

Dimensions of Open Government Data Web Portals: A Case of Asian Countries

Sanad Aarshi¹, Babur Hayat Malik³, Fariha Habib⁴,
Kinza Ashfaq⁵, Irm Saleem⁶
Department of CS & IT
The University of Lahore, Gujrat, Pakistan

Usman Tariq²
Department of Business Administration
University of Punjab, Pakistan

Abstract—Citizen Factors of the open government data are being explored in this study in the selected Asian countries. As per the open data availability countries have been selected on global open data index and well-structured open government data portals of Asian countries. To identify and analyze the differences of selected Asian countries through the principals of open government data which are eight in number, analysis the portal activities and observed the Open government data benefits. In analysis, the datasets of selected countries have been analyzed for the purpose of defining the portal activities. These activities include the Visitants, Suppliers, Applications, Developments, generation of Knowledge and overall resources utilization. Open government data of these countries are examined through web contented analysis, in order to understand the open government data's status. This study also describes different challenges on how adoption, promotion and acceptance of the open government data and portals have been carried out by Asian countries. Moreover, there are some recommendations according to the key problems and status in the open government data initiatives. Also, the study has limitations regarding the number of countries and future directions emphasize the need for Open Government Data analysis in less developed countries also.

Keywords—Transparency; accountability; portal activities; adoption; principals of open government data which are eight in number; benefits of open government data; recommendations

I. INTRODUCTION

In the last era there have been a lot of investments and activities in the public sectors to opening up that information to the public, for political, scientific and commercial purposes. For scientific research this information can be fruitful in numerous different domains e.g. administrative, political, management sciences, economic, and social [1]. Moreover, journalists and citizens can use it for achieving well and deep understanding of visions into the happenings and government agencies spending's. These results should be in mature, evidence-based and effective political processes. As well, open government data can have an optimistic impact on innovation and the economic growth, as they empower the development of new products, applications and services [2]. The data reusability and transparency are the two major goals. The few are, there is the Europe's Public-Sector Information Directive in the year 2003, along with the initiatives of the United State President's Obama in the year 2009, Open Government Partnership in 2011, and the Open Data Charter G8 in 2013 [3].

National and international administrations along with the enormous political leaders have acknowledged progressively various benefits of Open Government Data. David Cameron, Prime Minister of England in May 2010, stated that his government intended to use the open data in a tactic to decrease the deficit and get improved assessment for money in the public funds expenditures, and also to obtain economic improvements substantially through by the public data establishment which has allowed companies and nonprofit governments to build inventive websites and applications [4].

There is huge lagging behind in terms of open data adoption by Asian countries at governmental level, in the inclusive data availability and in the usage of open data for the transparency, accountability and collaboration. In many Asian countries lots of datasets is available on their national portals and according to these datasets a very less numbers of applications and services are developed that are identified in this study, yet in addition information utilization level made accessible, as appeared by the altogether conversion rate of different dataset-to-application applied on the Asian countries. Adoptive Open Government Data phenomenon has led us to conclude that although it is important to open the data, which is not enough. However, it is also pivotal to promote the reutilization of the open data by the civilization and the data that is provided on the countries portals are sometimes not open.

This problem has been found hitting the Asian countries leading these countries facing problems regarding policy making at the local level and international level. For the purpose of resolving these issues it is pivotal eliminating the issue in the near future.

Moreover, this research focuses the open government data in Asian countries including Taiwan, Thailand, Hong Kong, Japan, Singapore, Israel and Bangladesh. In the past studies, these Asian countries have not given due consideration with regard to the open government data therefore, this study discusses the matter in the context of Asian countries. Researchers have given emphasis on the open government data to be studied further as the importance of it is boosting with technological advancements.

The objectives of this study include:

- To explore open government data portals in Asian countries.

- To conduct open government data's content analysis and to providing the portal activities of Asian countries.
- To analyze the open government data's challenges faced by Asian countries.
- To provide recommendations for open government data in Asian countries.

To the theoretical field, this research would be a great contribution and to practical field as well. This will enrich the literature regarding open government data in Asian countries on one side and on the other side it would enhance the ability of general government to evaluate the activities of government leading them playing pivotal role in country development through influencing political decisions.

This paper describes the comparative study of open government data emergence in the Asian countries. After this introduction, Section II this paper discuss the open government data and the adoption of the open government data and then the adoption in the Asian countries and Section III there is the research methodology of selection of eight countries of Asia and the criteria used for analysis in Section IV there is data analysis phase and different technical related challenges in the Asian countries and Discussion. In Section V there is conclusion and discussion, and in Section VI there is some recommendations to overcome open government data's challenges in the adoption.

II. OPEN GOVERNMENT DATA

In the recent years, lots of open data activities sprung up around the whole world, with transparency and data reusability as two of the most important aims [5]. This Open Data movements, while recently, that initiated in order to promote the research and to discover obstacles and benefits, requirements and the technical services to promote values creation and the policy issues and implications. According to the researchers "Open government is related all around in order that transparency can be improved and also public affair's accountability" and consequently opportunities can be improved for citizens so that political decisions might have effect [6]. However, open government data's aspect of content analysis has been ignored in this research. Researchers have argued that a potential prerequisite for this is "open data", which denoted to the awareness that government data ought to be freely accessible [7]. Based on the literature, open data however, public sector collaboration is not covered with its residents, only the additional information's establishment is meant by the open data [8]. Effectually, governments comprehend the utilization of Open Government Data with the perception of endorsing greater transparency, participatory and collaboration with the other different sectors of society [9]. According to researchers those are the important factors of Open Government Data for citizens [10]. Nonetheless, the principles of open government data have been ignored in this study (Table I).

