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An Analysis of the Open Data Initiative in the Saudi e-government Framework

Dr. Mohammed Saleh Altayar
Information Management Dept.
College of Computer and Information Sciences
Al Imam Muhammad Ibn Saud Islamic University (IMSIU)

Abstract:

During the past decade, the applications of e-government have developed tremendously, which has resulted in different initiatives being implemented and launched across government agencies worldwide. In particular, there has been an increased interest among government agencies in adopting and implementing Open Government Data (OGD) initiatives. These initiatives have become a global phenomenon and a political priority for many nations around the globe. This study aims to investigate the adoption and implementation of OGD in Saudi Arabia. It adopts a qualitative research approach and the data was collected using interviews and documentation. The results indicate that the OGD initiative in Saudi is still at its early and experimental stage, and is being gradually recognized as an important e-government initiative. The study has identified a number of reasons that influenced the decision to adopt OGD, including the recent developments in the country such as Saudi vision 2030, the Freedom of Information Act, wide adoption of OGD initiatives at local, regional and global levels. Furthermore, the findings suggest that OGD initiatives contribute to enhancing transparency and accountability, facilitating access to government data, supporting innovation, improving government services, and encouraging participation. Moreover, the study has identified a number of barriers and challenges associated with OGD, including: the development of a bilingual OGD portal, privacy issues, data ownership, misuse and misinterpretation of OGD, and data related factors. Finally, the study concludes with a summary of the main findings and provides some recommendations.

Key words:

Open data, Open government data, IT adoption, Government information, e-government, data portals.



1. Introduction

For a long time, government agencies and organizations have generated, collected, stored, maintained and disseminated a huge amount of data and information (Kalampokis et al 2011). At the same time, the general public continues to request access to such data and information and government agencies feel under pressure to meet these requirements. With the development and proliferation of Information and Communication Technology (ICT) the demand for such access has increased, which has resulted in many government agencies providing their data over the Internet. During the past decade, the applications of e-government have developed tremendously, which has resulted in different initiatives being implemented and launched across government agencies worldwide. In particular, there has been an increased interest among government agencies in both developed and developing countries to implement open data initiatives, or open government data (OGD) (Zuiderwijk et al 2014). These initiatives have become a global phenomenon and a political priority for many nations around the globe and are related to other similar government project priorities such as e-government and online one-stop governmental data portals (Kalampokis et al 2011; Yang et al 2015; Dawes et al 2016). Currently, there are 75 participating countries in the Open Government Partnership, where government and civil society are working together to develop and implement ambitious open government concepts (OGP 2016).

Although there has been no agreement about what is meant by open data, many researchers have proposed different definitions from various perspectives. For example, Open data initiatives involve making data produced or commissioned by government freely usable, reusable, and redistributable by anyone (Yang and Knakanhalli 2013). The Open Knowledge Foundation (2016) defines open data as data that can be "freely accessed used, modified, and shared by anyone for any purpose". Figure 1 shows how data are open or closed based on their four characteristics.



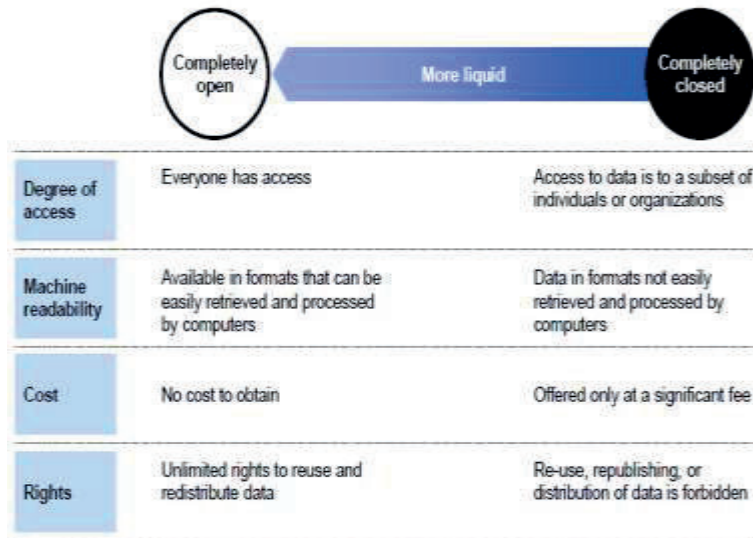


Figure 1: How data are open or closed based on their four characteristics
Source: McKinsey 2013

Since open data initiatives are still in their infancy, there is a lack of research that addresses several issues related to open data in local government such as their impact, barriers and opportunities, and there is a need for more systematic research on this topic (Janssen et al 2012; Kassen 2013; Conradie and Choenni 2014; Zuiderwijk et al 2014; Wang and Lo 2016) and in order to ensure the success of open data initiatives, there is a need to understand their adoption among government agencies (Wang and Lo 2016). Second, the topic is still evolving and attracting the attention of researchers. However, it is important to mention the fact that the majority of the research and studies was conducted from the quantitative perspective, and there is very limited qualitative research (Yang et al 2015). Third, most research on open data was conducted in Western countries, and there has yet been little systematic research in the context of The Middle Eastern countries and the Arab world, as open government practices have spread to these countries (Alanazi and Chatfield 2012). In particular, no research has extensively studied open data in Saudi Arabia. Thus, understanding the benefits and barriers in different contexts (and in this case Saudi Arabia) could contribute better to the development of open data initiatives. Finally, research available on this topic suggests that we

still have not developed a full and deep understanding of all the possible challenges and problems associated with open data (Krishnamurthy and Awazu 2016).

1.1 Research questions

This study aims to investigate the opportunities and challenges associated with the open data initiative among Saudi government organizations. It seeks to answer the following research questions:

- What is the current status of open data in Saudi Arabia?
- What are the drivers, opportunities and challenges associated with open data adoption?

The research process that has been followed in this study is summarized in figure 2. This paper is organized as follows. In the following section, it reviews previous research regarding the opportunities and challenges associated with open data adoption. Then, in section 3 it outlines the research methodology including data collection and analysis. This is followed by section 4 where it reports the findings and in section 5 it discusses the findings in the light of the literature and related work. Finally, section 6 presents the conclusions and implications of the study, and presents the research framework.

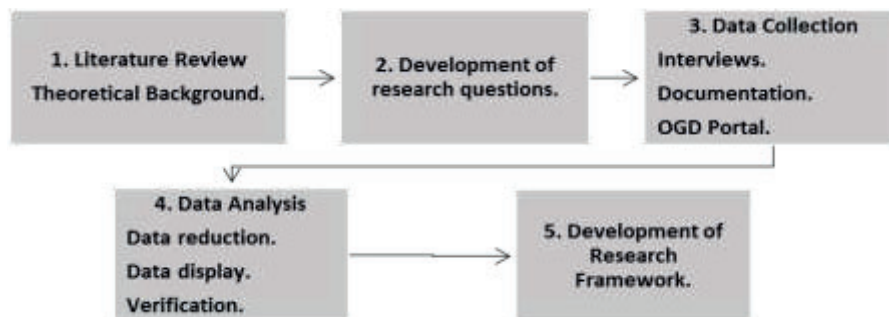


Figure 2: The Research Process

2. Literature Review

Previous literature on OGD has focused on a number of issues such as adoption, implementation and motivation (Yang et al 2015; Wang and Lo 2016; Yang and Wu 2016) policies and strategies (Huijboom and Van den Broek 2011; Zuiderwijk and Janssen 2014a; Nugroho et al 2015) planning

and designing of OGD (Dawes et al 2016) linked open data (Zuiderwijk et al 2012; Kalampokis et al 2011) OGD quality (Vetro et al 2016) OGD and e-government (Bertot et al 2014) OGD stakeholders (Gonzalez-Zapata and Heeks 2015) and OGD portals (Thorsby et al 2016; Lnenicka 2015; Lourenco 2015). The opportunities (benefits) and challenges (barriers) of OGD have also been subjected to investigation in the literature, and these issues are reviewed in the following section.

