

# Impact of Open Data in Selected Developing Countries

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## Abstract

Open data provided by open data initiatives is an important tool helping developing countries to boost their economies and reduce corruption. However, measurements are needed to evaluate the impact, performance and effectiveness of open data initiatives. They also provide insights on how the initiatives can be further improved and help other developing countries building their own open data initiatives. In this paper methods for measuring the impact of open data initiatives, as well as examples from existing open data initiatives of selected developing countries and their impacts are given.

## 1 Introduction

Governments around the globe are realising the benefits of providing open data to the public. By providing open data, governments hope to improve their transparency and efficiency as well as decreasing corruption and improving citizens participation in governance [5]. With the spreading of the internet and also the availability of smart phones the distribution of information got easier and easier. In the late 2000s, governments started to launch open data initiatives, also called open government data initiatives, making open data easily accessible through online platforms. Figure 1 shows available open government data sites around the globe. Since the wide availability of the internet is accomplished only recently for a lot of countries around the world, most open data initiatives in these countries are still relatively new. This is especially true for developing countries. In these early stages, lots of the open data initiatives are in, scientific research on the effectiveness and the impact of open data initiatives is especially important. The research offers other countries the opportunity to learn from the experience made by others and improve their own initiatives and avoid mistakes [9].

In order to keep alive the interest of government and public in open data, it is important to ensure that the provided data is relevant and adds some kind of value to the public. Therefore, measurements are needed to assess the success and usefulness of open data initiatives, to gain insights in how to improve these initiatives. Otherwise the lack of visible impact of open data initiatives can lead to a loss in interest from the public and government and ultimately to the termination of open data initiatives [5].

This paper is structured as follows: In section 2 the meaning of open data is defined and the benefits and challenges are assessed. Section 3 provides definitions and means to classify developing countries. How the impact and performance of open data and open data initiatives can be measured is elucidated in section 4. Further, in section 5, we present transnational and national open data initiatives and also assess the impact of the initiatives in these selected developing countries. In section 6 we present and assess two projects, from the selected developing countries of the previous section, that were realised thanks to open data provided by open data initiatives.

