an integral government and integral society approach.

#### 4.3.2. Data governance

The current data governance format always challenges effective governance of data for data-centric e-government in Iraq. The first thing to be considered is that data governance must not be a part of IT governance because a considerable amount of government data might be unreachable due to the failure of IT authorities in presenting appropriate data in the new e-government system. Users will not be familiar with accessing data and it will lead to question the networking, security, and privacy of the data.

Effective data governance should be based on a standardized set of values that will operate the formal managing of data in public sectors. The basic principles for data governance in Iraq should be based on four pillars; i) policies, ii) institutions, iii) data ecosystem, and iv) data technology. The first two points focus on valid and institutionalized policies for effective leadership in Iraq. Data ecosystem reveals the association of public engagement and data processes. Data technology focuses on technology applications in e-governance. The basic purpose of effective data governance in Iraq is to make sure that all processes related to data management are reliable and consistent.

#### 4.3.3. Organizational setup

The organizational capacity of a country's government describes charge, responsibilities and accountability, and practices of coordination, collaboration, and communication. Organizational structures formation that can engage and apply the new rules is essential to ensure the successful transition of e-government in Iraq. These structures should encourage the development of a new critical mindset. Even though there are no stranded rules for building organizational structures to encourage the unification of processes and data at a different level of government, Iraq can begin with the reforms of the institutions and organization to build suitable workflows at every level of government. Establishing a central coordinating agency with financial independence located in top decision-making offices of Iraq will assist in managing the government strategies and websites teams. This agency will also coordinate the duties of the top information officers. According to the united nations, 145 countries around the world have a chief information officer in place to manage the workflow and strategies of the government [11]. Every agency in Iraq must have a Chief

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information officer interconnected through official websites to collaborate and communicate with each other. Enhancing the abilities of these agencies for effective communication is significant for collaboration and efficient service delivery in different sectors such as health, education, security, and defense.

#### **4.3.4. Institutional framework**

The government of Iraq needs the institutional abilities to adopt the latest technologies for the recognition of wider social goals and the accomplishment of developing growths. Institutions play an important role in describing rules for establishing social, political, and economic structures of interaction to create order. The government of Iraq should establish an institutional ecosystem to adopt and apply the latest technology and position e-government services. Country laws, policies, and guidelines that deal with subjects related to information, digital security, artificial intelligence should be incorporated by this ecosystem. Digital signatures might be needed while offering personal online services. Also, new laws and regulations should be established that addresses the issue of private data handling by the agencies.

The government of Iraq should establish legal and regulatory frameworks to assist the development of e-government services. These electronic services may include making laws about private data safety, electronic publication and distribution of government expenses government reach to information, electronic identity, electronic signatures, data networking, evolving technology like artificial intelligence, and e-government as a right. For safe deployment of technologies at all levels of public administration robust standards must be established. The development of an electronic portal where citizens of Iraq can see their personal information and use e-services would be crucial in the e-government transition. Such portal would be a safe opening to the estate, offering reliable and consistent information to government and citizens, access to electronic services and direction on interaction, and engaging in transactions with government entities. To accomplish such a state, the government of Iraq has to make complete laws about the personal data protection act, digital identification act, public information act, cybersecurity act, identity documents act and state budget act with the Iraq internetwork system.

#### **4.3.5. Information and communication infrastructure**

A robust information and communication infrastructure is an important pillar for operative e government transition. The government of Iraq would not be able to effectively offer electronic services in absence of broadly available high speed internet and access to new technologies. The government should increase citizen's access options such as Wi-Fi hotspots in public spaces because private internet access through cell phone networks and other means is not always possible [20]. This step will demand substantial investment and will require funding from national budget. Collaborating with other countries will open ways to international partnerships that could also reduce the financial burdens. The government must energetically search for the opportunities of partnerships to build digital capacities at every level to enhance and emerge new technologies for e government development [21].

Like many other countries, the government of Iraq should move its services to the cloud [22], [23]. The IT systems and resources should be moved to commercial clouds and with passage of time the rest of the digital system should be moved too. Considering the risk of hacking and misuse of sensitive data (financial, health and public data) in clouds, defensive measures of international standard must be taken. These protective mechanisms should continuously be monitored and updated. The government of Iraq should make sure that cloud security rules and regulations should cover public and private, both cloud services [24], [25].

