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Open Data: A National Data Governance Strategy for Open Science and Economic Development - A case study of the United Arab Emirates

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ABSTRACT

Open science is data-based endeavor. It requires scientific collection and analysis to arrive at findings, that explains a phenomenon. Data are either primary or secondary. In a post pandemic world, restrictions are posing challenges to the collection of primary data for scientific analysis purpose. This is due to limited financial and/or time resources and/or some form of social distancing. A sustaining alternative for open science program is secondary data. These are data collected by a credible source like government and reputable organizations (Chinelo Igwenagu, 2016; Morgan & J.Harmon, n.d.). How accessible are open data for open science in the MENA region? The difficulty and/or unavailability of data poses a challenge to open science practices in the MENA region.

This paper intends to investigates open data for open science and economic development in the United Arab Emirates (UAE) as a leading country in the MENA region. The aim is to identify the region's open data and open science gaps based on the Open Data Barometer (ODB) framework and proffer insight for optimization, using the national data governance approach of Open data as per the Open Data Charter (ODC) principles of 2015. This study reviews a 63 randomly selected list of government entities & ministries open data practices in the UAE. Potential findings will help assess open data and open science strategy in the region. This is significant because it will draw the attention of MENA government and stakeholders to the gaps and opportunities in the revival of a post pandemic economy. It could also serve as a model for other MENA nations in their pursuance of all-round development.

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Introduction

This paper is presented to emphasis the role of Open data in Open science by reviewing a case study of government entities and ministries in the United Arab Emirates.

Like other Arab nations, the United Arab Emirates (UAE) is known for the luxurious oil-rich lifestyle but equally known for the conservativeness. Arabs preserve traditional, social institutions and practices. The quest and advocacy of open data seem like an unfamiliar territory in the MENA region. Open data requires the see-through transparency in data related matters. Such data exposure, in the Arab community seem like opportunity for undue influence and penetration but the absence of such openness is becoming detrimental to economic opportunities, that advanced economies are capitalizing on. While matured open data for open science is the objectives for researchers, modernization and the vision for globalization by the Emirati leaders makes countries like the UAE, attentive to issues and opportunities of open data. This is evident by the establishment of the UAE's Bayanat.com platform. The Bayanat.com platform underlines the UAE commitment to matter of open data on the basis of transparency. However, empirically analysis show that, even though the vision is evident, implementation by UAE government entities and ministries websites lack assumed cohesion in open data practice. As evidence, the entities and ministries website have the open data but the dataset on the website have not completely matched the principles of Open Data Charter (ODC) agreement, which is the global index/standard for open data practice.

A website is an entity's space on the internet to communicate and engage the public/audience. The same is the case for the UAE government and country's public. With the medium of engagement by the government, it can determine the level of openness in governance data that contributes to the effective state leadership (Open Data Charter, 2015). This is the birth of Open data Initiatives as approach to national data governance (Background: Charter Open Up Guides - Open Up Guide: Using Open Data to Combat Corruption, 2015). Data Governance is the regulation of data matters within a polity.

A country's Open Data is an initiative that is based on the principles of the Open Data Charter (ODC) agreed-upon by over 150 nations and organizations, committed to, during the Global Summit in Mexico in October 2015 (Adopt the ODC Principles - International Open Data Charter, n.d.). The aim, at the time was to tackle government corruption and ensure all-round development. Open Data Charter (ODC) is a collaboration between governments and experts working to advance open data for governance based on agreed upon principles as enumerated below;

Open by Default: Government data and information should be open by default;

Timely and Comprehensive: Government data and information must be on time and hold potential of being understood for strategic use and deployment;

Accessible and Useable: Government data and information should be effortless accessible and should be in format that can be used by citizens for purposes, not limited to education, research, understanding, assessment etc.;

Comparable and Interoperable: Government data and information should be available for comparism and inferential analysis purpose;

For Improved Governance and Citizen Engagement: Government data and information should for development and growth purposes relative to government and its citizens;

For Inclusive Development and Innovation; Government data and information should not be discriminatory in its contents or presentation and should boost innovation for governments, citizens in all sector.

