

# IDENTIFYING BEST PRACTICES IN ORGANISATIONAL SOA GOVERNANCE ADOPTION: CASE STUDY OF SAUDI ARABIA'S E-GOVERNMENT PROGRAMME

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## Abstract

*While many organisations have implemented service-oriented architecture (SOA) governance to optimise their delivery of services, tremendous practical challenges persist at different organisational stages. The existing literature illustrates the concepts of enterprise SOA and the adoption of SOA governance in a variety of contexts. Many SOA governance models have been developed and introduced based on specific organisations' requirements, strategies, responsibilities and orientation processes. However, SOA governance models are abstract and lack structure and best practices, making it difficult for them to be generalised and adopted in reality, especially in the context of e-government. Only a few studies use e-government to contextualise the Critical Success Factors (CSFs) in SOA governance adoption. Hence, Saudi Arabia's e-government programme, in which an SOA was established, is explored in this case study from a business point of view with regard to examining the best practices for a successful SOA governance adoption using the CSFs framework. This project's methodology begins with a review of the current literature that informs this qualitative research study by using semi-structured interviews with senior managers in Saudi Arabia's e-government programme. The managers confirm that literature-based CSFs indicating that SOA governance adoption will be successful are relevant in the Saudi Arabian context. Also, illustrate a list of best practices for each factor provided. The results show that more capabilities for some best practices are required for successful SOA governance adoption. This paper is an essential read for academic researchers, managers and practitioners seeking successful SOA governance adoption.*

*Keywords: SOA governance, e-government, critical success factors, key practices*

# 1 INTRODUCTION

The term service-oriented architecture (SOA) governance has been misinterpreted in several circumstances. Specifically, SOA governance is viewed only in relation to adopting policies in services or governing service growth. However, SOA governance goes beyond this scope; it eventually aligns business actions with overall SOA purposes (Afshar, Cincinatus, Hynes, Clugage, & Patwardhan, 2007). Bernhardt and Seese (2009, pp. 327-328) provided the following definition: "SOA governance consists of the organisational structures, processes, and policies an organisation puts in place to ensure that the adoption, implementation, and operation of SOA in an organisation is done in accordance with the best practices, architectural principles, government regulations, and laws in a manner that sustains and extends the organisation's strategies and objectives". A comprehensive discussion about the critical success factors (CSFs) of SOA pertains to the aspects of successful, real-life overall SOA adoption activities and SOA governance, which usually apply to both business and technical perspectives (Knutsson & Glennow, 2015). The SOA governance adoption can consist of the steps necessary to successfully employ and manage such technology within the organisation to build up new benefits, such as information technology (IT) architecture and businesses. However, doing so in a practical way faces some challenges (Knutsson & Glennow, 2015; Lee, Shim, & Kim, 2010). For instance, SOA governance, which includes organisational structures, processes and policies, still requires substantial effort and support on the part of decision makers to successfully implement an organisation's overall SOA applications (Hojaji & Shirazi, 2010). Previous studies have primarily addressed SOA governance issues from three perspectives – maturity, governance issues and CSFs. Some scholars have presented SOA governance as a fundamental aspect of the enterprise of SOA adoption that needs more attention and focus (Abdul-Manan & Hyland, 2013; Lee et al., 2010; Niemann, Eckert, Repp, & Steinmetz, 2008). Furthermore, due to the non-specific, broad frameworks of SOA governance, technology companies, such as Oracle, IBM and BEA, have developed SOA governance frameworks that operate from a variety of perspectives (Goyal, 2013). Another SOA governance framework, developed by Hojaji and Shirazi (2010) in relation to the Control Objectives for Information and Related Technology (COBIT), covers aspects of the SOA governance structure, service portfolio management and service life cycle management. However, these SOA governance frameworks are abstract and do not deliver practices that are applicable to the actual implementation of SOA governance (Abdul-Manan & Hyland, 2013; Lee et al., 2010). Moreover, they lack guidelines and recommendations for large enterprises that are required to successfully implement good governance decisions (Afshar et al., 2007).

