Open Data in Developing Countries

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I. INTRODUCTION

Many software applications, both desktop and mobile, benefit from Open Data, even without the users' knowledge. Open Data could be part of navigation and real-time trip-planner applications in the form of transit data for public transportation systems in the city's—provided by the government (Hillsman, Barbeau, *et al.*, 2011). However, this is only one basic use case for Open Data, especially for well-developed countries like the European Union, the US, or Australia. Open Data is experiencing a considerable upturn, also in developing countries (Davies and Perini, 2016). This work aims to examine why Open Data in developing countries could be a change for citizens in rural and poor areas, and what are the trigger mechanism for creating such Open Data in the first place. On the other side, we also want to give critical background information on why and where this technique in developing countries still needs improvements.

When this research was done, the terms Open Data for Development and Open Data in Developing Countries were used similarly in all conducted resources. Hence, this work uses the term Open Data in Developing Countries as the first term. The definition of Developing Country itself is not be discussed in detail, since this is out of the scope of this report.

This essay is arranged as follows: section II provides a brief introduction to Open Data as technology. Section III uses mainly the work from the (obsolete) *Open Data in Developing Countries* (ODDC) project and the (new) *Open Data for Development Network* (OD4D) to identify the mechanism, chances and risks for Open Data in development countries. By providing a concrete example of the Open Data initiative in Kenya, section IV gives an overview of the impact of this technology. A conclusion in section V critically discusses the findings.

II. OPEN DATA AS TECHNOLOGY

The introduction already stated one prominent example for Open Data as a productive use case. However, the concept of Open Data is much broader and finds applications in sectors like Agriculture, Education, Environment, Energy, Finance, Health, Infrastructure, or Governance. The concept is based on the approach to provide data for the general public. Everyone can use these data for every purpose without any charge and barriers. The data can (*should*) be processed and reused because restrictions are only allowed to guarantee the openness and freedom of these data (e.g., with a denomination of the author). This free-to-use license is contrary to the idea of commercial data, produced by the industry for business usage. (Murray-Rust, 2008; Mutuku and Mahihu, 2014; Davies, 2014)

The Open Data initiative started 2009 under President Obama in the United States as a cabinet's project for the Open Government movement; the EU started shortly after with the EU directive 2003/98/EC followed by Canada and Australia (Schwegmann, 2012). This also shows that governments initiated the first Open Data projects, and as motivation to start and fund such projects, political objectives should be achieved. However, also the industry, as well as non-governmental organization (NGOs) are interested in building up an Open Data infrastructure to "promote the use of social services," make "use of social services, transparency and accountability" or even for "profit making" (Davies, 2014, p. 25).

Typical formats for data distribution are spreadsheets, comma-separated values files (CSV), charts, and digital maps via a centralized online platform/web-page. The idea for using Open Data can be described as different stages, i.e., i) exploring the data collection; ii) visualizing and analyzing data to uncover patterns; iii) implementing and building applications based on the data; and finally, iv) sharing the outcome (Authority, 2020). Common for the usage of Open Data is the combination along with other 'open' initiatives like Open Source (i.e., Open Street Map).

III. OPEN DATA IN DEVELOPING COUNTRIES

This section aims to examine Open Data in the context of developing countries. A widely used research study is analyzed, which was held between 2013 and 2014 by ODDC. "Exploring the Emerging Impacts of Open Data in Developing Countries" is a project by the World Wide Web Foundation to get insights into the usage of Open Data in various country contexts and was mainly written by Tim Davies (Davies, 2014; Davies and Perini, 2016). The project initiated, conducted, and evaluated several independent case studies, which, themselves, focused on one particular Open Data initiative in a developing country. Davies et al. idea were to analyze the long-term impact of these Open Data projects. To generate generic and applicable research questions, they introduced two metaphors: a) the **domino effect** illustrates multiple pieces which are necessary through the whole Open Data setup process line

before they can be used to accomplish measurable outcomes; b) the **ripple effect** to highlight side effects which come along with the introduction of Open Data in developing countries. Beyond, the project evolved the following research questions:

1) *What is the level of awareness of open data among citizens in grassroots communities?*
2) *How did these citizens come to know about open data and related initiatives?*
3) *Who is using open data tools and what are the characteristics of the people using open data?*
4) *What prevents citizens from accessing and using open data and open data applications?*
5) *Has access to open data improved the social welfare of citizens and how public institutions offer services?* (Mutuku and Mahihu, 2014, p. 13)

The research questions, together with the metaphors, are reused in this report to identify key problems in the example case study in section IV.

When Open Data projects in developing countries are analyzed, it can be observed that most Open Data initiatives evolve out of the so-called Open Government movement. This synonym is used to describe the process of opening and creating free access to public management for citizens, which leads to more transparency and is used as an argument by the governments as a democratic development tool Schwegmann, 2012. Together with the benefits of Open Data, Open Government can provide two-way communication between the citizen and the government (e.g., by providing open political background information and led the citizen to be part of policy development). However, as already stated, political reasoning should not be the initiator for Open Data. This is also one of the findings of the ODDC project, as it appears that Open Data initiatives, which have emerged as a result of the government's argumentation, are lagging in data coherence, quality, and sustainability.

This section introduced the ODDC project, its research questions, and stated some limitation to close the gap for the next section.

IV. KENYA OPEN DATA INITIATIVE

The Kenya Open Data Initiative (KODI) is used to discuss the results of the ODDC project and to support them with concrete examples. The section firstly gives a short overview of the KODI project and describes the methodology of the research from Mutuku and Mahihu (2014); secondly, it presents its results by referring back to the ODDC findings; and finally, it adds a short and critical review.

A. KODI Project and Research Methodology

When KODI was lunched in 2011, it was the first sub-Saharan and second Open Data project after Marocco. The government supported the project intending to make data free for citizens by providing a centralized portal (accessible via http://www.opendata.go.ke). This project was an initiative in an Open Government movement since 2010 the government website was introduced, and afterward, one year later, KODI
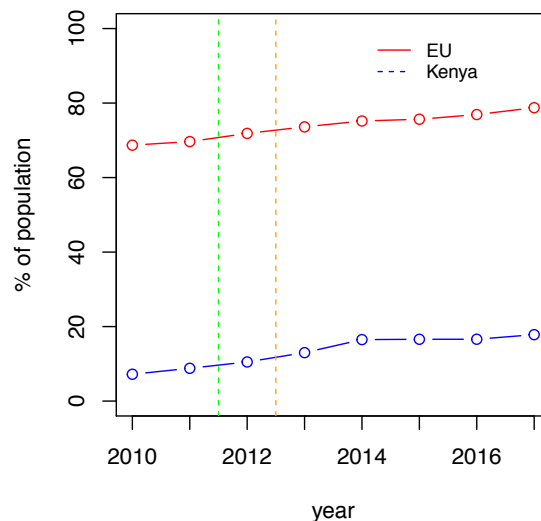

Fig. 1. Individuals using the Internet (% of population) - Kenya and European Union 2010-2017 - Kenya Open Data Platform (dashed green line) and Code4Kenya (dashed orange line) Launch (Bank, 2020; Mutuku and Mahihu, 2014)

was launched. One more year later, *Code4Kenya* was launched as a model to increase the acceptance of KODI by implementing several services and platforms based on the KODI Open Data sets. Outcoming projects were platforms like 'Find my School' (education sector), 'Star Health' (health sector), or 'GoToVote' (politics sector). (Mutuku and Mahihu, 2014)

The research from Mutuku and Mahihu (2014) was initiated as one of the case studies for the ODDC project. The aim was to uncover the impacts of KODI after its implementation. Mutuku and Mahihu used different methods to examine this impact: i) exploratory field study as a survey in the three main towns—Nairobi, Meru, and Nakuru; ii) stakeholder interviews with i.e., developers from Code4Kenya and government officials; iii) Web-Analytics evaluation for different KODI platforms; and iv) a minor user experience study.

