

A review of the current status of e-government in Saudi Arabia

Hussain Alnifayei

Email: hussain.cbr@outlook.com

Abstract

This paper aimed to review the works related to the maturity of e-government in Saudi Arabia. Saudi Arabia has had a rich history of the progressive implementation of modern tools for e-government since 2005. As a result, its rank in the UN global e-government development index has improved from 105 in 2003 to 43 in 2020, placing it among the developed nations. The only factor which pulls down its ranking is the online services index (OSI) determined by the number of services and customers using them.

Several maturity models have been reported in the literature. They can be used to place the status of the e-government of any country on a specific stage of maturity based on certain parameters. User-centric applications are important components of these models. User-centric variables like behavioural intention and their factors like perceived usefulness can be determined by using models like TAM, TRA, UTAUT, and DOI. Many attempts have been made to assess the customer experience, satisfaction, and resultant loyalty to push the people to use e-government services to a greater extent. This will lead to advancement in the maturity stages.

A temporal analysis of works related to the maturity level evaluations of Saudi e-government systems has led to the conclusion that gradually, the e-government services have reached stage 4 and preparing to advance towards the last stage 5. Apart from increasing the awareness of people and factors related to customer usability, mobile-enablement and infusing the perception that e-services reduce corruption, could be identified as the reasons for the rapid advancement of Saudi e-government systems to stage 4. The last stage 5 may be reached with the promotion of cloud computing, which is already happening in the country.

Keywords: Saudi Arabia, e-Government, Maturity, Advancements

Introduction

The term ‘e-governance’ or ‘e-government’ can be defined as the usage of information and communication technology (ICT) by the government to provide and facilitate government services, exchange of information, communication transactions, and integration of various standalone systems and services (Clear Tax, 2021).

In Saudi Arabia, e-governance started with the Royal Decree No. 7/B/33181 dated 7 September 2003 and the creation of a Ministry of Communication and Information Technology. This Ministry created an e-government programme, Yesser, in 2005 in collaboration with the Ministry of Finance and Communications and Information Technology Commission. Over 2500 services are offered by the Saudi e-government portal. As of 24th July 2020, 97% of the electronic services and 60% of G2C services out of 1200 services published in the portal and 1.25 million transactions were done (GOV.SA, 2021). A smartphone e-service for 160 services, Absher, was introduced in 2015 and expanded to include traffic violation complaints in 2019 (SPA, 2019). Some other applications added in 2019 were a smartphone-enabled citizen feedback information service, Watani (Nugali, 2019) by the National Centre for Performance Measurement (ADAA),

online healthcare services (SPA, 2019) for safe high-quality healthcare for Saudi patients and Med Consult (Hazzazi, 2019) connecting Saudi medical professionals with global experts in collaboration with WHO and KS Relief to avoid diagnostic mistakes. Saudi Authority for Data and Artificial Intelligence (SADAI), National Centre for Artificial Intelligence, and The National Data Management Office were also created in 2019 by Royal decrees to support the e-governance through innovation and digital transformation, rapid visa systems for various purposes to achieve the Vision 2030 (Saudi Arabia, 2021) of the country (GOV.SA, 2021).

In 2020, Saudi Arabia ranked 43rd (0.7991) in the UN Global e-Government Development Index (UN, 2022), ahead of many developed nations. Higher scoring countries from the West-Asian region were UAE (21st -0.8555), Bahrain (38th - 0.8213), and Israel (30th - 0.8361), as the top-ranked countries were Denmark (0.9758), the Republic of Korea (0.9560), and Estonia (0.9473). The difference in scores between Saudi Arabia and the top countries indicates the potential for development. The index (GDI) consists of three indices, namely, online services (OSI), telecommunication connectivity (TII), and human capacity (HCI). For Saudi Arabia, these values were 0.6882, 0.8442, and 0.8648 respectively, and reported biennially. Thus, the online service index was the element pulling down its performance.

Table 1 provides the changes in the overall GDI and its components for Saudi Arabia for different years.

Table 1. Saudi Arabia's global e-government development index for different years.

Item	2020	2018	2016	2014	2012
GDI rank	43	52	44	36	41
GDI score	0.79910	0.71190	0.68224	0.69001	0.66581
OSI	0.68820	0.79170	0.67391	0.77165	0.79738
TII	0.84420	0.53390	0.57334	0.55227	0.43232
HCI	0.86480	0.81010	0.79946	0.74610	0.76774

The best GDI rank for the country was in 2014, when it was 36th, improving substantially from 41st in 2012. Small variations in the measurement methodologies of the explanatory terms (UN, 2016) render comparisons between years meaningless. However, substantial variations between two consecutive reports could be attributed to differences in OSI, TII, or HCI. Thus, the improvement from 2018 to 2020 could be attributed to substantial improvement in TII and HCI. But the reduction in the services index is not a positive sign. The high-income level of the country is usually associated with a high OSI value of above 0.81. But in the case of Saudi Arabia, it is lower.

The GDI data for Saudi Arabia is available from 2003, the year when it initiated e-governance. In 2003, Saudi Arabia was ranked 105, from which it grew to 80 in 2005 when Yesser was implemented by the newly established Ministry of Communication and Information Technology and 2500 services were offered. The GDI rank gradually improved to the current rank of the '40s since 2012, the aberration being only the rank 52 in 2018. As the current rank of 41 places the country among the developed nations, it can be concluded that Saudi Arabia has achieved

sufficient maturity in e-governance. This maturity can be augmented by fine-tuning OSI, the current weak element of GDI. This review focuses on the current maturity level assessments in various years and factors enhancing and reducing the maturity levels, using published literature.