Although many of the SOA governance frameworks have mentioned the utility of CSFs in several contexts, they have not adequately interpreted the best practices for the implementation of SOA governance (Lee et al., 2010). Similarly, there is currently insufficient evidence to support the argument that enhancing SOA governance practices in a government context may lead to the loss of control over the SOA system's life cycle operation, policy execution and business changes. Thus, this empirical research uses the case of an e-government programme in Saudi Arabia as an example to extend the conversation beyond a mere description of SOA governance. This study also addresses many obstacles and issues, such as the lack of involvement and communication between lower-level practitioners and the top management, the lack of e-service aggregation and deployment among government agencies, and the absence of benefits from the Yesser e-government for all stakeholders, including citizen and user communication with e-government services (Alsheha, 2007). These challenges must be overcome by the top-level management when implementing overall SOA and SOA governance, particularly in public organisations. In this regard, this study examines the use of CSFs in identifying some of the best practices behind the successful implementation of SOA governance, considering the continuing debate over these factors in the public sector context (Abdul-Manan & Hyland, 2013; Goyal, 2013; Hojaji & Shirazi, 2010). Moreover, SOA technology in general and SOA governance practically remain relatively new concepts in the e-government context in Saudi Arabia; among government agencies (i.e., providers and consumers), SOA

governance practices require further clarification. A comprehensive review of the literature reveals that no other investigation has been undertaken with the aim of recognising the key practices behind successful SOA governance implementation via CSFs in the context of Saudi Arabia's e-government programme. Thus, this study seeks to identify the key practices for managing the SOA governance adoption through the CSF framework in Saudi Arabia's e-government programme.

The rest of this paper is structured as follows. Section 2 reviews the existing literature on SOA governance adoption and related practices. Section 3 presents the research methodology and the proposed CSFs for SOA governance adoption. Saudi Arabia's e-government programme is provided as a case study, with a brief background. Section 4 explains the results. Section 5 discusses some possible generalisations, applied best practices and applied weak practices. Finally, the conclusions are drawn, and suggestions are made for future research.

## **2 LITERATURE REVIEW**

Lee et al. (2010) exploratory research generated a framework of CSFs in terms of SOA adoption from the IT system perspective. Their proposed list had been tested and validated based on case studies in several companies. Their model helps enterprises to integrate corresponding SOA factors in different fields, such as strategy, management, infrastructure, project management of services and governance. Their findings highlight various CSFs, including SOA governance. For example, the adoption of SOA for each stage requires a serious assessment to define responsibilities regarding the main business goals and technology, the sequence of generating and managing the SOA policy and the sustainability of SOA governance. While CSFs have been detected in the successful implementation of SOA in the Korean industrial sector, their existence in contexts such as the government sector requires further attention. Additionally, it is essential to distinguish between the industry and government sectors in terms of their internal organisation processes, structure and decision making in all phases of the SOA implementation.

Abdul-Manan and Hyland (2013) addressed two aspects of SOA readiness in the case of an e-government system – SOA maturity and SOA governance matters. The survey method and structured interviews with IT practitioners were used to illustrate the importance of certain CSFs for enterprise SOA implementation. Abdul-Manan and Hyland (2013) emphasised the governance aspect as a serious subject for enterprise SOA implementation. According to their CSFs, successful SOA adoption within enterprises involves applicable details regarding SOA governance and SOA maturity. For instance, some factors have been measured and have received significant attention in the field of SOA adoption, such as service portfolio management and a business requirement study and standardisation. Another factor that reflects the SOA governance process is documenting an SOA strategy and a performance matrix. However, research in this area has yet to apply the proposed SOA readiness framework and the identified factors in practice to the government sector. Moreover, the study did not employ in-depth interviews to gather rich knowledge about the enterprise SOA implementation.

Klischewski and Askar (2012) studied government agencies that adopted SOA to achieve interoperability governance. The authors stated that it would be crucial to involve all stakeholders, sustain cooperation among them and formulate a service development scope within the SOA service life cycle vision. Likewise, during interoperability governance adoption, the matrix method must be followed and measured to ensure the method's full efficiency (Klischewski & Askar, 2012). However, some of the exposed practices are not fully relevant to other applications, including those practices targeting an operational level for a specific feature, such as interoperability governance among government agencies in Egypt.

Waris, Khan, and Fakhra (2013) significant list of the architecture and SOA adoption factors ideally matches the CSF list proposed in this study. The CSFs cover many aspects of SOA adoption in an organisation, including governance, people and business models. Many scholars have agreed that SOA factors can be divided into three main fields, as follows: reusability of services, complexity of SOA and adoption of the governance process. However, they claim that adopting and measuring the success of the

SOA implementation via CSFs can be easier than using frameworks (Lee et al., 2010; Vegter, 2009; Waris et al., 2013).