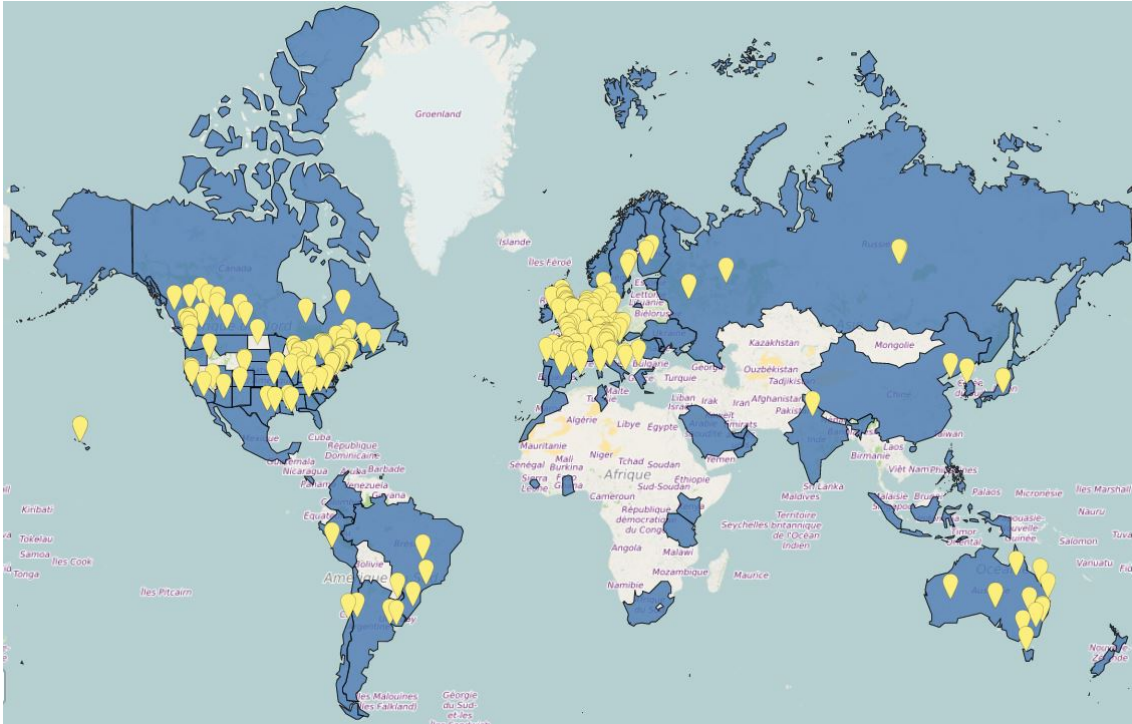


Figure 1: Map representation of Open Government Data Sites (source: [www.data.gov/open-gov](http://www.data.gov/open-gov)).

## 2 Open Data

Open data can be collected from all kinds of areas of expertise, for example traffic information, geographical information, statistics, weather data, public sector budgeting, scientific data, different sort of data relating to policy and inspection [7]. The providers of open data are called the supply side. These data can be collected by the public sector, mostly the government and its ministries and the private sector like organisations and non-profit organisations but also from the education sector like universities. The beneficiaries of open data are called the demand side which often are the citizens of a country but also journalists, scientists and others [9]. There are several definitions of open data in scientific literature; in this paper we use the following definition:

Open data and content can be freely used, modified, and shared by anyone for any purpose [6].

In [6] the term *access* in relation to open data is defined as free of charge and that the data must be downloadable via the internet, any additional license information must also be given. Furthermore, redistribution of any kind must be allowed, as well as separation of parts of the data and also compilation with other data.

The benefits, open data provides, are manifold and can have an impact on political, social and economic domains [7]. The benefits can range from improved civil services to more transparency and improved trust in the government for social and political domains and encouragement for innovations and economic growth through stimulation of competitiveness using open data as a recourse for the economic domain [7]. A government that is revealing processes and invites its citizens to open discussions and criticism can improve the trust of the citizens in the government. This is especially important in developing countries where trust in the government is continuing to decline.

However, in scientific research not all researchers agree with the benefits open data is supposed to deliver. According to those researchers open data faces some challenges. For example, the problem of so-called bad data, data that is either wrong, biased, misleading or inefficient for effective or a mixture of those, rendering the data literally useless. However, if it is used anyway bad data can lead to wrong decisions when used to inform policy making and can negatively affect performance of organisations and governments [9]. Also, the assumption that open data does lead to more transparency and more openness of governments is questioned. Open data can lead to an illusion of transparency, it is more of a tool to obfuscate [9]. Some also state that open data does not necessarily lead to more participation of citizens in governance [9].

It is therefore important to point out that open data does not necessarily lead to benefits. The impact of open data always has to be evaluated on a case to case basis. For more information on how the impact of open data can be measured see section 4.

### 3 Developing Country

Although there is a common understanding of what a developing country is, there is no clear definition of the term. A rather simplistic description by the Cambridge Dictionary is

"a country with little industrial and economic activity and where people generally have low incomes [10]."

To define this "low income" we could look at what the World Bank specifies.<sup>1</sup> They use four classifications based on the GNI (Gross National Income) per capita (data from 2018):

1. Low-income economies - \$ 1025 or less
2. Lower-middle-income economies - between \$ 1026 and \$ 3995
3. Upper-middle-income economies - between \$ 3996 and \$ 12375
4. high-income economies - \$ 12375 or more

As developing countries are deemed the first three categories, which are 138 out of 218 countries. The UN states the following regarding "Developing Regions":

"Although there is no established convention for the designation of "developed" and "developing" countries or areas in the United Nations system, in 1996 this concept was introduced to the Standard country or area codes for statistical use (known as M49). It is intended for statistical convenience and does not express a judgement about the stage reached by a particular country or area in the development process." <sup>2</sup>

If we take this classification into account, we end up with 182 developing regions out of 249 geographical regions included in the United Nations Statistics Division.<sup>3</sup>

Another approach is that of the IMF (International Monetary Fund) which uses the per capita income level, the export diversification and the degree of integration into global financial system.<sup>4</sup> The outcome are 155 "Emerging markets and developing economies".<sup>5</sup>

<sup>1</sup><https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups/>, 22.01.2020