#### **4.4. Implementation of the plan**

E government transition is a continuous process and not a onetime step, therefore it is important to continuously monitor and evaluate the electronic services provided by the government. Both quantitative and qualitative measures should be considered while monitoring user uptake, citizen's fulfilment and approval and the share of automated customer service. It is important to analyze the data with respect to age, sex, area, disability status to examine the results for different demographic clusters. The government should establish an e government implementation index, so it could be a standard for other institutions and monitoring groups. In e-government transition agenda, the united nation report suggested that an impact assessment methodology for evidence based policymaking can help the government to evaluate progress in the medium term.

It is equally important to find out that how e government services are assisting to attain the development growths. The government should launch a tracker that would collect data and feedback on the desired goals and targets to find out the current status of each process. As much as getting feedback from citizens is important, it is also necessary to show the results to public. Sharing the outcome will make the citizens feel that their participation is admired and their voices are heard. It will also increase the citizens trust of the government and will let them know that their participation is guiding the country to significant changes and strengthening transparency. Dedicated system to monitor citizens' feedback for improving

services and programs is also a significant step of a comprehensive approach towards e government transition that values performance and endure responsiveness.

## 5. CONCLUSION

A comprehensive approach for electronic services delivery that considers and fulfill the needs of Iraqi people by using latest technology and diminish the associated risks is essential. To achieve this goal, use of latest technology at government level that can be used for the ease of citizens is required. E government transition is presented using 4 steps iterative procedure that involves situation analysis, visualizing the future, building a plan and roadmap and implementation for consistent development. A strong dedication to increase the use of latest technologies for the prosperity of Iraqi people is required at the top levels of government and every sector of society. The usage of latest technologies at top levels of government and public sectors should be aligned with the national strategy and vision of Iraq. An investigative exploration will help the government of Iraq to recognize the purpose and benefits of e government transition. Top priorities of the country should be addressed comprehensively and the plan and roadmap of e government transition must be based on the key pillars. The government of Iraq should develop an institutional ecosystem for the transition of e government. Integrated services approach that fulfill the needs of every citizen in Iraq and no one is left behind regardless of their gender, age, physical disability, political and religious beliefs and area will assist in the transition of e government. Employment system thinking and establishing a central coordinating agency with financial independence to manage the execution of Iraq's national e strategy and transition road map will fulfill the need of viable development growth. Developing critical mindsets, finding and hiring the best talent and providing safe spaces for working and experimenting should be in the top priorities of the Iraqi government. Feedback from the citizens is important and hence the e government transition approach must have a system of getting feedback from the people of Iraq to ensure continuous improvement. E-government transition of Iraq can be understood as a continuous drive for consistent improvements in the services of Iraq's peace, development and prosperity.

## APPENDIX



Figure 1. Iraq status in UN e-government survey in last two decades (2003-2020)