2.1 Opportunities and benefits of open data

Many researchers have claimed that there are many advantages for publishing and sharing data and information between governments, their citizen and others, and that government agencies are likely to adopt open data initiatives if they perceive benefits (Zuiderwijk and Janssen 2014a; Wang and Lo 2016; Yang and Wu 2016). Previous literature has reported a number of benefits and advantages regarding the release of open data including political, social, economic, administrative and operational benefits.

2.1.1 Political and social

This issue is related to the political and social aspect of open data and its impact on society. Research shows one of the benefits of open data is that it can enhance and improve transparency and accountability in terms of how governments function and perform, what they are doing and how government policies, procedures and actions affect their citizens (Kalampokis et al 2011; Jassen et al 2012; Kassen 2013; Conradie and Choenni 2014; Albano and Reinhard 2014; Parycek et al 2014; Kucera and Chlapek 2014; Logica Business Consulting 2012). Another opportunity that can be brought by OGD is the public participation and empowerment of citizens, which helps to build trust and improve citizen satisfaction (Huijboom and Van den Broek 2011; Conradie and Choenni 2014; Jassen et al 2012). Political support, commitment and leadership was another driver for open data initiatives, as they receive the interest of politicians and high-level administrative support, which then can help to overcome further barriers that may prevent the progress of open data initiatives (Huijboom and Van den Broek 2011; Parycek et al 2014; Veronica et al 2015; Yang et al 2015).

2.1.2 Economic

Previous research has shown that there is an economic value for open data. However, there is no clear way to calculate or predict the return on investment (ROI) for open data and the issue is still debatable (Martin et al 2012). Some examples of economic benefits include: economic growth and stimulation of competitiveness; user-driven innovation; contributing toward the improvement and development of processes, products, and services; creation of a new sector that can add value to the economy; and availability of information for investors and companies. (Kalampokis et al 2011; Halonen 2012; Jassen et al 2012; Albano and Reinhard 2014; Kucera and Chlapek 2014; Logica Business Consulting 2012). The study of Barry and Bannister (2014) and Parycek et al (2014) reported that the economic potential of open data is to reduce costs and provide the private sector with an opportunity to generate new enterprises and business models as well as employment and revenue.

2.1.3 Operational and technical

The operational and technical benefits refer to how open data can contribute to the optimization of internal and administrative processes of government agencies (Albano and Reinhard 2014). Data reuse is another benefit of open data as the publishing of OGD will allow citizens, civil society groups, businesses, and other stakeholders to reuse, repackage and/or combine data for new purposes, without the need to collect it again (Jassen et al 2012; Kucera and Chlapek 2014; Logica Business Consulting 2012).

Another operational and technical benefit is that publishing open data helps to improve government data and processes. This can be achieved by obtaining feedback on the published data to improve its quality, which may result in improving the work of government and its activities (Kucera and Chlapek 2014; Logica Business Consulting 2012).

According to Yang and Knakanhalli (2013) open data initiatives support the improvement and development of new innovative services and products by leveraging external resources, skills and experiences possessed by external stakeholders, which government agencies may not have in abundance. This allows external parties to access government data to develop and build useful applications for the benefit of the general public and government agencies alike.



OGD supports the function of public administration (Kalampokis et al 2011) and reduces administrative effort by automating the administration processes (Parycek et al 2014); improves government services (Kucera and Chlapek 2014; Logica Business Consulting 2012) and simplifies administrative procedures (Parycek et al 2014). This in turn will help to improve public relations, attitudes and image toward government by enhancing citizens' trust and understanding of what government agencies are doing and how they can improve their services and procedures to serve the public (Parycek et al 2014; Kucera and Chlapek 2014).

2.2 Challenges and Barriers to Open Data

Although open data adoption can result in numerous benefits and advantages, the literature shows that there are a number of challenges and barriers, including: institutional and cultural, economic, technical, legal and administrative, data related factors, and stakeholder (users) related factors. The following is a discussion of these issues.

2.2.1 Institutional and Cultural

Previous research shows that organizational culture affects the adoption of open data initiatives in government agencies (Yag and Wu 2016). For example, Huijboom and Van den Broek (2011) reported that closed government culture was an important barrier to the adoption of open data projects. Many government agencies have a risk-averse culture and are not willing to open their data (Janssen et al 2012; Yang et al 2015). Similarly Barry and Bannister (2014) reported that the level of openness of an organization can be influenced by its culture and that the culture within government agencies tends to be cautious.

It has long been recognized that information is power, and losing information may potentially lead to loss of power. The issue of control and power regarding the ownership of the data among government agencies and departments was one of the major barriers to the release of open data, and one which may potentially cause organizations to guard their data (Barry and Bannister 2014; Conradie and Choenni 2014; Sayogo et al 2014).

Lack of communication between government agencies (data providers) and users or intermediate users regarding the open data provided was another barrier. For example, Zuiderwijk and Janssen (2014b) reported that data providers who release datasets usually do not discuss this with users, obtain their feedback or allowing them to rate the data and its quality, nor do they provide training on the use of open data or inform users about the updates of datasets (Martin et al 2012).

Other research has reported different kinds of barrier. For example, the study of Conradie and Choenni (2014) found that open data was not a priority for government agencies. This is because data release is not part of the regular work for many data professionals and there were no clear benefits or incentives to open data. Another barrier was the lack of understanding of open data meaning by government officials, which may lead to publishing data that should not be published or providing unstructured data such as pictures and articles (Yang et al 2015).

The study of Rosnay and Janssen (2014) and Yang et al (2015) found that government agencies and private sector agencies may lose competitive advantages after opening data. This is because other competitors and business clients may use and re-use these data for their own commercial purposes, or they may develop better applications that could superbly exceed the existing services provided by government agencies. Finally, the study of Yang et al (2015) found that releasing some data from one agency depends on first acquiring data from another agency, and this requires inter-agency information sharing, which can be a challenging issue.

2.2.2 Economic

The implementation of open data initiatives involves hardware and software costs and requires many resources (Martin et al 2012; Estermann 2014). The study of Huijboom and Van den Broek (2011) and Martin et al (2012) found that uncertainty about the economic value made some government agencies reluctant to invest in open data initiatives. This issue contradicts claims that investing in open data can provide economic benefits.

The study of Estermann (2014) and Sayogo et al (2014) shows that open data requires the investment in additional resources such as staff, time, money, and effort.. All of these were challenges for open data

adoption in Swiss institutions. Similarly, Barry and Bannister (2014) found that resource constraints such as reducing staff numbers and budgets were major barriers among Irish government agencies.

Funding models of some government agencies were found to be a major concern. For example, Barry and Bannister (2014) and Yang et al (2015) reported potential loss of revenue that may be generated by opening up government data, especially for public bodies that are self-funding. Furthermore, Martin et al (2012) suggested the need for sustainable business models for the production of open data to achieve the economic value.

2.2.3 Technical

Several studies reported that technical issues were among the barriers in open data implementation. The major barriers include technical capacity, lack of standardization, fragmentation of software and applications, network issues, advanced requirements for processing open data, and current legacy systems that cannot handle and publish open data in usable format (Huijboom and Van den Broek 2011; Barry and Bannister 2014; Jassen et al 2012; Sayogo et al 2014; Veronica et al 2015; Yang et al 2015).

Zuiderwijk and Janssen (2014b) reported that open data portals do not always provide friendly and clear interfaces that show the search capabilities and possibilities, nor do they always provide clear navigation. Open data requires a robust technology and adequate platform infrastructure for organizing, storing, analyzing, visualizing and reporting statistical data.