B. Research Findings

As one of the key findings, Mutuku and Mahihu (2014) examined during their field study that only 10% of the participants had heard about the Open Data concept, and 7% were aware of the presence of KODI as a platform. This result answers and comes along with the first ODDC research question (section III): citizens have no or little awareness about Open Data or KODI, respectively.

By interviewing different stakeholders, they examined that the initial Code4Kenya audience was not the Kenyans, but rather the authorities and the government. Concerning the authorities and government relatives, the user group of Code4Kenya platforms are English speaking, educated people—which does not represent the citizens of Kenya, where poverty levels are still high. This result characterized the third ODDC research question that the actual user group of Open Data is not the intended one.

The ODDC research outcome also stated, as already mentioned, that the motivator of Open Data projects should not be governmental interests. However, this is emphasized again by Mutuku and Mahihu (2014). They examined that most of the Code4Kenya projects are still have beta status and are not under development anymore. In 1.5 years after launch, fewer than 10 open-data sets have been updated, since showcasing was the primary purpose of developing these applications.

To referring back to the domino metaphor (see section III), it can be concluded, that in the case of the KODI project, many smaller pieces are left out, and therefore it was difficult to achieve the actual goal of Open Data for development countries—reaching out to all user groups in the city and "helping in propagating better governance through the implementation of the new constitution" (Mutuku and Mahihu, 2014, p. 7). Smaller domino pieces like good data quality, compliance with standards, observing the citizens' needs, and start a two-way dialog with the actual user group could have led to a more successful outcome.

C. Review

The findings from Mutuku and Mahihu (2014) and the ODDC project have a solid foundation and support each other's findings. The long-term impacts from KODI match the key-findings of the ODDC project and can be adequately explained.

However, the Mutuku and Mahihu used methodology could be improved in certain respects. The conducted field study involved only 71 participants. Even though they stated explicitly that they instead wanted to collect "qualitative insights on emerging impacts open data" (Mutuku and Mahihu, 2014, p. 16) instead of collecting representative data. Figure 1 states the percentage of the population of individuals using the Internet. It represents the data for the European Union and Kenya. It can be seen that fewer than 20% of the Kenyas using the Internet. Therefore, it is not surprising that the questionnaire results in such low numbers: this is particularly true since Mutuku and Mahihu considered for their survey only people "who had at least an access point to Internet" (Mutuku and Mahihu, 2014, p. 16). The figure also shows the launch of the KODI platform in 2011 and the actual Code4Kenya launches in 2012. Both launches recorded only a marginal rise in Internet usage. Moreover, the Kenya curve did not grow continuously compared to the EU (compare years 2014-2016). This is an indicator that digital literacy in Kenya is still low, and feature phones are predominant over smartphones with internet access (Schwegmann, 2012; Nitsche, 2019).

V. Conclusion

This report intended to provide an overview of Open Data in developing countries. The background for the section Open Data in developing countries in III was given by first explaining Open Data as technology in section II. This section explains the topic according to findings, research questions, and metaphors in a broad sense. To support the given statements, section IV examines the research of the Kenya Open Data

Initiative and supports the previous findings by providing and mapping concrete examples. Furthermore, a critical view of this research is given.

It can be concluded that Open Data is a global trend not only relevant for developed countries and could be a chance and argument for developing countries to provide public data for everyone (Schwegmann, 2012). However, some smaller pieces are missing to achieve a sustainable outcome of Open Data projects in developing countries.

May be subject to future studies could be the usage of voice services in combination with Open Data. Services could be also created for the broad mass and placed as a loop in the television, which the government owns. In this manner, visualizations of Open Data could be reached to the rural areas where mass media still gets a significant population (Mutuku and Mahihu, 2014).

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