Considering OSI, the latest report on GDI (UN, 2020) describes the methods of measuring it. The OSI component is a combined index on how far the government uses ICTs to deliver various public services at the country level. Data collected from comprehensive surveys on multiple aspects of the online presence of the country are used for this index. Mainly, the technical features of national websites the general e-government policies and strategies, and the strategies for e-government of special sectors for service delivery are reflected in the survey. The complete items and details of the OSI elements in the survey are given on pp 236-249 including the items in the Member State Questionnaire (MSQ) of the report (UN, 2020). The OSI questionnaire consisted of 148 items of binary response nature. Positive answers generated further in-depth questions. The total points from the questionnaire are converted to an index of value ranging from 0 to 1 by dividing the actual total score minus the lowest total score (usually 0) by the range of total score values for all countries. To get a set of OSI values, an assessment was made of each country's national website in the native language, including the national portal, e-services portal, and e-participation portal, and the websites related to the ministries of education, labour, social services, health, finance, and environment, as applicable to the country. Generally, the information sought was of three types from these sites: information about (45 items), existence of (37 items), and abilities to (27 items). One challenge in this respect is the identification of the specific site where all information on the national e-government services is available.

However, regardless of the measurement methods of OSI, TII or HCI, researchers have used different types of maturity models, including one of the UN itself published in 2003. Some works on maturity models and their applications in assessing maturity levels of e-government are reviewed in the next section.

Method and Results

The research database Google Scholar was searched for papers relating to the key words Saudi Arabia, e-Government, Maturity, and Advancements. The search resulted in a large number of papers. In excess of 50 shortlisted papers are discussed in the subsequent sections.

Maturity models

Several maturity models have been presented, discussed, and compared in the literature. Sometimes, three types of maturity models- government models, holistic approach models, and evolutionary e-government models- are recognised. The evolutionary models trace the maturity level through the temporal progress of e-government systems and services. Mentioning these three types, Fath-Allah, Cheikhi, Al-Qutaish, and Idri (2014) discussed the elements and compared the following models in various ways: Layne and Lee (2001), Andersen and Henriksen (2006), UN (2012), Alhomod, et al. (2012), Hiller and Bélanger (2001), Almazan and Ramón Gil-García (2008), Spencer (2007), Baum and Di Maio (2000), West (2004), Moon (2002), Deloitte (2000), World Bank as cited in Snellen (2012), Howard (2001), Shahkooh, Saghafi, and Abdollahi (2008), Lee and Kwak (2012), Siau and Long (2005), Wescott (2001), Chandler and Emanuel (2002- as cited by Fath-Allah et al 2014), Kim and Grant (2010), Chen, Yan, and Mingins (2011), Windley (2002), Reddick (2004), Accenture (2004), NAO (2002), and

Netchaeva (2002). Some of these models have been developed to address the inadequacies of five or six other models in comparative studies (for example, Almazan and Gi-Garcia).

In this respect, the discussions of Almarabeh and AbuAli (2010) on the four-stage model of Layne and Lee (2001) (Fig 1) and the corresponding processes of building the system by the governments, the PPR model of Andersen and Henriksen (2006) (Fig 2), are pertinent.