TABLE I. FACTORS OF OPEN GOVERNMENT DATA

Factors	Description
Transparency	The information that what government is providing and doing is depicted in the transparency along with the accountability promotion. Moreover, Federal government maintains the additional information. That has two key aspects: citizens have the right to access info from public agencies on request, government have the responsibility to publish records of policies [11].
Participation	Engagement of public has improved the efficiency of the government where quality of decisions has also been improved. Administrative departments and organizations should offer citizens amplified chances to contribute in policy-making and to deliver their government with the welfares of their mutual skill and info.
Collaboration	In the governmental work Collaboration vigorously engages citizens. Administrative organizations and departments should utilize inventive methods, systems and tools in order to collaborate among themselves, through all stages of government, and with businesses, non-profit organizations, and private sectors individuals.

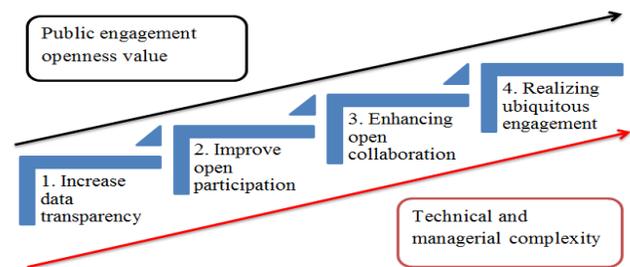


Fig. 1. The factors of open government data for citizen.

As appeared in Fig. 1, as the execution stages increases, the public involves with progressively more in government tasks and openness of government work upsurges, in this manner creating more greater values and advantages for both government and people in general. The researchers have debated as the implementation stages upsurges, the procedural and administrative unpredictability of the open government initiatives will also upsurge. However, these studies missed the aspect of challenges and recommendations for the organizations on small scale and for the country on the larger scale. Subsequently, organizations should hope to confront more prominent challenges and hazards in later implementation stages that are challenges are discussed later in Section IV.

A. Adoption of Open Government Data

Movement of the open government data has taken upward trend since last years. The Open government data perception is not just a political idea, but also an innovative government facility that is provided through Information Technology platforms. Based on the views of researchers provided in previous research it has been illustrated open government data as an entity on political level which speculated the right of

citizens in order to have governmental information freely accessible via the use of digital government platforms on local as well as federal level [12]. Nevertheless, this definition does not include the elements of transparency and accountability. Open government data can be perpetuated as “the web portal which is official in nature, accessible on local and federal levels and thus aims to make the datasets which are understandable and readable in machine format with the help of internet” [13]. One of the important principals in literature is the machine readable format for open government data’s implementation. To guarantee that published data are completely usable and accessible by the end users, it is crucial that format should be machine readable [14]. These definitions juts focus the factor of data availability and analysis while decision making factor of citizen participation is ignored.

Based on the reports the first open government data portal was launched in USA in May 2009. This platform fortified government, institutions and cities to publish their ancient datasets; hence increase the aptitude of citizens to effortlessly find, share and use the composed data by government [15]. In context to describe and to merge the concept of open government data, a working group of thirty people met in California in 2007 to mature what was called the “Eight Principles of Open Government Data”, which curved to be factors for assessing open government data initiatives [16]. In the light of views presented by previous studies by providing the comprehensive and useful information and guidance, the following principles are highly recommended to provide best practices to avoid the publication of low and poor-quality data and also help in publishing the useful and meaningful data over the globe [17]. Open Government Working Group in Meeting was agreed on following principles, which was held in California in December 2007. Below is the illustration of principles [16]:

- 1) *Completeness of data is necessary*
- 2) *Data should be Primary*
- 3) *Data should be Timely*
- 4) *Data should be Accessible*
- 5) *Machine Process able data is necessary*
- 6) *There should be Non-Discriminatory access*
- 7) *There should be Non-Proprietary formats of data*
- 8) *There should be License-free data*

A couple of more facts were introducing by keeping the view of technological and political nature of data were published by the governments. However, the use of these principles for the purpose of eliminating the open data challenges has not been discussed in previous research.

A remarkable breakthrough was occurred during the Presidency of Barak Obama in 2009 when, it was recognized that open government data should be able to boost up the public interest and involvement for the transparency of the system for the enhancement in quality, efficiency and effectiveness of the public system. Reportedly, As a result of that United States introduced the Data.gov in May 2009 was known as the quality step of the OGD movement to improve the delivery of data about the federal matters for the research purpose by keeping view of government’s structure [18].

According to studies this concept was quickly penetrated into the European governments, and as a result of this revolutionary step the United Kingdom provided its online platform for the availability of data to the public [19].