Lack of standardization was found to be a barrier to open data (Huijboom and Van den Broek 2011; Barry and Bannister; 2014 Yang et al 2015). It includes standards of data format and adequate metadata. There is a need for standard formats to ensure collaboration and data reuse. Furthermore, government agencies need to document standards for public release files which describe how datasets are organized, their elements, type (e.g., numeric, text), and other descriptive information regarding dataset contents (Bertot et al 2014). One of the issues regarding data format is the fact that open data can be stored and made available to the public in different formats (e.g., CSV, XML, Excel) and each format has

implications that can limit the use of the data. Therefore, it is important to define a commonly used data format (Bertot et al et al 2014).

The study of Yang et al (2015) found that after many government agencies in Taiwan outsourced their information system as part of e-government, it was difficult for the government employees to identify, select and prepare open data for publication due to the lack of IT background. In addition, the study revealed that many government agencies still maintain a huge amount of data and information in paper-based format that has not been digitized.

2.2.4 Legal and administrative

The publication of some open data might be against the law, it may violate data protection (legislation) and it may be in conflict with the people's fundamental right to information privacy. This can act as a barrier to opening up data. Thus government agencies need to ensure that their open data policies comply with existing regulations such as the Freedom of information Act, Copyright law, and data and personal information protection laws (Kulk and Loener 2012; Kucera and Chlapek 2014; Barry and Bannister 2014; Rosnay and Janssen 2014; Yang et al 2015).

Releasing open data may lead to revealing private or confidential information. Therefore, it is not surprising to know that security and privacy are of great concern when it comes to open data. Previous research shows that these issues were found to be barriers in open data projects (Huijboom and Van den Broek 2011; Jassen et al 2012; Conradie and Choenni 2014; Kucera and Chlapek 2014). While the aim of open data initiatives is to make data available to the public, some government agencies understand the tension that may arise between an open data policy and the privacy of their citizens. Therefore, it is difficult to publish all open data, especially sensitive data or data that is related to individuals (Huijboom and Van den Broek 2011; Jassen et al 2012; Floridi 2014; Bertot et al 2014).

Several studies have found that policy and licensing issues were concerns for open data initiatives. These include lack of policies, inconsistency of policies among the organization itself and across the public sector. Thus, open data requires a robust, appropriate and well-established licensing framework that governs the use and reuse of open data with terms and conditions that fit with open data initiatives, and that

protects government agencies from potential liabilities (Martin et al 2012; Sayogo et al 2014; Barry and Bannister 2014; Yang et al 2015).

In their work on the barriers to open data release, Barry and Bannister (2014) found that legislation was another barrier. It includes the lack of legislation on open data or the need for current legislation to be changed to make it fit with open data. Other issues related to the legal and administrative barriers included, litigation, liability, leadership, and business case (Barry and Bannister 2014).

2.2.5 Data related factors

A number of issues related to the data itself were found to be barriers. Among these issues is data creation and publication. According to Zuiderwijk and Janssen (2014b) data creation needs to be highly related to data publication, however many organizations consider these as separate tasks. In addition, one important element in the process of creating and publishing open data is the availability of adequate metadata, which can yield several benefits in the management of open data including improving findability, storing, preservation, accessibility, analyzing, comparing, finding inconsistencies, correct interpretation, representation, linking data, evaluating and ranking the quality of data, and avoiding unnecessary duplication of data (Zuiderwijk et al 2012). However, organizations pay less attention to the development of good, meaningful and sufficient metadata, which may lead to poor usage, and this is one of the most important barriers for open data adoption (Martin et al 2012; Zuiderwijk and Janssen 2014b).

The quality of open data was another issue (Jassen et al 2012; Albano and Reinhard 2014). Data quality may refer to different aspects including accuracy, completeness, comprehensiveness and timeliness (Yang et al 2015). A number of studies found that limited quality of data was another barrier to opening and publishing government data, including lack of information about the data, incomplete information, inaccurate datasets, and data credibility (Jassen et al 2012; Jassen et al 2012; Martin et al 2012; Kucera and Chlapek 2014; Barry and Bannister 2014; Sayogo et al 2014).

According to Zuiderwijk and Janssen (2014b) users want to obtain information, which often is not available, about the quality of the open

data before they use it. Another challenge was the fact that data appear in different heterogeneous data formats such as PFD, Excel, CSV and others, which may require users to have appropriate software to read and reuse these data and files (Martin et al 2012). Zuiderwijk and Janssen (2014b) reported some issues related to open data findability including difficulty for users to find data as search possibilities on open data portals are often not advanced. The study of Jassen et al (2012) and Kucera and Chlapek (2014) found that duplication and overlapping of data were major issues in open data implementation.

2.2.6 Stakeholder (user) related factors

The stakeholder perspective is an important element in the design, development, evaluation and implementation of new products and services including information technology projects and initiatives (Zhang et al 2005). In the context of open data, stakeholders are complex, dynamic and heterogeneous, and may include internal and external stakeholders (primary and secondary) such as politicians, public officials and civil servants, the general public, developers, communities, international organizations, activist individuals and groups, researchers, academics, businesses and others (Zuiderwijk and Janssen 2014b; Gonzalez-Zapata and Heeks 2015; Dawes et al 2016).

There are several challenges related to stakeholders, and this due to the multiple interactions among various players, as well as the diverse needs of each type of users (Albano and Reinhard 2014; Zuiderwijk and Janssen 2014b). Meeting the expectations of different stakeholders is an important issue (Lassinantti et al 2014). The study of Zuiderwijk et al (2012) reported that users may experience a number of issues in using open data including lack of knowledge about its existence. Similarly, Janssen et al. (2012) found that the lack of explanation of the meaning of open data and the lack of knowledge to make sense of it were barriers to the use of open data by users. The study of Zuiderwijk and Janssen (2014b) found that open data users find it difficult to process data by linking them to other data.

Some research suggests that OGD can result in a digital divide between those who have the ability to access data which could have a significant impact on their daily lives and those who do not have the opportunity to access the same data for reasons such as lack of information, literacy skills, lack of financial resources, and lack of access to

the internet (Huijboom and Van den Broek 2011; Martin et al 2012; Gurstein 2011).

Another barrier is the lack of engagement by external stakeholders, for example innovators, making use of open data (Yang and Knakanhalli 2013), the low interest of public servants in open data initiatives (Albano and Reinhard 2014; Yang et al 2015) or the absence of data consumers (Kucera and Chlapek 2014).

The misuse and misinterpretation of open data by users (either intentionally or unintentionally) were major concerns for open data usage. This is because misuse or misinterpretation of the data can have negative consequences on public sector agencies, which may lead to false or wrong conclusions. Examples of such misuse and misinterpretation include to cause scandal, to get competitive advantage, to cause damage or harm to others, abuse and fraud, lack of trust, false conclusions, all of which may result in liability of government agencies (Kucera and Chlapek 2014; Barry and Bannister 2014; Conradie and Choenni 2014; Rosnay and Janssen 2014; Yang et al 2015; Krishnamurthy and Awazu 2016; Yang and Wu 2016).

Other research has reported different findings. For example, Martin et al (2012) reported that the language barrier may prevent users from using open data.

In summary, the literature review has provided a general view of the opportunities and barriers associated with open data adoption and implementation among government agencies. These issues are summarised in figure 3.



Figure 3: Factors affect OGD adoption

3. Research Methodology

The fieldwork for this study was conducted during the period between January and March 2016. In order to achieve the aims and objectives of the study, a qualitative research approach was considered to be appropriate, and this can be justified as follows. First, a qualitative case study seeks to investigate a contemporary issue in depth and within a real setting, and this is effective in an area where little research has been conducted (Yin 2009). This applies to this research because, as far as could be established, no previous research had been conducted to investigate the opportunities and challenges associated with open data initiative in Saudi Arabia. Second, according to Halonen (2012) open data research is still a new phenomenon, and although there has been extensive research in this area, it is more important to focus on understanding in depth rather than breadth, something that can be achieved mainly via in-depth interviews of various key players in the field of open data and selecting a few application areas of open data for case-study purposes .

