Benefits and Barriers of Open and One Government Data: A Systematic Review

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Abstract. Open, and One Government Data (OOGD) is a breakthrough in the concept of e-government services management which has become an international standard. The government, as a public institution, must be able to manage information and provide public rights through the implementation of OOGD. OOGD implementation will provide benefits and obstacles. The purpose of this study is to present the results of a systematic review related to the potential benefits and barriers to OOGD implementation. The Systematic Method use in this study by using the Reporting Item Options for Systematic Review and Meta-Analysis (PRISMA) methods. Based on summary and result classification, there are five categories of barriers to adopting Open and One Government Data such as data and technology, stakeholders, organizations, legislation, and policies.

Keywords: Open Government, One Data, Benefits and Barriers, Systematic Review

1. Introduction

Data, information, and knowledge have become a critical strategic asset for modern organizations. The public has perceived increased publication of data on the Internet[1]. Public sector organization maintain big data that represents a valuable resource that can be utilized by organizations and citizens society[2]. Data that has been provided by public organizations is reused by researchers, citizens, journalists, or other users. However, Open Government Data is not only the publication of data but also includes users' feedback to increase governmental services performance and mechanisms for monitoring using one data. Open, and one Government Data should regard as part of cross-boundary information sharing[3]. Therefore, the Open and One Government Data (OOGD) is a breakthrough in the management concept of government that has become an international issue. Open Government Data has the potential to provide many benefits for citizens, including the government itself, business, academic, and political aspect[4]. The need to improve the service of public administration has put at the centre of the discussion about One Data services[5]. The value of the open data depository is that it enabled the public institution around the world to use technical information source and proved cost-effective for several years to initiate their open government data applications[6]. Consequently, the government, as a public body, must be able to manage information and give the rights of the public through Open and One Government Data implementation to achieve its benefit. Various barriers are making the use of OOGD difficult for both users and providers[7]. The purpose of this paper is to investigate, summarize, and identify the benefits that can be achieved by publishing OOGD and the barriers to adopt it. An investigation based on some existing literature, several studies
that have done on the area of adoption of Open and One Data.

2. Material and Methods

2.1. Open and One Government Data

Many terms of Open and One Government Data can be defined as data owned by public sector institutions that are published on the Internet for free use, reuse and redistribution to improve public services [2]. Based on the Open Government Working Group, public data should be transparent to the public, except if these data pertain to national security, business secrets, individual privacy, or other issues [3]. According to [17], eight Principles have resulted, i.e., complete, primary, timely, accessible, machine-processable, non-discriminatory, non-proprietary, and license-free.

2.2. Importance of benefits and barriers analysis for OOGD

Public sector institutions work with limited resources and budgets. The prioritization of the OOGD activities based on the expected benefits must consider because a large amount of data can potentially publish [2]. The perceived benefits and external pressures influence the adoption of Open Government Data by government agencies [13]. Hence, the analysis of the potential benefits and barriers of Open Government Data should provide assistance in the development of a publication of OOGD [2].

2.3. Systematic review method

This systematic literature review was made using the preferred reporting items for Systematic Review and Meta-Analysis guides, also known as PRISMA. This methodology consists of 27 items checklist deemed essential for transparent reporting. PRISMA also divided into four steps, which are: identification, screening, eligibility and include. Papers selection phase is divided into four stages:

Step 1: The first stage is the stage of identification of literature through database searching. Sources of data were chosen from IEEE Xplore Digital, Science Direct, and Scopus. The source of papers selected is from journals, conferences or proceedings. The keyword "Open and One Data" has been used as a basis in the search term, which we combined with the following terms in our search strings: "Open", "One Data", "government", "benefit", and "barrier".

Step 2: The second stage is the stage of screening literature. Screening by eliminating the articles that were duplicated and excluded articles that were not related to open government data domain.

Step 3: The third stage is the stage to see eligibility of literature. In this stage, the articles were selected carefully based on the abstract of the papers and the full text if necessary. Articles that were not relevant to research questions were eliminated.