B. Adoption of Open Government Data in Asia

Development in open data access to public is spreading all across the globe and many under developing countries are adopting this concept. Several countries have centralized portals but there is a need of getting different to hire staff and provide budget for the secure and successful publishing of data.

There is huge lagging behind in terms of open data adoption by Asian countries at governmental level, in the inclusive data availability and in the usage of open data for the transparency, accountability and collaboration. There are still some countries that don’t have their open data portals, mention below (Table II).

TABLE II. OPEN GOVERNMENT PORTALS IN ASIAN COUNTRIES

No.	Countries	Portals
1	Japan	http://www.data.go.jp/
2	India	https://data.gov.in/
3	Indonesia	https://data.go.id/
4	Thailand	https://data.go.th/
5	Singapore	https://data.gov.sg/
6	Philippines	https://data.gov.ph/
7	Hong Kong	https://data.gov.hk/
8	Malaysia	www.data.gov.my/
9	Korea	https://www.data.go.kr/
10	Pakistan	https://data.org.pk/
11	Iran	http://iranopendata.org/en/
12	Israel	https://data.gov.il/
13	Myanmar (Burma)	Not available
14	Sri Lanka	http://www.data.gov.lk/
15	Cambodia	Not available
16	Taiwan	https://data.cdc.gov.tw/en/
17	Saudi Arabia	www.data.gov.sa/en
18	Bangladesh	http://data.gov.bd/
19	Nepal	http://data.opennepal.net/
20	Afghanistan	Not available
21	United Arab Emirates	https://bayanat.ae/
22	Uzbekistan	https://data.gov.uz/ru
23	Oman	http://www.oman.om/
24	Bhutan	Not available
25	Bahrain	www.data.gov.bh/
26	Brunei	https://www.data.gov.bn/
27	Timor-Leste	http://timor-leste.gov.tl/

To publish elementary information Open government portals can be used, or electronic systems can be used to generate and continuation on specific requests. Additionally, the existing developments on opening government data boost information sharing using the open formats and standards that can be machine readable, so allowing the reuse and the exploitation of data to create public values. From the software perspective, the foremost development towards open government data was the development of portals for the open data providence. Researchers have found that they permit data detection through classify the resources, search and ability to exchange and use of information through well-documented

APIs [20]. But these portals have been reported as confronted several challenges regarding the open data usage and these challenges have not been provided in literature (Table III).

TABLE III. RANKS, SCORE AND OPENNESS ACHIEVED BY ASIAN COUNTRIES IN THE GLOBAL OPEN DATA INDEX OF 2017 (SOURCE [36])

No	Countries	Rank	Score	Openness	Asian region
1	Japan	16	61%	26%	East Asia
2	India	32	47%	13%	South Asia
3	Indonesia	61	25%	0%	Southeast Asia
4	Thailand	51	34%	6%	Southeast Asia
5	Singapore	17	60%	33%	Southeast Asia
6	Philippines	53	30%	0%	Southeast Asia
7	Hong Kong	24	51%	20%	East Asia
8	Malaysia	87	10%	0%	Southeast Asia
9	Korea	*	*	*	East Asia
10	Pakistan	72	19%	0%	South Asia
11	Iran	67	21%	0%	Middle East
12	Israel	41	41%	13%	Middle East
13	Myanmar (Burma)	94	1%	0%	Southeast Asia
14	Sri Lanka	*	*	*	South Asia
15	Cambodia	74	17%	0%	Southeast Asia
16	Taiwan	1	90%	80%	East Asia
17	Saudi Arabia	*	*	*	Middle East
18	Bangladesh	61	25%	6%	South Asia
19	Nepal	69	20%	0%	South Asia
20	Afghanistan	84	12%	0%	South Asia
21	United Arab Emirates	*	*	*	Middle east
22	Uzbekistan	*	*	*	Central Asia
23	Oman	81	14%	0%	Middle East
24	Bhutan	64	23%	0%	South Asia
25	Bahrain	*	*	*	Middle East
26	Brunei	*	*	*	Southeast Asia
27	Timor-Leste	*	*	*	Southeast Asia

Asterisk (*) are those countries that don't have any data or information on the Open Government Data Index, that's the Global ranking system.

Different countries have attained enormous echelons of open government data growth, and that can be perceived from the various ranks of positions attain on Index by respective country on the Open Government Data. Based on literature, that is some annual rankings which are being published by Open Knowledge Foundation from which countries are evaluated around the whole globe comparative to its index of OGD growth [21]. There are some facts that were gathered from some public sources to analyze the availability of government data according to the definition of Open Data. Conversely, the activities of these portals and benefits of the open government data to the Asian countries have not been given the consideration.

III. RESEARCH METHOD

As described earlier the objective of this research is to analyze the open government data portals and content analysis

in Asian countries with the description of challenges and recommendations provided.

This portion of paper describes that how the measurements were taken and which areas were targeted, how those areas were adopted and which criteria was use for the analysis.

A. For Analysis Selection of Countries

Three decisions guided the selection and identification of the initiatives in order to analyze in the paper. The 1st decision was to select the countries which have not their proper open government data portals. In the 27 Asian countries 4 countries (Myanmar, Cambodia, Afghanistan and Bhutan) were eliminated.

