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Challenges to Use Open Government Data through the Citizens' Lens: A Systematic Review

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Abstract

This study aims to explore the challenges to use open government data (OGD) among citizens . To meet the objective of the study, it used a systematic review by reviewing the published literature and followed Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) guidelines. The study identified the challenges affecting the citizens' satisfaction to use OGD including technological skills, retrieval of data, usability, quality of data, timelines, and accuracy. The OGD also lacks in standardization, the relationship between citizens and government, and awareness to use this data.

This study will fill the knowledge gap by identifying the barriers in using OGD. It may help to increase awareness towards the OGD portals among policymakers and practitioners and they should consider the underlying barriers in reusing the data.

Keywords: Open government data (OGD), Citizens' use, Open data-barriers, Open data portals, OGD-Factors

Introduction

OGD portals provide new and innovative services to the citizens and it has the capacity to play a catalytic role in the co-creation of new public services (McBride. et al., 2018). Open data should describe the purpose of publishing data, the context, application and the purpose of using that data. Governments around the world have been transforming themselves into electronic governments due to the increase in information and communication technologies and thereby encouraging citizens to participate in government processes and to use open data sets. Open Government Data (OGD) is a set of policies that make government data available to citizens in order to promote transparency and accountability within public institutions, along with the use, reuse and free distribution of these datasets. The three main reasons for opening government data to citizens are: transparency, releasing social and commercial value, and participatory governance (Reference?). OGD is the extension of the initiatives of electronic government that refers to data produced or commissioned by the government and that may be freely used, reused or reproduced by anyone.

To disseminate information related to the public sector, a more proactive-approach is implied by the OGD (Borglund & Engvall, 2014). It provides access to health, education, transport, industry, social work, and tourism and climate change data by the government. All information about citizens, organizations and transactions is provided by the government for the better delivery of services to the public (Alexopoulos et al., 2014).

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Literature established that OGD initiatives face many challenges about informed decision

and policy making (Janssen, 2012; Kassen, 2013; Tough, 2011) as well as users found online government information datasets incomplete or unavailable (Verma and Gupta, 2015).

The key objective of this study is to review the challenges to use OGD among citizens through a systematic review.

The following research question was developed to meet the objective of the study:

What are the impediments faced by citizens to use OGD?

Statement of the Problem

Open government data (OGD) is an emerging phenomenon that indorses data transparency and invites citizen participation and innovation for reuse of public data (Okamoto, 2017). Open governments provide opportunities to citizens to access government data. The literature also examined the dark side of open data, its myths, challenges and effect on citizens' perspectives (Wirtz, et al., 2018; Okamoto, 2017; Gonzalez-Zapata, et al.,2015;Wirtz, et al., 2015; Janssen, et, al., 2015; Hellberg, et, al., 2015; Zuiderwijk, et al., 2014). It was noted that there is no study conducted to assess the challenges to use open government data among citizens. Therefore, it is essentially required to identify the literature about the issues to use open government data from the citizens' perspective.

Method

Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P 2015) guidelines for systematic review is followed in this study (Moher et al., 2015). A search was carried out of the available literature with the following search strategy ("Open government data" OR "Open data Portals" AND "Citizens" AND "Challenges/Issues/Barriers). Searching was done in Web of Knowledge, Science Direct, Emerald Insight, ACM digital library, Springer link and IEEE digital library in December, 2018. The search approach was narrowed down in TITLE-ABSTR-KEY filed. One hundred and thirty-one studies were retrieved including journal articles and and book chapters published in the English language.

3.1 Inclusion and Exclusion Criteria

This study selected articles about the challenges/issues/barriers to use open government data for review. There was no restriction on the year of publication for the studies. Journal articles, dissertations, book chapters and reports were included. Only English language and full text available studies were selected for the review.

