

Investigating The Challenges and Value Creation of Open Government Data Initiatives

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Summary

The initiation of Open Government Data (OGD) projects evidently stemmed from digital developments. Growing responsibility and transparency have partially promoted the rapid expansion of OGD projects. Nevertheless, more significant private and state sector inquiry is required within the OGD research field. Advantages provided by OGD include the stimulation of creativity and development, as well as the strengthening of status, legitimacy, and integrity. Therefore, to achieve these benefits, OGD research subjects require in-depth scrutiny. Accordingly, this investigation has established the OGD research fields; determined the limitations of private and state-sector research fields, and established OGD projects' problems concerning the research aims. The advancement of OGD-related theoretical understanding is one of the original goals of this research. Furthermore, we found that government data should be open by default unless it violates national security or individual privacy. The extant research and analysis' veracity will be determined through meta-analysis and thematic analysis as part of a comprehensive literature review. As a result of semi-structured interviews, a conceptual framework is proposed concentrating on the challenges of OGD adoption. Consequently, a theoretical foundation for OGD inquiry, incorporating the development of OGD notions and identifying obstacles, defines the research outcomes.

Keywords:

Open Government Data, Open Data Portals, Government Initiatives, Challenges, Value Creation

1. Introduction

Several governments across the globe provide online publications for their data in order to make this data available to everyone. The first portal for publishing open data worldwide was established in 2009 through the US portal data.gov. [1, 2]. The government entities create an enormous quantity of information and governmental data [1, 2]. Once the governmental data is openly published without any constraints, it becomes Open Government Data (OGD) [3]. The OGD is data not subject to privileges, security, or valid privacy constraints [4, 5]. Many international and national Web portals are designed to provide an online

portal for OGD datasets [6]. Such portals enable people to gain access through a single resource in order to explore different sets of information related to government data which is considered to be in the public interest [5, 7].

Public bodies and governmental organizations generate a vast amount of data and enrich the OGD portal with the raw data through an open, standard, and machine-readable format, creating a portal that can be considered a significant pillar of open government strategies [8]. It has been suggested that everything necessary should be done to create complete freedom of information and eradicate all barriers that might impede information disclosure. The reasoning behind this suggestion refers to the potential gains through the entire disclosure of information (e.g., spreading and sharing the relevant knowledge) in order to give individuals the opportunities to create greater public, social, and economic improvements [9–12]. Additionally, there exists a relationship between barriers to data flows and innovation, creativity, and sharing of information [13, 14]. Once the barriers are eradicated or restrained, creativity and innovation rise. [13] proclaims that 'data and information are the currency of creativity and innovation' and 'information is what energizes our national innovation systems'.

This demonstrates the importance of open government data initiatives in disclosing the government data which yield tangible benefits [5, 15]. Consequently, the OGD initiatives deserve a substantial degree of attention and consideration. The OGD is still considered a new subject in the domain of open data [16, 17], which makes it an attractive subject for researchers. In developing countries, investigating the OGD can be a beneficial opportunity for a great deal of future research [18]. It is claimed that a worldwide, open data initiative is impossible because of the diverse national laws regarding transparency within the public sector [19]. Therefore, this paper investigates the status of Open Government Data initiatives in Saudi Arabia.

The Saudi Arabian OGD initiative has been the subject of various studies related to the OGD. The majority of these

studies attempt to measure the transparency level of the OGD initiative and the degree of awareness among Saudi citizens. The Saudi environment is valuable to study since it is a standard case of OGD initiatives from the governmental point of view. Few researchers have explored and analyzed the obstacles and challenges that officials managing the Saudi OGD initiatives face, including their relationship with the data owners whose information enriches the OGD portal. Current literature indicates that most OGD initiatives face several critical issues that, if not managed successfully, can negatively affect their success. Special attention must be paid to understanding and resolving these complex, related matters [15, 20]. This study addresses the insufficiencies in current research by analyzing the Saudi OGD initiative and investigating the various associated issues. This is achieved by focusing on the government officials in charge of this initiative. This study explores the initial problems facing the officials managing the Saudi OGD initiative, their challenges in collecting, processing, and managing datasets within the portal, and their plans to improve the current situation. Additionally, the 11th edition of the UN E-Government Survey, published in 2020, identifies the significance of analyzing the issues and risks which may influence the intended results, estimated outcomes, and processes. In fact, this significance assists executive-level administrators and policymakers in determining the most crucial areas of the initiative and enables them to prioritize the limited sources regarding the data initiatives [21].

