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Research paper

An investigation of application developer's awareness and attitude towards open government data in Malaysia

Tong Wu [1], Akbariah Mohd Mahdzir [1] *

[1] Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Malaysia
**Corresponding author E-mail: akbariah.kl@utm.my*

Abstract

Governments across the globe are publishing official datasets and making it readily available online as open government data (OGD). Leaders of the OGD movement sought to engage developers to make information available not only for greater transparency and accountability but also incorporate it into applications, services and business developed to serve the public and foster social and economic growth. Given rising concerns over the OGD movement, Malaysia also navigates new frontiers of this digital revolution and embrace openness as part of the public effort across government sectors. However, much more efforts need to be done in order to help translate the data openness into practical results. In this regard, this paper briefly reviews the content of the Malaysia government data portal and conducted a preliminary survey gathered from various application developers aim to investigate the level of awareness and attitude based on their perceptions towards OGD in Malaysia. Presently, the results indicate that OGD in Malaysia is still scattered and the awareness among developers is still slim. Many developers are still reluctant and uncertain concerning the pursuit of OGD in their current projects. These findings argue that the potential of OGD is real, but it requires more positive promotion and improvement to enhance the level of awareness and civic consciousness so that successful application would take off in the future.

Keywords: *Application; Awareness; Economic impact; Open Government Data (OGD); Open Data (OD).*

1. Introduction

The exponential growth of available and potentially valuable data compounded by the Internet, social media, digital devices, Internet of Things and cloud, or the tremendous progress in areas such as artificial intelligence, machine learning and data mining are a testament to the current weight of data in every segment of economy and society (John Walker, 2014). Data has notably been acknowledged as a valuable asset offers huge potential that can be commercialized (Savenkov, 2015). By the same token, governments are one of the largest producers and collectors of data in various domains. Government Open Data (OD) is a tremendous resource that is gaining an increasing amount of attention these days. Governments are increasingly opening up their data to the public in an open format, which has resulted to the increase of transparency and accountability, citizen engagement and public value creation (Attard, Orlandi, & Auer, 2016). While the OD revolution is not just about opening the data, it is also about setting up conditions for data to be accessed and re-used to achieve its full potential (Lakomaa & Kallberg, 2013). While unlike big data characterized by its size, the OD is more manifest by its usage (Slibar, Oreski, & Klicek, 2018). By publishing such data, the leaders of the OD movement sought to encourage developers to make the information not only consumable for political transparency but to a great extent to innovate upon and incorporate it into applications, services, and businesses (Melissa, Almirall, & Wareham, 2016).

The pioneer of the OD movement was mainly leading by matured democratic nations like the United States, United Kingdom, and the European nations. According to the Open Data Barometer developed by the World Wide Web Foundation, the median score among the Association of Southeast Asian Nations (ASEAN) member countries fall short in comparison with the OD pioneers, and Malaysia ranked 53th, which scores second lowest of all members among ASEAN nations (OpenDataBarometer, 2017). Apparently, the OD movement is still at its infancy in Malaysia. Open data projects and developments are mostly at the pioneer stage. Among the examples of OD projects in Malaysia are majorly led by Malaysian Administrative Modernization and Management Planning Unit (MAMPU) which aim to harness the power of OD for enhanced public service delivery and accountability. To move towards open data initiative and leveraging on existing datasets to derive meaningful ideas, insights, and innovation, the mere existence of centralized data portal from data suppliers is insufficient to realize the desired democratic and economic motivations (Chan, 2013). What is needed is the participation and collaboration of businesses and citizens in using upon data. Therefore, more efforts are needed and should be directed towards realizing the potential from the practitioners' side (Janssen, Charalabidis, & Zuiderwijk, 2012; Ofe & Sandberg, 2016).

In this paper, our objective is to review the government OD portal and investigate the awareness and attitudes among application developers towards OD in Malaysia. Developers are selected because they are the ones initiating the project and have predominant influence over the overall project direction. Accordingly, to the best of our knowledge, the study of OD research is relatively sparse when it comes to Southeast Asia and for Malaysia is still at its very infant stage; and the empirical study from the OD utilization through developer's perspective is not existing at the moment. As a result, we believe that the contribution of this paper will fill a gap in the OD literature overall, and add value to Malaysia context specifically.