<sup>2</sup><https://unstats.un.org/unsd/methodology/m49/>, 22.01.2020

<sup>3</sup><https://unstats.un.org/unsd/methodology/m49/overview/>, 22.01.2020

<sup>4</sup><https://www.imf.org/external/pubs/ft/weo/faq.htm>, 22.01.2020

<sup>5</sup><https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/groups.htm>, 22.01.2020

# Countries Grouped by United Nations

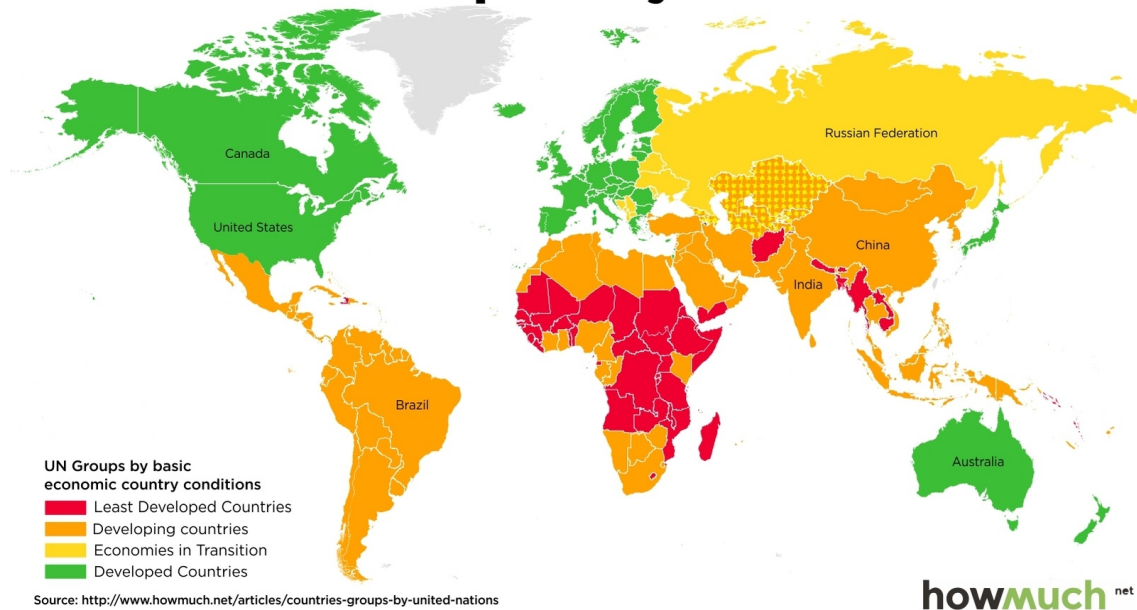


Figure 2: HowMuch.net, a financial literacy website

## 4 Open Data Impact Measurements

The efforts that are made to produce, publish and maintain open data are not negligible, especially for developing economies. Nonetheless, these investments are made, because substantial impacts are expected. The question now arises, if there really are impacts, how can these be noted and measured and have the investments paid off? To assess the impact of open data in a country, different perspectives can be used. Some measurements assess the quality and type of the data, the governments transparency and others data portal performance [5].

In the scientific literature several approaches exist to research the various impacts open data initiatives can have in a country. The research approaches can be categorised into the following five types:

- The first type of research focuses on the theoretical and conceptual understanding of open data initiatives using models for example to assess the exchange between citizens and the government or models to assess the quality of open data initiatives [11].
- The second type of research focuses on identifying obstructing or improving factors for the adoption, diffusion and implementation of open data initiatives [11].
- The third type of research conducts case studies where the influence of open data on selected national events is assessed [11]. For example, changes in citizen participation in governance after the launch of open data initiatives or specific open datasets.
- The fourth type of research compares open data initiatives of two or more countries to each other in order to strengthen the initiatives by learning from the approaches of other countries [11]. Factors for the comparisons can be legal and cultural differences.
- The fifth type of research focuses on the acceptance and the extent of usage of open data initiatives on the demand side [11].