The Saudi Arabian OGD initiative constitutes the best case study for this research for two reasons: firstly, Saudi Arabia's efforts to afford e-government services are well-documented, and secondly, the Saudi government formally initiated an OGD procedure in 2015. That government records are exchanged between government bodies is vital in the initial phases of OGD initiatives. Therefore, by identifying the barriers to OGD which exist between diverse governmental departments, this research can propose an improved procedure for other countries embarking on similar initiatives. This study aims to improve current research literature in several significant ways: it will offer a fresh perspective on determining the source of barriers to successful OGD data sharing, it will advance understanding of OGD initiatives by empirically investigating the challenges and barriers hindering the OGD in Saudi Arabia, and finally, the practical, managerial aspect of this research will benefit those who implement government policy. This study contributes to the current body of knowledge for open government data, particularly Saudi Arabia context.

This paper is organized as follows: after summarizing the literature on OGD, an explanatory brief will elucidate the KSA's national OGD portal. Next, the methodology for this study will be elaborated. Finally, the results are discussed.

Thereafter, concluding remarks will recap the significant contributions.

2. Literature Review

A comprehensive literature review of the OGD initiative was undertaken via internet science-based databases due to the extremely broad coverage of the subject in journals. The keywords used to categorize the initial list included "open government data" and "initiatives." The search was limited by document type, 'article' or 'review' to ensure rigor and superiority of content. The review of studies in Table 1 elucidates the research undertaken into OGD initiatives. The research methods employed were quantitative, qualitative, review, and documentary analysis. Furthermore, the studies placed little emphasis on why some OGD initiatives are failing and what measures could mitigate these failings. The careful synthesis of these studies illustrated the numerous uses of OGD initiatives, their benefits, and associated implementation barriers. The main focus of this paper is barriers to OGD use.

Open government data can deliver several advantages for both society and government [15]. The initial objective that governments aim to achieve in terms of the OGD is enhanced efficiency and transparency with regard to government performance [22]. In particular, governments make their data publicly available to increase public awareness and display transparency of their various activities and programs. Moreover, it is possible that the open government data can bridge the gap between individuals and governments and can provide the foundation on which further cooperation between governments, societies, and public agencies can be built [23, 24].

Open government data portals represent a reliable resource for program designers in developing different applications. This is because the data available from the open data portals can be easily and freely used compared with data from secondary sources, which might require the program designers to purchase the necessary datasets [15, 25]. This data can be used by any individual or organization, governmental or private, who share the same interests [26, 27]. For instance, the development of new applications, the design of new services, etc. [4]. Furthermore, there are no constraints on how this data can be reused or republished since it is freely licensed through the portals in contrast to other resources that demand several formal applications to allow access to the data with no constraints. Moreover, the data that exists within the open government data portals is more easily verifiable and reliable, and since governments publish it, these portals represent more reliable resources than external sources [25].

Based on an analysis of research undertaken to improve OGD, four factors can be seen to affect the success of OGD initiatives. Firstly, the support of the top leadership is required during the early stages of improving an OGD initiative, including during the extensive process for underpinning its sustainability. Secondly, the participation of both private individuals and civil servants must be assured. Thirdly, participation of a majority influencer must be obtained; this ensures the successful communication of the initiative to the general public, thus bridging the divide between citizens and government. Fourthly, the process of using an open-access license indicates a legal foundation, allowing the public access to the relevant data, while simultaneously maintaining the rights of governments to possess and manage their interests in copyrights. In fact, these factors create the Open Government Data Success Model (OGDSM), as advocated by [22].