Saudi Arabia was chosen for this study because of its good status in e-government applications. First, the Saudi Government sees great importance in the adaption of e-government applications due to the noticeable benefits to the national economy (Al-Khalifa 2013). Second, the country has witnessed significant changes and developments in the adoption and implementation of ICT in government settings, which has become a crucial component in the national and strategic plans for the country (Altayar 2016). Saudi was ranked 44 globally in the e-Government Development Index (United Nations, 2016). Third, in terms of open data, Saudi's experience can be described as new and less mature and lagging behind traditional leaders such as the UK, USA, France, Korea, New Zealand and Australia, who were among the top ten countries in the Open Data Barometer (2015).

While Saudi Arabia was ranked 57 in the Open Data Barometer (2015), it can be said there is noticeable interest and activities among government agencies towards the development of the open data initiative. These activities include the recent development of the Freedom of Information Act, the launch of the open data government portal in 2014, the use of social media to disseminate government data and information (Jaeger and Bertot 2010; Altayar 2016), the increase in the number of

government agencies who join the open data initiative, and the increase in the number of datasets being released and published on the open data government portal. Therefore, it is important to understand why government agencies are interested in open data and what are the challenges associated with the open data initiatives.

The decision to study these government agencies can be justified as follows. First, these were among the first agencies who adopted open data initiatives, they are active participants, and have already established some practice in this area. Second, these organizations belong to different sectors including Science, Commerce, Education, IT and Services. Therefore, by studying multiple cases in different contexts, the researcher expects that insight into the opportunities and challenges associated with open data adoption can be gained, (Zuiderwijk and Janssen 2014a) which would increase the confidence in the findings and increase external validity (Yang et al 2015). Third, the decision to study these organizations was based on the practicality of gaining access to the necessary data, as they showed willingness to participate in this research.

Table 1 shows government organizations participated in this study.

Table 1: Government agencies participated in the study

Organization	Sector
A	Commerce
B	Education
C	IT
D	Science
E	Information and Services

3.1 Data Collection

To achieve the aims and objectives of the study, two data collection methods were used: interviews and documentation.

3.1.1 Interviews

Semi-structured interviews were conducted to collect data. Interviews were conducted with ten (10) people in the organizations studied. The decision to interview those people was based on their experience with open data as well as their responsibility and involvement with the initiative (Zuiderwijk et al 2012; Halonen 2012; Dawes et al 2016).

As part of the interview agenda, and before the start of each interview, the researcher provided interviewees with an information sheet which described the purpose of the interview and the topics to be covered. As mentioned above, this study seeks to understand the opportunities and challenges associated with open data initiatives. Thus, the interviews focused on the main topics that were informed by the literature review findings, such as the development of the open data initiative, motivation, publication of open data, opportunities and challenges (Bertot et al 2014). However, it is important to mention that the researcher did his best to make sure that the interview was flexible enough to allow interviewees to bring up new topic areas during the course of the interview, which otherwise may not have been considered (Barry and Bannister 2014). The interviews offered the researcher the opportunity to understand in more depth the expected benefits and challenges associated with open data initiatives. Each interview lasted between 40 and 60 minutes, and the researcher received permission from the interviewees to record the interviews. All interviews were recorded and then transcribed using Microsoft Word, and interviewees were provided with the transcribed interview and given the opportunity to provide comments (Zuiderwijk and Janssen 2014b). All participants were assured that all data provided and recorded interviews would be made anonymous and remain confidential and would be used for the purpose of this study.

3.1.2 Documentation

Documentation was used as a second method for data collection. The aim was to corroborate and augment evidence provided by the interviews, as documents can provide other specific information that was not available in other sources (Yin 2009). Documents studied included policies and guidelines, government publications, progress reports, news stories and other documents related to open data initiatives available on the websites of the organizations studied. In addition, the researcher

analyzed the content of Saudi Government Open Data portal (www.data.gov.sa).

3.2 Data Analysis

Thematic analysis approach (Robson 2011) was used to analyze the qualitative data, taken into consideration the aim and objectives of this study. Thematic analysis takes several stages. First, it starts with reading the data collected. Second, the researcher codes and labels all or parts of the data that represents something of interest to the phenomenon under investigation. Third, the same code and labels are grouped together to generate themes, which then serve as a ground for additional data analysis and interpretation (Robson 2011).

Analyzing qualitative data goes through three major phases, as described by Miles and Huberman (1994) which are: data reduction, data display, and conclusion drawing and verification. These techniques were used in this study, as follows. First, the researcher read all transcribed interviews and documents related to open data, with the focus on identifying issues and significant statements that represented something of interest, most importantly those issues that answered the research question. Each piece of evidence (for example a transcribed interview or a document) was analyzed individually to identify themes of interest, and then all the evidence was compared. This helped the researcher to develop a deeper understanding of the phenomenon under investigation. This resulted in reducing the amount of data. Second, data display was performed on the themes and patterns that emerged from the analyzed data, which were then organized into categories and sub-categories, and the relevant pieces of text (from interviews and documents) were added to them.

Finally, conclusion drawing and verification was performed on data by revising the data many times to cross check and verify the emerging issues and themes. In addition, the researcher provided his interpretation and explanation of the issues identified and then compare them with what is being reported in the literature and previous research on the opportunities and challenges associated with open data initiatives.

4. Results

This section reports the findings from the interviews and documentation.

4.1 Description of the Open Data Framework Project

The Saudi Government Open Data portal was initiated and launched in 2014. The findings indicated the initiative is still at its early and experimental stage, and is being gradually recognized as an important e-government initiative. The open data project was developed by the Saudi e-Government Program (YESSER). Figure 4 shows the home page of OGD portal (<http://www.data.gov.sa/en>).

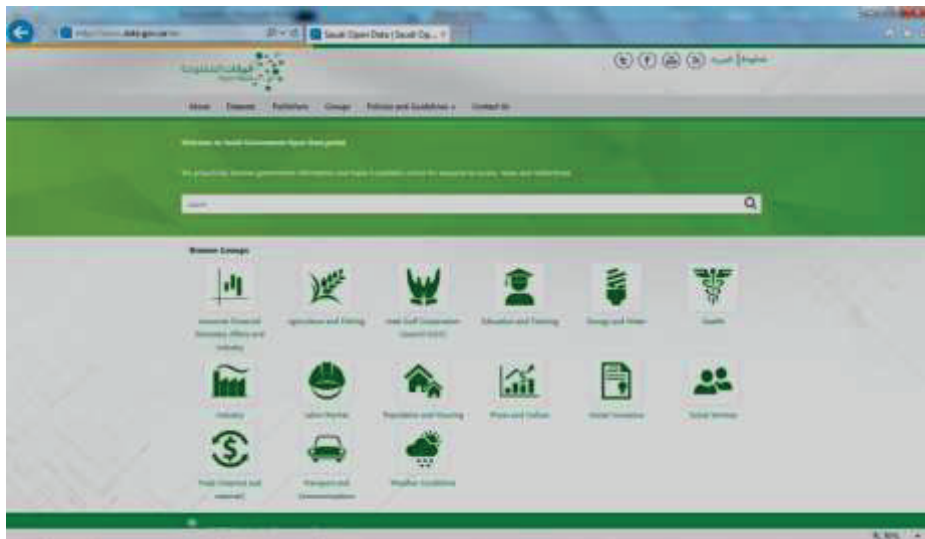


Figure 4: The Saudi Government Open Data Portal

According to the OGD portal:

The Open Data portal of Saudi Arabia is an important initiative for the country, as it aims to implement a public data hub and strategy to enable transparency, promote e-participation and inspire innovation.

The portal is intended to be a central repository for all government data which can be accessed by different kinds of stakeholder including citizens, government organizations, businesses and others. Each government agency is given an admin account to access the portal, and upload datasets. At the time of writing this paper, the OGD portal brings

together over 441 datasets, with total resources of 15305 from different government agencies, which can be described as very limited. The researcher monitored the portal and found that there is an increase in the number of datasets being released and published and there are updates on a regular basis. The datasets are organized and sorted by categories, as shown in table 2.