<b>Readiness (35%)</b> (Primary & secondary data)			
<b>Government policies (¼)</b>	<b>Government action (¼)</b>	<b>Entrepreneurs &amp; business (¼)</b>	<b>Citizens &amp; civil society (¼)</b>
<b>Implementation (35%)</b> (Dataset assessments)			
<b>Accountability dataset cluster (⅓)</b>	<b>Innovation dataset cluster (⅓)</b>	<b>Social policy dataset cluster (⅓)</b>	
<b>Impacts (30%)</b> (Primary data)			
<b>Political (⅓)</b>	<b>Economic (⅓)</b>	<b>Social (⅓)</b>	

Figure 3: ODB weightings

Source: <http://opendatabarometer.org/doc/leadersEdition/ODB-leadersEdition-Methodology.pdf>, p.3

#### 4.1 Open Data Barometer

The Open Data Barometer (ODB) is a tool, produced by the World Wide Web Foundation in collaboration with the Omidyar Network. It tries to demonstrate the prevalence and impact of open data, based on the principles of the Open Data Charter (see section 5.1.1). Therefore, it undergoes a process of examination with each participating country.<sup>6</sup> The four types of considered data are:

- responses from a peer-reviewed expert survey
- a government self assessment
- detailed data set assessment
- secondary data (e.g. from the UN or the World Bank)

With the gathered data, the readiness, the implementation and the impacts are measured [5]. Table 3 shows the weightings of the ODB score for the sub-indexes and their respective components. The most relevant for our work are the impacts, which are categorised either political, economic or social. The "approach was to treat online, mainstream media and academic publications about open data impacts as a proxy for existence of impacts."<sup>7</sup> In this scoring the direct connection between open data and observed impacts are of highest importance. The political impacts regard government efficiency and effectiveness, and increasing transparency and accountability. The social impacts are measured by environmental sustainability and increasing inclusion of marginalised groups. And the economic impacts were simply the country's economy and the success of businesses built on open data.<sup>8</sup>

<sup>6</sup><https://opendatabarometer.org/barometer/>

<sup>7</sup><http://opendatabarometer.org/doc/leadersEdition/ODB-leadersEdition-Methodology.pdf>, p. 11-12

<sup>8</sup><http://opendatabarometer.org/doc/leadersEdition/ODB-leadersEdition-Methodology.pdf>, p. 12

## 5 Open Data Initiatives and Their Impact

There are numerous open data initiatives around the globe, some of which are transnational initiatives formed by cooperating organisations or countries, other open data initiatives are initiated by the governments on a national level. In this section we present two transnational open data initiatives and three open data initiatives from developing countries of three different continents. We also assess the impact of the national open data initiatives according to their acceptance and success.

### 5.1 Transnational Open Data initiatives

In this section we present two open data initiatives which are formed across countries and organisations. In general, these initiatives exist, because there is a common vision and the belief that, uniting their forces and working towards the same goals, they can have a greater impact in their own domains, but also be an inspiration for others.

#### 5.1.1 Open Data Charter

An initiative of that kind is the Open Data Charter.<sup>9</sup> They describe themselves as "a collaboration between governments and organisations working to open up data based on a shared set of Principles."<sup>10</sup> These principles for Open Data are:

- Open by Default
- Timely and Comprehensive
- Accessible and Usable
- Comparable and Interoperable
- For Improved Governance & Citizen Engagement
- For Inclusive Development and Innovation

They campaign for a culture of open and responsible data use, that can lead to more just societies and innovative economies. They currently have 73 government adopters and 53 organisations endorsers. They organise their work into two major thematic areas: Articulating norms and Demonstrating impact. The former means to help implement open data principles, that proved successful and show immediate effect, and the latter means to highlight what open data can achieve in specific situations and provide practical guidance for those.<sup>11</sup>

#### 5.1.2 Open Data for Development

Another initiative is the Open Data for Development or short, OD4D. It is "hosted at the International Development Research Centre (IDRC) and co-funded by the Canada's Department of Foreign Affairs, Trade and Development and the Hewlett Foundation."<sup>12</sup> It has an ecosystem approach, which includes governments and NGOs for data creation, and data journalists, civil society, local businesses, local scientists, etc. for proper, innovative usage of the data. The OD4D works in seven regional hubs, for example the AODN, or Africa Open Data Network. The 5 core pillars of their work are<sup>13</sup>:

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<sup>9</sup><https://opendatacharter.net/>, 20.01.2020

<sup>10</sup><https://opendatacharter.net/who-we-are/>

<sup>11</sup><https://opendatacharter.net/who-we-are/>

<sup>12</sup><https://www.od4d.net/about.html>

<sup>13</sup><https://www.od4d.net/annual-report-2018.html>

- Catalysing action
- Support to governments
- Scale effective use
- Monitor impact
- Institutional capacity

Other global initiatives that are related to OD4D are the Feminist Open Government, the State Of Open Data, the Open Data Barometer, which will be addressed further below, the Open Data Charter, the Open Data Impact Map, the Open Data Index and the International Open Data Conference.<sup>14</sup>

## 5.2 National Open Data initiatives

In this section we present three different open data initiatives of developing countries from three different continents. We describe why they are introduced and what they have to offer and also provide an assessment of the impact of the provided open data in these countries.

### 5.2.1 Brazil's Transparency Portal

To open up budget data, Brazil created the Transparency Portal in 2004, but it contained very limited and unstructured data. Now the portal has information in five categories - 1. direct spending by federal government agencies, 2. all financial transfers to states, municipalities and the federal district, 3. financial transfers to social programs, 4. administrative spending and 5. information on all government official credit card spending - which are much better structured. The portal features also a way to report misconduct, but also to give feedback, which has lead e.g. to more information on private and nonprofit organisations. [1]

In the Open Data's Impact Report from 2016 [1] the impact was measured in several ways. First, the website traffic rose from around 10,000 unique visitors in 2004 to around 900,000 in 2012, which indicates the site's relevance and importance.

Secondly, the publication of credit card usage brought a 25% reduction in spending by officials. Moreover, some credit card policies were changed, e.g. the use for payments for travel, per diems or cash withdrawals. Other consequences were a resignation of a minister or a repayment of \$30,000 to the government.

Thirdly, in 2009 a law was passed that required other levels of government to have a similar portal to publish their data and even other Latin American countries (like Chile or Mexico) implemented similar projects.

Probably the overall change in the climate for corruption is one of the most noteworthy effects, even if it can't be attributed solely to the Transparency Portal. The Brazilian society has made much progress in this area and the portal has made some of the desired changes possible. [1]

### 5.2.2 Ghana Open Data Initiative

Starting in the early 1990s Ghana began to build its own open data initiative called Ghana Open Data Initiative (GODI) providing information to its citizens. This got expanded by a e-Government platform in the early 2000s and since the 2012 a web platform (data.gov.gh) is available for the public [9]. It has the government on the supply side gathering data

<sup>14</sup><https://www.od4d.net/global-initiatives.html>

from 22 agencies and its citizens, journalists and academia on the demand side [2]. It is designed with the goal in mind to the openness of the government by increasing its transparency and accountability and also to improve the services offered for its citizens as well as the citizens involvement in governance [9]. It provides data on education, energy, environment, agriculture, health care and many more. The datasets are available mostly in csv format but also in excel and PDF format, most of it is licensed under the Creative Common Attribute and other, however there are currently 35 datasets without any license information [2].

In [9] effectiveness of the GODI in delivering its services to its citizens and also the participation of the citizens in governance are examined. For the study, the documentary analysis method is used, where documents are systematically reviewed, evaluated, categorised and interpreted [9]. The analysed documents were produced by the Ghanaian government and its ministries and comprises of reports (e.g. annual reports of the Ministry of Communication and others) and policy documents. As a result, Ohemeng et al. identified several issues that could harm the GODI, therefore they believe that these issues have to be addressed to secure the GODI's long term success. A Freedom of Speech Act is not present, but it would be a first crucial step to improve the opening of the government and the education of the citizens of the value of open data [9]. The GODI portal does not offer any methods for feedback reporting and also lacks of methods for citizens to participate in governance [9]. They propose a strengthening of the communication between the supply and demand side using the Web 2.0 and social networks potentials to share information and feedback and also making accessing information easier. This could strengthen the citizens participation in governance and distribute the knowledge sharing between the supply and demand side more evenly [9].

