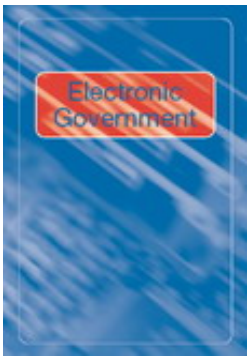

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The journey from e-government to digital transformation: the case of Saudi Arabia

Sotirios Zygiaris, Bassem E. Maamari

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The journey from e-government to digital transformation: the case of Saudi Arabia

Sotirios Zygiaris* and Bassem E. Maamari

Prince Mohammad Bin Fahd University,
College of Business Administration,
Al Aziziyah Highway, Al-Khobar, 31952, KSA
Email: szygiaris@pmu.edu.sa
Email: bmaamari@pmu.edu.sa
*Corresponding author

Abstract: The e-government implementation process in the world is at various stages with some countries having a pronounced success. The governments with a greater degree of success are subject to the second stage of evolution known as digital government. In the digital government stage, organisations carry on internal service improvement in an attempt to change cultural impulses. The purpose of this study is to analyse the transition process from e-government to digital government in Saudi Arabia. We aim to identify the factors that would enable this transition. The findings of our study illustrate that in the journey from e-government to digital government there are four important enabling factors, namely technology adequacy, organisational change, open government and social inclusive government. The study provides a researcher's view of the factors that will lead a digital transformation process in government to incorporate internal socio-technical physiognomies that will promote a responsive, proactive, open and social government.

Keywords: electronic government; digital government; open government; social inclusive government; transition process; structural equation modelling; SEM; Saudi Arabia; government transformation; e-services; technology adequacy; organisational change.

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Biographical notes: Sotirios Zygiaris holds a BSc (1986) and an MSc (1988) in Computer Science and MIS from Lamar University USA and PhD in Innovation management from Aristotle University Greece. He has 25 years of international experience in academia, research and industry. His main research interests are innovation ecosystems, business intelligence, and smart cities. Currently, he is an Assistant Professor with the College of Business Administration, Department of Management Information Systems, Prince Mohammad Bin Fahd University, PMU.

Bassem E. Maamari, after a long executive career, joined the academic world after 12 years of part-time higher education teaching in different universities, and during which he assumed multiple executive positions. He assumed a full-time faculty position since 2010 and brings a wealth of practical experience in consulting in the areas of sales management, finance, MIS and human resources management of SMEs. He has a number of studies and his research interests include satisfaction of customers and employees, emotional intelligence, and the impact of technology on people.

1 Introduction

Electronic government (e-government) initiatives worldwide and particularly in the Kingdom of Saudi Arabia setting, allow citizens, businesses, and organisations to receive electronic services (e-services) through government portals as one-stop-shop service points (Lindgren and Veenstra, 2018). Users evaluate the perceived government e-services based on the efficiency and effectiveness of service delivery. Since the mode of delivery in e-government is contactless, the public experiences the virtual perception of services through trigger request. The intermediate steps from trigger to the delivery of results are hidden internally, and they are implemented in an automated, semi-automated or manual mode by the government administrators. The optimisation of this internal process mostly defines the quality of service delivery in e-government. With the trend among governments to embrace digital government frameworks, where they rely on information and communication technologies to enable better strategic goals and policy achievement. With this plan to effectively design and implement this strategic approach comes the challenge of successful implementation of the transformation to digital government, and the factors affecting it.

Digital government and e-government are used interchangeably by many researchers when they refer to government services. Probably when both are seen under the prism of end resulting services, they both produce the same result to the final user. What differentiates e-government and digital government is the origin of technological changes. Changes in e-government can be caused externally by demand-driven societal pressures for citizen-driven government services (Janowski, 2015; Manda and Backhouse, 2016). Digital government is an upward stage toward building the culture of change inside government organisations that becomes inherent in having a wider engagement and contextualisation as policy-driven e-governance (Janowski, 2015; Hartl and Hess, 2017; Downes and Nunes, 2013).

The Kingdom of Saudi Arabia (KSA) has placed great attention to e-government implementation as an integrated framework to reach the milestone of the Saudi Vision 2030 plan towards digital government and the final goal of achieving smart governance. The KSA's national e-government project (Yesser), started back at 2005, has produced significant results. Khan et al. (2013) made an analytical comparison of KSA's, USA's and UK's e-government systems, concluding that the progress of the Saudi's e-government is at a compatible stage.