The 2nd decision was to base the identification of the countries on the list of Global open data index and the ranking published by open knowledge foundation (<https://index.okfn.org/place/>). In this global ranking system some countries have not their governmental data. In the remaining 23 countries we eliminate 8 more countries (Korea, Sri Lanka, Saudi Arabia, United Arab Emirates, Uzbekistan, Bahrain, Brunei and Timor-Leste). Therefore, 15 countries have been selected which have their open government data on their web portals and also ranked in global open data index. Unfortunately, when the analysis started, it was observed that 7 countries (Indonesia, Philippines, Malaysia, Iran, Pakistan, Nepal and Oman) has some information on their governmental portals and ranked on the global open data index but they are not opened to their public. When we were in the analysis phase the Indian open government data portal was not active so we also discard it.

After all these decisions, finally seven countries were selected through their well-structured open governmental data portals and the ranking on the global open data index and openness. Those seven countries were Taiwan, Singapore, Japan, Hong Kong, Israel, India, Bangladesh and Thailand (Table IV).

TABLE IV. LIST OF COUNTRIES/INITIATIVES ANALYZED

No.	Countries	Portals
1	Taiwan	https://data.cdc.gov.tw/en/
2	Singapore	https://data.gov.sg/
3	Japan	http://www.data.go.jp/
4	Hong Kong	https://data.gov.hk/
5	Israel	https://data.gov.il/
6	Bangladesh	http://data.gov.bd/
7	Thailand	https://data.go.th/

B. Criteria used for Analysis

The following standards are used for detailed examination of facts:

1) Performed Activity Level Analysis on the Open Data Plate Forms

Five separate types of activities were inspected: the activity of open data site visitors, the activity of data providers, the actions taken by developers for building the applications, the activities correlated with knowledge discovery, and the

activities related to the complete and efficient resource utilization which was available on the open data sites.

- **Open data visitor's activity** measured the strength of availability and utilization of the portal by common visitors, what provides a gesture of the utility and relatedness of the Open Government Data portal. The value accredited to this standard was collected by inspecting a element's collection for instance site analytics, targeted counter's access, posted comment's number, information quantity provided through networks community networks, and discussion for a participation quality.
- **Portal supplier's activity** measured the strength and quality of the open data plate form "feeding of process". The accreditation of value has been carried out to this standard was collected by considering and analyzing the provider of data in numbers on the portal, along with the action quality for instance the number of published data sets, as well as the readiness and of excellence the data shared. Special observation is needed for the readiness of data inspection, moreover various initiatives are considered because for someone one year data might be outdated and for other three years data means a lot.
- **Applications development related activities** measured how the open data plate form can be helpful for building the new software-based application. These applications should be available on data sites. Number of applications accredited the value to this standard which was available on the data sites as well as by the review of opinion and feedback delivered to these applications.
- **Activity related to the generation of new knowledge.** This standard aimed to assess how the data published on the Open Government Data portal has been utilized to discover latest knowledge and hidden patterns. Inspection elements accredited and gained the value to this standard which expresses the presence of sharing (of initiatives, of documents, of movements, of applications,) among the various users of portal, since we assumption has been carried out that basic gadget to knowledge development is sharing.
- **Overall resource usage available on the portal activities.** This is objected to the standard to inspect the way how multiples users attached with it are handling the data and also to evaluate the publishing standards of data and applications created and developed through the use of open data. For this, the user's activities related to application usage on portals are to be accessed.

2) Open Government Data benefit's Observable Analysis

Every portal was also inspected in order to find out how role is being played for acquiring the benefits which are normally obtained from Open Government Data strategies. For the measurements we supposed the following kinds of prosperities:

- **Transparency of government** published dataset's nature exhibits a valuable attempt by the government administrations to accomplish their tasks more clearly.
- **Public participation:** This type of published datasets exhibits an attempt of administration to encourage the involvement and attachment of citizens in social and political life.
- **Entrepreneurship and Innovation** the newly published data sets provide the users an ability to analyze the data and create and discover new meaning of data and build new applications and services.
- **Efficiency of Government** published dataset's types are convenient to promote the betterment of public strategies and the accomplishment of quality gains and efficiency of governmental services.

For analyzing the factors of government transparency, public participation, entrepreneurship, efficiency of government, and innovation have been analyzed through the datasets of 7 Asian countries. For this, 256 data sets of Taiwan, 1275 datasets of Singapore, 21,029 datasets from Japan, 632 from Hong Kong, 556 from Israel, 58 datasets of Bangladesh, and 1095 datasets of Thailand were analyzed.

3) Each initiative Differentiating factors Analysis

Apart from the inspection of the standard exhibited in (1), (2) and (3), from the beginning of the content examination on web of the portals, identification was also strained to the attention of any specific exclusive characteristic or feature that might be able to differentiate the initiatives.

IV. DATA ANALYSIS

Summary is presented in Table IV concerning the number of datasets, formats of datasets and available services or applications on the open government data portals. This table also describe conversion rate of the application dataset. Indication is given by conversion rate gives an indication of the active data utilization that is shared on the portals of countries in order to produce something. That conversion rate calculation of dataset to application was done by this formula: (number of applications/services developed / number of datasets) \times 100).