OGD initiatives rely on governments emphasizing the importance of participation, collaboration, and transparency [11, 27–31]. The knowledge available from OGD initiatives can provide massive social and economic advantages. In fact, the generation of value is a sign of the quality of an OGD portal [32]. Nonetheless, a few challenges exist to obtaining the required value from the OGD. The conflicts and issues around OGD initiatives have received a great deal of attention from academic researchers as well as governments [33]. These concerns include: technological issues relating to data management through several authorized structures, political concerns pertaining to every government, the priorities of government authorities, and the concerns and legalities applying to data available to the general public [34]. Nevertheless, OGD initiatives should tackle these and any other issues through every phase of the implementation procedure in order to obtain valuable and efficient benefits [35]. According to (2019), open government data initiatives are affected by a prodigious diversity of issues. However, the majority of these issues can be divided into separate classifications, such as technical and organizational issues, financial and economic issues, data quality issues, and citizens' issues

3. Saudi Arabia Context of OGD

In Saudi Arabia, the national transformation program, which is one of the executive programs initiated to achieve the Kingdom's vision by 2030, aims to raise the quality of e-government services. The decision of the Kingdom of Saudi Arabia to adopt OGD initiatives is not a recent one, and open data is not a new concept in the country [27, 36–38]. The e-Government program in the KSA was released in 2005 under the name “Yesser”. The Ministry of Communications and Information Technology handle this

program in combination with the Ministry of Finance and the Communication and Information Technology Commission [39]. The open data portal of the KSA (data.gov.sa) is an initiative implemented by the “Yesser” program in 2015. Prior to releasing a distinct portal for publishing the Saudi open government data, it was released on a sub-portal of the national portal (saudi.gov.sa) [5, 40]. This program aimed to increase efficiency and productivity in the public sector by offering more effective services to businesses and individuals, increasing returns on investments, and providing the requisite information with increased accuracy within the necessary period [41]. Additionally, the OGD has been adopted by many different governmental organisations in the KSA. [42] states “The adoption of OGD was influenced by existing institutional arrangements and landscapes occurring in the country such as the Saudi Vision 2030, the approval of the Freedom of information Act 2016, and anti-corruption campaigns which have contributed positively to the transition from a culture of secrecy to openness”.

The open data portal represents a significant initiative in the KSA since it aims to implement a strategic and public data hub that will enable e-participation, transparency, and inspired innovation. The main task of the portal is to provide access to the required datasets from many related governmental agencies and ministries in an open format, thus allowing this data to be accessible to the public. The platform provides the public with a centralized point of access in order to search, download and interrogate datasets that governmental entities and ministries have created within the KSA. The government's open data assists in bridging the gap between its citizens and the government [43]. The public benefits from the open data available to them in several ways. For instance, the data furnishes them with a more effective and comprehensive understanding of how government agencies function. Other examples include providing the opportunity for citizens to assess the performance of government policies. Furthermore, public data provides the public with a method of sending feedback, reports, and research by improving various smartphone and web solutions and applications, which rely on the government's open data. Based on the open data portal, the Saudi government has enhanced its e-governmental services' portfolio by increasing its links with the private sector and individuals, developing transparency, and permitting individuals to demonstrate their creative skills [44].

The national data portal currently provides access to more than 6,297 datasets from 116 publishers, which are available in English and Arabic. The datasets are offered in different formats, for example, JSON, XML, XLSX, CSV, and XLS. The portal's datasets are classified into 19 groups, as represented in Fig 1.

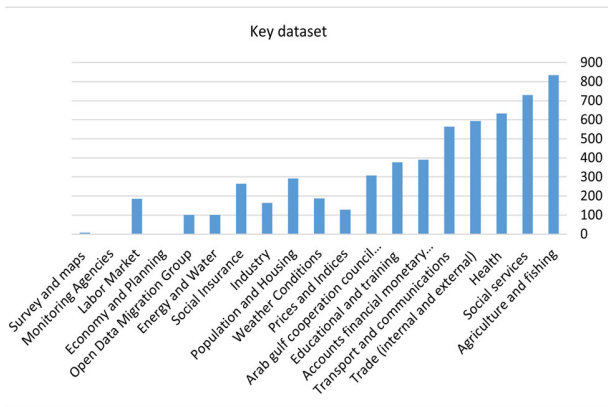


Fig. 1: Summary of Datasets Classification [45]

4. Research Design

This study was designed on an exploratory qualitative approach. The decision to perform a qualitative study rather than a quantitative study was driven by the objective and investigatory nature of the research [46]. This study attempts to explore the status of the Saudi OGD initiative and investigate any serious concerns surrounding it. Furthermore, it aims to develop recommendations to tackle the issues encountered by the Saudi Open Government Data initiative. As Roskell (2013) discussed as this study follows a qualitative approach, it will introduce a more specific and contextual comprehension of the participants' perspectives regarding the open government data initiative in Saudi Arabia alongside the issues, which can influence its improvement. Furthermore, the qualitative method recognizes the interrelationships between several of the obstacles to and the consequences of OGD adoption by society. Lastly, qualitative exploratory research is necessary to discover various theoretical factors, to advance an innovative theoretical framework, and to further research on OGD adoption.