Since then, the e-government initiative has advanced to high standards. The United Nations' (2018) comparative analysis of national e-government initiatives present KSA in the top 20% performers in relation to offered services and the integrated approach in e-governance. According to the measurement and analytics tools, contacted by Yesser (https://www.yesser.gov.sa/) in 162 government agencies, the results are positive (over 70%) related to the implementation of e-government. The most positive measurements are related mainly to technological capacity project management, quality assurance and human resources. But the success and/or failure of these initiatives rests on measuring their outcomes.

Many scholars verify the positive revolution that exists in the e-government in Saudi Arabia. Khan et al. (2013) describe the current development strategies of e-government in Saudi Arabia (Khan et al., 2013). They review the maturity model in relation to the Vision 2030 moving towards digital government. The research has positively identified that the maturity state of the e-government in KSA is reaching by

2020 the digital government era, having completed online presence, interaction, and transaction stages in e-government since 2005. Since then, the government has introduced a large number of parallel e-services including many government processes into strategic plans aiming at e-service development. These are topped today by the newest strategic plan known as the 'Vision 2030' launched in 2016. Basahel and Yamin (2017) highlighted also the success of e-government in KSA concluding that employee engagement and change awareness must be developed towards digital government. The e-government measurement has presented weaknesses in the transition to digital government in policy design, demand-oriented or citizen-oriented participation, and knowledge integration and diffusion. From the above mentioned weaknesses confronted with the e-government initiatives, the need arises to assess the process for better transition toward digital government. Thus, this research rationalises the need to explore the underlying enabling factors for the emerging transition in KSA from e-government to digital government.

The following explores the pertinent literature, highlights the methodology used, the results of the study to conclude with the lessons learnt for facilitating e-transition processes.

2 Literature review

The literature review exercise aims to identify findings and evidence of enabling factors and drivers in the journey from e-government to contextualisation in digital government. The public sector's bureaucratic procedures are overloaded with lengthy controls, delays and paper-based operations (Pardo et al., 2012). The transformation to digital governments is a milestone in the journey from e-government towards 'smart digital governance'. A government organisation is transformed when information technologies, administrative processes, institutions and human capital are interconnected and synchronised to better serve the citizens (Gil-Garcia, 2013). This synchronicity in digital transformation is demanding, considering the complexities of the sociotechnical barriers that create various integration and interoperability issues (Manda and Backhouse, 2016).

Since the measurable results of digital government are not always measurable, the transformation process to contextualisation requires greater contextualisation of services (Janowski, 2015; Benjamin and Potts, 2018).

Leadership is an important enabling factor in managing change toward digital government, securing resources and minimising resistance to change. As the government is fragmented into ministries with differed priorities in the technological arena, leadership is required to overcome integration and cooperation barriers among government units. Since most of the technological platforms require cross-governmental cooperation and integration, the leadership role should not be confined within each ministry or government organisation but it should be horizontal, crossing holistically all government units. A leadership assignment highlights the existence of digital government authority inspiring the vision and synchronising policy planning, coordinating activities and allocating resources for the transition toward d-government (Zheng et al., 2013). E-government implementation can be achieved ad-hoc, rapidly within the bounds of internal leaders in government organisations, but digital government implementation follows a catholic plan integrating all levels and hierarchies of the governmental

institution (Benjamin and Potts, 2018). All previous studies have identified leadership as an apriori factor in digital e-government transition to be widely accepted as the initiating force in the change process (Lindgren and Veenstra, 2018; Manda and Backhouse, 2016).

As citizens aspire for high-quality e-government services, digital government is changing the organisational management structure (Manda and Backhouse, 2016), frequently presented as stage two e-government project. Previous research has outlined indicators for evaluating the impact of digital government. Benjamin and Potts (2018) and Waller (2016) have highlighted that the creation of a functional cross-departmental task force, improves e-service efficiency, as it is perceived by the citizens (Mergel et al., 2018). Participatory policymaking and groupware to improve the implementation effectiveness of e-services. The endogenous service idea generation reduces the analysis faults and design iterations in service implementation drawn as conclusions for the digital transformation exercise to d-government in Sweden (Lindgren and van Veenstra, 2018). In the findings of Manda and Backhouse (2016) and Janowski (2015), digital government changes the organisational structure, reducing the processing steps, and automating controlling structures by introducing cross-functional horizontal teams in process implementation. This research embraces previous research findings on various empowering factors that are presumed enablers of change to digital government as hypothesis statements instigate their impact on the change process to d-government in KSA. The enabling factors of technological adequacy, change organisational culture, open government, and social technology, and smart government formulate our hypothesis.