Table 2: Categories of OGD

No	Domain	No of datasets
1	Finance and Industry	33
2	Agriculture and Fishing	29
3	Arab Gulf Cooperation Council (GCC)	12
4	Education and Training	30
5	Energy and Water	19
6	Health	68
7	Industry	19
8	Labor Market	22
9	Population and Housing	26
10	Prices and Indices	10
11	Social Insurance	7
12	Social Services	99
13	Trade (internal and external)	20
14	Transport and Communications	34
15	Weather Conditions	13
	Total	441

The datasets are in different machine readable formats such xls, xml, jpg, xlb, and cvs, and are about various activities related to government agencies and institutions. In addition, the portal provides a search box that allows users to find information and datasets hosted in the portal. The OGD portal is based on DKAN framework. It is a web-based open source data management system that can easily handle, store, manage, maintain and publish open data (DKAN website 2016).

4.2 Motivations of OGD

The results indicate that although there is some awareness and practice of OGD, it can be said that the concept of OGD is still evolving and is new to many government agencies. This is consistent with Conradie and Choenni (2014) who reported that the act of publishing open data is new for local governments. However, some participants argued that the publication of OGD is a new concept for an old practice and is an extension of some tasks that government agencies do by publishing government data and information in traditional ways or via their websites such as the annual reports that contain such data and information .

The results show that there are a number of motivations that may have influenced the decision to adopt OGD. These are discussed in the following sections.

4.2.1 Political reform

Many participants argued that the recent reform and political developments in the country have supported the OGD initiative. These include the Saudi Vision 2030 and the approval of the Freedom of information Act 2016, which all emphasize the importance of transparency and accountability between the government and the citizens. One of the participants reported that:

Now we have the Saudi vision 2030, and the Freedom of information Act, all of these developments support the move to the open data initiative (Participant 3).

Another participant agreed that the new Freedom of Information Act supports the move towards open data. He said:

The Freedom of information Act supports the effort in moving to open data, and according to this law everyone is



*entitled to access government data when they need it
(Participant 1).*

Another participant provided a similar view when he mentioned:

*I think the recent approval of The Freedom of information
Act was one of the most important factors that promote the
OGD Initiative...This law imposes coercive pressure on
government agencies to release their data (Participant 4).*

For the following participant, OGD has been put on the political
agenda of the government, and this has prompted government agencies to
move from closed government to open government. He said:

*The directive of the government mandates all government
agencies to publish their data, and this is a great opportunity
to take the initiative and move from closed government to
open government. OGD has been put on the Strategic
Meeting Review Board, which governs e-government projects
(Participant 9).*

4.2.2 Open data initiatives at local, regional and global level

The findings revealed that the widespread adoption of OGD
initiatives by many government agencies at local, regional and
international levels was another motivation. An open data project manager
claimed that:

*There is a general trend at local and international levels
towards the adoption of open data projects. It is a great
opportunity to learn from their experiences (Participant 10).*

Another interviewee reported that OGD has been on the agenda
of different countries around the world. He said:

*Open data has become a key part of e-government and an
international trend and many governments around the world
have paid attention to it and put a lot of resources in such
projects... we want to be with international practices
(Participant 6).*

4.2.3 Internal and external coercive pressure

The results show that there was some kind of internal and external coercive pressure that influenced government agencies decision to adopt OGD. Regarding the internal one, and as mentioned above, OGD has been on the political agenda of the country and is a key aspect of the e-government project (YESSER Program). Thus; it requires all government agencies to release their data. One of the participants mentioned that:

It has become a requirement by YESSER programme and we have to adhere to this (Participant 6).

Another participant reported that:

One aspect that motivated us is that releasing OGD has become criteria for evaluation among our national e-government project (Participant 3).

Regarding the external pressure, the Saudi e-government project (YESSER Program) is influenced by the United Nations Index, which evaluates the development of e-government initiatives in different countries across the globe. Part of this evaluation is how governments are opening their data. The OGD project manager reported that:

OGD has become an essential criteria for evaluating e-government activities by the United Nations Index. This has motivated us to go ahead and strive to achieve an advanced position (Participant 5).

Another participant reported a similar view when he said:

One of the most important issues that we considered is the United Nations' evaluation in the area of e-government and open data... we have made excellent achievements in this assessment, as we ranked in 2003 (105) and now 36 of 193 countries.(Participant 1).

4.3 Benefits and opportunities of OGD

The study has identified a number of benefits associated with releasing OGD. These include: transparency and accountability, facilitating access to government data, supporting innovation, improved government services, operational benefits and encouraging participation. They are discussed in the following sections.

4.3.1 Transparency and accountability

There is evidence that suggests that one of the opportunities that can be gained from open data is transparency and accountability. Many participants believe that the adoption of open data can increase transparency and accountability among government agencies and how they interact with the public. A senior project manager mentioned that:

By opening our data, we become transparent with the public and make them aware of what we have and they have the right for that (Participant 6).

A similar view was identified by another participant when he said:

Our approach is based on a transparency perspective and to give the right for all people to access government data when they need it (Participant 10).

For the following participant, recent developments in the country have positive impacts in promoting transparency and accountability. He said:

I can say that the recent developments in the country such as the widespread use of ICT, increased use of social media, the Freedom of Information Act and the joining of our country to the World Trade Organisation (WTO)... these developments have provided a solid foundation for OGD and play a key role in enhancing transparency and accountability among government agencies... if OGD came to us several years ago, it would be impossible to accept it (Participant 1).

The age of locking government data has gone and from a transparency perspective it is important for government agencies to be the main trusted source of their data, as described by the following participant:

I think there is a transparency dimension to open data. The era of locking government data has ended...now everything is open and nothing to hide... There is a significant change in Saudi society. For government agencies, it is better to be the source of your data rather than to have someone else be the source about your data. As data owners, this increases

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*transparency and you can win the trust of the people.
(Participant 5).*

Another interviewee reported a similar view when he said:

*Providing OGD enhances the good image and reputation
of the institution by becoming the main source and reference
for the data... This means your data must be credible,
accurate and with good quality, all of which can increase the
trust among people who will use the data (Participant 6).*

For many participants, transparency can increase the trust of citizens as well as enhancing the public image of government agencies. One of them said that:

*For us transparency and honesty are key issues for
publishing government information online... releasing open
data related to the economy and industry of the country gives
clear indications of where the economy is going... and
therefore investors will know more about opportunity in
investing their money. This increases the trust of the
government (Participant 3).*

4.3.2 Facilitating access to government data

Many participants think that open data play a key role in facilitating the access to government data and information. On the one hand, it provides the public (users) with access to government data when they need it. This issue was mentioned by the following participant:

*By opening our files and unlocking our hard drives, we can
improve access to data and offer great opportunity and
unleash the potential benefits of open data (Participant 8).*

For the following participant, there is an increase demand for accessing government data and information by people and researchers. He said:

*There is an increased demand and need for accessing
government data by people and researchers who use it for
different purposes... providing OGD meets this demand
(Participant 6).*

The next participant claimed that accessing government information is hard and requires effort. OGD can overcome this issue:

Accessing government information (reports, statistics, etc.) requires great effort... Making OGD available online, it becomes easy for researchers, journalists, business owners and others to find information they need (Participant 7).

Another participant reported a similar view when he said:

There is a demand for open data in our country and this is coming from researchers, journalists, academics, businesses and others (Participant 4).

On the other hand, OGD can improve access and sharing of data and information among different government agencies:

Open data can facilitate the sharing of data between government agencies... In the normal way sharing data and information between government agencies take a long time and goes through red tape procedures. With open data the government itself can do very well (Participant 8).

4.3.3 Open data supports innovation

A recurring theme during many interviews was the fact that open data help to drive innovation by providing access to data from different government agencies. One of the interviewees mentioned that:

An important and direct advantage of OGD is the fact that it supports and promotes innovation and creativity. One of the most important criteria in the Open Data Portal platform is to have APIs, which provides an opportunity to develop new innovative applications based on the use of existing data... These applications help to serve the citizens, residents and authorities in the country to provide better services and to assist in making decisions (Participant 8).