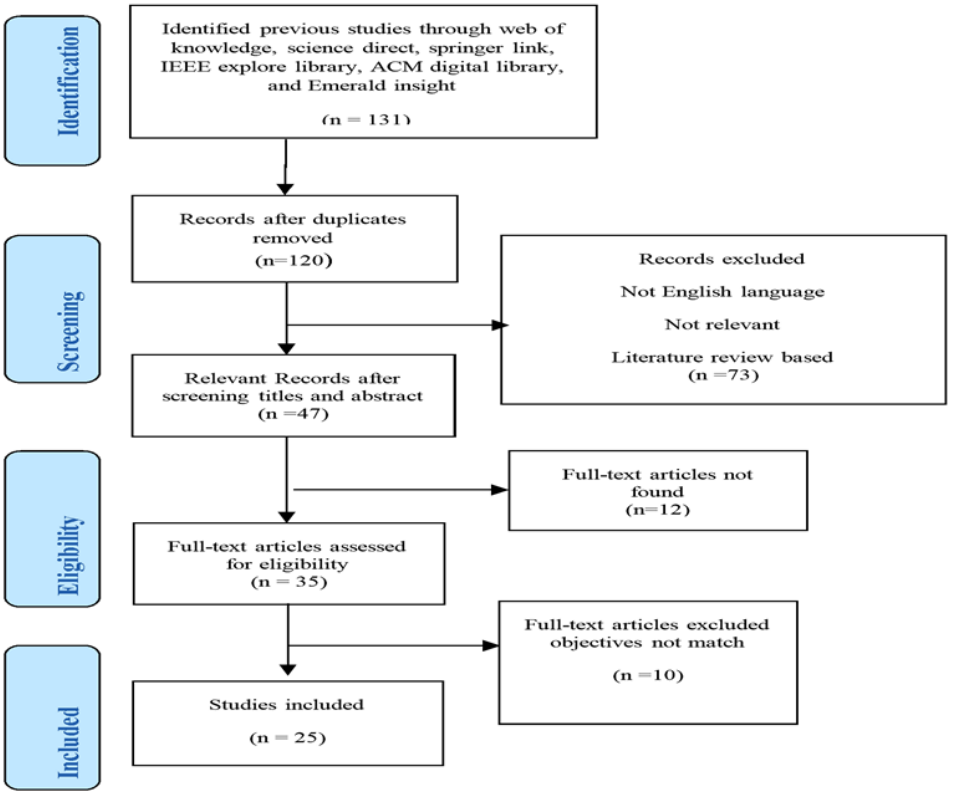

Figure1. Flow Diagram of selection process of studies

3.2 Procedure of Selection or Extraction of Studies

Figure 1 shows the selection procedure of review studies. After exploring six different databases 131 studies were identified. Screening of identified results showed in two stages. One hundred and thirty-one results were found by applying Boolean search operator AND/OR. The complete inclusion and exclusion procedure is shown in Figure1. Forty-seven studies were found relevant after screening the title and abstract of retrieved results. Twenty-five studies were included for the review that investigated different barriers/issues in the use of OGD and were available in full text. This figure clearly describes the inclusion and exclusion criteria of studies i.e., title, abstract, full text etc. The topics, abstracts and objectives of the studies were analysed for the final inclusion stage. The publication year, authors, method, sample and findings of selected studies were assessed for the review purposes.

3.3 Analysis and synthesis

Researchers analysed all included articles and identified themes related to the researcher question. MS Excel was use to enter related codes. Then themes were generated using these codes. The literature established the following barriers/issues: lack of OGD availability, lack of data access, technical issues data and service quality time barrier etc. as a themes and sub themes.

4. Results

This study found twenty-five studies published till December 2018. These studies were conducted in Austin, Brazil, Chile, China, Croatia, Estonia, Germany, India, Indonesia, Kenya, Malaysia, Netherland, Sweden, Oman, Philippines, Switzerland, UK, and USA. These articles were published in E-government, information systems, administrative sciences, informatics, engineering and applied sciences, and education and development journals.