From an initial analysis, it appears that many enterprises do not include all SOA concepts, such as SOA governance during implementation, which might have negative consequences. For example, many enterprises adopt SOA from a single approach, such as the integration of infrastructure and the development of flexible user/business processes and services, whereas the development of services requires a well-managed life cycle that involves close observation, measurement and clear management procedures (Abdul-Manan & Hyland, 2013; Koumaditis, Themistocleous, Mantzana, & Souliotis, 2012; Vegter, 2009; Waris et al., 2013). Other scholars (e.g., (Marks, 2008); Schepers, Iacob, and Van Eck (2008) mentioned that gradual SOA adoption, along with the enforcement of policies with the involvement of the board of decision makers, would help achieve business goals and result in a successful overall SOA implementation. However, based on real cases in different social contexts, the trend of SOA governance adoption focuses mainly on supplemented recommendations for full design principles, metrics and an alignment of IT architecture with business process architecture to achieve a business-oriented design through IT (Legner & Heutschi, 2007; Varadan, Channabasavaiah, Simpson, Holley, & Allam, 2008). Hong, Chan, Thong, Chasalow, and Dhillon (2013) also illustrated how the same technology would not generate similar results when implemented within different groups. Likewise, investigating the technology outside its social context might lead to unpredictable results (Hong et al., 2013).

Ren and Lyytinen (2008) found that multiple areas of SOA adoption within the organisation generated major obstacles, likely due to the change's huge impact on the whole business, which included areas such as methods, modes of communication, means of cooperation and methods of reporting relationships. Their results listed some circumstances that led to unsuccessful SOA adoption, such as the lack of the following components: planning, a clear business case, understanding what services were available, governance and standards.

Over the last few years, many studies have addressed the adoption of SOA in general and SOA governance using CSFs in particular, as summarised in **Table 1**. The table lists the previous studies that employed the CSF technique and used different methods to discover aspects of overall SOA adoption, including governance in different case studies and contexts. Only Abdul-Manan and Hyland (2013) study adopted CSFs as a theoretical approach to the e-government context to address SOA readiness from a business perspective.

N	SOA adoption	Adoption theory	Description	Methods	Context	References
1	Successful SOA implementation	Content analysis technique for CSFs	Proposed a model that helps enterprises integrate matching factors into SOA implementation from an IT perspective	Semi-structured interviews (questionnaires)	Korean private companies	(Lee et al., 2010)
2	SOA Readiness	Content analysis for CSFs and process model	Generate and validate an Enterprise SOA readiness framework based on CSFs	Factor analysis, Survey and qualitative, (structured interview).	Malaysia's e-government	(Abdul-Manan & Hyland, 2013)
3	Successful SOA implementation	Content analysis for CSFs	Identify and validate CSFs	Case study: interview and questionnaire	Dutch insurance company	(Vegter, 2009)
4	Key practices in SOA adoption Architecture	Reference SOA maturity model	Identify key practices regarding successful SOA implementation	Comparative analysis approach	General companies transforma	(Vukmanović & Kalpić, 2012)

					tion to SOA	
5	SOA projects challenges and success	Content analysis	Detect challenges and success factors of SOA projects.	Qualitative and quantitative	IT audience from different organisations	(Vlizko, 2014)
6	SOA adoption	Critical review and analysis	Discover important factors for SOA adoption via methodological framework	Qualitative: interviews, and observation	e-banking	(Basias, Themistocleous, & Morabito, 2015)
7	SOA implementation	Content analysis technique for CSFs	Proposed CSFs for deploying e-health services based on SOA	Qualitative: case study	Public healthcare	(Koumaditis et al., 2012)
8	Success SOA implementation	Critical review and analysis	Develop list of CSFs for SOA implementation in businesses	Empirical analysis	General organization	(Waris et al., 2013)
9	SOA implementation	Erickson and Siau (2008) framework	Propose list of factors related to SOA success adoption	Delphi methodology	General organization	(Erickson & Siau, 2008)
10	Organizational SOA adoption	Technology, Organization and Environment(TOE) frameworks	Provide more insight information along with important factors in terms of SOA adoption	Quantitative questionnaire	South African enterprises	(MacLennan & Van Belle, 2014)

Table 1. List of previous studies related to overall SOA adoption

### 3 RESEARCH METHODOLOGY: CASE STUDY

This research asked, “What are the key practices for managing SOA governance adoption through the CSF framework in Saudi Arabia’s e-government programme?” To answer this question, this study applied a methodology that included the following steps:

- a) A comprehensive literature review was conducted, focusing on the studies that examined the concept of SOA and its adoption that used the CSF technique. The proposed CSFs and their best practices for the SOA governance implementation stage were mainly identified by using the works of Lee et al. (2010) and Abdul-Manan and Hyland (2013), along with several studies indicated in **Table 2**.
- b) The information system (IS) theory was employed. In this paper, it is categorised as an explaining theory because it can help academic researchers explain how certain kinds of processes and actions occur in a systematic manner to improve understanding (Gregor, 2006). According to Gregor, “Scientific theories are universal statements. Like all linguistic representations they are systems of signs or symbols. Theories are nets cast to catch what we call ‘the world’; to rationalize, to explain and to master it. We endeavor to make mesh even finer and finer” (Gregor, 2006, p. 615).
- c) A qualitative case study approach was used to focus more on the specific case, with its aim of deeply exploring certain complex phenomena in practice (Yin, 2013). This research used Saudi Arabia’s e-government programme to explore how the SOA governance adoption was managed. This case study will also help to present the reality of the current and future practices regarding SOA governance adoption in the government sector.

- d) Semi-structured interviews were used to uncover key practices based on the CSF framework of the SOA governance adoption by Saudi Arabia's e-government IT specialists. The method applied in this study involved asking open-ended questions to gather rich data from the people who were most likely to be directly involved in overall SOA projects. The participants were recruited after taking several steps to ensure the accuracy and validity of their data regarding SOA governance adoption. First, the researcher submitted a request to the head of the research and innovation department at the Yesser e-government to identify those individuals who were most likely to be involved in the SOA project. Second, seven people were identified, but only five agreed to participate in the study, including the project manager, senior enterprise architect (EA), government service bus (GSB) manager, business analyst and integration specialist. These positions were targeted because the individuals holding them had more experience and practice regarding SOA projects and would thus play more significant roles in SOA governance adoption compared to the other staff in the organisation. This technique has been considered one of the best methods to gather knowledge in IT and IS research (Lee et al., 2010). Third, e-mail approval to conduct the interviews was obtained from all the interviewees. Lastly, the individual interviews, lasting approximately 30–45 minutes each, were conducted in English and recorded.
- e) Thematic analysis, which means developing themes by detecting and analysing data (Creswell, 2002), was performed in this study. The interviews were transcribed in English. Then, the thematic analysis was conducted to develop the themes and to allow for a comparison and discussion of the data across all five participants. The six essential stages of the most effective way to perform a thematic analysis (Braun and Clarke (2006); Saldaña (2012) were followed in this study. First, transcribe all the data, and then read and reread the transcripts to generate ideas to facilitate coding. Second, produce early codes from the collected data, and group all the relevant data in the data set. Third, link and explore possible themes from the codes created in the previous step. Fourth, review the themes, reread the themes, and determine whether or not the developed themes are supported sufficiently by the codes and the total data set. Fifth, describe and label the themes by defining and refining the meaning of the data to identify the essential themes, and then assign each theme to the appropriate research phenomenon. Finally, write the report, with an analysis and conclusions drawn from the results (Braun & Clarke, 2006).

<b>Factors</b>	<b>Study</b>	<b>Developed Practices</b>
Establish SOA strategy and application.	(Abdul-Manan & Hyland, 2013; Afshar et al., 2007; Schepers et al., 2008; Waris et al., 2013).	P1: Create SOA strategy and develop application stages. P2: Cooperate among enterprise departments in SOA projects.
Manage SOA policy processes	(Abdul-Manan & Hyland, 2013; Koumaditis et al., 2012; Lee et al., 2010; Schepers et al., 2008)	P1: Create the standards for service roles to describe service management policies. P2: Apply policy management processes, such as scope and plans, to portfolio management.
Establish a service development/ operation management process	(Abdul-Manan & Hyland, 2013; Klischewski & Askar, 2012; Lee et al., 2010; Schepers et al., 2008)	P1: Launch SOA development process. P2: Control service lifecycle based on sustained observation.
Measure performance of service processes	(Abdul-Manan & Hyland, 2013; Klischewski & Askar, 2012; Lee et al., 2010; Schepers et al., 2008)	P1: Describe SOA goals and measurement methods. P2: Describe performance measurement matrix for reusability and redesign. P3: Outline how performance analysis leads to

		business processes.
Set clear goals based on business value	(Abdul-Manan & Hyland, 2013; Klischewski & Askar, 2012; Lee et al., 2010; Schepers et al., 2008)	P1: Identify business value for choosing SOA objectives. P2: Build and connect SOA new business entities for the legacy system and the external system. P3: Align enterprise vision and core values with SOA target and business development concepts.
Plan gradual evolution with consideration of current capacity	(Abdul-Manan & Hyland, 2013; Klischewski & Askar, 2012; Lee et al., 2010; Schepers et al., 2008)	P1: Draw up achievable targets. P2: Evaluate the plan efficiently regarding various capacities such as technology, business goals and infrastructure. P3: Implement expansion plan and its elements gradually within existing applications.