2.1 Technological adequacy

Technological adequacy is a cornerstone construct in the digital government transformation structural process. Digital government trails e-government. Digital government requires cross border government collaboration and groupware (Lindgren and Veenstra, 2018). Technological integration has been referred to as a critical indicator for moving to digital government with legacy systems exemplified data exchange and migration, and incompatible standards (Lam, 2005; Yang and Wu, 2014; Manda and Backhouse, 2016).

Another referred enabler is the development of cross-organisational skillset in information and communication technologies (ICT) related to human empowerment (Lindgren and van Veenstra, 2018). ICT culture among government employees is also referred to in the study of Zheng et al. (2013). The digital government demands that ICT skills should be a broad-based government initiative covering all the organisational structure and should not be limited to specific IT-related employees. There is a difference between ICT skilful pockets of employees needed to manage e-government applications, viewing ICT in isolation (Ifinedo, 2006; Benjamin and Potts, 2018) and the distinctive cross-organisational ICT knowledge that could play a participatory role in designing ICT policies (Zheng et al., 2013) where ICT culture is embedded in the government's organisational structure (Cordella and Iannacci, 2010).

2.2 Organisational change

Organisational change culture, as an enforcing factor for digital government, is a dynamic process seeking continuous improvements in the efficiency and the effectiveness of

government operations and decision-making (Lisboa and Soares, 2014). Change could originate from upper management, due to societal or political pressures for better government services. In this case, responsively, e-government applications flourish rapidly sourced from the top management levels (Zheng et al., 2013). When change originates endogenously and is not enforced in the entire organisation, they indicate the development of change in organisational structure, as a quest for continuous improvement. The digital government era promotes a citizen-centred dynamic process, where internal changes and improvement in citizen services are sourced from within the organisational structure of the government (Manda and Backhouse, 2016; Jalagat, 2016). The culture of change is created when the level of acceptance of a change is exceeding resistance to change, as an obstructing factor (Grab et al., 2019).

Change management in general encompasses a number of factors including revisiting the vision, mission values, economic indicators and trends, and many others. More specifically in the public administration it requires major reengineering to avoid bureaucracy deriving from the vertical organisational structure (Jalagat, 2016). However, in this study, the variable labelled as organisational change handles change in its totality (as one single construct). In a state of digital government, critical processes are automated crossing across the vertical organisational structure of the government. Thus, the development of cross-functional teams to service uninterruptedly these electronic processes is an enabling factor for digital government using techniques such as business process reengineering and Six Sigma (Bugubayeva et al., 2017; Grab et al., 2019). While the volume of paperless operations and one-stop-shop services is a clear indicator for the e-government services, in digital government, state requirements are directed toward internal structures that will efficiently serve the required e-services.

Requests for e-government services are externally originated based on citizen demands or political pressures (Lisboa and Soares, 2014). In the digital state, the e-services should be produced also endogenously as the citizen oriented government organisation (Mergel et al., 2018; Lindgren and van Veenstra, 2018). Moreover, in digital government, the organisation is conducting formal idea generation sessions to suggest new or improved services to the public. Formal sessions like brainstorming or mind mapping are often contacted to generate and screen the ideas for new services in e-government. These new internally sourced services complement the demand-oriented externally sourced ones (Danneels and Viaene, 2015).