Table 1

Review of Studies on Open Government data N=25

	Open Government data
Reviewed Studies	25
Research methods	4= quantitative research, 12= qualitative research, 9= Mixed methods
Publication year	Six=2018, five=2017, Six=2016, Four=2014, Two=2015 and one each study published in the year 2013 and 2012
Journals fields	E-government, information systems, administrative sciences, informatics, engineering and applied sciences, and education and development journals.
Countries in which studies conducted	Austin, Brazil, Chile, China, Croatia, Estonia, Germany, India, Indonesia, Kenya, Malaysia, Netherland, Sweden, Oman, Philippines, Switzerland, UK, and USA
Sample population	From different citizens groups i.e. businessman, professors, teachers, students, information officers, websites developers, CEOs, project manager, and engineers
Sample size	07- 3212
Sample education	Secondary school certification to PhD degree
Sample population age	18-75
Data collection Instrument	Twelve studies used interview as instrument to collect data, five studies used survey questionnaire and nine studies used mix methods approach i.e. interview and questionnaire or focus group or documentary research approach and storytelling technique or content analysis to collect data.
Model/frameworks	Technology acceptance model (TAM), Adjusted diffusion of innovation model; Rogers' diffusion of innovations theory (DOI), Unified Theory of Acceptance and Use of Technology (UTAUT) framework, Institutional theory, training needs analysis (TNA) model, ITIL service lifecycle model, citizen engagement models, and Organizational Network Theory.

The sample population belonged to different fields of life: businessman, professors, teachers, students, information officers etc. between 18-75 years of age with qualification ranging from secondary school certification to PhD degrees. The selected studies used different data collection tools i.e. interview, survey questionnaire, focus group or documentary research approach and storytelling technique to collect data and subsequently used different data analysis technique such as content analysis and Structural equation modelling (SME). The model and framework used in these studies were: Technology Acceptance Model (TAM), Adjusted Diffusion of Innovation Model, Rogers' Diffusion of Innovations Theory (DOI), Unified Theory of Acceptance and Use of Technology

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(UTAUT) framework, Institutional Theory, Training Needs Analysis (TNA) model, ITIL service lifecycle model, citizen engagement models, and Organizational Network Theory.

4.1 Barriers/issues in the use of OGD

Citizens are facing different barriers/issues in the use of OGD. The literature established the following barriers/issues: lack of OGD availability, lack of access to data, technical issues, time barrier and service quality of data.

Lack of OGD

The overall lack of OGD was the most prominent barrier during the service design phase. OGD users demanded richer and increasingly diverse data in order to increase the variety of possible services (Hellberg & Hedström, 2015).

Lack of data access

Lack of data access and task complexity barriers are also considerable by the citizens to use OGD. A wide variety of skills are required to use open data, to develop systems and for services (Smith and Sandberg, 2018). Only to create awareness regarding OGD use and benefits are insufficient to promote use of OGD portals (Hellberg and Hedström, 2015) among citizens.

Technical Issues

Users are less familiar with the digital development and some users found technical issues to use OGD (Smith and Sandberg, 2018). Technological skills are considered a crucial challenge for the citizens to use OGD (Magalhães and Roseira 2016; Gonzalez-Zapata and Heeks 2015).

Time Barrier

Citizens perceived that timeliness is a barrier to use OGD (Saxena, 2018; 2017; Hellberg and Hedström, 2015; Zuiderwijk and Janssen, 2014). Time barrier affect users' intention to use OGD portals (Smith & Sandberg, 2018; Craveiro et al., 2016; Magalhães & Roseira, 2016).

Data and service Quality

Low service quality and data quality is a barrier in the use of OGD portals (Smith & Sandberg, 2018; Saxena, 2017). The success of open data systems depends on the quality of the data provided to the users by the OGD provider (Janssen et al., 2012). The quality of information provided through OGD portals is the major barrier (Albano and Reinhard, 2014). Service quality and data quality is considered barriers by the users (Magalhães and Roseira, 2016).

Other barriers

Citizens' participation is also a silent barrier in the use of OGD. Lack of data and the data format as well as lack of communication and poor support from OGD providers

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obstructed the OGD users' abilities to understand current and future statuses of the data provision. Users got very little feedback from the OGD service providers (Smith & Sandberg, 2018). It is also noted that the service providers are also service users at the same time, as they are dependent upon the government open data (McBride. et al., 2018). Therefore, it was hard for the OGD users to evaluate the services level, usability and performance of open government data (Smith & Sandberg, 2018).