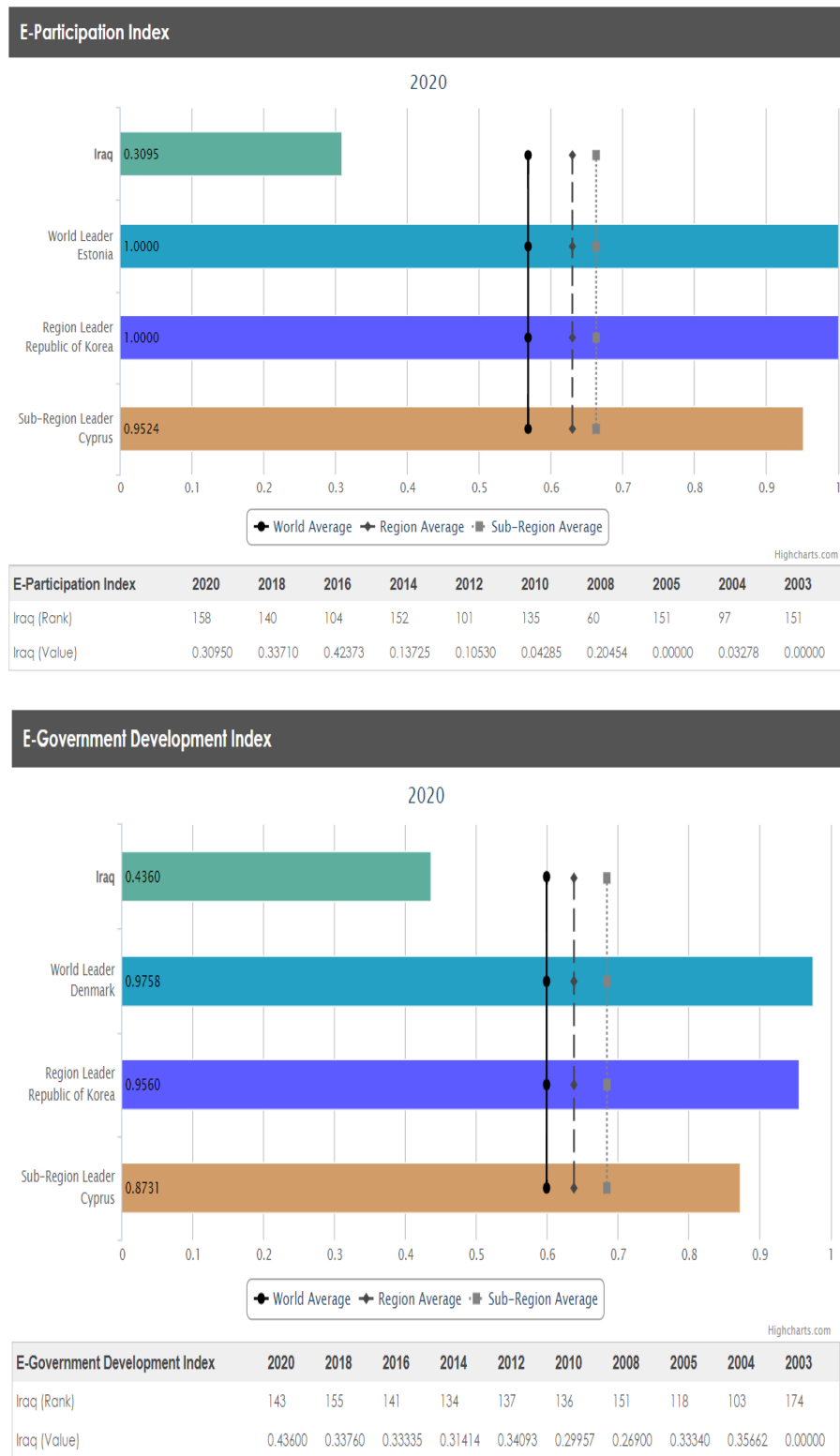


Figure 1. Iraq status in UN e-government survey in last two decades (2003-2020) (continue)




## REFERENCES

- [1] R. Gomez, "The Changing Field of ICTD: Growth and Maturation of the Field, 2000-2010," *The Electronic Journal of Information Systems in Developing Countries*, vol. 58, no. 1, pp. 1–21, Jul. 2013, doi: 10.1002/j.1681-4835.2013.tb00408.x.
- [2] T. Nam, "Determining the type of e-government use," *Government Information Quarterly*, vol. 31, no. 2, pp. 211–220, Apr. 2014,