2.3 Open government

Open government encompasses may lead to new ways of governing, both from the governments' and citizens' perspectives. Open government occurs when the state allows free access to public sector data under a regulatory framework that excludes private sensitive data. These data can be statistics and agglomerated reports that do not reveal any private information. Open government is one of the major prerequisites of digital government, ensuring that citizens, organisations and non-governmental organisations effectively share information (United Nations, 2018). The government should override obstacles like loss of authority related to information sharing (Jimenez et al., 2014). Government data should be openly available and shared, excluding personal and protected by regulation private data, acting as an information hub for expanding the information era across and over the limits of the government, in the society (Pardo et al.,

2012). While e-government is based on applications derived from the governmental organisations, digital government can expand the sourcing point of services to citizens, organisations and communities (Voorberg et al., 2015). The outcome of open government is transparency and accountability in the administrative operations (Al-Jamal and Abu-Shanab, 2018; Saxena and Muhammad, 2018). Opening up government data and information on areas such as public spending, government contracts, recruiting and hiring, policy debate and implementation, and public service performance induce the public sense of trust to government operations (Jimenez et al., 2014; Al-Jamal and Abu-Shanab, 2018). Accountability is enhanced in open government by embedding regulations that ensure the responsibility for actions taken in administrative operations.

When governments openly avail data through the network using web structural ontologies called 'linked and open data' (LOD), they offer the possibility of using data across domains or organisational borders for statistics, analysis, maps and publications (Lucke and Geiger, 2012). The Semantic Web is using LOD technology that constructs knowledge and shareable information reservoirs, as a common collaboration space (Talleras, 2017). For example, open government data about the car traffic accident locations can inspire the creation of a road hazard alert or a warning application on Google Maps. Open and linked data automatically update the applications developed by the community or the private sector (Ullah et al., 2018). LOD and the semantic web can be an enforcing factor for digital services since they create the space for an open dialogue between the government and external entities. The availability of open data can create the collaborative environment for discussion blogs, community participation in policymaking and crowdsourcing public opinions (Voorberg et al., 2015; Barry and Bannister, 2014). As such, open government implies that sharing and using the open government data with stakeholders promotes the co-creation of auxiliary government services (Lucke and Geiger, 2012; Al-Jamal and Abu-Shanab, 2018).

2.4 Socially inclusive government

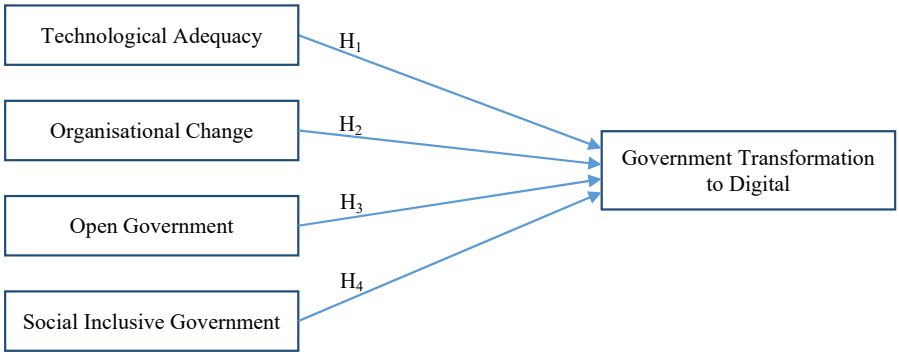
Dimensions of social inclusion and participation in social inclusiveness in the government is enforced by the advancement of technologies that will allow citizens, communities and entities to participate in policy debates, review on government's performance and contribute to the improvement of government services (Selwyn, 2002; Millard, 2007). 'Inclusive citizenship' can be exercised through crowdsourcing or in other words socially inclusive service development (Pollock, 2020; Holland et al., 2012). In crowdsourcing the public (crowd) can generate ideas or identify a problem related to a publicly concerned issue. Clark et al. (2019) have developed a framework to strategise crowdsourcing through a formal tool for problem solving. Crowdsourcing is based on Web 2.0 user interactive technological platforms, in which governments can interact with the citizens under an organised framework. Citizen's contributions to problem solving in government enhance the feeling of inclusiveness. Furthermore, Loukis and Charalabidis (2015) have distinguished crowdsourcing in government. They define it as 'passive' where mostly information and knowledge is sought from the crowd, and as 'active', when knowledge is created in collaboration with the crowd. Liu (2017) describes government sourced crowdsourcing in terms of a process, providing district methodology that facilitates the participation and ensures that conclusive arguments can be produced by the crowdsourcing exercise.