A primary contribution of open data is its descriptive and inference nuance in open science practices. Accessibility to the outcomes of research, enabled by accessible open data, is what is commonly referred to as open science. As an outpost of modern dispensation, open science is a set of practices that increase the transparency and accessibility of scientific research (van der Zee & Reich, 2018). If open data is transparency of government data, open science is the transparency of scientific research, bearing in mind that open science is a function of open data because open data is an input of open science. The outcome of this integration between open data and open science is to potentially make knowledge available for creative use (Zimmermann & Pucihar, 2015). This form of knowledge is encoded in data formats. A country's national data governance ensures that this form of knowledge (encoded in data), is accessible in the right place, time and format for innovative and creative use by citizens. Ekundayo (2021) establish that national data governance in form open data can boost economic GDP to the tune of 12% because it impacts economic sectors and activities. Research is an economic activity, as such the input of open science is inevitable.

Open science is data-based endeavor. It requires scientific collection and analysis of data to arrive at findings that

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explains a phenomenon. Data are either primary or secondary. In a post pandemic world, restrictions are posing challenges to the collection of primary data for analysis purpose. A sustaining alternative for open science programs is secondary data. These are data collected by a credible source like government and reputable organizations (Chinelo Igwenagu, 2016; Morgan & J.Harmon, n.d.).

How accessible are open data (secondary) for open science in the United Arab Emirates?

The difficulty and/or unavailability of data poses a challenge to open science practices in the MENA region. While pro-open science advocates, evangelize for access to open science publication and the knowledge it proffers, anti-open-science advocates consider science, their effort and intellectual property as such, seek some form of recompense as payment before access to their derived knowledge is granted for public use. This means, their science is accessible but only when they receive monetary worth in value. Publication houses and journal also considers their investment in publication and distribution as a value, deserving exchange for money in the absence of sponsorship for publication processes and efforts. Either argument are valid perspectives, it remains a standing debate and educational/professional quagmire with no anticipated end. Another perspective of the argument is that, the authors of scientific publications, invests time, effort and finances into collecting primary or/and secondary data and sometimes analyzing the same. To this end, they consider the output insight worthy of financial exchange.

Researcher, publication houses and the insight they proffer are unit/activities of an economy. The government are overseers of the economy. The government is tasked with the responsibilities of state governance. They are also responsible for putting in measures that permit growth of economic unit and activities like researching and scientific publication for creative and innovative use while inferentially contributing to economic development. The government also create a data collection mechanism that serving as source of data, based on the open data charter principles.

Significance of study

This paper signals the gap in open data practice in the MENA region. Potential findings of the study, will help the government and other stakeholders understand the contribution of an effective open data initiative, as a national data governance approach for open science and economic development. It is a wake-up call for the MENA to implement open data initiatives and follow-up implementation to ensure compliance in support for open science, innovation and economic development.

Literature review

After the commitment of nations and organizations to the Open data principles and initiatives in 2015, Open Data Barometer – (ODB) was set-up in partnership with the World Wide Web Foundation to measure adherence to the open data principles (Davies, 2015). The World Wide Web foundation was founded by the inventor of the world wide web - a computer scientist Tim Berners-Lee (World Wide Web Foundation, 2009). Sir Tim believed the access to the internet and the information therein, should be a basic human right. Open Data Barometer (ODB) formulated a matrix to measure the progress on the implementation of Open Data Charter (ODC) agreement – which is, to practice open data based upon the agreed upon and aforementioned principles. The ODB methodology enabled the evaluation of open data initiative across three sub-indexes namely; Open Data Readiness, Open Data Implementation and Open Data Impact. Open Data Readiness is the readiness of states, citizens and entrepreneurs to secure the benefits of Open Data. Open Data Implementation is the extent to which accessible, timeliness in open data publication by each country's government, in key 15 economic sectors. Open Data Impact refer to the extent to which there is evidence that open data released by the country's government has impact on different domain in the country (Ansari & Naz, 2021).

The Open Data Barometer (ODB) 2015 report for the UAE, shows that UAE has always ranked above average in the MENA region (since its inception of 2013, as shown in Fig 1). But it is comparatively low compared to the average the of advanced nations like the United States (US) as shown in Fig 2 (Davies, 2015). According to the report, the UAE readiness to implement Open data is the highest compared to its implementation index, where it falls short and even shorter in its impact(Davies, 2015).

As shown in the below figure.