There are surely huge contrasts among the activities not just in what concerns the suppliers of the data, with nations having in excess of ten thousand datasets accessible to nations that have just minimal in excess of a hundred, yet in addition in the level of utilization of the information made accessible, as appeared by the altogether various conversion rate of dataset-to-application introduced by a few nations (Table V).

The assessment's conformance level with the open government data is compressed in Table VI. For explanations of space, in the table every rule is characterized by a code as indicated by the accompanying correspondence: complete (OGD-P1), primary (OGD-P2), timely (OGD-P3), accessible (OGD-P4), machine processable (OGD-P5), non-discriminatory (OGD-P6), non-proprietary (OGD-P7), and license-free (OGD-P8).

TABLE V. DATA COLLECTED ASSOCIATED TO DATASETS AND APPLICATIONS/SERVICES ARE FOUND ON PORTALS. SEVEN PORTALS OF DIFFERENT COUNTRIES

Countries	No. of dataset	Formats of datasets	No. of applications/ service developed and available	Dataset to application conversion rates
Taiwan	256	csv, json, xml, pdf, geojson	02	0.78
Singapore	1,275	csv, pdf, kml, shp, api	14	1.10
Japan	21,029	csv, zip, xlsx, pdf,html and 39 other formats	36	0.17
Hong Kong	632	Asc, csv, gif, gml, ics and 14 other formats	27	4.27
Israel	556	xls, xlsx, zip, html, csv and 23 other formats	47	8.45
Bangladesh	58	csv, xlsx, pdf, excel, xlb, data, xls, zip	04	6.90
Thailand	1,095	csv, xls, xlsx, pdf, xml and 8 other formats	02	0.18

TABLE VI. ANALYSIS OF THE EIGHT OPEN GOVERNMENT DATA PRINCIPLES

Countries	Eight principles of Open Government Data							
	P1	P2	P3	P4	P5	P6	P7	P8
Taiwan	B	A	A	A	B	A	A	A
Singapore	B	B	A	A	B	A	A	A
Japan	B	B	A	A	B	A	A	A
Hong Kong	B	B	B	B	B	A	A	A
Israel	B	B	C	C	B	B	B	A
Bangladesh	C	B	C	C	B	B	B	A
Thailand	B	B	C	B	B	A	A	B

Legend: : A: all, B: most, C: some, D: none

The eight Open Government Data principles are applied in the initiatives sensibly as evinced by the data, showing a comprehension with respect to public institutions on how data ought to be made accessible. The third principle, Timeliness (OGD-P3), that is the aptitude to made data accessible as rapidly as essential to save its actual value, is the rule that accomplished grouping at lower terms, showing dependable specialists may have some exertion in keeping the systematic accessibility of data.

The fifth principle, Machine readability (OGD-P5), is almost good in all the countries, but is lot of other data formats that first has to transform in machine readable format before data any manipulations.

This data likewise demonstrates that, while there aren't affected distinctions among all the Asian countries tend to show unrivaled conformance levels with the open government data principles.

Perceptions results in what portal activities are concerned shown in Table VII. In the case of portal activity the difference is very important, contrarily to what happened with compliance principles of open government data, and there was tenuous difference in between the Asian countries.

TABLE VII. ANALYSIS OF PORTAL ACTIVITIES

Countries	Portal Activities				
	Visitants	Suppliers	Applications developments	Knowledge generation	Overall utilization of resources
Taiwan	A	A	A	B	A
Singapore	A	B	A	B	B
Japan	A	B	A	A	A
Hong Kong	B	A	B	B	B
Israel	B	A	D	B	C
Bangladesh	D	D	D	C	D
Thailand	C	D	D	C	D

Legend: : A: very good, B: good, C: enough, D: poor

The observation concerned with open government data benefits is enumerated in Table VIII.

TABLE VIII. OBSERVED OPEN GOVERNMENT DATA BENEFITS

Countries	Observable OGD benefits			
	Government Transparency	Public Participation	Innovation and entrepreneurship	Government efficiency
Taiwan	B	A	A	A
Singapore	B	A	B	A
Japan	B	A	B	A
Hong Kong	A	C	B	B
Israel	B	B	C	B
Bangladesh	B	D	D	D
Thailand	B	B	C	D

Legend: : A: very good, B: good, C: enough, D: poor

Once more, in the intended table, a distinction in between the seven Asian countries is apparent. This distinction is much disreputable for advantages of "participation of public", "government efficiency", " entrepreneurship and innovation". It is intriguing to take note for the achievable benefits, in which it is required that data is released as well as that the reutilization of open data is possible, i.e., they rely upon the effective utilization of the datasets made accessible on the portals, through the expansion of new applications and services, and accordingly it is essential that society (enterprises, public and numerous different entities) has a culture of transparency and participates in the establishment and data reutilization. Maybe,

open data's social appetite may validate the distinctions found amongst Asian countries.

Perceptions consideration as a whole is carried out along with the collection of the data we are move forward to the concluding terms that the primary distinction between the quality of the open government data development at present accomplished in seven selected Asian countries lays not on the amount and sort of datasets made accessible yet primarily on the amount and way those data is salvaged, as delineated in Table IX.