*Table 2. Proposed SOA governance, CSFs in SOA adoption along with best practices*

### **3.1 Case Study: Saudi Arabia's E-Government Programme**

This study was designed with the aim of exploring the best practices in managing SOA governance adoption via the CSF framework in the case of Saudi Arabia's e-government programme. The country was selected because its e-government programme had implemented the SOA concept to establish and facilitate its e-service system, provide business value and increase profits. Moreover, SOA enables Saudi society to access composite applications and e-services securely through an integration channel called the GSB as the infrastructure architecture. This is the main SOA model for integrating all the government agencies' software/hardware and for securely sharing their data and services (Alsheha, 2007; Franke & Eckhardt, 2014; YESSER, 2007).

Saudi Arabia's e-government programme was established in 2003 by Royal Decree Number 7/B/33181. Its purpose is to adopt information and communication technology (ICT) in Saudi society in order to deploy e-services throughout the government sectors. The programme is operated and managed by the Ministry of Communications and IT, the Communications and IT Commission, and the Ministry of Finance (Alfarraj, Alhussain, & Abugabah, 2013). The e-government programme has established a vision to achieve a digital economy and to convert Saudi Arabia into an electronic society, with optimal e-services being delivered to both citizens and non-citizens. The execution of the e-government programme is decentralised to enable and develop e-government services in cooperation with other government agencies, such as government-to-government (G2G), government-to-business (G2B) and government-to-citizen (G2C) services. The use of the IT service management perspective within the e-government programme has led to an emphasis on IT service quality, which is linked to end-user needs (YESSER, 2007).

## **4 RESULTS**

This section details the results of this study, along with a selection of evidence taken from the participants' interview transcripts. The data analysis consisted of coding (as mentioned in the methodology) to shape the raw data, recognise the main patterns for each factor and relate these findings to the existing literature to determine the similarities and differences – or perhaps to identify new results or contributions. The implications of the findings of these significant practices are related to Saudi Arabia's e-government programme. Table 3 present the factors identified through the data analysis, along with labels indicating the best practices for each factor.

### **4.1 Establish an SOA Strategy and Application**

The interviewees indicate that establishing SOA strategies and applications in an e-government programme is one critical factor. This consists of several practices that have been clarified by all the

participants and listed as follows. First, according to the GSB product manager, the existing practices for reviewing and introducing SOA in Saudi Arabia's e-government programme are *"considered from the beginning because SOA products, life system and services reusability are implemented here"*. The senior EA says, *"The foundation of GSB [has been] based on SOA since [it] started"*. Second, in terms of establishing the maturity of the SOA application practice and based on the clarity of the best practices, a participant says, *"[The] SOA application stage [was] marked in its initial stage in terms of complexity"*. Other participants note, *"It is in the good stage or advanced stage of general assessment"*. Third, the participants identify clear cooperation among departments in terms of the SOA projects as another best practice. In this context, the senior EA notes, *"Major departments are involved in SOA projects"*. The project manager agrees, *"Many departments are involved"*.

#### **4.2 Manage SOA Policy Processes**

The participants report that managing SOA policy processes is critical due to the best practices that appear remarkable in the context of Saudi Arabia's e-government programme. First, it is essential to enforce the same policies and guidelines for all the services. The senior EA says, *"Policies and guidelines for the interoperability behaviours of services and continuation are enforced within our SOA projects"*. The GSB manager asserts, *"Policies [are] actively enforced on services here at [the] e-government programme"*, while the business analyst states, *"We have policies [that] apply from top management for [the] behaviour of the services"*.

Second, in terms of activating rigorous quality assurance standards of services and data definitions, the GSB manager notes, *"Rigid quality assurance on services is mandatory"*, explaining, *"We have guidelines and standard[s] to ensure that the SOA [is] followed and implemented correctly"*. The project manager says, *"There are certain policies used for each phase of services"*.

Third, the other participants express their beliefs regarding developing a service based on a government agency's needs. The senior EA shares, *"Although the agencies develop the service, we are involved in the requirement phase and the design phase to ensure compliance with standards"*. A participant adds, *"Based on the service identification of the Yesser business development team, the enterprise architecture team is assessed and approved by [the] head of Yesser – the CIO [chief information officer]"*. Another participant elaborates, *"The functionality of web services [is] based on [the] government agencies' needs and Yesser's business development department's vision"*.