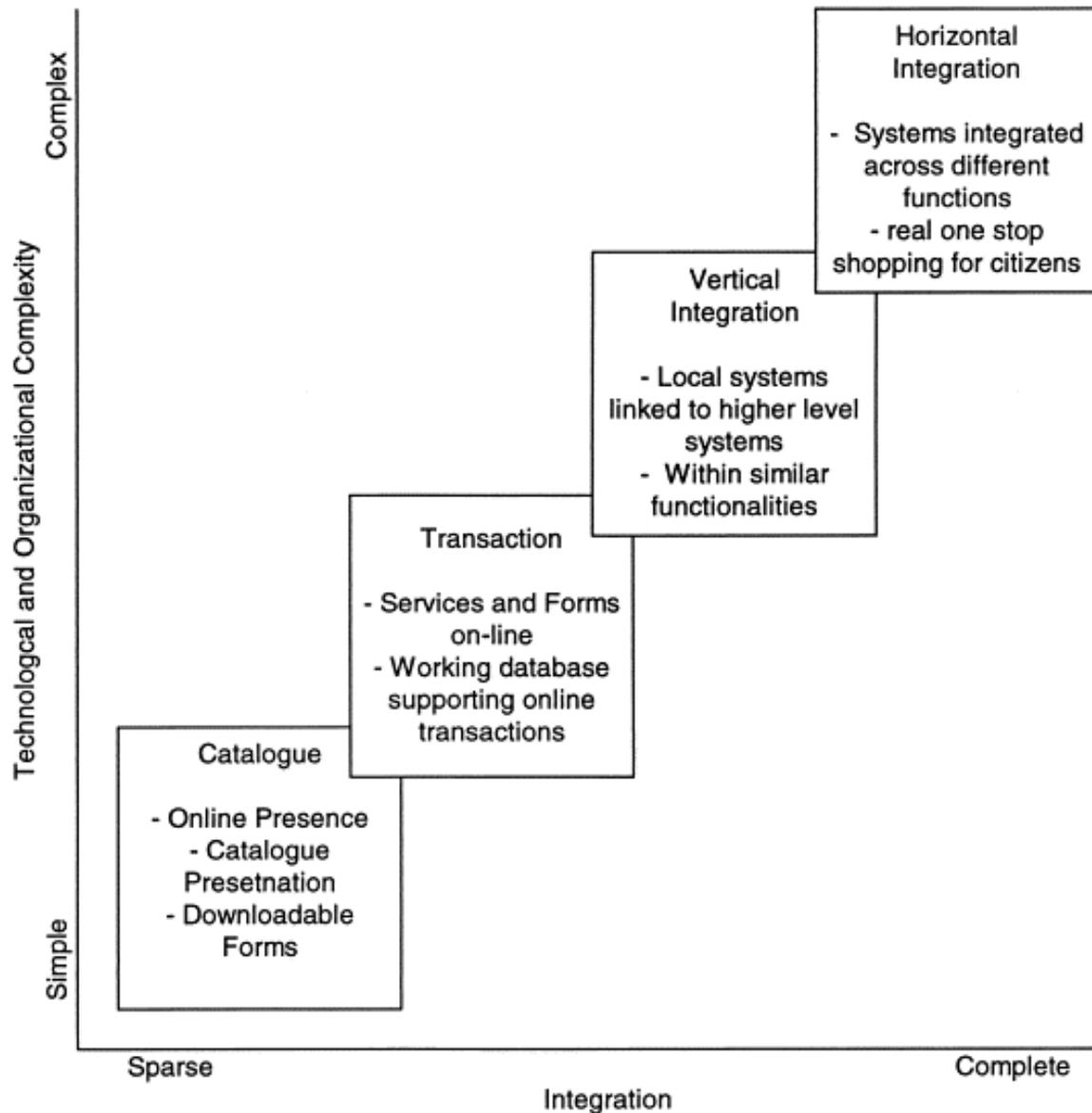


Figure 1: The four-stage model (Layne & Lee, 2001).

The stages cover the period between sparse e-services with simple technologies, in the beginning, proceeding to integration in the mid-stage, and finally the time when it is completed. The four stages of cataloguing, transactions, vertical and horizontal integrations overlap during

these periods. The processes of building up the system for each of these four stages are clear from Fig 2.

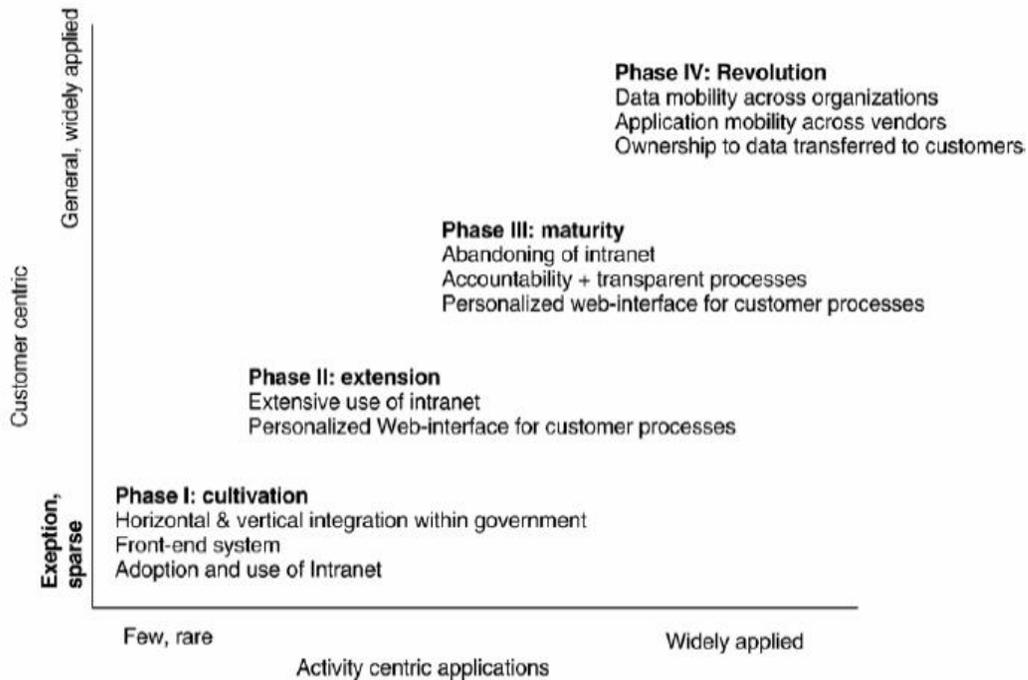


Figure 2: Process building stages of e-government (Andersen & Henriksen, 2006).

The extent of user-centric applications and maturity levels

At least three papers focused on the relationship between maturity levels and user-centric applications. Although the paper of Andersen and Henriksen (2006) calls their model an extension of Layne and Lee (2001), there are many differences. The periods are replaced by few and rare to widely applied activity-centric applications. Customer-centric applications are very rare first but finally, it is the main focus. These two dimensions are covered in four phases consisting of cultivation, extension, maturity, and revolution. Thus, the maturity level increases with increasing user-centric applications.