Description of data do not provide adequate contextual information to allow users for efficient data use regarding the issues in which they may not have knowledge. Handling of the data is also an issue for the OGD users. The colour scheme is one of the important features for enhancing information by expressing definite relations and differences in data (Brugger et al., 2016). There is no provision of suggesting or contributing towards the existing data sets by the users. Moreover, data in OGD portals is not updated that affect citizens' intention to use it. There is a need to promote the use of OGD among citizens (Saxena, 2018).

Fragmentation, retrieval and find-ability of data are also considered key issues to use OGD among users. Data usability, which is related to the timelines, accuracy of data and incompleteness of non-existent metadata, and lack of standardization in data sets are serious challenge for the service providers. Due to the absence of liaison between citizens and government, it is hard for government to get feedback from the users about their services (Magalhães & Roseira, 2016). The format and quality of information as well as legal issues are the barriers for effective use of OGD (Albano & Reinhard, 2014).

Bureaucratic and political issues are considered more important than the technological and economic factors/challenges in terms of the use of OGD portals. There is a weak linkage between the data provision and its stakeholders. These perspectives can be described through the capabilities and interests of key stakeholders/ users (Gonzalez-Zapata and Heeks, 2015). Marketing of OGD is a barrier to use OGD services. Many users uttered frustration to access data in the use of OGD.

Open-data infrastructure is developed for the public; though it cannot be predictable that the public and researcher have the same quantity of knowledge and competencies. Public data have many characteristics including quality, usefulness, intrinsic value, ease of use etc. To use information about crime rate, implementation of budget and weather have different benefits and challenges and different datasets are treated in a diverse way according to the needs of users.

Table 2

Challenges regarding the use of OGD

Challenges	Studies discussed issues to use OGD
Lack of OGD	(Hellberg & Hedström, 2015).
Lack of data access	(Smith & Sandberg, 2018); (Hellberg & Hedström, 2015).
Technical Issues	(Smith & Sandberg, 2018); (Magalhães & Roseira 2016; Gonzalez-Zapata & Heeks 2015).
Time barrier	Saxena (2018); Smith & Sandberg (2018); Saxena (2017); Craveiro et al.(2016); Magalhães & Roseira (2016); Hellberg & Hedström (2015); Zuiderwijk & Janssen (2014)
Data and service Quality	(Smith & Sandberg, 2018); Saxena (2017); (Magalhães & Roseira 2016); (Albano & Reinhard 2014); (Janssen et al., 2012).
Quality	Purwanto et al. (2018); Saxena (2018); Smith & Sandberg (2018); Canares et al. (2016); Magalhães & Roseira (2016); Albano & Reinhard (2014); Varga et al. (2014); Xu & Zheng (2013); Janssen et al. (2012)
Format	Albano & Reinhard (2014)
Lack of communication	Smith & Sandberg (2018)
Poor support	Smith & Sandberg (2018)
Feedback	Smith & Sandberg (2018); Magalhães & Roseira (2016); Gonzalez-Zapata & Heeks (2015)
Visualization	Janssen et al. (2012)
Handling of the data	Brugger et al. (2016)
Accuracy	Purwanto et al. (2018); Magalhães & Roseira (2016); Varga et al. (2014)
Standardization	Magalhães & Roseira (2016); Varga et al. (2014)
Lack of relationship between citizens and government	McBride et al. (2018); Magalhães & Roseira (2016)
Citizens participation	Gascó-Hernández et al. (2018); Smith & Sandberg (2018)
Motivation to use open data	Purwanto et al. (2018); Brugger et al. (2016); Hellberg & Hedström (2015)

Findings emphasize that users should aware about the availability of the data as they have enticements for the use of the data. Furthermore, users just want the answer of their questions and they are not interested in open data metrics and others benefits of open data.

5. Discussion

The purpose of this study was to review the published articles about OGD to evaluate the citizens' perception regarding OGD. However, there is a limited evidence for transformation, which is partially credible due to the lack of user training and technical skills (Gascó-Hernández et al., 2018).