Step 4: In the last stage, performing the full-text review of eligible articles to make sure that the selected articles have the benefits that can be achieved by publishing OOGD and the barriers to adopting Open and One Government Data. The results obtained after analysis of 15 final articles. The summary of the selected article result is shown in Table 1.

| Table 1. The Number of Review Stages. |
|---------------------------------------|
| Scientific Database | Identification | Screening | Eligibility | Included |
|---------------------|----------------|-----------|-------------|----------|
| IEEE Xplore         | 101            | 28        | 14          | 7        |
| Science Direct      | 53             | 24        | 11          | 4        |
| Scopus              | 72             | 22        | 11          | 2        |
| ACM                 | 58             | 16        | 7           | 1        |
| ProQuest            | 45             | 11        | 5           | 1        |
| **Total**           | **329**        | **101**   | **46**      | **15**   |
2.4. Review Extraction and Synthesis
The process of review extraction and synthesis was conducted by reading full-text of each article carefully and organized the selected articles into spreadsheets analysis. The following items were extracted are study title, authors, publication year, and publishing location (conference proceeding, journals), the study to discover the benefits and barriers to adopting Open Government Data.

3. Results and Discussion
3.1. Article Selection
The article selection was made in four stages, as described in section 2. The process of research article selection is seen in Figure 1.

![Figure 1. A Systematic Review Stages.](image)

A systematic review stages initial search set by searching all online database journal by using the keyword. In the first stage, we identified 329 articles from the scientific databases. In the second stages, elimination was done by removing the duplicate articles and the irrelevance articles. Hence, 101 are includes in the third stage. In the third stage, by reading the abstract of each article, 55 articles are excluded because the articles were unrelated to the subject. Forty-six articles were sent to the last stage. The last stage, the criteria were applied considering the full text of the selected articles, therefore resulting in a set of 39 articles being further excluded.

3.2. Study Characteristics
This part describes the study characteristics of this systematic literature review. The study characteristics are including the type of paper and the year of publications. The majority of the studies were returned from the Journal of Government Information Quarterly, followed by Journal of Computer Law & Security Review. Then, the majority of the year of publications was 2017. The result of the characteristics shown in Table 2.
### Table 2. Number of Literature Selected

| Extracted Data | Distributions               | Number |
|---------------|----------------------------|--------|
| Journal       | Government Information Quarterly | 14     |
|               | Computer Law & Security Review | 1      |
| Publication year |                               |        |
|               | 2013                        | 2      |
|               | 2014                        | 3      |
|               | 2015                        | 3      |
|               | 2016                        | 2      |
|               | 2017                        | 5      |

### 3.3. Synthesis of Results

The result shows that many researchers have identified the benefits and barriers to adopting open government data based on several theories. These benefits can include synthesis and classification in five categories, as shown in Table 3. These categories are political, economic, social, technological, operational and technical benefits.

### Table 3. Benefit Categories of OOGD

| Category   | Benefits                                           | References                                      |
|------------|----------------------------------------------------|------------------------------------------------|
| Political  | Increased transparency                           | [2], [4], [5], [8], [9], [10]                 |
|            | Improved accountability                          | [5], [8], [9].                                  |
|            | Strengthen democracy                             | [5], [6], [11], [12].                          |
|            | Stabilization and legitimization of policies      | [1], [2], [3], [8].                            |
| Economic   | Increased economic growth                        | [1], [2], [3].                                  |
|            | Stimulation of innovation                        | [11].                                           |
|            | Development of new products and services         | [1].                                            |
| Social     | Improved government services                     | [2], [3], [5], [9], [11].                      |
|            | Public engagement                                | [1], [3], [8].                                  |
|            | Improved public relations toward government      | [2], [11].                                      |
|            | Insights into government mechanism               | [1], [2].                                      |
| Technology | The standardization of procedures in e-government | [9], [13]                                      |
| Operational and Technical | Fair decision-making by enabling comparison | [8], [14]                                      |
|            | Improved government data and processes           | [2].                                            |
|            | Rapid availability of data                       | [1].                                            |
|            | High qualitative data                            | [1].                                            |
|            | Sustainability of data                           | [12].                                           |

- Political benefits, this categorization is derived from the impact of the implementation of the Open Government Data in the political domain. This aspect consists of many benefits, i.e. increased transparency, improved accountability, strengthen democracy, stabilization and legitimization of policies.
- Economic benefits, there are economic benefits of adoption Open Government Data although the realization of e-government needs effort that consuming high cost and time. The economic benefits are increased economic growth, stimulation of innovation and development of new products and services.
- Social benefits, Open and One Government Data can create more social values by utilizing such data. Benefits that construct this categorization are improved government services, public engagement, improved public relations toward government and insights into government mechanism.
- Technological benefits, the publication of data by the government must require advanced technology. The main technological benefit is the standardization of procedures in e-government.
- Operational and technical benefits, the operational benefits were clustered together with the technical benefits to analysis the impact of Open and One Government Data. The benefits in this categorization are fair decision-making by enabling comparison, improved government data and processes, rapid availability of data, high qualitative data and sustainability of data