Another example of user-centric maturity level evaluation can be found in the Jordanian work of Al-Hujran (2012). After reviewing an exhaustive list of the maturity models, the author selected the model of Chatfield and Alhujran (2007), consisting of one-way information flows, two-way interaction, e-payment transactions, and e-democracy. Different departments of Jordan were found to have achieved different maturity levels determined by the extent to which they have user-centric applications.

According to Shareef, Kumar, Kumar, and Dwivedi (2011), the Canadian e-government adoption by citizens differed with the maturity level of the service. Theory of planned behaviour (TPB), technology adoption model (TAM), and innovation diffusion theory (DOI) was inadequate to explain the extent citizens' adoption of e-government services. As maturity level reflects the extent to which the e-services are connected with the customers, this finding also focuses on user-centric maturity level.

Saudi results

The published research on the maturity levels of Saudi e-government services is discussed in the sequence of their published years, in the hope of finding an increasing trend of maturity level in the country's e-government services.

According to Al-Nuaim (2012), the maturity levels of Saudi e-government in 2011, was that eight (41%) of 21 ministries had not implemented the main features of an e-government website. Another 10 ministries (45.4%) were only in the first stage of web presence, completely or partially and 3 ministries (13.6%) were in the second stage of one-way interaction and 6 ministries did not have any online service. The stages considered were web presence, one-way interaction, two-way interaction, transaction, and integration. No ministry was in the third or fourth maturity level.

An analysis of 79 websites common to all countries of the Middle-East, Dokhtesmati (2011) concluded that the countries in the first stage of the Layne-Lee model were in better condition than the countries in other stages. Saudi Arabia was top-ranked along with UAE and Bahrain on the achievement of e-government. Armenia, Iran, and Iraq were ranked the lowest. Saudi Arabia top-scored with 12 for the first stage of cataloguing (access to general information about the organisation and downloadable forms), with 19 for the second stage of the transaction (possibility of getting online services, possibility of communications using electronic tools, and feedback/comment form page). But the country scored zero for both the third stage of vertical integration (Possibility of having links to websites related to the system's functions at different levels) and the fourth stage of horizontal integration. The total sum of 31 achieved by Saudi Arabia was the highest. The results on Saudi Arabia confirm the findings of Al-Nuaim (2012), who detected only the first two stages of maturity.

Using an adapted UTAUT model, Alshehri (2012) observed that Trust (TR), Performance Expectancy (PE), Effort Expectancy (EE), Website Quality (WQ), and Facilitating Conditions (FC), significantly affected the Behavioural Intention (BI) to accept and use e-government services. BI influenced the usage behaviour of e-government services. Age, gender, and internet experience moderated the relationship of key factors with user behaviour. The importance of website support systems and awareness of the people about the e-services was also evident. When BI is high, the site becomes more user-centric and reaches higher levels of maturity.

In the studies of Khan, Alsahli, and Alsabri (2013), the scores of both e-information and e-services of Saudi Arabia were much lower than those of the USA (reference country) and the UK. Whereas information and services components were kept separate in the US websites, they were mixed up in the UK and Saudi websites. Facilities to refine the search within the categories of citizens, businesses, employees, etc available on the US website were not found in the case of the UK and Saudi sites. In the case of the Saudi website, despite being properly organised, information and services were not available easily. Although the sections of information and services exist, they are in pending mode. The users will find it hard to navigate due to multiple issues. These problems of Saudi e-government sites were attributed to it being in the early development stage, compared to the more mature stage of the USA and UK. These results on Saudi Arabia provide the reasons for its e-government services not maturing beyond the second stage till this time.

The citizens' loyalty to the e-government services of Saudi Arabia was positively related to service quality and citizen satisfaction, according to the survey results of Chatfield and AlAnazi

(2013). However, age and education moderated the relationship of service quality with loyalty and of citizen satisfaction with loyalty. The authors targeted the survey questions on the Saudi website MOHE, Ministry of Higher Education. As loyalty arises from positive customer experiences from user-centric sites, the relative level of loyalty is a measure of the maturity level. From the above results, it is already known that the Saudi e-government has not matured beyond the second stage. That means, customer loyalty achieved till this year was low.

In their work, Alghamdi and Beloff (2014) listed TAM, TRA, DOI, and UTAUT models, with explanations for their inapplicability to the e-government contexts. The authors proposed an e-Government Adoption and Utilisation Model (EGAUM). The model consisted of Intention to Use E-Government (ITU), E-Readiness of e-Government (ER), and Actual Adoption and Use of eGovernment (AAU) as the three dependent variables. There were four groups of independent variables, namely, Personal Factors (PF with 4 sub-variables), Motivational Factors (MF with 5 sub-variables), Technical Factors (TF with 3 sub-variables), and Reliability Factors (RF with 3 sub-variables). The model is under testing and validation.

Based on website and policy analysis to evaluate Saudi website's citizen-centric integrated interoperable (CCI) e-government services, Chatfield and AlAnazi (2015) concluded that the earlier disconnected websites did not facilitate cross-agency information sharing, which is essential for citizen-centric e-government development. On the other hand, both e-government interoperability policy framework and collaborative governance helped to overcome the challenges of implementing and delivering CII e-government services to diverse stakeholders. Thus, by the year 2015, the Saudi e-government services were better positioned to advance into maturity levels beyond the second stage.