TABLE IX. AVERAGE VALUES OF ASIAN OPEN GOVERNMENT DATA PORTALS

Average values	Asian countries
Available dataset's average number	3,557
Average number of developed applications/services	18.8
applications conversion rate's average number	3.12

As the values appear, the average conversion rate of seven selected Asian countries is calculated and displayed. This leads us to reason that to encourage the open government data singularity, while it is basic to open the data, that isn't enough. It is additionally vital to advance the reuse of the open data by the general public.

A. Challenges of Open Government Data faced by Asian Countries

Open Government Data as a movement and theory initiated in the countries which are developed and after this now the developing Asian countries are adopting it. Moreover, open government data challenges are illustrated in Fig 2. Subsequently, they have done plethora of development in this regard and are currently countries well-ahead from the other regions in terms of both quality and quantity of datasets. But still according to the many factors, OGD initiatives of the many developing countries are still at its early stages, subsequent and numerous challenges at the implementation level [22].

- **Cost for releasing public data:** Releasing public data may incur some potential costs allied with the creation and presentation of open data that need to be deliberated [23]. This may be factual in tasks like data collection, data management and data cleaning that needs assured abilities for the human resources.
- **More complex data more barriers will come:** If the task is more multifaceted which the user desire to achieve, the more barriers will occur therefore forcing the organizations to train their human resources with such technical skills [24].
- **Appropriate infrastructures of OGD:** By opening government data, the government organizations may necessitate preparing appropriate infrastructures such as buying the new server or upgrading network infrastructures [25]. For the successively OGD initiatives, these factors comprising cost that may be the foremost obstacles for government.
- **Lack of metadata and accuracy in open data portals:** Another dispute in OGD application is data

quality. Lacks of Meta standards, lack of accuracy, outdated and non-valid data are amongst the problems originate in existing data in the open government data portal [26].

- **Outdated and non-valid data in OGD portals:** Government organizations also face the data privacy issues when some of the datasets comprises personal identities, when merging with different datasets [27]. In precise, government leans towards to publish the data which is easier to collect, unstructured and incomplete.
- **Government organizations also face the data privacy issues.** In determining the adoption of OGD initiatives the level of understanding of what is OGD amongst government organizations correspondingly plays a central role. It is frightened that some government organizations just hopped into the supportive central agency's or top management decisions but not on voluntarily reasons. Because of this problem, organizations may be emancipating data only once and no supplementary movements to publish more datasets [27].
- **Pressure from public to release the data:** Technical barriers are not the only aspect in OGD adoption, on the other side, government may suffer the pressure from community to release more practical data as civil society organizations, civic hackers, citizens, non-government agencies to label a few are receiving more aware of valued datasets e.g. from the health data, crime data, government spending and transport data [28].
- **Multiple and decentralized data sources and incomplete datasets in different sectors:** There are multiple and decentralized data sources. There is not proper integration in the datasets and the incompleteness of datasets in different sectors. Information which is published is very limited and majority municipal level data portal have more data than the nation level data portals.
- **Zombie data that are dump data:** In some cases, there are lots of zombie data that are not "live" but are only databases dump which can be downloaded and present in the intended format. Even if retrieved over an online API, there is not any assurance of updates in source. None of either national portal unambiguous data updates policy or used open data portals. "Existence of information is guaranteed by the system in their databases however data updating is not guaranteed" [29].
- **Government released one-way data to public:** Governments lean towards to release the data which is one-way from the government to the public. Such data can be illustrated by applications, but there is quite limitation in the foremost online facilities and valuable applications, with public returns data to government [29].

- **Published online data through full disclosure policy:** Another aspect is a failure to Deliberate Audience, the envisioned the policy design's users of the data. Datasets can be reviewed in the policy in order to look in the datasets that are desired by public or are of concentration to user values and create the essential documents to be published online through the Full disclosure policy [30].
- **Public is not conscious about the available data on the websites:** Groups of citizens are not conscious that data is available on the websites. They also struggle in engaging with released data of government. If the government is serious with guaranteeing transparency and accountability, should notify and local participants are capacitated on how to navigate and how to access along with the utilization local government data [31].
- **Low internet diffusion:** Open data assists only the info requirements of less than 40% of the populace. In a perspective of low internet diffusion, public are dependent on other ways of information distribution to protect local government data [32].
- **Data is in raw form and not open:** Deliberated the raw material of the 21st century, the data must be refined, located, and extracted in a directive to produce value. Accordingly, in any significant sense the data is not open to the public when published in its raw form. Frequently, a normal citizen is incapable to travel the collection of available datasets due to the deficiency of essential statistical and computational expertise [33].
- **Lack of Data quality:** Data quality is a main aspect on the open government data portals. There is lots of invalid and missing data on different open portals so that's the foremost obstacles for the public and other organizations [34].
- **Attained datasets in automated way:** Attained datasets in an automated way through the application of Information Technology Systems is still a bigger challenge [35].