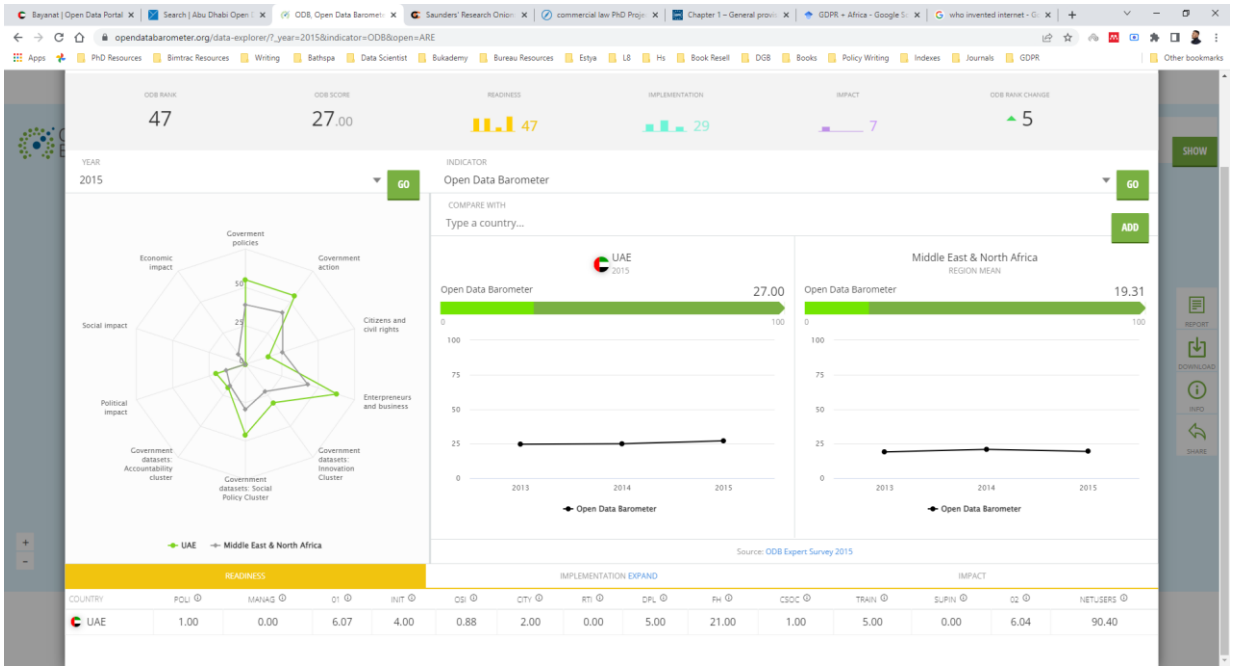


Figure 1. Screenshot-UAE vs MENA Average

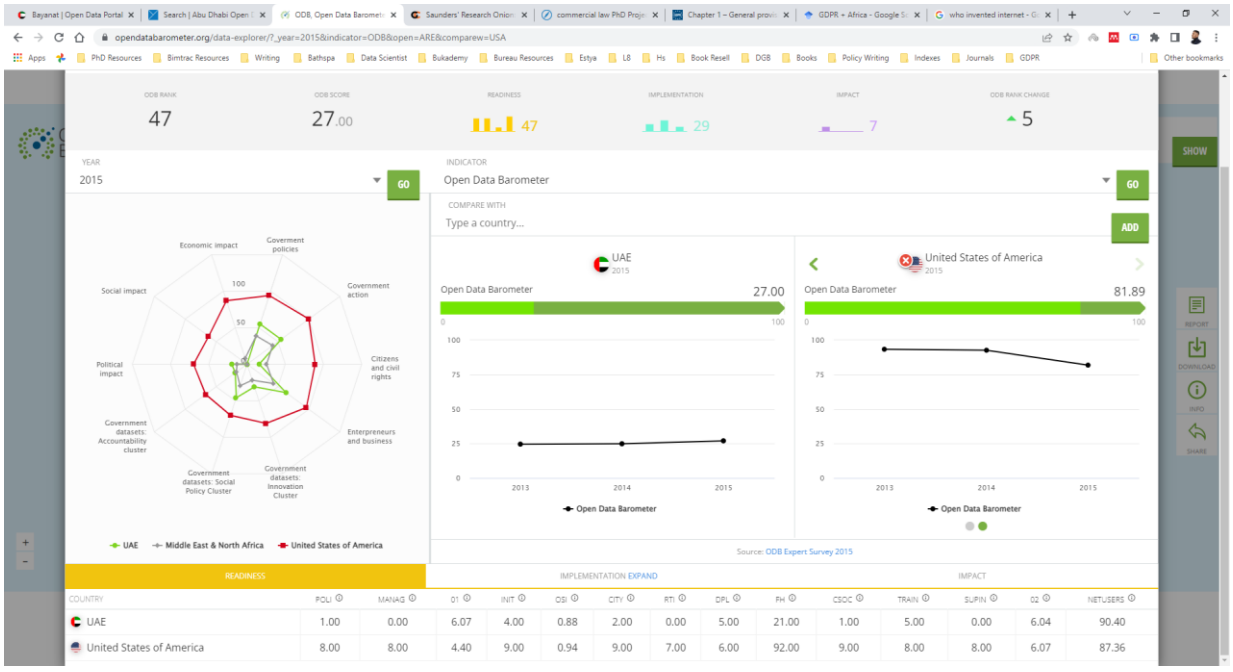


Figure 2. Screenshot- UAE Vs United States

One would argue the urgent need for the UAE to show more commitment since 2015. This study posits there is more work to be done, if the UAE stakeholder intends to support open science in the MENA because a key ingredient to open science is the data accessibility.

Conceptual Framework

Figure 3. Conceptual framework

This empirical study conceptualizes that open data contributes positively to open science by propagating the exposure and distribution of both descriptive and inferential insights, which in-turn aid economic development via the creative and/or innovative deployment for commercial value. In this study, this study posit that this linearity, represents an untap potential in the United Arab Emirates practice of open data and open science.

The next section, investigate the reality on the ground based on real time empirical evidence.

Methodology

Research Design

This empirical study follows the precipitates of ontology (Saunders 2007). The aim to gain knowledge and

understanding about the reality of open data (for open science) in the United Arab Emirates. To this end, this study investigates availability of open data on the government assessable website that supports open science initiatives that in turn impacts potential economic result. This paper follows the assumption of ontological pragmatism. Pragmatism proffers the best tools possible to investigate phenomena. This paper investigates the state of open data in the country by applying suitable descriptive statistics tools (pie-chart) to analysis and relay the primary data. The paper follows an inductive approach (qualitative) as we under studying the specific case of open data for open science and economic development of the United Arab Emirate as a case study as research strategy. The research choice is mono, i.e., qualitative. For time horizon, each website was reviewed within a space of 2days – 18th -19th August 2022 (Sahay, 2016; Saunders et al., 2007).

The overall goal of this research design is to observe and describe.

Data collection

A list of United Arab Emirate (UAE)'s government entities and ministries is sourced from Imtiyazat website on 18th -19th of August 2022 (See appendix 1). Imtiyazat is a UAE federal government initiative, launched in 2011 to care for its employees and their families. Imtiyazat publication listed 63 United Arab Emirate (UAE) government ministries and entities.