In 2005, Saudi's mobile government services began with the introduction of SMS service for citizens' requests. By 2015, the Saudi mobile government services had advanced through the informational level to the interactional level and had reached the transactional level. In this context, Zamami and Memon (2016) investigated the currently available Saudi m-government services concerning the maturity models for m-government. The authors identified 11 types of m-services offered from different departments of the country. These services range from the exchange of information, navigation, offline applications, online application, mobile interface, and online payment. Three maturity models were compared for their application in the mobile service context. Out of 26 departments and government organizations, six were in stage 1 (initial informational), 18 were in stage 2 (enhanced phase- interactional), one in stage 3 (reforming phase-transactional) and one in stage 4 (enrichment phase-integrational), and none in stage 5 (governance phase-transformation and participation). Some recommendations have been given. With the introduction of mobile services, Saudi Arabia had a leap forward in the maturity levels of its e-government services. This is reflected by some sites reaching the third and fourth stages. However, the fifth stage is still to be achieved.

Noting that earlier studies have shown that the lack of initiatives to create awareness, providing adequate training and building trust had contributed to a lower rate of e-government by Saudi citizens, Basahel and Yamin (2017) surveyed to reassess the current situation. The results showed that the Saudi e-government has now attained a firm footing and its popularity among the people, especially among the young and the educated, and among women, has increased. Expatriates also have been immensely benefitted by the Saudi e-government services. The need for a similar study on the pilgrims has been advocated. These observations may indicate that more sites are now in stages 3 and 4 and perhaps, an odd site may have reached stage 5.

In an evaluation of the effects of political, economic, and cultural dimensions on the corruption control achieved by the e-government maturity of different countries, Nam (2018) observed that anti-corruption effects of e-government significantly reduced with high power distance and with high uncertainty avoidance. The basic conditions are provided by political, economic, and cultural factors for the level of corruption. Implementation of e-government provides a strategic initiative to reduce corruption in cultures prone to corrupt behaviours. Saudi Arabia was one of the countries evaluated and these results apply to the country, as the power distance and uncertainty avoidance are high in the case of Saudi Arabia (Hofstede, 2021). When the users find that the corruption element is removed from getting various government services, more of them will use e-services, especially if mobile-enabled. This enhances user-centric applications leading to positive user experiences and loyalty. This means, achievement of stages 4 and 5.

The Saudi Government implemented a mandatory e-government service to assist high school graduates in the university academic admission process. In the studies of Alkrajji (2021), usefulness (a variable both in TAM and Seddon models) was found to be the single major factor in determining the acceptance of these mandatory e-government services by foundation year students at the government universities. Information quality was not related to customer satisfaction. The mandatory nature of sites avoids the need for staging maturity levels altogether, as all intended users must use the site.

Restricted resources for adopting digital government policies and lack of trust were identified as the two major challenges in the progressive implementation of e-government by most countries, including Saudi Arabia. Especially, lack of trust in the government initiatives had been the most important issue hampering progressive implementation and reaching the desired maturity levels within the estimated period (Alshehri, Alharbi, Khayyat, & Aboulola, 2021). Saudi Arabia seems to have improved on the trust factor to some extent, as shown by some sites reaching stages 3 and 4 in the above works.

The paper by Alzahrani (2022) lists many challenges of e-government implementation for Saudi Arabia and recommendations to overcome these challenges. The 17 challenges identified are infrastructure development, law and public policy, digital divide, e-literacy, accessibility, trust, privacy, security, transparency, interoperability, records management, permanent availability and preservation, education and marketing, public/private competition/collaboration, workforce issues, cost structures, and benchmarking. It is possible to categorise these 17 challenges to OSI, TII, and HCI. The OSI challenges are related to the digital divide, e-literacy, accessibility, trust, privacy, security, transparency, and interoperability and are related to the user aspects. TII challenge points are infrastructure development, records management, permanent availability and preservation, and benchmarking. HCI elements are law and public policy, workforce issues, private/public competition/collaboration, and cost structures. Some of the recommendations on these challenges are applicable and others do not apply to Saudi Arabia due to the level of achievement of the maturity stage of the country concerning e-government. If people are not adequately using the e-services, it could be due to a lack of efforts to create awareness and training of citizens on their usefulness and problems of accessibility and user-friendliness, trust, privacy, security, and transparency. In effect, the value chain of e-government- readiness, availability, uptake, and impact determines how well the citizens use the e-government services. There can be different levels of e-governance ranging from international to local dimensions. Citizens may use one or more of these dimensions for various purposes. The need for e-government should be clear with the associated vision and priorities, current readiness, what is

best, planning, implementation, and management of the system, overcoming resistance and challenges, private sector involvement, measuring and monitoring progress, and future improvements. On the other hand, remarkable improvement in the maturity level of Saudi e-government services was noticed by Alzahrani (2022) from an analysis of e-government websites using the five-stage maturity model. These improvements should have led to the achievement of higher levels of maturity by most Saudi sites by this year.

Based on the results of a survey of IT managers and employees of Saudi government organisations, Mudawi, Beloff, and White (2022) concluded that attitude, trust, top management support, security, technology readiness, and competitive pressure significantly and directly affected the adoption of cloud computing. Therefore, support and encouragement of positive attitudes and trust in adopting cloud computing by IT administrations are necessary. Therefore, appropriate IT infrastructure environments needs to be designed to help the top management in government organisations adopt such cloud services. Stage 5 may be reached with the help of cloud computing.