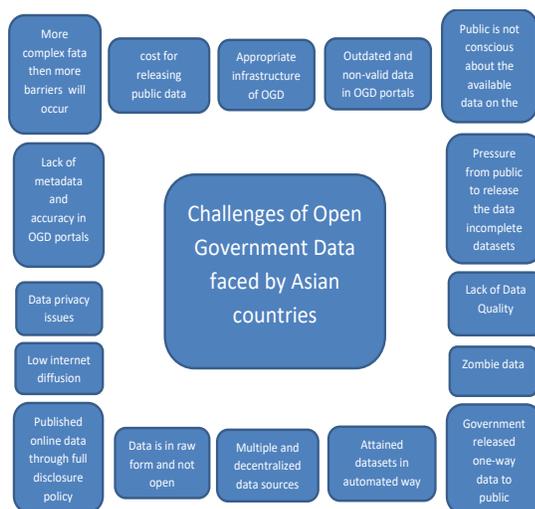


Fig. 2. Challenges of open government data faced by Asian countries.

As was stated through this paper, technological and political urges showed to be conclusive factors in the growth of Open government data crusade. First, the acknowledgement of Obama in 2009, necessity Administration for application of the notion, which roused the rest world to this necessity and, second, the Internet, the benefits of a single resource for the information sharing. In a few years, significances of this OGD are clear: at a political phase, that delivers better transparency, collaboration and accountability to representatives and particular policies, donating to a more participatory and independent society. Moreover, the material establishes a rich resource that delivers the formation of new services and products whether envisioned for civil usage or to encourage better efficacy in governmental services themselves. Consequently, it can be said that, the open government data notion gives society the aptitude to influence public data and reutilize it for drives that encounter the desires of the parties intricate, thus endorsing the generation of novel knowledge, entrepreneurship and innovation.

The analysis demonstrates that there is still some lots of illiteracy about this notion on civilization side, which is reflected in the feeble participation of social representatives on the reprocess of the released data. Which are the motives for the feebler reprocess of opened data in Asian countries is consequently a fascinating research query to explore.

The reflections and analysis directed propose that the dissimilar appetite level exploit adopt and to accept the notion of open government data, which are demonstrated by some countries, may be owed to the presence of dissimilar ethnicities and cultural attitudes about notions for instance privacy of data. Do cultural problems have an influence on the level of data opened to civilian reprocess? Are there any kin between country size and open government data growth achievement? Or do cultural problems have an influence on the societal appetite actors to reutilize and exploit the values of open data? In future works, that we propose to achieve on this stream of research, more nations should be elaborate and various ways of collecting the data about initiatives, for example, interviews to those accountable for open government data portals, to individuals that publish datasets in open government data portals and to individuals that are using information available on open government data portals to develop the applications and services should be applied.

The study has theoretical as well as practical implications. This study is a major contribution to literature regarding the activities of data portals, principles and the benefits of open government data. Furthermore, the development of the countries has been depicted through the study which will contribute to the literature. Additionally, challenges and recommendations would help researchers find some other research related dimensions. On the other hand, the practical implications include the use of benefits and principles by the seven and other Asian countries. The less developed Asian countries would also benefit from the study.

V. CONCLUSION

The notion of Open Government Data swiftly developed one of the most pertinent subjects of dispute among governments of many countries around the world.

The results of the study indicate usage of data sets on the larger scale by the countries of Japan, Singapore and Thailand that depict the high scale of open data usage in these countries with the inclusion of technological development. Also, the open datasets are increasing in Hong Kong, Israel and Taiwan as well. Bangladesh is found lagging behind because of underdevelopment and less technological usage. Furthermore, the dataset conversion rate has been described depicting the data sharing on country's portal for boosting public participation in order to produce something of value. The conversion rate is for Japan and Thailand has been viewed as attractive as these countries maintain huge number of datasets on the applications that portrays proper management of open government data. In addition, the open government data principles have been analyzed. These were given the rankings of A, B, C and D where A stands for very good, whereas B for good, C for enough and D for poor. Out of 8, the principles of primary, machine process able, non-proprietary nondiscriminatory and license free are ranked as very good and good for all the countries while principles complete, timely and accessible hare regarded as good and enough. The reason behind the factors of completeness, time and accessibility being god and enough is because of the skills held by people related to the management of open data. Also, the portal activities are very good and good for Taiwan, Japan, Singapore and Hong Kong. On the other hand, these have been regarded as enough and poor for Israel, Bangladesh and Thailand. This is because the developed countries are much advanced in technology development for the purpose of data management and opening the government data. Additionally, the benefits of government transparency, public participation, innovation and entrepreneurship and government efficacy has been regarded as good and very good for Taiwan, Japan, and Singapore. Hong Kong have been regarded as very good, good and enough because of difference in use of open data by different level of governments. In the nutshell, the number of applications developed for the purpose of open government data and data conversion rate is not so high in the Asian government which faces different challenges including cost and complexity. The need for improving the mechanism has been provided through the recommendations.

The study carries limitations as in form of limited number of countries studied. Countries like Japan, Singapore and Thailand are enough advanced to the level that they use and manage the open government data. Also, the study has limitation in methodological form as it lacks the proper use of sampling technique and other forms of web portals used for open government data. The future researchers must include the less developed countries including Pakistan and Iran for the purpose of understanding the open government data in these countries so that use of open government data could be enhanced in such countries as well.

VI. RECOMMENDATIONS

As per the key problems and status in data initiatives of the open government in the sample areas, eight recommendations are proposed for the expansion of opening governmental data in Asian countries which can are illustrated in Fig. 3.