The following steps shows how the data was collected.

Imtiyazat list of ministries and entities was a PDF documents with ministry and entity arranged in tabular format. The same copied and pasted on a excel sheet to enable categorization of entities V ministries.

Entities and ministries without own website were identified and considered not-suitable for empirical investigation of sort. This eliminates 3 entities and 1 ministry. This reduces the total number of potential observations to 59 ministries and entities.

A column on the excel spreadsheet to identify government entities against government ministries. See appendix 2

NOTE: A government entity is a close affiliate government organization, owned or/and control, by government for governance purpose. A government Ministries is a departmental designation used by executive bodies of governments to manage a specific sector of public obligations.

Data Analysis

Columns were created for investigation using as listed below – See Appendix 3. Validating this investigation is done with Yes=1 and No=0 scale.

Confirmation of website's existence. This is helps to determine if the government is well position to communicate.

Confirmation of "Open data" tab on the respective website - This is helps to determine if the government is well position to communicate datasets.

Ease of identifying the 'Open data' tab on the respective website - This is helps to determine if the government is well position to communicate datasets.

Confirmation of data availability - This indicates that, the government is actually carrying out the commitment of open data.

Confirmation of data availability in multiple useable formats like CSV, EXL, PDF formats - This indicates that, the government is actually carrying out the commitment of open data.

Does the UAE government announce the innovative use of data on the websites? -This indicates if the government notice and publicize the use of their data for innovative businesses and/or strategy planning

After the empirical investigation on selected entities and ministries websites, the "Count if" function on excel was used to aggregate score of Yes=1 and No=0 observations. See Appendix 4

Presentation of Findings

Tabular presentation of result

	Indicators	Yes	No
1	Website	97%	3%
2	Open Data Tab	65%	35%
3	Open Data Tab Ease of identification	62%	38%
4	Data Availability	41%	59%

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5	Open Data Format Variation	41%	59%
6	Announcement on use of data	0%	100%