These barriers can inhibit synthesis and classification in four categories, as shown in Table 4. These categories are data and technology, stakeholders, organizations, legislation and policies.

| Category                  | Benefits                                                        | References       |
|---------------------------|-----------------------------------------------------------------|------------------|
| Data and technology       | Insufficient data standards                                     | [3], [9], [15], [13], [10] |
|                           | Lack of availability of open data                               | [11], [3]        |
|                           | Lack of data quality                                            | [2], [11], [8], [7] |
|                           | Absence of metadata                                            | [5], [9], [7]    |
|                           | Missing infrastructure to support OOGD                         | [11]             |
| Stakeholders              | Lack of awareness of open data and benefits                     | [2], [11], [11]  |
|                           | Requires trust and participation                               | [2], [11]        |
|                           | Technological skillset missing                                  | [11], [7]        |
|                           | Political environment                                          | [11]             |
|                           | No reaction from public organizations                          | [8]              |
| Organizations             | No formal oversight on the OOGD practice                        | [3]              |
|                           | Existing business models                                       | [11], [7]        |
|                           | Missing innovation orientation of public                       | [16]             |
|                           | Incompatible organizational processes                           | [11]             |
|                           | The diversity of power structures                               | [9]              |
|                           | Deficiency of talents                                          | [11]             |
| Legislation and policies  | Legislation on data sharing and licenses                        | [3], [5], [11], [13], [7] |
|                           | Limited legal obligation to publish OOGD                       | [2], [11], [15], [7] |
|                           | Privacy and security concern                                   | [2], [5], [11],[9], [8], [13], [7] |
|                           | Harmonization of legislation for unification of e-government platforms | [9]             |

- Data and technological barriers, the publication of data has data and technological barriers. The data and technological barriers to adoption OOGD are insufficient data standards, lack of availability of open data, lack of data quality, and absence of metadata and missing infrastructure to support OOGD.
- Stakeholder barriers, stakeholder barriers are related to the trust and behaviours of different public and private stakeholders. Barriers that occur from stakeholders are lack of awareness of open data and benefits, requires trust and participation, technological skillset missing, political environment and no reaction from public organizations.
• Organizations barriers, this categorization is derived from the problems of the implementation of the Open Government Data in the organizational domain. This categorization consists of many barriers, i.e. no formal oversight on the OOGD practice, existing business models, missing innovation orientation of public, incompatible organizational processes, the diversity of power structures and deficiency of talents.

• Legislation and policies barriers, several kinds of studies defined legal issues as a barrier, existing legislation related to sharing and licenses. The legislation and policies barriers implementation are legislation on data sharing and licenses, the limited legal obligation to publish OOGD, privacy and security concern and harmonization of legislation for the unification of e-government platforms.

4. Conclusions and Recommendations
This study was to develop an understanding of the benefits and barriers that were affected by the adoption of OOGD. A systematic review based on the PRISMA checklist was used to research this study. The benefits of OOGD can be classified into several categorizations, such as political, economic, social, technological, technical, and operational benefits. In addition, the results of the study also found five categories of barriers to adopting open data government such as data and technology, stakeholders, organizations, legislation, and policies. Based on this systematic review, the benefits that frequently achieve in the adoption of OOGD are increased transparency, economic growth, and government services. While studies about the barriers that frequently appear to adoption OOGD that obtained from this systematic review of our privacy and security concern, insufficient data standards, and legislation on data sharing and licenses. The future studies are to investigate whether there are still other benefits that can be achieved in the adoption of OOGD by citizen, business, and government. In the future, further empirical studies should be conducted to identify other barriers that probably have a negative impact in adoption of OOGD.