#### **4.3 Establish Service Development/Operation Management Processes**

The establishment of service development and operation management processes is a significant factor for SOA governance adoption in the context of Saudi Arabia's e-government programme. Some of these practices are clarified by the participants, as follows. First, regarding the implementation of the service development life cycle (SDLC) development process specifically, the integration specialist mentions that *"from a business point of view, [an SOA programme] is significant to operate, and it documents any development process, such as the use of SDLC"*. The business analyst adds, *"The development process used for the SOA project is [a] waterfall SDLC"*. Second, for the service maintenance practices, a participant mentions that *"from [a] functional point of view, the use of supported systems, such as IBM Clear Quest, [is] to ensure the sustainability of the service life cycle"*. Lastly, the integration specialist says that they *"use [a] tool called SOAP to maintain services, but the main responsibility [lies with] the operation team, not [with] our team work"*.

#### **4.4 Measure the Performance of Service Processes**

According to the majority of the participants, measuring the performance of service processes is a critical factor. Many practices in this regard have been identified. First, applying and describing the service level agreement (SLA) of the services and controlling the contracts among government agencies are two of the best practices. In this regard, the business analyst says, *"Service level agreements describe and control*

*contracts among agencies*". Another respondent states, *"We have SLAs for each service, for [the] consumer and [the] provider, and control [over] the contracts"*. Second, when asked about the practices to measure the service performance, the senior EA responds, *"There is no international standard for performance measurement, but an internal procedure [is] followed to measure the performance, either by response time that must be within 0.600 second or 50 transactions/second – and both are part of the YAFI standard used for SOA projects"*. *Yafi*, an Arabic word that means "meet your needs", is the chosen name for the internal standards set by the Saudi e-government to measure performance. Third, concerning another best practice for how new services are changed and revised, the GSB manager explains, *"The procedures for changing the services are part of the sunset process and need to go through the SDLC process"*. Additionally, the business analyst indicates that the *"procedures for changing the services [are] called configuration management and follow the same procedure as a new service's SDLC"*.

#### **4.5 Set Clear Goals for the SOA Project**

Developing clear goals for the SOA project based on business values is another relevant factor in Saudi Arabia's e-government programme. The clarity of the three best practices in this regard can be classified accordingly. First, develop the government's strategic plan and vision in association with a government agency's needs. Some of the participants involved in the SOA projects, who came from multiple government agencies, go further by saying, *"All government agencies are satisfied, as all SOA development visions are aligned with businesses"*. Moreover, the senior EA says, *"Our government services contributed to the business goals from different government agencies"*, and *"new development visions must consider business needs and government agencies"*. Second, adopt the SOA application without its legacy system. The project manager mentions that a *"brand new SOA system [has been] installed from the beginning of the e-government programme, which allows [us] to have clear goals for SOA projects"*. Another participant says, *"There were no legacy systems at the e-government programme, whereas [such programmes] exist among government agencies"*. Third, with the SOA and the development vision established via clear action plans descending from top to bottom through different SOA projects as part of the SOA goal and in support of this aspect, the senior EA says, *"Multiple action plans [were] operated from top to bottom through different projects"*. The GSB manager notes, *"The driving of the business plan is the department of strategic planning, but we need to look at the e-transformation for agencies"*.

#### **4.6 Plan Gradual Evolution and Consider Current Capacity**

Only three participants with high-level positions (i.e., project manager, senior EA and GSB manager) have answered questions about evolution planning and have been involved in managing and issuing future plans. First, the main practice that supports this factor in Saudi Arabia's e-government programme involves a future plan; however, only the higher-level management is aware of the scope of the SOA projects and expansion plan, citing the *"clear commitment and implementation of this phase within the SOA projects"*. The same participants also mention that they *"expected development plans for SOA, allocated in the multiple action plans"*. Second, when considering the cost for all SOA projects, the senior EA admits *"[the] need to develop the ownership and funding"*, indicating the weaknesses in this aspect. Third, upper management support is still in its infancy in the e-government programme although the project manager says, *"Certain things such as top management really commit to deliver[ing] the SOA successfully"*. Finally, the last two practices – developing the scope and clarifying the subscription when using services – require more efforts in the context of Saudi Arabia's e-government programme. The participants with the lower-level positions (business analyst and integration specialist) are unaware of these best practices, responding that certain matters are *"not included in the scope or even issuing [of] future plans"*.