Table 1. Results

Figure 3. Percentage of UAE entities and ministries that have a functioning websiteFigure 3: Percentage of UAE entities and ministries that have a functioning websiteGraphical presentation of result - KEY: YES -No-

Figure 4. Percentage of entities and ministry have open data tab on their websiteFigure 4: Percentage of entities and ministry have open data tab on their website

Figure 5. Percentage of UAE entities and ministries websites with ease of identifying the open data tabFigure 5: Percentage of UAE entities and ministries websites with ease of identifying the open data tab

Figure 6. Does the UAE government entities and ministries that announce the innovative use of datasetsFigure 6: Does the UAE government entities and ministries that announce the innovative use of datasetsFigure 6: Percentage of UAE entities and ministries website that have datasetsFigure 6: Percentage of UAE entities and ministries website that have datasetsFigure 7: Percentage of UAE entities and ministries website that have datasets in multiple data formatsFigure 7: Percentage of UAE entities and ministries website that have datasets in multiple data formats

Discussion and Conclusion

Figure 3. -8 shows a graphical representation of empirical observations. According to the Open data barometer methodology readiness, implementation and impact are the tri-subindex of open data implementation(Tim Davies & Silvana Fumega, 2022). The readiness indicates the preparedness of a government to effect open data, Implementation is the actual action of open data and impact is the result of such action(Iglesias, 2019). Relative to the five empirical questions on the entities and ministries websites, as the YES decrease per inquiry as shown on the pie chart, the NO increases.

This finding (Fig 3-5) confirms the report of the ODB since 2015. 97% of UAE government ministries and entities own websites, 65% of these websites have Open data tabs and 62% tabs are easy to identify open data on the entities and ministries websites. According to the ODB framework, this indicates the Readiness of the UAE government to initiate Open data. However, there is more readiness effort to be invested to ensure (1) the creation and management of website for all government ministries and entities, (2) insertion of the Open data tab and (3) the ease of identification of the open data tab, hits the 100% or at least move close to 100%, to ensure optimized readiness for Open Data.

41% of open data tabs for UAE government ministry and entities have the actual dataset for its operational effectives and user accessibilities. 41% also have the data in more than one dataset format in downloadable for useability. This measures the ODB argument of Open data Implementation (Fig6-7). This validates the ODB index report, that there is a need for more effort to optimize the open data implementation in the coming years, if it intends to boost economic development related as it anticipates. The complexities of the modern economy are based on solutions only research-oriented efforts can proffer. Open science research plays a major part of this research-oriented effort and as such need open data to be optimal(Kouper et al., 2020; Mosconi et al., 2019).

According to the findings (Fig 8), there are no effort to induce the open data impact usage in any form of innovative/create process of value production. It is assumed that the potential of this approach is yet to discovered.

All outcomes support the ODB 2015 findings on the UAE deployment of Open data initiatives based on the agree-upon principles of Open data charter (ODC)

Impact this finding on Open science practice and economic development

When researchers face difficulty in sourcing primary data for research purpose, there is 59% doubts on secondary data alternatives. This is because to of the 59% inefficiency of the government practice of open data implementation.

The world is faced with problem that required research-based result. In the absence of open science and the derived knowledge it proffers, open science borne innovative/creativity is not optimal.

Other observations

Certain observations are noted in the process of this study yet are outside the scope of the empirical review. They are listed below

Where some datasets are available, they are not up to date.

Some website open data measure website visits as the only data in the open data tabs

Where open data tab is available on entities and ministries website, they are easy to identify.

The government of respective emirates are developing a single hub for all data matters from entities and ministries, that meet the Open data charter principles, themed "https://bayanat.ae/en/" for Dubai and https://data.abudhabi/taxonomy/term/43 for Abu Dhabi. However, a major aspect as expected is neither not, not updated or simply fall short of the ODC principal description.

Recommendations

The UAE government should ensure the all-government entities and ministries have a functioning website.

The website should have an Open data tab and the tab should be easily visible on the website.

The tab should contain datasets in variation of formats. The same must be periodically updated. E.g., quarterly or bi-annually.

The use of the dataset by the public and private sector for innovative and creative purpose should be communicated accordingly to residents of the nation.

Further studies

This is a need to discover which aspect of the UAE economy suffers this deficiency of open data and open science practice. There is an urgent need to identify the same and implement resolutions accordingly in the areas of open data readiness, implementation and impact. This is also a need to investigate the impact of open data on open science apart from gap in data collection mechanism. Further study could determine, if the deficiency is UAE government entity based or UAE-government ministry dominated.

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