Another active social inclusive practice is the cooperative formation of government policies with the use of technologies such as blogs, discussion and debate platforms (Millard, 2007). Governments may use crowdsourcing or open collaboration for policymaking. Taeihagh (2017) examines crowdsourcing as a tool for policy-making and defines the technologies used in different stages of the policy process. Governments follow different approaches in policy-making. The most usual approach is to draft a first policy and then release the draft for social scrutiny and debate. This process iterates several times until a consensus is met among participants (Phd et al., 2015). Another approach is using open collaborative services when a policy is built from the beginning using social input, having the government to play the role of mediator in the open policy making process (Certoma et al., 2015; Dutil, 2015; Kietzmann, 2016).

Based on the initial investigation and previous observations on the enabling factors in the move to digital government process, and based on the literature review, we propose a framework for our working hypotheses in figure 1, to answer our research question:

Do technology adequacy, organisational change, open government and social inclusive government affect government transformation to digital-government?

Figure 1 Transformation to digital government research instrument, variables and indicators (see online version for colours)



3 Methodology

This study analyses the enabling factors that will allow digital transformation to develop across KSA's government. The country is considered a successful e-government story. Would this success keep the momentum to transform digitally the organisational structure of the government? The survey shall focus the respondents' views on the government transition, where the government is moving from using manual methods to digital government. It will allow the researchers to describe the advantages and disadvantages of the journey of the government from the e-government to the d-government stage. The measurement instrument to the variables in the research model is constructed using questionnaires. The measurement instrument combines research results from previous work in the area. It is composed of six sections, one capturing the demographic characteristics of the respondents, a second on technology adequacy (four items from Janowski, 2015); a third on organisational change (four items from Jalagat, 2016); a fourth on open government (four items from Manda and Backhouse, 2016; Benjamin and

Potts, 2018), a fourth on social inclusiveness (three items from Millard, 2007) and a fifth on government transformation process (17 items from Janowski, 2015). In digital government transformation, the enabling factors are not always observable but they can be inferred as latent variables or constructs since they can be measured directly but they can be evaluated using a number of indicators. The previous work on the topics on hand is used to derive the research instrument. These previous works provide the ground and are the basis on which this study builds forward. The questionnaire was pilot tested with ten respondents and found suitable with minor language editing.

The literature review resulted in specific areas that are enabling factors of the transition from e-government to digital government, along with performance indicators used to evaluate the impact of these factors in digital government.

3.1 Data collection

Data were collected using a survey method having as target KSA's government employees. Sample data was drawn using a combination of purposive judgement sampling and the exponential snowball sampling method. The sample frame used in the study is the information system departments of the different governmental units involved in the d-government transformation process. These include approximately 22,000 employees in various departments/units/ministries/offices of internal affairs, civilian status records, foreigner status records and foreign affairs, police and security, transport and road safety, education, land titles, etc. These are all involved in the planning and implementation of their respective module interfaces and integration.

The data collection started with ten government employees (subjects) judged by the researcher as experts in government administration and involved in the project. These experts have been working on the system development for more than 2 years each, and are thus considered knowledgeable on the subject matter. The initial subjects have to nominate at least three more subjects, which in turn will do so. This way the sampling size increases as a rolling snowball (Naderifar et al., 2017). Knowing the two main weakness of the snowball technique, first increasing chances of repetitiveness, and second, bias toward population demographic characteristics (where respondents refer respondents with similar age, gender, educational level, etc.) (Baltar and Brunet, 2012), the authors choose the exponential snowball method because the sample frame in this case is difficult to reach and has similar demographic characteristics. Moreover, the exponential snowball technique allows researchers first to receive the most possible relevant answers to the research question that will mark the generalised findings as more convincing as it targets respondents who have the same characteristics, and who know each other. Second, to collect responses from target respondents that are hesitant to come forward and take part in the study (Cohen and Arieli, 2011). Third, to locate the respondents with the specific characteristics and that are difficult to locate (Morgan, 2008). Fourth, it requires less staffing and time (Voicu, 2011). And finally, to boost the research efficiency and quality, in addition to minimising bias (quota sampling bias) (Cohen and Arieli, 2011; Atkinson and Flint, 2001). Moreover, the researchers use PLS-SEM as the population size is small and restricted, and because of anticipated lack of data distribution normality (Hair et al., 2019). All the data received from the respondents was quantified (coded) and entered onto Excel formats and checked for completion, then transferred to SPSS and checked for reliability using Cronbach's alpha

(results ranged between .871 and .896) and validity (Kaiser-Meyer-Olkin measure of sampling adequacy ranged from .799 to .901).