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2. Open government data for application development

In the current digital economy, almost every business domain has some products, services or business analysis methods to a certain aspect, which could apply data or data-related process and services. Governmental open data projects in different countries have created emerging opportunities for private companies (Lindman & Tammisto, 2011). Several studies in other national contexts have given input to the deployment of OD. Gonzalez-Zapata and Heeks (2015) indicate that disregarding the enhancement of existing businesses, OD activists see the fostered innovation and entrepreneurship as a sufficient economic impact from the use of OD. By conducting a survey to discover how Finnish organizations are interested in OD and its applications. In a similar realm, Herala, Kasurinen, and Vanhala (2016) discuss the perceptions of OD in business development within the Finnish context. Their data consisted of 45 survey responses gathered from numerous Finnish companies in different business domains, and the results indicate that open data offers potential economic value in different ways, ranging from application development to process efficiency. Kitsios, Papachristos, and Kamariotou (2017) studies OD ecosystem and identifies how value is created from OD among different actors within the ecosystem. According to them, the cooperation among actors is necessary on the commercialization of application development in order to help to expand their application and maximize economic growth. In addition, it is suggested that the quality and permanency of data is what must be ensured before any application or service start using OD. Therefore, new versions of contracts that guarantee the permanency of service developers are required.

To leverage the OD, several governments conduct hackathon events to engage civic-tech developers and citizens to participate to come up with societal applications based on the datasets provided in governmental data portals, which could benefit the city and its people. The goal is to connect application developers with government entities and promote openness, participation, and innovation (Mutuku & Mahihu, 2014). For instance, the government of India conducted an #OpenDataApps challenge aim to build applications by using data from the Department of Agriculture that helps users decide recipes based on real-time food prices (Vasa & Tamilselvam, 2014). The New York Big Apps competition was held by the New York City Department of sanitation together with the participated restaurant to spur new and innovative apps to improve city processes. The government of Shanghai has committed to publishing data on portals since 2014 and organized several competitions, namely Shanghai Open Data Apps (SODA) for application developers to apply their solutions around city problems and created values upon open government data (Lyu & Zheng, 2017).

It was evident that OD would create potential opportunities for the success of developing and delivering OD applications (Melissa et al., 2016). However, studies of the current status of OD and its applicability is still a scarce concept in Malaysia. The attention from the Malaysian government has been approved that the OD plays a critical role in the digital economy for innovation and economic growth. The government of Malaysia has joined this global trend by recognizing the potential of OD on improving information and communication technology (ICT) within its public sector, with a specific focus on OD and e-Government and (WorldBankGroup, 2017). However, though Malaysia has made several good signs of progress in moving towards a more open environment in supporting a more transparent and accountable government, more work is required to align the actual practice and experience with OD toward greater impact to serve the public and foster economic growth.

3. Malaysia open data portal

The government of Malaysia has joined the global trend by recognizing the potential of OD and placing a strong emphasis on improving ICT with the public sector, and with a specific focus on open data and e-Government. This focus and the aim to harness the power of data was carried forward in the "Eleventh Malaysia Plan" (2016-2020), which clearly expresses the country's intention towards data-driven governance to harness the power of OD for enhanced public service delivery and accountability through greater transparency (WorldBankGroup, 2017). In order to move ahead with these initiatives, Malaysia Administrative Modernization and Management Planning Unit (MAMPU) has been assigned responsibility to drive forward the digital government agenda and plays a leading role as an information broker in consolidating data between public and private stakeholders. The Malaysia national repository for OD was set up and is available at the domain name data.gov.my. All available datasets should be published there along with their metadata and under legal guidance. In this section, we briefly present a review of this OD repository.

Malaysia's OD portal listed 780 datasets in January 2016 with the portal available in Malay language and mostly non-machine readable format (Stagars, 2016) to 10,633 datasets available in both Bahasa Melayu and English language, and with a large percentage of machine-readable format as of 1st of November 2018. Notably, Malaysia went through a significant improvement. These datasets are mainly provided by local and regional authorities and ministries and cover 18 areas of datasets, including budget, legislation, public contract, crime, statistics to name a few. Among all the available datasets, 7,421 of them are organized in categories as shown in Table 1, while the rest of them do not belong to any group.

Table 2 presents an outline of the formats of the published open datasets. Most datasets are published in XLSX and CSV formats, with XLS and JSON follows up. Regarding data licensing, most datasets published are under an open license, with Creative Commons Attribution for most (10631), as shown in Table 3.

After reviewing the Malaysia government OD portal, despite the lack of several key datasets categories, on the positive side, the availability of open data exists in a data-rich environment. The government entities have put efforts by recognizing the potential of OD and placing a strong emphasis on improving the usability and legal guidance towards more accessible, usable and transparent public data deliver for data users.