The data were collected via a series of semi-structured interviews in an attempt to explore the specific organizational issues obtained from the various opinions provided [47]. Semi-structured interviews concentrate on individual experiences and opinions by motivating interviewees to express their thoughts regarding the study subject and by purposefully directing the interview in order to obtain comprehensive and meaningful views [48, 49]. Interviews were conducted with eminent figures, responsible for OGD in Saudi Arabia, to generate an in-depth perspective of the current status of OGD in the country. The interviewees in this study were selected based on a 'purpose', following the purposive sampling approach, in order to highlight or inform specific issues based on an important criterion [50]. The interviewees participating in

this study were purposefully chosen because of their ability to provide different, important views on the Saudi open government data initiative. This study concentrates on respondents' experiences working in the domain of the Saudi's open government data program. Consequently, respondents were researchers and officials chosen from the OGD initiative's theoretical and practical communities. Obtaining qualitative information is further appropriate for this study since only a few respondents possess the necessary experience to allow them to comprehensively answer the research questions [51].

In this research, the aim is to involve respondents who have real experiences as officials of the Saudi OGD initiative and researchers with interest in this field, in other words, participants who would be "knowledgeable informants" [52]. Nine participants were purposefully sampled for this study from the body of officials and researchers working in the OGD domain. The sampling involved identifying the government bodies which are responsible for the Saudi OGD initiative, which are: the E-government program (called YESSER), the Ministry of Communications and Information Technology, the General Authority for Statistics, and the Saudi Data and Artificial Intelligence Authority. Then, the personnel in charge of OGD and those who are knowledgeable about and have conducted research regarding OGD in Saudi Arabia were identified and interviewed. This process included contacting 16 personnel, of which nine responded. Most of the participants hold at least a master's degree in information science, information technology, information systems and data mining engineering, computer science, and applied statistics and research methods. Moreover, they belong to different government entities and perform different roles. Some of them have conducted research in the field of open government data. Table 2 summarises the participants' demographic data.

The questions were emailed to the interviewees prior to the interview session in order to assist in the smooth running of the interview. The study includes information gathered using several data resources [53]. The approach of relying on multiple resources was applied to improve the objectivity, reliability, and validity of the various recommendations and analyses provided [54]. In this research, in addition to the interviews, some global reports, government publications, and internet resources were used as secondary data sources. The interviewees recommended some of these documents and reports. The interviews were conducted via phone calls or face-to-face and then transcribed. With participant approval, the interviews were audio-recorded to ensure a comprehensive transcript of the interviews [55, 56].

Table 2: Participants' Demographic Information

Participant	Gender	Background	Degree	Position	Years of Experience
1	M	Information Science	PhD	General Director	4 years
2	M	Information Technology	PhD	Director	+6 years
3	F	Information system and data mining engineering	Master	Data Specialist	2 years
4	M	Computer Science	PhD	Assistant Professor	3 years
5	M	Applied Statistics and research methods	Master	Statistical specialist	1 year
6	F	Computer Science	Master	Director	+ 4 years
7	M	Information Science	PhD	Co- professor	+7 years
8	M	Information Technology	Diploma	Director	+8 years
9	M	Computer Science	Master	Vice President	+5 years

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Thematic content analysis was deemed to be the most appropriate and reliable approach to evaluating the data gathered in this study due to its flexibility and efficiency [57]. This is a recognized approach, frequently applied in qualitative research. Additionally, it attempts to explore well-known patterns through reading and re-reading, coding, and investigating and assessing different themes in order to ensure that they entirely fit the received data. Thematic content analysis is ideal for describing and identifying the different available themes [58].