For the following participant, innovation can be achieved by converting available data and developing new insights. He said:

Through open data, we can convert data into information and then into knowledge and use it in decision-making. You

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can also invent other things that you cannot imagine now... In the future, you can build and develop unique innovation and ideas based on existing open data. Hopefully we will reach what is called Data Orchestration (Participant 9).

Another participant reported a similar view when he said:

By making government information available, you offer several opportunities to developers and citizens to use these data and information and they will be able to develop innovative apps that could be helpful to the society (Participant 9).

The following participant argues that OGD can support innovation in different ways. However, innovation is context specific and that depends largely on the amount of available data and its quality. He said:

Yes, there is no doubt that OGD supports innovation, however, the degree of innovation varies from one sector to another, and it depends on the amount of available data and its quality and how it is used. Through using data mining techniques, you can create new insights and use that to predict the future (Participant 6).

One of the participants mentioned that:

Utilizing OGD effectively supports creativity and innovation, since our domain is in science and technology... by releasing the data to the public, new ideas and innovations can be created and developed by utilizing the wisdom of the crowd (Participant 2).

The following participant emphasizes the importance of the added value of OGD:

We try to make it clear that OGD has an added value to the public and how it can help in improving services and decision making (Participant 1).

The next participant describes the relationship between open data and innovation:

I believe that open data supports innovation, and this can be achieved by making such data available to people who

engage in commercial activities, or who are working on SME business. It is also very beneficial for the different kind of people in the society who may use this data to generate or develop new products and access to new ideas and innovations (Participant 3).

4.3.4 Improve government services

The results show that OGD plays a key role in improving government services, informing public policy as well as several benefits for the government itself. The following participant describes this issue as follows:

We have very high and great ambition of open data and to employ it to serve the country in different ways at the national level. OGD has many advantages for individuals, society and government sectors... it can improve and develop government services as well as enhancing decision-making (Participant 10).

A project manager mentioned that:

OGD is useful for the government itself, as it can help in the development plans, inform policy making and understand what citizens want (Participant 2).

For the following participant, OGD can be used to gain insights and therefore improve government services. He said:

We have some future ideas to take advantage of OGD... our target is not to collect and present OGD, but to gain insights and knowledge and use it to improve government services, decision-making and inform public policies to serve local needs (Participant 4).

The next participant described how OGD can be used in smart government applications:

We aim to go beyond just releasing data. Our target is to utilise open data and its application in smart government, which hopefully will improve services provided to the citizens at national level. To do so, we need to have a very large

amount of data and the cooperation of government agencies. The goal is not just to collect it, but to use it effectively. We aim to reach what we call data orchestration stage, which is an advanced level of integration between the data (Participant 5).

4.3.5 Operational benefits

The results indicated that there is an operational benefit related to the optimization of internal and administrative processes of government agencies. One of the participants mentioned that:

One of the benefits of OGD is to overcome the inefficiencies in daily operations related to the management of the data, which is caused by use of the manual processes (Participant 7).

For the following participant, OGD will improve information sharing between government agencies. He said:

I strongly believe that this initiative will improve the collection and dissemination of data among government agencies and provide access to such data via a single place (Participant 3).

The next participant described how OGD can help in making decisions:

We experience current challenges in making accurate decisions related to the tasks of our agency, and this is due to the lack of access to data. Having access to data improves the efficiency in decision making (Participant 1).

Another participant reported that:

Adopting international best practices (in this case OGD) to collect and disseminate government data and information gives you an advantage to benefit from data sources at the national level (Participant 7).

4.3.6 Open data encourages participation

During the interviews, issues surrounding how OGD can encourage participation were raised. Releasing OGD allows direct interaction between

government agencies and the public and establishes some kind of participation. One of the interviewees mentioned that:

Releasing OGD encourages participation between the government and citizens, as it allows the public to use and reuse public information and interact with our institution via different means of ICT (Participant 3).

For the following participant, OGD encourages participation by sharing data between government agencies and citizens. He said:

OGD projects encourage public participation by sharing government data between government agencies and citizens... thus the public can use, reuse, share, evaluate and comment on available data... which provides two ways of communication (Participant 7).

It was found in the OGD guide document that OGD encourages citizens' participation by giving them the opportunity to use, reuse, evaluate and provide feedback on the data. In addition, the Saudi data portal offers some features that encourage participation such as filling out an online form feedback and even allowing users to propose a new dataset.

4.4 Challenges and Barriers to OGD

The study has identified a number of issues that can be considered as challenges to OGD adoption. These include the development of bilingual OGD portals, privacy issues, data ownership, misuse and misinterpretation of OGD, and data related factors.

4.4.1 Developing a bilingual OGD

This issue was a recurrent theme during the interviews. A number of participants agreed that developing and managing an OGD portal is very challenging and requires many resources to be allocated such as time, effort, money, translation issues, data quality, experience, and the need for skilled personnel who speak other languages. The Saudi Open Data portal is available in Arabic and English including details in both languages about datasets, publishers, policies, guidelines and other information. For the organizations studied, providing open data in more than one language is

important because they can reach wider audiences, locally and globally, and this would increase the access to government data. A project manager mentioned that:

Our aim is to make the OGD portal available in more than one language, especially the English. This is because the English is the second language used in the country, and we have a large population who don't speak Arabic. OGD can be of interest to external international parties outside the Kingdom such as academic researchers, other individuals, organisations and institutions (Participant 10).

The following interviewee described the issues that need consideration:

Yes, there is a challenge to provide OGD in more than one language. We have to address issues related to the design of the portal for English users, content management, cost, translation policies, time, effort and human resources (Participant 2).

The next participant raised issues related to automatic and manual translation, and the quality of the OGD. He said:

Providing OGD in more than one language such as English depends on government agencies and their ability to do so. In our case, we had to decide whether to use automatic or manual translation to OGD, make sure and be confident about the quality of the OGD and its translation. All of these required effort, time, and additional resources such as staffing and budget. We are looking at other countries' experience that provides OGD in more than one language (Participant 5).

The following participant talked about issues related to translating procedures, metadata, quality assurance and control of the content. He said:

You have to address the translating procedures, metadata, quality assurance and control of the content to make sure that the Arabic content matches the translated into English

content. All of which requires effort, cost, and time (Participant 4).

For the following participant, it is important to develop accurate standards for managing the datasets and the metadata on the OGD portal. He said:

To provide a consistent bilingual open data platform, you need to have semantic translation between the two languages, which requires developing taxonomies and ontologies and accurate metadata (Participant 3).

4.4.2 Privacy and the confidentiality of data

The issue of privacy and the confidentiality of OGD were prominent during the interviews. Some issues identified were related to what kind of data should be released, the right of individuals to have their privacy respected, security and the impact of linked data techniques on privacy. One of the participants reported that:

Due to a number of reasons, it is difficult to publish all data...One issue that concerns us with publishing OGD is the privacy issue... and that the data does not have any indication to any person, entity or any sensitive information (Participant 9).

The following interviewee suggests that government agencies need to balance the benefits of OGD against the issues related to privacy and security. He said:

We need to balance between the benefits of opening data and the right of individuals to have their privacy respected and protected. Sensitive data related to individuals or national security need a tightened policy and we have to make sure that such data is not released either intentionally or unintentionally (Participant 2).

The next participant emphasized the importance of protecting the privacy of the people. He said:

Protecting privacy is a very important issue when we talk about open data... we have to make sure that we don't release data or information related to people (Participant 6).



Another person reported a similar view when he said:

When revealing open data, it is important to consider the issue of privacy of individuals and confidential information must be removed and not published (Participant 7).

The issue of privacy concerns the following participant because advanced techniques which can link different datasets may reveal the identity of individuals:

For example if you release different datasets together, and by using linked data techniques, there is a risk that the identity of person might be known (Participant 1).