Conclusions

This review aimed to evaluate the current status of Saudi e-government maturity levels. The existence of a large number of maturity models was noted. Irrespective of the model, the number of customer-centric applications will determine the level of maturity. To measure the extent of customer-centric contents, barriers, and challenges of implementing e-government in different stages, models like TRA, TAM, UTAUT, and DOI have been used and valuable findings have been obtained.

Examining the maturity levels of Saudi e-government sites in the temporal order of publication, increasing levels of achievement of maturity stages were noted. In the early years of implementation, only stages 1 and 2 were achieved. As the years progressed, the achievement progressed towards stages 3 and 4 and well-positioned to reach stage 5, as cloud computing offers good opportunities. Removing the problems and challenges, making the sites more user-friendly, mobile-enabling, and including the increasing number of customer-centric applications facilitated the progress of Saudi Arabia in achieving advanced maturity levels for its e-government systems.

References

- Accenture. (2004, May 4). *Governments Must Find New Ways to Encourage Citizen Take-Up of eGovernment, Accenture Study Finds*. Retrieved January 26, 2022, from Accenture: <https://newsroom.accenture.com/industries/health-public-service/governments-must-find-new-ways-to-encourage-citizen-take-up-egovernment-accenture-study-finds.htm>
- Alghamdi, S., & Beloff, N. (2014). Towards a comprehensive model for e-Government adoption and utilisation analysis: The case of Saudi Arabia. *Federated Conference on Computer Science and Information Systems, 7-10 Sept. 2014, Warsaw, Poland. ACSIS, Vol. 2*, pp. 1217-1225. IEEE. doi:10.15439/2014F146
- Alhomod, S. M., Shafi, M. M., Kousarrizi, M., Seiti, N. F., Teshnehlal, M., Susanto, H., & Batawi, Y. A. (2012). Best practices in E government: A review of some Innovative models proposed in different countries. *International Journal of Electrical & Computer*

- Sciences*, 12(1), 1-6. Retrieved January 26, 2022, from <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.655.694&rep=rep1&type=pdf>
- Al-Hujran, O. (2012). An assessment of Jordan's e-government maturity: a user-centric perceptive. *International Journal of Electronic Governance*, 5(2), 134-150. Retrieved January 25, 2022, from https://d1wqtxts1xzle7.cloudfront.net/31369145/IJEG_5_2_00_Paper_3-final.pdf?1370836887=&response-content-disposition=inline%3B+filename%3DAn_assessment_of_Jordans_e_government_ma.pdf&Expires=1643090598&Signature=IMcuB-7ePOiuxYK0AHa20GVa1AQToI-6FBPSoD1Jxe
- Alkrajji, A. I. (2021). An examination of citizen satisfaction with mandatory e-government services: comparison of two information systems success models. *Transforming Government: People, Process and Policy*, 15(1), 36-58. doi:10.1108/TG-01-2020-0015
- Almarabeh, T., & AbuAli, A. (2010). A general framework for e-government: definition maturity challenges, opportunities, and success. *European Journal of Scientific Research*, 39(1), 29-42. Retrieved January 25, 2022, from https://www.researchgate.net/profile/Amer-Abuali/publication/228850900_A_General_Framework_for_E-Government_Definition_Maturity_Challenges_Opportunities_and_Success/links/0c96052ffd6c7655db000000/A-General-Framework-for-E-Government-Definition-Maturity-Ch
- Almazan, R. S., & Ramón Gil-García, J. (2008). E-Government portals in Mexico. In *Electronic government: concepts, methodologies, tools, and applications* (pp. 1726-1734). IGI Global. doi:10.4018/978-1-59904-947-2.ch131
- Al-Nuaim, H. (2012). An evaluation framework for Saudi e-government. *Journal of e-Government Studies and Best Practices*(1), 1-12. doi:10.5171/2011.820912
- Alshehri, A., Alharbi, S., Khayyat, M., & Aboulola, O. (2021). Global E-government Trends, Challenges and Opportunities. *SAR Journal*, 4(4), 175-180. doi:10.18421/SAR44-04,
- Alshehri, M. A. (2012). *Using the UTAUT model to determine factors affecting acceptance and use of e-government services in the kingdom of Saudi Arabia*. School of Information and Communication Technology. Griffith University. Retrieved January 25, 2022, from https://d1wqtxts1xzle7.cloudfront.net/57991232/Alshehri_2013_02Thesis-with-cover-page-v2.pdf?Expires=1643111387&Signature=FAiJjS0~qJf1pLDl8sND2G6bBXId3A59baB0G6EssKu9texzDHm9Kj255qsAWKU16qj-wX7IEmz7G58-c9J7LzcKphVmlfY4YBtDiwt9AjVxrZeTD9tV8qeT7j9Ku7EtvAABQ
- Alzahrani, A. I. (2022). A periodical analysis of e-government maturity in Saudi Arabia. *Transforming Government: People, Process and Policy*, In Press. doi:10.1108/TG-05-2021-0083
- Andersen, K. V., & Henriksen, H. Z. (2006). E-government maturity models: Extension of the Layne and Lee model. *Government information quarterly*, 23(2), 236-248. doi:10.1016/j.giq.2005.11.008