5. Results

Four distinct themes emerged from the research data. The major themes identified include (1) lack of awareness, (2) conflicts between parties, (3) resistance to data release and fear of misuse, and (4) driving factors of OGD adoption.

5.1 Lack of Awareness

The process of preparing and releasing open data poses some challenges. The participants complained about the weak interaction of governmental entities with the open government data initiative. They explained that this weakness sprang from a lack of awareness of governmental entities about the open government data initiative and its importance. One participant stated that “The main problem is the lack of awareness of government agencies. To overcome this problem, the lack of understanding of open data should be addressed for government agencies and private sector entities by holding workshops and formulating regulations that force the entities to make the data available according to the standards of open data.” Another participant added that weak infrastructure on the part of the data owners is a challenge because it adversely affects the ready availability of the data. The readiness of data was a concern raised by another participant as well as the absence of a data classification mechanism. They said that “The biggest challenge is the lack of data classification among government agencies; there is no way the data can be converted to open data without being classified in accordance with the regulations adopted.”

The absence of regulations motivating government agencies to release data and the absence of policies clarifying the criteria for releasing data are additional challenges. One of the participants enumerated the potential pitfalls of OGD as, “Publication of data illegally, privacy, publication of inaccurate data, misinterpretation of the data, overlapping of data, updates, costs, risks, national security issues, fear of releasing/open data.” Another participant agreed that the lack of national data strategy, policy, and regulation and the lack of national data governance are challenges. He stated that, moreover, there is a fear of data misuse. To handle and deal with these challenges, recommendations were made to the responsible entity to develop a national data framework that encompasses all the support required to handle data issues between different parties.

5.2 Conflicts between Parties (Strategies, regulations, policies)

Conflicts have emerged between different parties involved in releasing open data for multiple reasons. One of the participants stated that “Conflicts occur due to business and technical issues. The latter is easy to solve; however, the former is very complicated as, currently, there is no proper framework that delineates rights and responsibilities and draws the boundaries for all parties. Technical issues, while easily addressed, usually trigger conflict. So far as effort, cost, capabilities, passion for the concept, uptake, etc., are concerned, some entities do not show any interest. The carrot and stick approach is usually used to manage conflicts.”

Some participants stated that data ownership does not create conflicts between different parties because open data is provided by its original source. For example, health-related open data is only taken from the Ministry of Health. According to some respondents, the lack of standards, policies, authority over the open government data were the issues that triggered conflicts between the different parties. On the other hand, some participants view the conflicts positively. They stated that when conflicts emerge, they help identify a problem that needs to be solved. The participants stated that the decision to establish the Saudi Data and Artificial Intelligence Authority might solve the conflicts. The existence of regulations is vital for clarifying responsibilities regarding open government data.

5.3 Resistance to Releasing Data and Fear of Misuse

There is no doubt that resistance to releasing data exists amongst data owners. The participants explained that this resistance might be due to the old culture which advocated protecting data to secure a competitive advantage. However, they added that this way of thinking is changing over time and that resistance decreases due to the expected benefits of open data. One of the participants stated, "Yes, there is opposition, and this opposition is due to the lack of legislation and lack of awareness." Another participant added, "Yes, there is opposition from some organizational units due to problems with data readiness or the existence of data sources." A participant said, "Individuals have demanded data to overcome their challenges and make better decisions about their life issues. On the other hand, most organizational units are reluctant to open up their data due to challenges (or obstacles) such as the lack of national data strategy, policy, and regulation, the lack of national data governance, and the fear of misuse."

5.4 Driving Factors of OGD Adoption

When the participants were asked about the government’s goal in introducing an open data initiative, common points were found in their responses, such as the government trying to be more transparent. By providing data about the country in multiple fields, such as the level of security and safety, tourism, investment, health, and education, the government aims to create new economic opportunities and to encourage investment in the country. Giving investors, whether they are citizens or foreign nationals, a clear picture of the country, guarantees investment in the kingdom of Saudi Arabia. According to the participants, there are additional goals that the government is trying to achieve with its open data initiative.