3.2 Data analysis

Within structural equation modelling, this research is using confirmatory factor analysis (CFA), as a measurement tool, to investigate the relationships between latent variables and their indicators or in other words to test how well the measured variables represent the number of constructs. In this research, the CFA tool is used to confirm or reject the measurement instrument, which is a questionnaire on the enabling factors for government transformation to digital government. The questions in the questionnaires are designed based on the measurement items for each construct or latent variable models that exist in the design of the study. Partial least squares-structural equation modelling (PLS-SEM) method is used due to its ability to evaluate the measurement of latent variables (Cepeda-Carrion et al., 2018), and to test the relationships between latent variables.

4 Results

A questionnaire was sent to 194 government staff members and 173 from those responded giving us an 82% response rate. According to Simpson and Simpson (2014) and Chintagunta et al. (2006), a dataset size of between 100–200 is an adequate sample in structural equation modelling (SEM) to investigate the relationship between enabling factors for the digital government development. The high number of response can be referred to the selected snowball sampling method that is using referral samples rather than random samples. A vast majority of the respondents are males (88%). Most of the respondents (52%) are between 30 to 40, and 40 to 50 (26%) years old. In terms of management level, 67% are self-declared in middle management and 22% in upper management. The educational level of the respondents is 63% bachelor holders 19% master holders and 6% PhD holders. All the respondents are working full-time on the project. Among the respondents, 82% (142) are government cadres and 18% are on contractual or project employment terms. The 142 cadres are 23 senior team leaders (13%), 98 supervisors (57%), and 21 middle managers (12%) (see Table 1).

Structural equation modelling was used for the analysis of data. The data collected are analysed using SMARTPLS statistical software package, which is specialised in latent variable modelling. The partial least squares structural equation modelling allows estimating complex cause-effect relationship models with latent variables (Hair et al., 2019).

Confirmatory factor analysis (CFA) is used in the research as evaluation, for the proposed measurement model to the validity and reliability of the constructs. The research first identified constructs with convergent validity, which can be established if similar constructs correspond with each other. According to the result of CFA we eliminated construct 1 in technology adequacy (degree of technology cross-organisational integration), construct 2 in technology adequacy (depth of ICT culture in organisational skillset) and construct 2 in organisational change (degree of process oriented operational structure based on horizontal cross-functional teams). These constructs had a loading factor less than 0.5 AVE and the communality values of all constructs where higher than

0.5. Based on these observations these constructs satisfy the requirements of convergent validity. In CFA, the composite reliability value measures the shared variance among all latent variables used as an indicator of a latent construct. The composite reliability value for all constructs was between >0.6 and <0.9. Therefore, according to Hair et al. (2019), all constructs meet the requirements of the reliability test.

Table 1 Demographic characteristics of the respondents

Characteristic	*Number*	*Percentage*
Gender	152	Male
	21	Female
Age	90	30–40 years – 52%
	45	41–50 years – 26%
	38	51+ years – 22%
Educational level	109	BSc/BA – 63%
	33	MSc/MBA – 19%
	10	PhD/DBA – 6%
	21	Other
Job category	142	Cadres – 82%
	26	Contractual – 15%
	5	Support employee – 3%
Job rank	19	Senior employee – 11%
	116	Middle management – 67%
	38	Upper management – 22%

Table 2 Path coefficients of the model

Relationship tested	*Hyp.*	*Original sample (O)*	*T statistics (|O/STERR|)*	*P value*	*Decision*
Technological adequacy → DTG*	H1	0.007314	0.087432	.023	Supported
Organisational change → DTG	H2	0.337926	4.445271	.000	Supported
Open government → DTG	H3	0.282779	3.002751	.000	Supported
Social inclusive government → DTG	H4	0.211843	1.678453	.000	Supported

Note: *Digital government.

Once the reliability test measured positive for the constructs, the structural model was tested using PLS-SEM, this approach measures the predictive relationship between constructs or latent variables. It is an especially useful method when formative constructs are used and non-parametric assumptions are ignored, in social sciences where the testing can be done with a less strong theoretical basis (Hair et al., 2019). The R-squared (R^2) statistical measure was used to measure the extent to which the variance of one variable explains the variance of another variable. The R^2 for the transition to digital government was at 0.7242, so the accuracy parameters of the prediction model are at 72.42%. This means that the transition to digital government from e-government is influenced or can be explained to 72.42% by the technological adequacy, organisational change, open

government, and social inclusive government and there is a remaining 27.58% of variables that influence digital government that are not covered by this model.