### 5.2.3 Open Government Data Platform India

In 2012 India introduced the National Data Sharing and Accessibility Policy (NDSAP) it specifies the basis for India's own open data initiative called Open Government Data (OGD) Platform India (<https://data.gov.in/>) to provide its citizens with open data. The NDSAP specifies what OGD and datasets are, and the rules and form under which the government and its ministries have to share their data. Unlike the Ghana Open Data Initiative the OGD platform provides means for citizens to participate in governance. Citizens can discuss, share and express their thoughts and needs in blogs and forums of specific spheres of interests or through rating of dataset quality. Those discussions and expressions of feedback enables the supplier to not only provide datasets of higher quality but also datasets that are actually needed on the demanding side. To further increase the citizens knowledge of and engagement in OGD, events like hackathons, workshops and more are hosted [8].

In [11] Saxena and Janssen examined the acceptance and usage of the OGD platform by actual and potential users. For the study questionnaires and interviews were conducted asking questions about the personal usage experiences with OGD, why and how or why not OGD is used or not used, the availability of technology to access and use OGD and possible future usage of OGD. The study uncovered several issues with OGD. On the one hand open data was accepted and widely used amongst the participants, however only few found them beneficial for professional gains [11]. Other issues are data not always being up-to-date and also a lack of understanding on how to use the desired datasets. Positive remarks are that the OGD is easy to access over the internet, however this assumes the availability of a stable internet connection which may not always be the case in rural areas [11]. The study also showed that societal influence plays an important role in the acceptance and use of OGD. To increase the acceptance and usage it is therefore important for the supply side to use different channels of communication to promote OGD [11]. It



is also important to put emphasis on the collaboration of different stakeholders from the private sector and non-profit organisations in order to enhance the exchange of information, thus strengthening the participative democracy [11].

## 6 Project Examples Using Open Data

There are numerous examples of successfully developed projects based on the usage of open data. In this section we present two projects where open data provided by open data initiatives, introduced in the previous section, played a crucial factor for their completion and success.

### 6.1 Ghana's Esoko

Ghanaian farmers are in need of current weather data especially about rain and information about market prices of agricultural products to make informed decisions about their businesses and on which agricultural products to focus on. However the Ghanaian agricultural information was not efficient and could not satisfy the farmers demands both in relevance and availability [4]. Esoko aims to provide the necessary information to the farmers via call centres, automated alerts via text or voice messages to cell phones, strategic planning and field training. Providing information about market prices, weather forecasts, crop market situation and up-to-date price information [12]. Esoko uses a mix of open data and proprietary data. The main source of open data is provided by the Ghanaian government (e.g. market prices and yield rates) but also from a non-profit organisation and by Esoko itself collected by the farmers, while the weather data being to only proprietary data [12].

In [4] an empirical study was conducted to examine the impact of the market price of agricultural products of farmers using the services provided by Esoko. The farmers in northern Ghana getting market price information from Esoko could sell groundnuts at 7% and maize at 10% higher prices compared to farmers not utilising the services provided by Esoko [4]. Farmers also adopted their bargaining strategies because of their better understanding of the agricultural market and how the whole ecosystem of food production works, thus strengthening their position when negotiating prices, resulting in higher selling prices in general [12].

### 6.2 India's ESMI

The Electricity Supply Monitoring Initiative (ESMI) in India was launched by the NGO Prayas Energy Group in 2007 to collect real-time power quality information. The reason was the poor electricity supply quality and the many resulting complaints about the interruptions, which they wanted to have evidence for, in order to point out the inefficiencies. They even wanted to approach this problem proactively and improve the power supply situation. [3] In the "Open Data for Developing Economies Case Studies" by odimpact.org the impact is viewed on two different levels. The first is described with a quote of Dr. Pendse:

"The question is, in the 200 houses that it (ESMs) has been placed in, has the power quality improved? And if it hasn't then at least has someone been made accountable using this evidence? The whole idea is that the use of data should lead to improvement. Otherwise, it isn't working." (Canares et al., 2017, p.13)

This is very hard, but they did not find any documented cases that showed improvement at that time. Nevertheless, there are three domains in which impact could be assessed. [3]

1. Awareness raising - Multiple organisations or individuals used ESMI to show point out the quality problems and most importantly journalists brought those problem to public discussions.