Participant 1 stated that the purpose of the adoption of the OD initiative is to make the Saudi government more open and accountable like any modern government worldwide, to increase people’s participation in government, to help build

trust in the government, and to provide decision makers with useful data in both the public and private sectors. Participant 2 agreed with participant 1 that the government was trying to be more accountable. Participants 8 and 4, like participant 1, stated that the government is trying to increase the participation and cooperation of individuals and the private sector in government. The government also aims to support innovation, the movement towards smart cities, and application development in order to enhance service quality and create new job opportunities according to participants 2, 4, and 7. According to participants 1 and 9, the government aims to enhance the quality and the integrity of the government and the data which is used by decision makers. Moreover, participant 9 stated that the government of the Kingdom of Saudi Arabia seeks to be a leader in national data management and data governance. Participant 6 added that the government is opening up its data to align with vision 2030.

6. Discussion

There are challenges to meeting the government’s goals behind the open government data initiative. Those challenges hinder the OGD initiative’s development and success from the perspective of organizations. As a contribution of this research, a conceptual framework is proposed that explores the challenges of OGD adoption from the viewpoint of both the private and public sectors. As illustrated in Fig 2, this framework strengthens the mutual relations between the aspects identified.

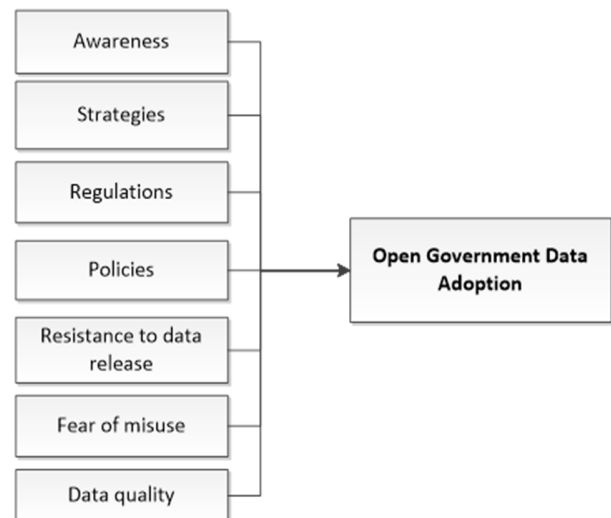


Fig. 2: Conceptual framework of OGD adoption challenges

Participants in this research stated that the lack of national data strategies, regulations, and policies constitutes a significant challenge. This is supported by the literature as

a challenge to implement OGD initiatives [59]. In addition to that, open data projects require collective and ongoing efforts, and that an open data policy is the cornerstone. However, other issues arise at both technical and organizational levels [60]. The lack of strategies, regulations, and policies makes judging which data should be open and which should not be very difficult. Moreover, the lack of standards and policies results in ambiguous rights and responsibilities with no clearly-defined boundaries. The previous issue is also related to the most significant challenge: the absence of a data classification mechanism. This is considered a global challenge. There is no way to open up data without applying an approved classification to prevent decision-makers from releasing sensitive data that could harm national security or violate individuals' privacy.

The participants described how the absence of awareness by government entities about OGD negatively influenced the initiative. The awareness of government entities is crucial because they are the data owners. The lack of awareness affects the progress of the OGD initiative; some entities may not provide sufficient data or provide data that does not comply with open data standards. This supports the challenges discussed by [15] regarding the main problems affecting open government data. The lack of awareness of open data standards can result in data owners providing processed data which conflicts with the principle of open data being raw data, without any processing, in order to allow users to analyze the raw data in depth without restriction to complete datasets. Providing processed data decreases the value of open government data. [61] agreed that aggregated data is a data granularity problem in the OGD initiative, where some of the datasets published are in the form of a report summary.

Moreover, some entities do not show any interest in providing data as they want to protect their competitive advantage or fear data misuse. In fact, most of these challenges probably arise from a lack of awareness amongst government entities about the purpose of open government data, its projected results, and how it should be properly implemented. This conclusion is supported by common excuses for not publishing data such as, "Data is not interesting.", "The purpose or benefit for the organization is unknown.", "There will be too many user requests for data.", "Users will draw superficial conclusions from the data.", "Data is not sufficiently accurate to be shared.", "It will cost too much to transform the data to a standard format.", "There is a risk of acquiring a negative reputation.", "Publishing low quality data could harm the image of public sector organisations." [62]. The reation of legislation, regulations and policies could eliminate such barriers by enforcing compliance, clarifying

responsibilities, encouraging participation, and evaluating results.