Open data quality is often problematic or under the acceptable level. It is reported that "information is often treated as a black box in the open data movement, information is often seen as a given, used uncritically, and trusted without examination, open data

was collected or created for other purposes, its substantial risks for validity, relevance, and trust" (Dawes, 2012). The government has to ensure data quality when publishing it. Inaccuracy of data should be checked before being open. A proper user friendly interface would be a catalyst for using open data (Varga et al., 2014).

The published data quality might vary from dataset to dataset. Certification may be localized, which is better than no certification at all (Varga et al., 2014). According to the needs of the public, the government should open data and make government data that is fit for use by the citizens. The citizens have diversity of preference for the contents, standards, channels, forms, spots, frequencies and languages of air quality information disclosure. The government should deliver information according to each demographic group and consider their needs respectively (Xu & Zheng, 2013). If data is not available or its quality is poor, this bounds the users to use data, and ultimately hampers the usefulness of open data initiatives. Use of data is also affected by the unavailability of the data that users want (Canares et al., 2016).

Local governments have limitations about the ability and willingness of citizens to use open government data portals. If a service is not for the interest of public, it has no incentive. There is need to market a service that is launched by the government (Hellberg & Hedström, 2015). Active promotion of open government data should be used for citizens' engagements by the social media (Saxena, 2018).

Citizens think that open data simply means to jump to their answer of question. Many challenges exist to the use of open data. However, many instruments exist to lower the challenges such as visualization help non-experienced users to use open data (Janssen et al., 2012).

The issue of standardization is a critical feature towards the use of open government data (Magalhães and Roseira 2016). The open government data is not yet standardized at an acceptable level. The open data portal should reduce the number of used formats and use the accepted standards. The graphical interface of open data portals should be user friendly. The themes of open data portal should be similar to the interests of data users and reliant on local circumstances (Varga et.al, 2014). Data accessibility and data usability are the challenges about the open government data (Magalhães and Roseira 2016). If open government data is difficult to findand use as well as is irrelevant for users, that data might be meaningless. The use of open data is time consuming, complex, and requires certain skills to find, understand and use data. Therefore, it is the threshold for the ordinary citizens to make use of the data because they do not have enough statistical skills to use the open data. Open government data can be used by some groups (Stakeholders, journalist, researchers etc.) to support their position (Zuiderwijk and Janssen, 2014).

Users perceived OGD as imperative to promote government efficiency and improve citizenship (Albano and Reinhard 2014). The users stopped to use open government

websites because of out-dated and incomplete data. For the proper utilization of information available on the OGD, websites need to revise regularly (Saxena, 2017). The citizens' participation is the realization of social control of governments. If the OGD portals are easy to use for the citizens it will enhance the usage of OGD (Matheus et al., 2014). There is a challenge in re-using the open data sets. Poor quality, difficulty in understanding the data and time are the factors to re-use data in the perspective of Oman OGD (Saxena, 2018). Data users should be aware about the re-use of open data and the source of open data (Varga et al., 2014). Someone must be ready to devote time and energy for the reuse of open data. Slow internet connection in return decreases the use of OGD (Hellberg & Hedström, 2015). People need to know how they can improve their collaboration with OGD. Open data experts and subject matters experts are needed for this purpose (Canares et al., 2016).

6. Conclusion and Recommendations

Open government data (OGD) portals are created to make government data more accessible and usable by the citizens from the last decades. Mostly governments are interested in standards to improve government data transparency, citizen collaboration and participation along with spurring innovation.

Technological skills, retrieval of data, usability, quality of data, timelines, accuracy, and incomplete of inexistent metadata, lack of standardization, lack of relationship between citizens and government and lack of interest to use open data are issues regarding the OGD (Albano & Reinhard 2014; Gonzalez-Zapata and Heeks 2015; Magalhães and Roseira 2016).

The citizens experience that open government data portals are not user friendly although computer specialists are able to work with portals. In terms of recommendations on the basis of results, service providers of OGD should consider the citizens' needs and designers should design the OGD portals according to the skills of general users. Marketing of OGD portals is also very important. So the responsible stakeholders of OGD should consider these points before initiation of any new service.

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