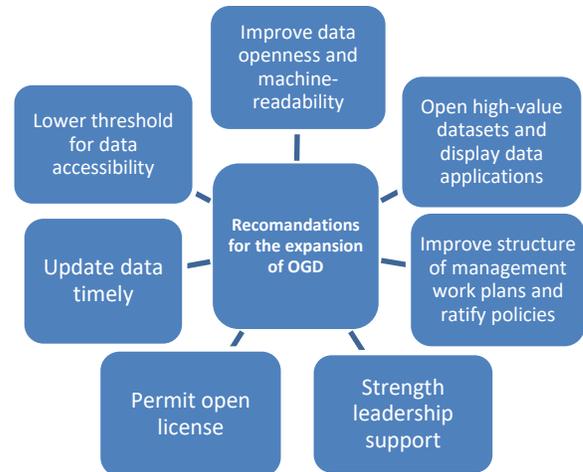


Fig. 3. Recommendations for the expansion of open government data in Asian countries.

A. Improve Data Openness and Machine-Readability

Open government data initiatives are recommended, whether still under-development and in future it has to be developed, ought to improve the machine-readable format of open data, and to certify that data are not published in different other formats for instance web pages, pictures, or PDF, etc. Intended prerequisite should not only be the work plans of the initiatives of open government data but local-policy documents should also be personified and, but also be occupied as an important indicator to evaluate all released data in several initiatives. To explicate the goals and meaning of various formats i.e. machine readable, trainings should be provided, familiarize mutual machine-readable formats, and to provide consistent tools for the help to convert non-machine-readable data into machine-readable formats. Additionally, all initiatives ought to establish endorsement process to sternly observe data formats before they are published with mutually manual and automatic approaches, so as to certifying that published data gratify the prerequisite of open formats.

B. Open High-Value Datasets and Display Data Applications

It is recommended that initiatives of open data should be concerned with user's demands and parallelized the data release departments and demanders of data (like reporters, enterprises and individual developers, etc.) there should be round table meetings in order to communicate face to face on data needs that can improve the quantity, quality form and open data worth. In addition, data release sections ought to collect public needs through shared communications via social media and websites, to constantly display developed based applications and open high-value data and on open data.

C. Improve Management Structure and Ratify Policies and Work Plans

Presently, numerous regions are short of plans, policies and actual management architectures targeted at open government data schemes. Firstly, it is recommended to create or elect capable sectors to take work responsibility related open

government data and permit full authorities sectors to participate data provided by supplementary business sectors. Temporarily, partition of work and responsibilities of business sectors ought to be elucidated. Secondly, it is endorsed to formulate specifications, work plans, practical policies, and to describe requirements, principles, forms, boundaries and objects of open government data to certify the systematism and normalization of data opening. Lastly, to formulate yearly work plans and make them public is suggested, as a struggle to improve social public's responsiveness of and contribution in the open government data.

D. Strength Leadership Support

It is distant from being sufficient to leave departments in responsibility only to endorse open government data schemes. Obvious support from domestic managers is no doubt a serious influence in lashing open data initiatives. It is recommended that local administrators ought to excavate their considerate of the drive and implication of open government data also fortify their sustenance for opening governmental data in significant local discussions, public discourses and setting up an ethos on the daily works, of open government data, growing the cognizance of open data, refining the aptitudes and providing supervision and sustenance for sectors in responsibility to the development of open data.

E. Permit Open License

Initiatives of open data ought to workout open license that are valid in Asia. The license ought to be in line with prevailing laws of their countries, but also clearly certify public the privileges to freely attain, use, and redistribute the data. Governments must focus on the obligation and importance of open license and ease data publishers and data users to develop the open license reciprocally.

F. Update Data Timely

Open data activities ought to set up comparing particulars and supervision components to guarantee that data are refreshed timely. For instance, exposure buttons could be determined to data pages to enable general society programmed investigation strategies can be built up in open data stages to naturally convey refreshing alarms to comparing departments or to report data that are neglected to be refreshed timely. Given the cost and weights of task and upkeep, data discharging departments may enable social associations or undertakings to assume the liability of looking after data. Through open private association, dynamic data can be reliably given to the general public.

G. Lower Threshold for Data Accessibility

Open data stages ought to data convenience and collaboration for lower thresholds with data holders, enable the public to obtain data and contribute in the communications without having to register. In addition, the user's valuation on data requests, datasets and recommendations intend to be timely studied and retorted. Lastly, the practice of social media tools ought to be reinforced to timely broadcast the news and happenings of open data to the public, in directive to entirely promote and broadcast open data crusade and develop public consideration, contribution and sustenance. Furthermore, communications could arise not only among and the public and

the government, but consistently between data users themselves to deliberate and interconnect on substances associated to open data and motivate more notions and produce more applications, so as to paradigm a dynamic, maintainable and well functioned ecosystem of open data.

H. Promote Innovative Ideas

Another recommendation is to promote innovative ways to successfully engross with participants to source notions and co-create resolutions and grasp the prospects provided by digital government tools, together with the usage of open government data, to sustenance the accomplishment of the aims of open government initiatives and policies.

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