7. Conclusion

The adoption and experience of the OGD concept are still considered new in Saudi Arabia. This study investigated the barriers to opening up and publishing government data in the Saudi context by interviewing officials involved in the initiative. Researchers interested in the project were also engaged in bringing insight to this study. The lack of national data strategies, regulations, and policies constitutes a significant challenge to the progress and success of the Saudi OGD initiative [62]. The lack of awareness among government entities is another challenge since they are considered the data owners and stakeholders of the OGD initiative. Furthermore, it became clear that the Saudi government regards the data as a national asset through this research. Their attitude is that data should be open by default unless it violates national security or individual privacy. This research identified that creating a legislative framework is vital to overcoming these challenges. Recently, the Saudi Data and Artificial Intelligence Authority (SDAIA) was given the mandate to manage the legislative side of OGD. SDAIA, represented by the National Data Management Office, is responsible for controls and legislation, while the operational infrastructure (platforms and technologies) is the responsibility of the National Information Centre, and the National Cybersecurity Authority manages protection. These parties, along with the Ministry of Communications and Information Technology and the Communication and Information Technology Commission, work together to improve the open data initiative in the Kingdom of Saudi Arabia, to promote transparency and empower entrepreneurs. In addition, using open data has a valuable impact on boosting the economy for the country.

This study contributes to the current body of research by investigating the challenges of OGD adoption, particularly Saudi Arabia context. In addition, it highlights the major difficulties experienced by key personnel working on the OGD initiatives. Moreover, this study expands the knowledge and the research on OGD. The results will serve as a foundation for future research into this subject and provide more information about open government data initiatives for practitioners. Decision-makers can also use the outcomes to formulate rules and inform policymaking in implementing new procedures and plans.

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Table 1: Summary of Open Government Data Initiatives

Source	Country	Method	Sector	Primary focus	Key findings	Barriers to OGD use
[63]	Singapore	Quantitative	Public sector	What drivers public agencies use to share their data on OGD	The dependence on external innovators was influenced by the delimitation between IT and human resources	Lack of participation
[35]	Italy Ireland Netherlands	Qualitative multiple case studies	Public sector	Develop a Democratic Activity Model of Open Data Use	Context-sensitive OD design facilitates the conversion of raw data into significant information	Lack of data sets quality
[64]	Philippines	Documentary analysis	Private and public sector	Major drivers and barriers to reuse the data sets	Data sets are not current, and no attempts have been made at updating the record	Lack of data sets quality
[65]	Oman	Documentary analysis	Private and public sector	Drivers and obstacles towards reuse of OD sets	OGD initiative simplifies the re-use of the open data sets.	Lack of data sets quality
[66]	Africa	Survey	Technical development perspective	Technical dimension of data portals	The diversities of OD portals applications such as university-related initiatives, specialised data portal, etc.	Data portal functionality
[67]	Tanzania	Qualitative	Private and public sector	Assessments of OGD initiative	Several challenges hinder OGD initiatives such as: (Organizational, social, legal, and technical domains).	Data quality, awareness, and guidelines
[19]	European Union	Documentary analysis	Public sector	Closely study OD initiatives with private and transparent domains	The application of OD initiatives should never be to the detriment of data subjects' essential right to privacy	Privacy issues
[68]	Brazil	Qualitative	Public sector	Classify the public service improvements developed by smart city	OD initiatives contribute to improving the delivery of public service	Skill training/ awareness
[69]	India	Review literature	Public sector	Examines the national OGD portal	The quality of the OGD portal could be enhanced by taking the TQM model as a point of reference	Quality of data set
[70]	Sri Lanka	Documentary analysis	Public sector	To ensure "usage" of data sets conceding that re-use of data sets is one of the key objectives of any OGD initiative.	Deficiency of metadata in the data sets Lack of cooperation towards building additional OGD initiatives.	Lack of participation, awareness, resistance to data release
[71]	Korea	Quantitative	Public sector	Analyse the managerial aspects as drivers of and barriers to OD success	Managerial aspects are the driving forces that often boost or hinder OD success	Managerial capabilities