5. References
[1] P. Parycek, J. Höchtl, dan M. Ginner, "Open government data implementation evaluation," J. Theor. Appl. Electron. Commer. Res., vol. 9, no. 2, hal. 80–99, 2014, doi: 10.4067/S0718-18762014000200007.
[2] J. Kucera dan D. Chlapek, "Benefits and Risks of Open Government Data," J. Syst. Integr., hal. 30–41, 2014, doi: 10.20470/jsi.v5i1.185.
[3] B. Fan dan Y. Zhao, "The moderating effect of external pressure on the relationship between internal organizational factors and the quality of open government data," Gov. Inf. Q., vol. 34, no. 3, hal. 396–405, 2017, doi: 10.1016/j.giq.2017.08.006.
[4] K. Dos Santos Britto, M. A. Da Silva Costa, V. C. Garcia, dan S. R. De Lemos Meira, "Assessing the benefits of open government data: The Case of metu congreso nacional in Brazilian Elections 2014," ACM Int. Conf. Proceeding Ser., vol. 27-30-May., hal. 89–96, 2015, doi: 10.1145/2575401.2575422.
[5] S. A. Theocharis dan G. A. Tsihrintzis, "Open data for e-government: The Greek case," IISA 2013 - 4th Int. Conf. Information, Intell. Syst. Appl., hal. 248–251, 2013, doi: 10.1109/IISA.2013.6623722.
[6] M. Tootts, K. McBride, T. Kalvet, dan R. Krimmer, "Open data as enabler of public service co-creation: Exploring the drivers and barriers," Proc. 7th Int. Conf. E-Democracy Open Gov. CeDEM 2017, hal. 102–112, 2017, doi: 10.1109/CeDEM.2017.12.
[7] M. Beno, K. Figl, J. Umbrich, dan A. Polleres, "Open data hopes and fears: Determining the barriers of open data," Proc. 7th Int. Conf. E-Democracy Open Gov. CeDEM 2017, hal. 69–81, 2017, doi: 10.1109/CeDEM.2017.22.
[8] M. Kassen, "Globalization of e-government: Open government as a global agenda; benefits, limitations and ways forward," Inf. Dev., vol. 30, no. 1, hal. 51–58, 2014, doi: 10.1177/0266666912473620.
[9] K. Hardy dan A. Maurushat, "Opening up government data for Big Data analysis and public benefit," Comput. Law Secur. Rev., vol. 33, no. 1, hal. 30–37, 2017, doi: 10.1016/j.clsr.2016.11.003.
[10] D. Linders, "Towards open government development: Leveraging open data to improve the planning and coordination of international aid," Gov. Inf. Q., vol. 30, no. 4, hal. 426–434, 2013, doi: 10.1016/j.giq.2013.04.001.
[11] M. C. Jurisch, M. Kautz, P. Wolf, dan H. Krcmar, "An international survey of the factors influencing the intention to use open government," Proc. Anna. Hawaii Int. Conf. Syst. Sci., vol. 2015-March, hal. 2188–2198, 2015, doi: 10.1109/HICSS.2015.262.
[12] T. Vracic, M. Varga, dan K. Curko, "Effects and evaluation of open government data initiative in Croatia," 2016 39th Int. Conv. Inf. Commun. Technol. Electron. Microelectron. MIPRO 2016 - Proc., hal. 1521–1526, 2016, doi: 10.1109/MIPRO.2016.7522380.
[13] H. J. Wang dan J. Lo, "Adoption of open government data among government agencies," Gov. Inf. Q., vol. 33, no. 1, hal. 80–88, 2016, doi: 10.1016/j.giq.2015.11.004.

[14] A. Hjalmarsson, N. Johansson, dan D. Rudmark, "Mind the gap: Exploring stakeholders' value with open data assessment," Proc. Annu. Hawaii Int. Conf. Syst. Sci., vol. 2015-March, hal. 1314–1323, 2015, doi: 10.1109/HICSS.2015.160.

[15] J. Di dan W. Li, "Study on the government strategy of transformation from information publishing to data opening," 2017 IEEE 2nd Int. Conf. Big Data Anal. ICBDA 2017, hal. 432–436, 2017, doi: 10.1109/ICBDA.2017.8078856.

[16] T. E. Pidgeon, G. Wellstead, H. Sagoo, D. J. Jafree, A. J. Fowler, dan R. A. Agha, "An assessment of the compliance of systematic review articles published in craniofacial surgery with the PRISMA statement guidelines: A systematic review," J. Cranio-Maxillofacial Surg., vol. 44, no. 10, hal. 1522–1530, 2016, doi: 10.1016/j.jcms.2016.07.018.

[17] B. Ubaldi, "Open Government Data: Towards Empirical Analysis of Open Government Data Initiatives," OECD Work. Pap. Public Gov., vol. NO.22, no. 22, hal. 61, 2013, doi: 10.1787/5k46bj403s7-en.

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