- doi: 10.1016/j.giq.2013.09.006.
- [3] S. K. Srivastava and P. K. Panigrahi, "The Impact of E-government and E-business on Economic Performance: A Comparative Study of Developing and Developed Countries," *Journal of Contemporary Issues in Business and Government*, vol. 22, no. 1, p. 36, Dec. 2016, doi: 10.7790/cibg.v22i1.33.
  - [4] X. Zhao and H. D. Xu, "E-Government and Corruption: A Longitudinal Analysis of Countries," *International Journal of Public Administration*, vol. 38, no. 6, pp. 410–421, May 2015, doi: 10.1080/01900692.2014.942736.
  - [5] Nugi Nkwe, "E-Government: Challenges and Opportunities in Botswana," *International Journal of Humanities and Social Science*, vol. 2, no. 17, p. pp 39-48, 2012.
  - [6] D. Drljača and B. Latinović, "E-Governance in Republic of Srpska - Challenges and Prospects," *Quality of Life (Banja Luka) - APEIRON*, vol. 5, no. 1–2, Jun. 2012, doi: 10.7251/QOL1201032D.
  - [7] S. Basu, "E-government and developing countries: an overview," *International Review of Law, Computers & Technology*, vol. 18, no. 1, pp. 109–132, Mar. 2004, doi: 10.1080/13600860410001674779.
  - [8] M. Wimmer, C. Codagnone, and M. Janssen, "Future e-Government Research: 13 Research Themes Identified in the eGovRTD2020 Project," in *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008)*, Jan. 2008, pp. 223–223, doi: 10.1109/HICSS.2008.179.
  - [9] R. Matavire *et al.*, "Challenges of eGovernment Project Implementation in a South African Context," *Information Systems Journal*, vol. 13, no. 2, pp. 153–164, 2010.
  - [10] D. Dada, "The Failure of E-Government in Developing Countries: A Literature Review," *The Electronic Journal of Information Systems in Developing Countries*, vol. 26, no. 1, pp. 1–10, Aug. 2006, doi: 10.1002/j.1681-4835.2006.tb00176.x.
  - [11] U. Nations, "Capacities for Digital Government Transformation, Digital government in the decade of action for sustainable development," New York, 2020.
  - [12] Y. N. Chen, H. M. Chen, W. Huang, and R. K. H. Ching, "E-Government Strategies in Developed and Developing Countries," *Journal of Global Information Management*, vol. 14, no. 1, pp. 23–46, Jan. 2006, doi: 10.4018/jgim.2006010102.
  - [13] C. G. Reddick and J. Roy, "Business perceptions and satisfaction with e-government: Findings from a Canadian survey," *Government Information Quarterly*, vol. 30, no. 1, pp. 1–9, Jan. 2013, doi: 10.1016/j.giq.2012.06.009.
  - [14] L. C. Schaupp, L. Carter, and J. Hobbs, "E-file adoption: A study of U.S. taxpayers' intentions," in *Proceedings of the 42nd Annual Hawaii International Conference on System Sciences, HICSS, 2009*, pp. 1–10, doi: 10.1109/HICSS.2009.171.
  - [15] F. Bélanger and L. Carter, "Trust and risk in e-government adoption," *Association for Information Systems - 11th Americas Conference on Information Systems, AMCIS 2005: A Conference on a Human Scale*, vol. 2, pp. 735–744, 2005.
  - [16] P. D. V Ramanamurthy, "E-Governance – Reforming Government through Technology : A Digital India Initiative," *International Journal of Innovative Research in Information Security (IJIRIS)*, vol. 3, no. 09, pp. 2014–2017, 2016.
  - [17] E. Batará, A. Nurmandi, T. Warsito, and U. Pribadi, "Are government employees adopting local e-government transformation?," *Transforming Government: People, Process and Policy*, vol. 11, no. 4, pp. 612–638, Oct. 2017, doi: 10.1108/TG-09-2017-0056.
  - [18] E. Raguseo and E. Ferro, "eGovernment and Organizational Changes: Towards an Extended Governance Model," in *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, vol. 6846 LNCS, 2011, pp. 418–430.
  - [19] L. Cortellazzo, E. Bruni, and R. Zampieri, "The Role of Leadership in a Digitalized World: A Review," *Frontiers in Psychology*, vol. 10, no. AUG, Aug. 2019, doi: 10.3389/fpsyg.2019.01938.
  - [20] M. Ali Saare, A. Hussain, and W. Seng Yue, "Relationships between the Older Adult's Cognitive Decline and Quality of Life: The Mediating Role of the Assistive Mobile Health Applications," *International Journal of Interactive Mobile Technologies (iJIM)*, vol. 13, no. 10, p. 42, Sep. 2019, doi: 10.3991/ijim.v13i10.11288.
  - [21] S. M. Ali, S. K. Abd, M. M. Jaber, and A. T. Yaseen, "Toward Iraqi Healthcare System Framework," in *Lecture Notes in Networks and Systems*, vol. 322, 2022, pp. 737–744.
  - [22] M. A. Saare, A. A. Mahdi, S. A. Lashari, S. A. Sari, and N. A. Hamid, "Measuring prevailing practices of healthcare professional on electronic health record through the lens of Iraq," *Bulletin of Electrical Engineering and Informatics*, vol. 10, no. 2, pp. 970–977, Apr. 2021, doi: 10.11591/eei.v10i2.2408.
  - [23] A. Hussain, M. A. Saare, O. M. Jasim, and A. A. Mahdi, "A heuristic evaluation of Iraq E-Portal," *Journal of Telecommunication, Electronic and Computer Engineering*, vol. 10, no. 1–10, pp. 103–107, 2018.
  - [24] J. Blagojević and R. Scekic, "The Arab Spring a decade on: information and communication technologies as a mass mobilization tool," *Kybernetes*, Jul. 2021, doi: 10.1108/K-03-2021-0240.
  - [25] M. Zeebaree, S. Sattar, G. Y. Ismael, A. N. Qader, and M. Aqel, "Impact of Infrastructure Barriers on Electronic Government Implementation," *Studies of Applied Economics*, vol. 38, no. 4, Feb. 2021, doi: 10.25115/eea.v38i4.3971.

## BIOGRAPHIES OF AUTHORS






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