2. Effectiveness of power quality advocacy - In the Akola Industrial Area, a consumer presented data from ESMI, which could prove that the electricity interruptions caused economic damage, and put the distribution company in the position to react and remediate.

3. Re-emphasizing power quality monitoring at the regulatory level - Praya presented their findings to regulatory meetings and different commissions volunteered to use ESMI. Among them, there were the Delhi Electricity Regulatory Commission and the Joint Electricity Regulatory Commission, which are important on national and state level. [3]

## 7 Conclusion

The importance of open data is omnipresent in countries around the globe, with governments launching their own open data initiatives. The examples of open data initiatives in developing countries we presented in this paper show how serious and ambitious these countries are in pursuing their goals of achieving more transparency and openness and empowering of citizens. However, owed partly to the difficult political and infrastructural circumstances in those countries as well as the relative young age of the initiatives there is still room for improvement. The quality and topicality are amongst the common concerns of these initiatives as is the integration of feedback features whereby the supplier side and demand side can share information and needs. The assessments showed that feedback and discussion on open data is of great importance to better cater to the needs of the demand side.

Overall the presented open data initiatives can perform effectively and lead to enhancements in various areas. Further do the presented projects show how open data can contribute to successful products and improvements in peoples lives.

## References

- [1] [n. d.]. *Brazil's Open Budget Transparency Portal*.
- [2] National Information Technology Agency. 2020. Ghana Open Data Initiative. Retrieved February 6, 2020 from <https://data.gov.gh/>
- [3] Michael Cañares, Anirudh Dinesh, Andrew Young, and Stefaan Verhulst. 2017. India's ESMI: Civil society complementing government data in an open manner. *Open Data in Developing Economies: Toward Building an Evidence Base on What Works and How* (January 2017), 78–95.
- [4] Pierre Courtois and Julie Subervie. 2014. Farmer Bargaining Power and Market Information Services. *American Journal of Agricultural Economics* 97, 3 (June 2014), 953–977. <https://doi.org/10.1093/ajae/aau051>
- [5] Frederika W. Donker and Bastiaan van Loenen. 2017. How to assess the success of the open data ecosystem? *International Journal of Digital Earth* 10, 3 (Mar. 2017), 284–306. <https://doi.org/10.1080/17538947.2016.1224938>
- [6] Open Knowledge Foundation. 2019. The Open Definition. Retrieved February 4, 2020 from <https://opendefinition.org/>
- [7] Marijn Janssen, Yannis Charalabidis, and Anneke Zuiderwijk. 2012. Benefits, Adoption Barriers and Myths of Open Data and Open Government. *Information Systems*

*Management* 29, 4 (Oct. 2012), 258–268. <https://doi.org/10.1080/10580530.2012.716740>

- [8] Alka Mishra, D. P. Misra, Arpan K. Kar, Sunil Babbar, and Shubhadip Biswas. 2017. Assessment of Open Government Data Initiative - A Perception Driven Approach. In *Digital Nations – Smart Cities, Innovation, and Sustainability*. Springer International Publishing, Cham, 159–171. [https://doi.org/10.1007/978-3-319-68557-1\\_15](https://doi.org/10.1007/978-3-319-68557-1_15)
- [9] Frank L.K. Ohemeng and Kwaku Ofosu-Adarkwa. 2015. One way traffic: The open data initiative project and the need for an effective demand side initiative in Ghana. *Government Information Quarterly* 32, 4 (Aug. 2015), 419 – 428. <https://doi.org/10.1016/j.giq.2015.07.005>
- [10] Cambridge University Press. 2014. Meaning of developing country in English. Retrieved February 6, 2020 from <https://dictionary.cambridge.org/de/worterbuch/englisch/developing-country>
- [11] Stuti Saxena and Marijn Janssen. 2017. Examining open government data (OGD) usage in India through UTAUT framework. *Foresight* 19, 4 (Aug. 2017), 421–436. <https://doi.org/10.1108/FS-02-2017-0003>
- [12] Stefaan Verhulst. [n. d.]. *Open Data in Developing Economies: Toward Building an Evidence Base on What Works and How*.

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<sup>15</sup><https://free-and-open-technologies.github.io>