<b>Factors</b>	<b>E-Government Programme's Best Practices Code Labels</b>	<b>Applied</b>	<b>Required Ability</b>
Establish SOA strategy and application.			
	<ul style="list-style-type: none"> <li>Review and introduce SOA application from the beginning.</li> </ul>	√	
	<ul style="list-style-type: none"> <li>Assess SOA application maturity.</li> </ul>		√
	<ul style="list-style-type: none"> <li>Involve several divisions in all SOA projects.</li> </ul>	√	
Manage SOA policy processes.			
	<ul style="list-style-type: none"> <li>Enforce policies and guidelines for all services.</li> </ul>	√	
	<ul style="list-style-type: none"> <li>Activate rigid quality assurance on services with standards.</li> </ul>	√	
	<ul style="list-style-type: none"> <li>Design services based on government agency's needs and committee determination.</li> </ul>	√	
Establish a service development/ operation management process			
	<ul style="list-style-type: none"> <li>Apply SDLC development process for all services.</li> </ul>	√	
	<ul style="list-style-type: none"> <li>Maintain services via internal software tools.</li> </ul>	√	
Measure the performance of service processes.			
	<ul style="list-style-type: none"> <li>Apply and describe SLA of the services and control the contracts among government agencies.</li> </ul>	√	
	<ul style="list-style-type: none"> <li>Measure services performance by internal procedure.</li> </ul>	√	
	<ul style="list-style-type: none"> <li>Apply SDLC procedures for changing or versioning services.</li> </ul>	√	
Clear goal setting based on business values.			
	<ul style="list-style-type: none"> <li>Develop government strategic plan and vision in association with government agency's needs.</li> </ul>	√	
	<ul style="list-style-type: none"> <li>Recruit SOA without legacy system.</li> </ul>	√	
	<ul style="list-style-type: none"> <li>Operate multiple action plans from top to bottom through different SOA projects.</li> </ul>	√	
Gradual evolution planning taking account of current capacity.			
	<ul style="list-style-type: none"> <li>Plan and govern future plan regularly.</li> </ul>	√	
	<ul style="list-style-type: none"> <li>Consider the cost of current operating plan.</li> </ul>		√
	<ul style="list-style-type: none"> <li>Support from top management.</li> </ul>		√
	<ul style="list-style-type: none"> <li>Develop scope by including several departments in all SOA projects.</li> </ul>		√
	<ul style="list-style-type: none"> <li>Clarify subscription mechanism in using services among government agencies.</li> </ul>		√

*Table3. Identified factors along with labelled best practices*

## 5 DISCUSSION

This research seems to be one of the few studies that has explored the area of SOA governance implementation in the context of Saudi Arabia's e-government programme. This study has proposed a list of best practices for successful SOA governance adoption, using the CSF framework derived from a comprehensive review of the SOA adoption literature. Furthermore, this study makes significant contributions. First, it adds to the body of knowledge on overall SOA adoption by focusing on SOA governance applications, particularly in different social contexts. Second, this study enhances current research through its use of the CSF framework by taking an empirical approach to Saudi Arabia's e-government programme, thus reflecting the adoption of SOA governance in practice. Third, this research provides a list of the best practices that are currently applied, alongside others that are recommended. The list of best practices will help higher management teams and lower-level practitioners to implement and operate the SOA governance successfully in public organisations. Hence, SOA governance is the backbone of successful SOA projects; in such a context, the illustrated list of best practices will be fundamental in carrying out future investigations into enterprise systems (Abdul-Manan & Hyland, 2013; Goyal, 2013; Lee et al., 2010).

Upon completion of the analysis, this study's results have offered recommendations about what the upper-level management needs to do regarding the implementation of successful SOA governance. However, when the results are compared to those from the literature review, some important practices do exist in the context of the e-government programme, but they are still weak at both managers' and practitioners' levels. There are several possible explanations for these findings. First, at the technology stage, the lack of analysis on enterprise architectures within the e-government programme negatively impacts the internal business process and means of the relationship between managers and practitioners, which is supported by Ren and Lyytinen (2008). Second, at the organisational stage, the internal e-government programme structures affect the business process and deployment of shared services (Hong et al., 2013; Ren & Lyytinen, 2008). Third, at the governance stage, there is a lack of top management support and involvement in SOA governance in terms of transforming, sharing and balancing tasks (Niemann et al., 2008; Varadan et al., 2008). In terms of the applicable practices for the first factor – launching the SOA strategy and application – surprisingly, no differences have been found between previous works and the discovered practices, such as introducing the SOA governance road map and involving all the organisations' departments in all overall SOA projects. However, an unanticipated practice has not been fully applied, which is the assessment of the SOA application maturity. This practice has not been sufficiently addressed in Saudi Arabia's e-government programme practices; a possible explanation might be the lack of established SOA roles designated from the programme committee. This result is consistent with earlier findings, which could negatively impact the overall SOA project's specifications, resources, business processes and composite applications (Afshar et al., 2007; Marks, 2008; Schepers et al., 2008).