Another participant mentioned that:

It takes us a lot of time and effort to make sure that data has no context and the privacy of people is maintained, respected and protected (Participant 3).

4.4.3 Data related factors

The results revealed that there are several barriers to OGD. These include file format, standardization of metadata, technical issues related to the portal, data visualisation, linked open data, and the quality of the data.

Having OGD in certain file formats was an important issue, identified in the majority of the interviews. One of the participants reported that:

One of the main challenges that we encountered is the fact that there is a need for a unified standard to make OGD available and be downloadable in different formats such as XML, CVS, which will make the use of data more flexible (Participant 1).

Another participant mentioned that:

A common problem that we found is that the majority of OGD were in PDF files, and the data were not organized, and they needed to be filtered and put on the appropriate format (Participant 6).

A project coordinator emphasised the importance of releasing OGD on a free and open-standard. He said:

One of the technical difficulties is the fact that the majority of government agencies were not using a standardised

(global) format for their data. You know one of the most important principles of open data is that the data should be provided on a free and open-standard, not restricted to particular format which requires certain software. All data files were on Excel, and the challenge was to transfer them to XML or CSV, so they can be run on APIs (Participant 4).

The following interviewee argued that many datasets do not meet the technical requirement:

The majority of open data does not satisfy the technical requirement, I mean the format. The majority of files can be PDF or PDF images. You can copy and paste but you cannot process the file effectively (Participant 8).

An examination of some datasets available on the OGD portal shows that the data has been published in different file formats such as jpg, xls, xml, xlsx, csv, xlb and other formats.

Another issues identified was the need for a standardization of the metadata used to manage the datasets on the OGD portal.

It is important to have a consistent metadata scheme that can be used for all OGD. To do so, you have to identify the attributes of the data, and developed structured models that can handle different datasets (Participant 10).

Bringing all government data into a single and unified portal was reported as a barrier, and this is due to the variation in the process of data management among government agencies:

Another technical challenge is to collect, store, combine, link and provide access to OGD in a single portal... this is because there is a variation in the process of data management among government agencies (Participant 7).

The next participant claimed that providing an OGD portal with advanced features is the challenge. He said:

The challenge is to offer an online powerful portal that provides advanced features for analyzing, visualizing and reporting data... this requires OGD to be in appropriate

*formats so that the system can handle them effectively
(Participant 10).*

4.4.4 Misuse and misinterpretation

The results showed that one of the main concerns mentioned by the participants was the potential that publishing OGD may lead to the misuse or misinterpretation of the data, which may have serious consequences for government agencies. One of the participants reported that:

There is a great concern regarding how OGD can be used or interpreted by different users... Because OGD can be reused and modified, there is a possibility that misuse or misinterpretation can occur. Therefore; it is important to get the data from the right source by visiting the original source who published the data (Participant 1).

The next participant argued that OGD might be used out of context either intentionally or unintentionally. He said:

Publishing OGD may give the room for misuse or misinterpretation either intentionally or unintentionally... data could be used out of its context, especially data related to health and economic issues (Participant 3).

Another participant argued that misuse or misinterpretation of OGD could be reasons for government agencies not to publish their data. He said:

It's difficult to publish 100% of your data...by doing so you may lose complete control of your data or they may be used against you or misused. Many government agencies refuse to open their data for these reasons (Participant 7).

4.4.5 Data ownership and conflict of interest

The results indicated that data ownership and conflict of interest among government agencies were major challenges when it comes to OGD. Some government agencies, units and departments are reluctant to open their data and share it with the OGD initiative. One of the participants described this issue as follows:

We are now in the beginning phase of the deployment of the concept... and we are dealing with government agencies who have a rooted culture of closed government practice as well as resistance to change and adopt new concepts! As a result, we have to address a number of issues related to data ownership and conflict of interest (Participant 1).

Another interviewee said that:

I think the concept of OGD is still in its infancy, and has not matured yet... there is a class of people who are still under the old concepts... There is resistance in some government agencies as well as decision-makers on certain concepts related to OGD (Participant 3).

The next participant suggested that it is important to persuade people who are in charge of the data about the benefits of releasing OGD. He said

You have to persuade some individuals who are in charge of government data about the important of releasing OGD. They say: "it is our data and how can you take it from us? We have put our effort in it" We try to convince them that it is your data but we help you to make it available and get it published. We are all here to serve the country (Participant 7).

The following participant argued that some government agencies were working on similar projects, and this caused what he described as "conflicts of interest":

In some cases we found that some agencies were working on similar projects... and when asked for collaboration there was some reluctant... I think this is because of conflicts of interest (Participant 9).

The movement from a closed government system to an open government system caused some resistance. A project manager mentioned that:

A notable barrier that we encountered was the change from a closed system and an open system and there was

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resistance from some people to change and accept the current situation. In many cases there was reluctance by some government authorities in providing us with the data. They argue that it is their own data, and it is difficult to give it to someone else. To overcome this issue, we had to explain to them the importance of the initiative, and the tangible and intangible benefits of releasing OGD and how it can serve the public and national interest. This took us a lot of time and effort, as we had to hold several meetings with government ministries and agencies to explain the concept to them... you have to convince them and make a strong business case for the project (Participant 5).

A similar view was reported by another participant who stressed the importance of human factors in addressing this issue. He said:

We tend to be a closed government... some departments and units are very reluctant to share and provide us with their data... The human factor is more difficult than the technical one when working on OGD... People get a prior impression before they think. Some people especially those with the old mentality think that sharing their data with others will make them powerless, and they raise issues related to the ownership of the data and that nobody has the right over their data except them. We try to solve these issues by intervention from top management (Participant 6).

5. Discussion

5.1 Benefits and Opportunities of OGD

It can be said the main motivation for government agencies to adopt OGD is the perceived benefits. The results showed that transparency and accountability, facilitating access to government data, supporting innovation, improved government services, operational benefits and encouraging participation were important issues.

The results of this study fit with what has been reported in the literature, and the explanation of these findings is particularly important in the context of Saudi Arabia. The importance of open data and its role in enhancing transparency and accountability were clearly evident in this

study, and confirmed existing literature, for example (Kalampokis et al 2011; Jassen et al 2012; Kassen 2013; Albano and Reinhard 2014; Dawes et al 2016). Although the concept of OGD was developed in Western countries, based on the principles of transparency, accountability and public participation, it can be said that these concepts have traveled through technology adoption (in this research open data) and can be relevant to some Middle Eastern countries, which can be described as closed government cultures and in this case Saudi Arabia. In recent years, the country has witnessed a series of political reforms such as the Saudi Vision 2030 and the development of the Freedom of information Act 2016, which all emphasized the importance of transparency and accountability of government agencies and how they handle data and information. In addition, the transition of the Saudi society towards the information society, the widespread use of ICT and social media among the general public have increased domestic demand for transparency and openness; and thus may impose expectations and provide models for individual governments to adopt OGD policies and practices (Dawes et al 2016).

In terms of facilitating access to government data, the findings of this study are consistent with previous research (Logica Business Consulting 2012; Kucera and Chlapek 2014). Open government data will help people and organizations to access data and information. This in turn will improve public relations, attitudes and image toward government by enhancing citizens' trust and understanding regarding how government agencies are providing access to such data and how they can improve their services and procedures to serve the public (Parycek et al 2014; Kucera and Chlapek 2014).

The study has also identified that releasing open data will support innovation and the creation of new products and services. This finding is in line with previous research showing the important role of OGD in supporting innovation, for example (Halonen 2012; Jassen et al 2012; Yang and Knakanhalli 2013; Albano and Reinhard 2014; Kucera and Chlapek 2014). Although open data supports innovation and encourages creativity in developing services and applications, many participants believe that the challenge is how to transfer data into knowledge and use them in different areas.