- Basahel, A., & Yamin, M. (2017). Measuring success of e-government of Saudi Arabia. *International Journal of Information Technology*, 9(3), 287-293. doi:10.1007/s41870-017-0029-4
- Baum, C., & Di Maio, A. (2000). *Gartner's four phases of e-government model*. Gartner Group. Retrieved January 26, 2022
- Chatfield, A. T., & AlAnazi, J. (2015). Collaborative governance matters to e-government interoperability: An analysis of citizen-centric integrated interoperable e-government implementation in Saudi Arabia. *International Journal of Public Administration in the Digital Age (IJPADA)*, 2(3), 24-44. doi:10.4018/ijpada.2015070102
- Chatfield, A., & AlAnazi, J. (2013). Service quality, citizen satisfaction, and loyalty with self-service delivery options to transforming e-government services. *24th Australasian Conference on Information Systems, 4-6 December 2013, Melbourne. Transforming E-Government Services*, pp. 1-11. Australia: RMIT University. Retrieved January 25, 2022, from <https://ro.uow.edu.au/cgi/viewcontent.cgi?article=3343&context=eispapers>
- Chen, J., Yan, Y., & Mingins, C. (2011). A three-dimensional model for e-government development with cases in China's regional e-government practice and experience. *Fifth International Conference on Management of e-Commerce and e-Government, 5-6 Nov. 2011, Wuhan, China* (pp. 113-120). IEEE. doi:10.1109/ICMeCG.2011.49
- ClearTax. (2021, July 28). *E-governance in India*. Retrieved January 24, 2022, from Cleartax: <https://cleartax.in/s/e-governance>
- Deloitte. (2000). *At the Dawn of e-government: The citizen as customer*. Deloitte. Retrieved January 26, 2022, from <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.196.7298&rep=rep1&type=pdf>
- Dokhtesmati, M. M. (2011). The status of ministries' website of Middle Eastern countries in achieving e-government. *77th IFLA General Conference and Assembly, 13-18 August 2011, Puerto Rico* (pp. 13-18). World Library and Information Congress. Retrieved January 25, 2022, from <https://www.ifla.org/past-wlic/2011/124-dokhtesmati-en.pdf>
- Fath-Allah, A., Cheikhi, L., Al-Qutaish, R. E., & Idri, A. (2014). E-government maturity models: A comparative study. *International Journal of Software Engineering & Applications*, 5(3), 71-91. doi:10.5121/ijsea.2014.5306
- GOV..SA. (2021, July 24). *Performance dadh board*. Retrieved January 24, 2022, from E-Government portal of Saudi Arabia: <https://www.my.gov.sa/wps/portal/snp/aboutPortal/performancedashboard>
- GOV.SA. (2021). *Saudi National Portal for Government Services - GOV.SA*. Retrieved January 24, 2022, from e-government portal of Saudi Arabia: <https://www.my.gov.sa/wps/portal/snp/main>
- Hazzazi, H. (2019, March 2). *'Med Consult' app for patient safety launched*. Retrieved January 24, 2022, from Saudi Gazette: <https://saudigazette.com.sa/article/560286/SAUDI-ARABIA/Med-Consult-app-for-patient-safety-launched>

- Hiller, J. S., & Bélanger, F. (2001). Privacy strategies for electronic government. *E-government*, 200, 162-198. Retrieved January 26, 2022, from <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.470.2867&rep=rep1&type=pdf>
- Hofstede. (2021). *Saudi Arabia*. Retrieved September 30, 2021, from Hofstede Insights: <https://www.hofstede-insights.com/country/saudi-arabia/>
- Howard, M. (2001, August). E-government across the globe: how will 'e'change government. *Government Finance Review*, 6-11. Retrieved January 26, 2022, from <https://d1wqtxts1xzle7.cloudfront.net/30927075/eGovGFRAug01-with-cover-page-v2.pdf?Expires=1643178096&Signature=e0qoL2~IbpZh0d8KAoD10jdLO5HpFfTmO0VeQYWPF2BLnyjPsL4B5EH5WAI0N4vkV5bZDomIDxYq~Eob7YszFRMrhjSSQbkffFcI16eOKsH4sngX~yzzYyL~VbrPJJlzzY-yQyTjvRokv>
- Khan, H. U., Alsahli, A., & Alsabri, H. (2013). E-Government in Saudi Arabia: Analysis on present and future. *E-Government*, 1(3), 3-17. Retrieved January 25, 2022, from https://www.researchgate.net/profile/Hamdan-Al-Sabri/publication/270749627_E-Government_in_Saudi_Arabia_Analysis_on_present_and_future/links/54b3a9070cf2318f0f955973/E-Government-in-Saudi-Arabia-Analysis-on-present-and-future.pdf
- Kim, D.-Y., & Grant, G. (2010). E-government maturity model using the capability maturity model integration. *Journal of Systems and Information Technology*, 12(3), 230-244. doi:10.1108/13287261011070858
- Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government information quarterly*, 18(2), 122-136. doi:10.1016/S0740-624X(01)00066-1
- Lee, G., & Kwak, Y. H. (2012). An open government maturity model for social media-based public engagement. *Government information quarterly*, 29(4), 492-503. doi:10.1016/j.giq.2012.06.001
- Moon, M. J. (2002). The evolution of e-government among municipalities: rhetoric or reality? *Public administration review*, 62(4), 424-433. doi:10.1111/0033-3352.00196
- Mudawi, N. A., Beloff, N., & White, M. (2022). Developing a Framework of Critical Factors Affecting the Adoption of Cloud Computing in Government Systems (ACCE-GOV). In K. Arai (Ed.), *Intelligent Computing* (Vols. Lecture Notes in Networks and Systems, vol 283, pp. 520-538). Springer, Cham. doi:10.1007/978-3-030-80119-9_32
- Nam, T. (2018). Examining the anti-corruption effect of e-government and the moderating effect of national culture: A cross-country study. *Government Information Quarterly*, 35(2), 273-282. doi:10.1016/j.giq.2018.01.005
- NAO. (2002, April 25). *Government on the Web II*. Retrieved January 26, 2022, from National Audit Office, UK: <https://www.nao.org.uk/report/government-on-the-web-ii/>
- Netchaeva, I. (2002). E-government and e-democracy: a comparison of opportunities in the north and south. *Gazette (Leiden, Netherlands)*, 64(5), 467-477. doi:10.1177/17480485020640050601