In the model, the hypothesis testing was contacted using inferential statistic and in particular, t-test to measure the effect of the independent variables on the dependent variable. The significance test through the t-test model was conducted using multivariate analysis and measuring which independent variable has a significant influence on the dependent variable. We measure simultaneously all the independent variables that have a significant influence on the dependent variable. Thus, all the independent variables (technological adequacy, organisational change, open government, social inclusive government) that have significant influence on the depended variable (digital government) are included. An independent variable is significant when the significance value is greater than the value reported in the t-table (Baur and Lamnek, 2007). We have used path coefficients that involve multiplying the ordinary regression coefficient by the standard deviations of the corresponding explanatory variable having coefficient values (Mean, STDEV, t Values). The path coefficient values are presented in Table 2.

Based on the results of the analysis of the path coefficient values, the major enabling factor in transitioning to digital government is organisational change. On one hand, significant enabling factors include open government and social inclusive government. On the other hand, technological adequacy does not have a significant effect on the transformation to digital government in Saudi Arabia.

5 Discussion

The results of this research have identified that in Saudi Arabia's transformation process of the e-government to digital, the most important enabling factor is organisational change with estimator value at 0.337926. The result is in line with findings of previous researchers (Lisboa and Soares, 2014; Zheng et al., 2013) that identified that mature e-government systems trigger the request for improvement in the organisational structure. With the successful implementation of the Yesser e-government program in KSA (http://www.yesser.gov.sa), the plurality of quality e-services drives the internal forces for changes. The basis of these changes is the promotion of a culture for change and continuous improvement within the Saudi Government. In fact, the Yesser program has launched an initiative for promoting the changing culture among executive government employees. These initiatives relate to the enhancement of the skills of employees in understanding technological change, and to the infusion of a culture of change with the organisational structure. Another parameter of high significance identified within the organisational change variable of change management is the development of cross-functional team and horizontal teams to monitor the flow of the process of delivered services. In accordance with the Yesser program has launched workshops across the country for service improvement using the ADKAR change management model towards reengineering the government structure (Bugubayeva et al., 2017; Grab et al., 2019). Another parameter of organisational change is the endogenous creation of government e-services (Mergel et al., 2018; Lindgren and van Veenstra, 2018) discussed in the Bahrain e-Government International Forum with the participation of the Yesser program.

Open government with estimator factor at 0.282779 is presented as a significant factor in our research in accordance with the studies of Voorberg et al. (2015) and Pardo et al. (2012). The Saudi government has launched an initiative for open data (https://data.gov.sa/Data/en/dataset) having as main target public awareness, transparency and accountability in accordance with the findings of the work of Al-Jamal and Abu-Shanab (2018) and Saxena and Muhammad (2018). The open government initiative in Saudi Arabia has released over 4,000 datasets with the Ministry of Environment leading the process with 988 open datasets. Apart from the availability of datasets, the government has created the linked data ontologies that can be used by the public to co-create applications. Application developers may use open data and develop web or mobile-based applications using Python and Javascripts. This research affirms the significance of the co-creation of applications with stakeholders in accordance with the finding of Talleras (2017) and Ullah et al. (2018) towards the semantic web.

The social inclusion in governance is another highly ranked factor with a high significance. It is an enabling variable with an estimator factor at (0.211843) in accordance with the findings of Holland et al. (2012), Clark et al. (2019) and Pollock (2020). The Saudi Government has developed a high priority initiative (http://www.mcs.gov.sa/ar/BetterMCS/eParticipation) called 'e-participation' allowing the citizens to participate in formulating solutions for issues of public interest, and to contribute in policy design. The platform provides access to over 20 government portals and mobile applications that promote the crowdsourcing idea by encouraging citizens to participate actively and provide input about governmental service design and improvement as co-creation, and provide valuable input in the design of public policies, as social policy design.

Technological adequacy is a structural enabling factor for digital government. The studies of Manda and Backhouse (2016) and Lindgren and van Veenstra (2018) report that cross-organisational technological integration and the depth of ICT culture in organisational skillset are important enabling factors for transformation to digital government. Our study has identified technological adequacy as not a critical factor with estimator factor at 0.007314. A profound justification is that the Saudi government has gradually achieved technological adequacy through the successful e-government Yesser program. The digital government takes the e-government program one step further. So, the major concern of our sample audience shifted from technology to the type of innovations that should be taken in government's organisational structure to capitalise on the internal resources and social collaborative input.