Another interesting finding is that the practices for the enforcement of the policies, guidelines, and quality assurance and standards for all the services show clear responsibilities for maintaining SOA governance processes. These, clear practices appear to positively affect the service development and measurements. Also, practices may explain the relatively good service life cycle management that the e-government programme initiated. However, the most remarkable discovery is the use of internally developed practices for measuring performance, which is either calculated according to the response time (must be within 0.600 second) or the number of transactions (50 transactions/second) – both are part of the YAFI standard used for SOA projects. This indicates that the adoption of SOA governance in an e-government context is well measured in all its service aspects and that clear management procedures are in place. Moreover, measuring the performance of services involves the SLA, which is also clearly applied in the e-government context and in some other government agencies in Saudi Arabia. These results show that the e-government programme is based on solid SOA foundations that require intelligent standards to measure successful performance from the start. These findings corroborate the ideas of several researchers (Abdul-

Manan & Hyland, 2013; Schepers et al., 2008), who suggested and placed more emphasis on the service performance measurement matrix. It is interesting to note that the factor of clear goal setting based on the business value comprises three practices that are ideally applied to the e-government programme. All SOA projects, which are based on the business value and the government agencies' needs, as well as the feedback from existing government agencies and published e-services, present sufficient achievements regarding the SOA development vision. Moreover, from the beginning, the e-government programme has chosen an appropriate system – the SOA system – to operate and deliver e-services to government agencies without integrating with a legacy system. Therefore, the e-government programme has successfully undertaken the goal and alignment of business and IT for the purpose of SOA governance adoption. These practices confirm that the SOA governance goal is encapsulated with the overall business value in the e-government programme, which is associated with previous works that strongly request a clear SOA goal to be embedded with the business goal (Abdul-Manan & Hyland, 2013; Lee et al., 2010; Schepers et al., 2008).

Finally, although Saudi Arabia's e-government programme has set clear goals and a strategic future plan, some important practices are related to the gradual evolution planning, taking into account that the current capacity factor that is assumed to be ideally applied is actually weak and needs more capabilities. The underlying cause is attributed to the lack of top management support, which negatively influences the adoption of SOA governance. An example is a lack practice of considering the current operating costs due to the lack of awareness in activating short serving time policy. The lack of engaged lower-level practitioners and departments in the entire scope of the SOA projects and the absence of a clear subscription mechanism in the use of the services among government agencies have also been noticed. The failure of implementing these practices can be attributed to the e-government programme's culture and internal bureaucratic processes that create many barriers. These findings further confirm the current misunderstanding about the appropriate implementation of the SLAs among government agencies. Similarly, some government agencies linked with e-government programme integration channel lack clear enterprise architectures. Lastly, this finding appears to be inconsistent with the outcome that is generally presented in the literature (Abdul-Manan & Hyland, 2013; Klischewski & Askar, 2012; Lee et al., 2010; Schepers et al., 2008). Therefore, the adoption of SOA governance cannot be achieved through a single project; greater efforts must be made to overcome the obstacles that lead to neglecting the cited best practices. The selected best practices explored in this paper facilitate an understanding of the role of SOA governance adoption and help both managers and practitioners to cooperate within Saudi Arabia's e-government programme and with other IT practitioners in similar contexts.

## **6 CONCLUSION**

To shed greater light on this topic, this paper has explored a list of best practices, using the CSF framework in the adoption of SOA governance in Saudi Arabia's e-government programme. Table 3 presents the main findings about the applied practices and other recommended best practices that demand greater efforts. Each practice carries certain requirements, such as clear strategies, goals, processes, structures and higher-level support. These research findings have been obtained with a qualitative case study approach, which supports the exploration of factors in real-life situations. However, this study's limitations should be considered when analysing the data. First, due to the time limitations of the research, the perspective and scope of the SOA governance activities have been reduced, and the factors and key practices related to SOA maturity, SOA infrastructure or even its interrelationship with IT governance concepts have not been systematically evaluated. Second, this study's sample size has been limited to five participants only. Finally, future researchers should examine the identified best practices and use a

quantitative method to validate these key practices among different government agencies, as well as discover the challenges behind the adoption of SOA governance in the Saudi Arabian context or in the Gulf Cooperation Council context.

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