The study has also identified that OGD can improve government services and has several operational benefits such as informing public policy, the development of plans, helping to understand citizen needs, providing smart government applications, improving information sharing between government agencies, and overcoming the inefficiencies in daily operations related to the management of the data. This agrees with other research showing similar operational benefits (Jassen et al 2012; Logica Business Consulting 2012; Albano and Reinhard 2014; Kucera and Chlapek 2014).

The findings indicate that open data encourages participation. This includes allowing direct interaction between government agencies and the public, citizens can use and reuse public information, sharing data between the two parties, and citizens can evaluate and provide feedback on the data. These results confirm previous research (Huijboom and Van den Broek 2011; Jassen et al 2012; Conradie and Choenni 2014).

5.2 Challenges and Barriers to OGD

The study has identified a number of challenges related to OGD. The first issue was the development of a bilingual OGD portal. It can be said that providing bilingual or multilingual OGD portals is important because government agencies can reach wider audiences, locally and globally, and this would increase the access to government data. This argument is supported by Martin et al (2012) and Zuidewijk and Janssen (2014a) who reported that users want to discover and browse datasets across local, national and international datasets in their own language. However, the majority of open data platforms are not multilingual.

This study argues that providing a bilingual OGD portal is costly and requires the investment in many resources such as time, effort, money, and skilled personnel who speak other languages. According to Conradie and Choenni (2014, p.516) there are still transaction costs related to the release of data, such as locating datasets or digitization. The cost can be doubled when the OGD portal is bilingual or multilingual. Other issues related to providing a bilingual OGD portal that need to be addressed include translation issues, data quality, datasets and metadata, translation policies and tools, automatic translation versus manual translation and what standards to follow. This argument is supported by (Martin et al 2012) who argued that the creation of transnational services requires

implementing mechanisms to guarantee the linguistic interoperability of datasets.

The second barrier identified was the privacy and the confidentiality of data. Examples of these issues include type of data to be released, respecting individuals' privacy, security and the impact of linked data techniques on privacy. These findings are consistent with previous research on OGD and privacy, for example (Huijboom and Van den Broek 2011; Logica Business Consulting 2012; Jassen et al 2012; Conradie and Choenni 2014). While the aim of OGD initiatives is to make data available to the public, it is important for government agencies to address the tension that may arise between open data policy and the privacy of their citizens. In order to address this issue, open data policy should comply with existing regulations such as the Freedom of information Act and data and personal information protection laws (Kulk and Loener 2012; Barry and Bannister 2014; Yang et al 2015).

The study has also identified a number of issues related to data including file format, standardization of metadata, technical issues related to the portal, data visualisation, linked open data and the quality of the data. This agrees with other researchers who reported similar findings (Martin et al 2012; Zuiderwijk et al 2012; Zuiderwijk and Janssen 2014b; Albano and Reinhard 2014; Yang et al 2015). In order to provide a good OGD portal, government agencies need to consider these issues and pay attention to them from the outset of the project.

The fourth challenge was the fact that OGD may be misused or misinterpreted by different stakeholders who will use the data either intentionally or unintentionally. This issue has been documented in the literature (Conradie and Choenni 2014; Yang et al 2015; Krishnamurthy and Awazu 2016; Yang and Wu 2016). Examples of such issues include using OGD to get competitive advantage, to cause damage or harm to others, abuse, and fraud. These may result in liability of government agencies. However, it is important that these issues should not discourage government agencies from opening up their data. Instead, any misuse or misinterpretation should be addressed within the legal framework and policy of the country.

A final and important issue that is considered as a barrier was data ownership and conflict of interest. The results show that many government agencies, units and departments are reluctant to open their data and share it with the OGD initiative for different reasons. These include lack of understanding of the initiative, fear of losing power and control of their data, resistance to accept and move from closed government to open government, and some agencies were working on similar projects (conflict of interest). These findings correspond to previous research showing that organizational culture affects the adoption of open data initiatives in government agencies (Janssen et al 2012; Barry and Bannister 2014; Yang et al 2015; Yan and Wu 2016). In order to address these issues, a number of strategies can be followed. First, there is a need to clarify the added value and the benefits of open data initiatives to both internal and external users and for the country as a whole. This can be achieved by promotion and communication using different channels. Marketing and promotion are central aspects of OGD initiatives (Parycek et al 2014; Zuiderwijk and Janssen 2014a). In addition, open-data initiatives depend heavily upon collaboration across agencies (Krishnamurthy and Awazu 2016) therefore, it is important to address this issue and work closely with different stakeholders and involve them from the outset of the initiative.

5.3 Research Framework

Based on the findings, this study provides an integrated framework that presents the motivation, opportunities and challenges associated with OGD initiatives among Saudi government agencies, as shown in figure 5.

Open Government Data		
Motivations	Benefits and Opportunities	Challenges and Barriers
<ul style="list-style-type: none"> - Political reform (Saudi Vision 2030; Freedom of information Act 2016 -OGD initiatives adoption worldwide. - Internal and external pressures. 	<ul style="list-style-type: none"> - Transparency. - Facilitate access to data. - OGD supports innovation. - Improve government services. - Operational benefits. - OGD encourages participation. 	<ul style="list-style-type: none"> - Developing bilingual OGD - Privacy and security - Data related factors - Misuse and misinterpretation - Data ownership.

Figure 5: An integrated framework of OGD

6. Conclusion and recommendation

This study aimed to understand the opportunities and challenges associated with open data initiative in Saudi government organizations. It has shed some light on open data adoption in the Saudi context. One of the contributions of this study is the fact that it has widened our understanding concerning the opportunities and challenges associated with open data initiatives. Second, this study has contributed to the literature on the adoption of open data in government agencies by extending the set of open data benefits and challenges reported in the literature on OGD.

The main conclusions of this study can be summarized as follows:

1. The Saudi government has realized the important of OGD and launched the project in 2014.
2. It can be said that the current status of open data application is in its infancy and in an early stage of development.
3. The project was intended to be a central repository for all government data which can be accessed by different kinds of stakeholders including citizens, government organizations, businesses and others.
4. This study argues that a top down approach (centralized structure) is useful to drive the development and management of an open data project, especially issues related to OGD infrastructure, policy, implementation, and standardization. This approach helps to bring and combine open data from different government agencies regardless of its sources.
5. The main motivations for adopting OGD initiatives include political reform, the development of different OGD projects at local, regional and global level, and internal and external pressures.
6. Government agencies sought to achieve a number of benefits from adopting OGD initiatives. These include enhancing transparency, facilitating access to government data, supporting innovation, improving government services, operational benefits and encouraging participation.

7. The research has identified a number of challenges and barriers related to OGD. These include the development of bilingual OGD portals, privacy issues, data ownership, misuse and misinterpretation of OGD and data related factors.
8. The development and management of bilingual or (multilingual) open data is very challenging, and government agencies need to address this issue.

Finally, and based on the findings, the study provides the following recommendations:

1. It is important for policy makers in Saudi to consider OGD and plan and design the initiative using an ecosystem approach which considers all aspects related to OGD.
2. Government leaders should have direct involvement and follow up to monitor the progress of the OGD project and help overcome barriers that may arise, and this is important in the context of Saudi government agencies as most decisions are made by top management.
3. Open data initiatives should be backed by a legal framework and integrated and linked to existing laws in the country.
4. Since the OGD project in the country is in its infancy and in early stage of development, it is important for government agencies to go beyond this simple adoption of OGD into more semantic application of OGD.
5. There should a committee at national level to govern the development and management of the OGD project. It can provide consultations, session awareness, workshops, meetings and sharing experience with other government agencies.
6. There is a need to promote and market the OGD project at a national level, and to make the public and interested stakeholders aware of the initiative, and how they can benefit from open data. This helps to clarify the added value of open data.
7. In order to improve the OGD project, it is important for government agencies to look at best practice and benchmark against countries that have matured experience such as the USA, the UK, Singapore and South Korea.



8. Finally, the findings of this study are important for policy makers and practitioners in government agencies to understand OGD benefits and challenges, as well as to develop effective strategies related to OGD projects.

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