- Nugali, N. (2019, February 15). *Smartphone application launched to improve public agencies' services in Saudi Arabia*. Retrieved January 24, 2022, from Arab News: <https://www.arabnews.com/node/1452376/saudi-arabia>
- Reddick, C. G. (2004). A two-stage model of e-government growth: Theories and empirical evidence for US cities. *Government information quarterly*, 21(1), 51-64. doi:10.1016/j.giq.2003.11.004
- Saudi Arabia. (2021). *Vision 2030 Laying the foundation of our future*. Retrieved September 15, 2021, from Saudi Arabia: <https://www.vision2030.gov.sa/>
- Shahkoo, K. A., Saghafi, F., & Abdollahi, A. (2008). A proposed model for e-Government maturity. *3rd International Conference on Information and Communication Technologies: From Theory to Applications, 7-11 April 2008, Damascus, Syria* (pp. 1-5). IEEE. doi:10.1109/ICTTA.2008.4529948
- Shareef, M. A., Kumar, V., Kumar, U., & Dwivedi, Y. K. (2011). e-Government Adoption Model (GAM): Differing service maturity levels. *Government information quarterly*, 28(1), 17-35. doi:10.1016/j.giq.2010.05.006
- Siau, K., & Long, Y. (2005). Synthesizing e-government stage models—a meta-synthesis based on meta-ethnography approach. *Industrial Management & Data Systems*, 105(4), 443-458. doi:10.1108/02635570510592352
- Snellen, I. T. (2012). Maturity models in the age of digital diversity: Beyond the Layne & Lee legacy. In I. T. Snellen, M. Thaens, & W. B. van de Donk (Eds.), *Public administration in the information age: Revisited* (pp. 205-221). IOS Press. doi:10.3233/978-1-61499-137-3-205
- SPA. (2019, March 5). *Health attaché in UK develops online platform to serve Saudi patients*. Retrieved January 24, 2022, from Arab News: <https://www.arabnews.com/node/1461511/saudi-arabia>
- SPA. (2019, March 12). *Saudi Interior Ministry launches e-service for traffic fine objections*. Retrieved January 24, 2022, from Arab News: <https://www.arabnews.com/node/1465236/saudi-arabia>
- Spencer, P. (2007). *Connected Government: Creating a Springboard for Transformation and Innovation*. CISCO. Retrieved January 26, 2022, from https://www.cisco.com/c/dam/en_us/about/ac79/docs/wp/ctd/Connected_Govt_PoV_1030_finalCB.pdf
- UN. (2012). *E-Government Survey 2012- e-government for the people*. United Nations. Retrieved January 26, 2022, from <https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2012-Survey/unpan048065.pdf>
- UN. (2016). *United Nations e-government Survey 2016: Annexure on Methodology*. United Nations. Retrieved January 2022, 2022, from <https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2016-Survey/Annexes.pdf>

- UN. (2020). *E-Government Survey 2020*. Department of Economic and Social Affairs. United Nations. Retrieved January 24, 2022, from [https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2020-Survey/2020%20UN%20E-Government%20Survey%20\(Full%20Report\).pdf](https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2020-Survey/2020%20UN%20E-Government%20Survey%20(Full%20Report).pdf)
- UN. (2022). *E-Government Index 2020*. Retrieved January 24, 2022, from United Nations: <https://publicadministration.un.org/egovkb/en-us/data-center>
- Wescott, C. G. (2001). E-Government in the Asia-pacific region. *Asian Journal of Political Science*, 9(2), 1-24. doi:10.1080/02185370108434189
- West, D. M. (2004). E-government and the transformation of service delivery and citizen attitudes. *Public administration review*, 64(1), 15-27. doi:10.1111/j.1540-6210.2004.00343.x
- Windley, P. J. (2002). *e-Government maturity*. Windley. Retrieved January 26, 2022, from <https://www.windley.com/docs/eGovernment%20Maturity.pdf>
- Zamami, I., & Memon, M. (2016). Establishing Model of Mobile Government Services at Saudi Arabia. *Sindh University Research Journal-SURJ (Science Series)*, 48(4D), 91-96. Retrieved January 25, 2022, from <https://sujo-old.usindh.edu.pk/index.php/SURJ/article/view/2736/2156>