Table 1: Groupings of Datasets in Data. Gov. My

Clusters	Number of Datasets
Others	2824
National statistics	1746
Education	1187
Census	886
Agriculture	804
International trade	442
Health	452
Environment	381
Mapping	250
Transportation	249
Government spend	195
Company registration	173
Crime	126
Budget	119
Legislation	96
Land ownership	74
Public contract	56
National election	5
Total	10,065

Table 2: Formats of Datasets in Data. Gov. My

Format	Number of datasets
XLSX	8361
CSV	2212
XLS	825
JSON	391

XML	369
HTML	168
ODS	100
Others	81
Total	12,507

Table 3: License of Datasets in Data. Gov. My

Licenses	Number of datasets
Creative Commons Attribution	10,568
Open Data Commons Attribution	27
Other (Open)	22
Creative Common Attribution Share-alike	9
Open Data Commons Public Domain	2
Creative Commons Non-commercial	2
Other (Public domain)	1
Others (Non-commercial)	1
Open Data Commons Open Database	1
License not specified	1
Total	10,634

4. Research methodology

Awareness and knowledge are initial stages for practitioners to understand OD movement as well as concerning the pursuit of OD in their projects. It is expected that the developers would have been aware of the concept and begun incorporating it into their projects. The field of this study was undertaken to investigate the present awareness and knowledge of the Malaysia developers regarding OD movement and their attitude towards it.

This study is qualitative in nature, which is applied optimally for situations that aim to explore a phenomenon that has little research done on it, enhance understanding and expand knowledge (Creswell & Clark, 2007). A survey focused on developers in mobile and web application was designed and carried out. The questionnaire was distributed through social media, forums and developer communities located in the area of Kuala Lumpur (capital city of Malaysia) and Selangor. These two areas were selected due to a large portion of developers work and have their main offices located and operated there. The questionnaire structure comprised two main sections: the first section included demographic questions such as age, gender, educational background; and the second section include questions on developers' attitude and knowledge towards open data knowledge and reuse, as shown in Table 4.

In total, we received 45 qualified responses to the questionnaire with 9 respondents being female and the remaining 36 being male. Their distribution in age groups was arranged as follows: 13 respondents were in the range of 20-29 years old, 28 respondents were between 30 and 39 years old, and 4 participants aged more or equal to 40 years old. Regarding their educational background, 11 participants had diploma degrees, 29 respondents had a bachelor degree, 4 respondents had a master's degree and 1 respondent had completed studies at a Ph.D. level. Due to the small respondent volume, this study does not expect to reveal statistically significant findings. However, as of the fact that the sample was not random but it was purposefully targeted towards application developers, we are convinced that the reported results could be seen as initial indications and served as the foundation to support more extensive research efforts in future.

Table 4: Groupings of Datasets in Data. Gov. My

Questions
1) Are you aware of the movement towards open (government) data in Malaysia?
YES/NO
2) Have you ever browsed the national Open Data Portal (data.gov.my)?
YES/NO
3) Have you ever developed any application using public/government open data?
YES/NO
4) Have you ever applied to government entities to receive data in order to use them in application development?
YES/NO
5) How do you assess the availability of the data published in the national data portal (data.gov.my)?
Not at all/Partly/Meet/More than/satisfactory
6) How do you assess the quality of the data published in the national data portal (data.gov.my)?
Not at all/Partly/Meet/More than/satisfactory
7) Which data formats do you consider as usable and user-friendly for application development? (multiple choice)
PDF/XML/CSV/DOC/JSON/ODF

5. Results and discussion

This section present the results of the participants' answers to the questions of the main part of the questionnaire. The first question was "Are you aware of the movement towards open (government) data in Malaysia?" As shown in Fig.1, the results show that only 33% (15) of the respondents have knowledge on the OD in Malaysia, while the rest 30 of them had never heard nor have knowledge around government OD movement in Malaysia.

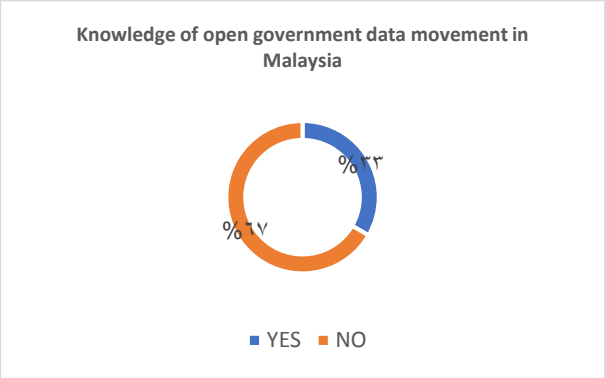


Fig. 1: Respondent Answer Distribution on Question 1.