The Government of Saudi Arabia runs a comprehensive e-government implementation plan with wide acceptance among the public. Furthermore, it has taken significant measures to the journey toward digital government. In each of the enforcing factors identified by this study, there is evidence that the government has been taking significant steps towards digital transformation having as cross-ministry organisational body the Yesser program.

6 Conclusions

This study is expected to further identify the enforcing factors of digital transformation in governmental institutions while proceeding with e-government programs unfolding. The case of Saudi Arabia shows how the best practice in e-government implementation may

gain benefits in the transition to digital government. Apart from a coherent leadership to advance these e-government initiatives, governments need to advance major internal and external reforms to advance to the digital government stage. Technological adequacy is another factor that, at an advanced digital government stage, is considered critical since it is a prerequisite to reach this advanced transition level. This study considers as enforcing factors the internal organisational change, infusing a culture of change, and change facilitating mechanisms. Service improvement to citizens should be a continuous internal improvement process as a citizen oriented approach. Open government data is an important enabling factor that builds trust among the public for government operations enhancing the sense of transparency and accountability. It also builds collaborative space with the public based on jointed initiatives. A social inclusive government augments the co-design space for services and policies with the public. The study uses SEM to analyse the data collected. This data is gathered through a questionnaire designed for the purpose of this study. The results have identified three important enabling factors for the transition to digital government. These three factors cumulatively cover or explain 75% of the digital transformation enabling factors. There remain another 25% of unknown factors that have not been identified by this study, which provides the ground for further research on the topic.

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Appendix

Questionnaire

		1 = Disagree *5 = Agree*				
Technological adequacy						
1	You feel that you are empowered by the information systems to adequately perform your operational tasks and decision making	1	2	3	4	5
2	You can access information from other departments when is needed easily	1	2	3	4	5
3	You often cooperate with staff from various departments when you apply information systems	1	2	3	4	5
4	Staff members are interested in technology and they are updated about the technological trends.	1	2	3	4	5
Organizational change						
5	Your organization is forming participatory groups of staff who belong to various departments to design and optimize information systems.	1	2	3	4	5
6	Ideas for organization improvement are recorded and discussed formally	1	2	3	4	5
7	Operational effectiveness is a continuous process in your organization	1	2	3	4	5
8	Your organization makes changes having as priority the improvement of services to citizens	1	2	3	4	5
Open government						
9	All procedures and results in your organization are transparent and accessible through information systems	1	2	3	4	5
10	Organizational data are accessible to staff and under condition to external bodies	1	2	3	4	5
11	Sources of accessible data are announced to staff	1	2	3	4	5
12	New services and processes are generated from the available data	1	2	3	4	5
Social inclusiveness						
13	Policies are usually are announced and openly debated on internet with public	1	2	3	4	5
14	Your organization is using applications to receive ideas from public about new services	1	2	3	4	5
15	Public feedback on services is always reviewed for corrective actions	1	2	3	4	5

Questionnaire (continued)

		1 = Disagree 5 = Agree				
Government transformation						
1	Access to government information in electronic formats	1	2	3	4	5
2	Developing, analyzing and operating government websites	1	2	3	4	5
3	Technological infrastructure for digital	1	2	3	4	5
4	Organizational change and change management	1	2	3	4	5
5	Project, program and portfolio management	1	2	3	4	5
6	Development according to stage of growth models	1	2	3	4	5
7	Information sharing and collaboration	1	2	3	4	5
8	Increasing adoption by citizens	1	2	3	4	5
9	Increasing participation and engagement	1	2	3	4	5
10	Transparency, accountability and open government	1	2	3	4	5
11	Cultural changes and trust building	1	2	3	4	5
12	Contextualizing digital government	1	2	3	4	5
13	Digital government in national contexts	1	2	3	4	5
14	Digital government in sectorial contexts	1	2	3	4	5
15	From digital government to development	1	2	3	4	5
16	Addressing policy-relevant problems	1	2	3	4	5
17	Addressing the needs of vulnerable groups	1	2	3	4	5