The second question was "Have you ever browsed the national Open Data Portal (data.gov.my)?" The answer for this question represent a quite closer result. With 44% (20) of the respondents have positive confirmation, and the remaining 25 of them acknowledged that they had never browsed data from government OD portal in the past.

In Fig.3 we can see that of the participants replied for the question "Have you ever developed an application using public/government open data?" and 24% of the respondents respond affirmatively, while the rest 76% of them had never exploited government data for the applications development. Following this question, 44% of participants had once applied for the acquisition of data from public or government related entities (Fig.4).

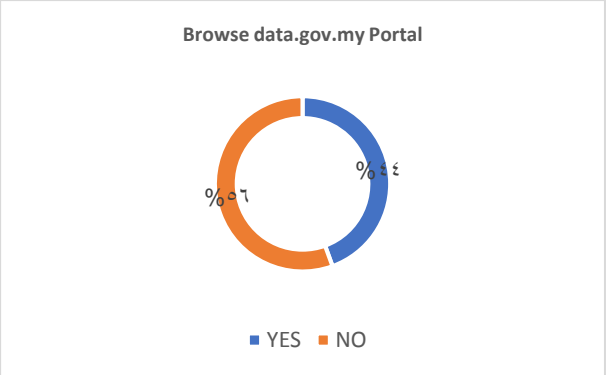


Fig. 2: Respondent Answer Distribution on Question 2.

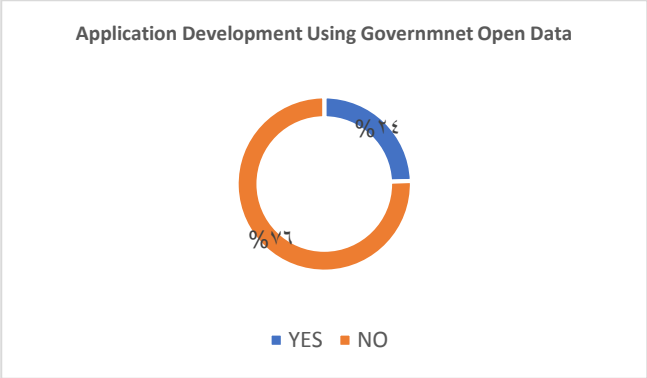


Fig. 3: Respondent Answer Distribution on Question 3.

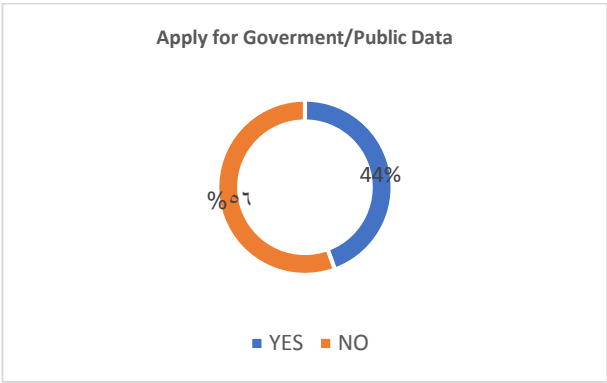


Fig. 4: Respondent Answer Distribution on Question 4.

Among the participants who confirm positively access to data portal, questions were asked to evaluate the availability of datasets published in the government data portal. The results are presented in Fig.5. Additionally, participants asked to assess the quality of datasets provided in the data portal. We can see that generally, participants are satisfied with the data quality provided, with partly satisfactory take the most vote (65%). Yet still left 11% of them are dissatisfied of the quality where the data portal offered. Their answers are presented in Fig.6.

Finally, most of the developers prefer OD to be published in a structured and machine-readable format, with CSV, XML and JSON take the most votes (Fig.7). A statistical analysis (Chi-square tests) of the responses revealed a correlation between respondents that applied for data to government entities and applications exploiting open data ((1) =4.719 p=0.030). Additionally, a correlation was also found between those who are aware of the OD movement and those who have visited the open government data portal ((1) =5.302 p=0.021). Other than this, there are no correlations were found.

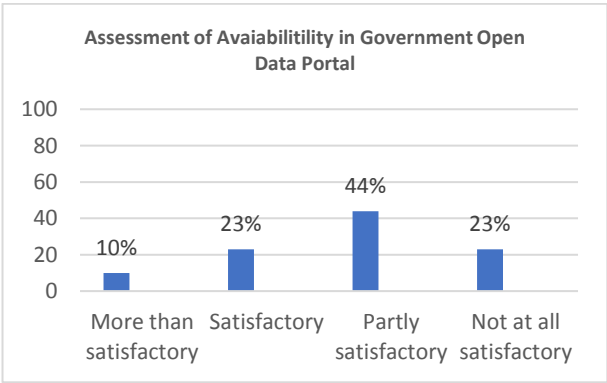


Fig. 5: Respondent Answer Distribution on Question 5.

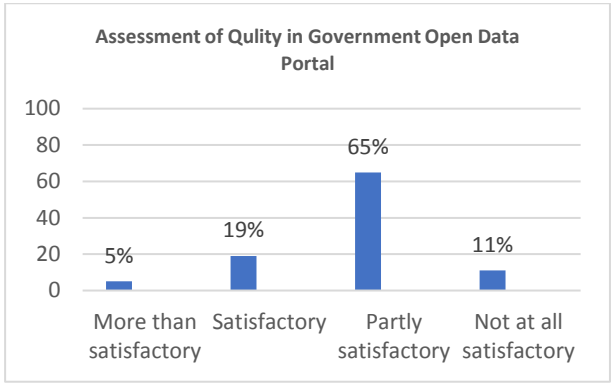


Fig. 6: Respondent Answer Distribution on Question 6.

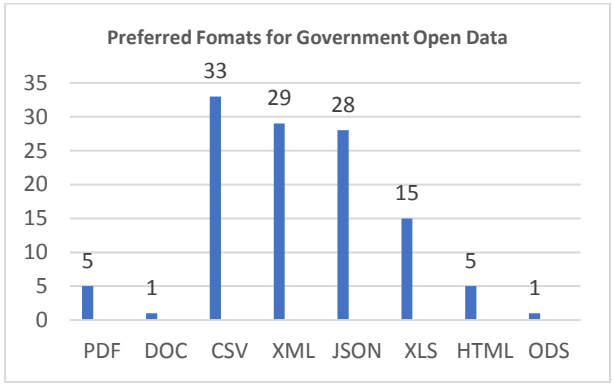


Fig. 7: Respondent Answer Distribution on Question 7.

6. Conclusion

Looking at the willingness of the government towards the digital economy for innovation and growth, OD has played an important role in supporting a more transparent and accountable government, as well as fostering economic growth. However, although Malaysia has made some good progress in moving towards a more opened environment, more work is required to align the implementation with OD into real-world practices, and many steps are waiting to achieve by the national strategy for OD. At the policy and legal level, there is no single legal framework in the country that determines whether data can be opened or not. This may lead to uncertainties to sustain the data publication. Additionally, it may create a fragmented environment for both government and other stakeholders on how data can be requested, shared and used. This situation has also been highlighted in the result of our study. From the analysis, we understand that the awareness of government OD movement among developers is quite low in Malaysia (33%) with a slightly higher number of participants (44%) browsed the national data portal. This implies that application developers are not very much familiar with the OD trend happens in Malaysia, but more of them are aware of the existence of the data portal.

When it comes to real usage, the result is less prominent. This proves the fact that making data available does not guarantee it will be used effectively. With only 24% of the developers have exploited data from government portal into their application development. This infers a real gap between the data provision and its reusability from the user group. However, higher appears the percentage of developers who have applied for the provision of data by public entities (44%). This seems that developers are looking for more information and higher priority datasets which they may not be able to find through the existing data portal. With participants who have browsed the OD portal seems to be relatively satisfied with the quality of available datasets, from their answers it can be determined that there is still room for improvement. Despite the fact that data format and license supplied by government data portal is of a good condition with machine-readable format and open license applied at most, the data update frequency, accu-

racy, and potential to link to other datasets also play significant roles when data users consider to utilize such data or not into their application development (Eckartz, Van den Broek, & Ooms, 2016). Finally, regarding data formats that the participants consider applicable of published open data, the choices include mainly as machine processable and structured formats such as CSV, JSON, and XML which has been revealed high.

In general, the results confirm that the actions for promoting OD awareness and concept should be further addressed on the national level for successful adoption practices. In the future, the results of this study can be used to assist policy guidelines towards OD and OD suppliers to further optimize their strategies of publishing data more efficiently to developers with higher quality and consistency. Within the OD context, several areas offer opportunities for additional studies that were not the objectives of this research, such as perceptions towards OD in business, opportunities, and barriers for commercial OD value creation. Changes resulting from this open phenomenon will contribute not only to the growth of data driven innovation, but also will evolve a new forecast of the direction of digital economic development. The researchers suggest combining different concepts. Presented the awareness and current trends towards OD has a starting point for discussion for value generation to create new and innovative services. Hence, research on OD in other areas will open the way for many future endeavors in Malaysia context.

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