



ECONOMIC BENEFITS OF OPEN DATA IN AFRICA

March 2017

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AFRICAN DEVELOPMENT BANK GROUP

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Note: This study is based on evidence as of mid-2015. There have been some developments since then.

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Executive Summary

Open Data is data that can be freely used, reused, and redistributed by anyone. At least 46 governments worldwide, including those of at least 14 of the 54 countries in Africa, are working on open data initiatives to release some of the data they collect and generate. The primary objectives of open government data are economic growth, increased transparency and accountability, improved public services, and efficiency in government.

Estimates of the global potential economic benefit of open data range as high as US\$ 3-5 trillion, which represents about 4 percent of world GDP, although the international evidence to support such figures is not yet systematic. More modest estimates have driven policy-makers in Europe, the US, and elsewhere to initiate an open data approach. This makes good economic sense, not least because the costs of releasing data that the government already collects are far outweighed by even the most conservative estimates of potential benefits.

Open data programs are at a nascent stage in Africa, with most attention being focused on the objective of boosting transparency and accountability. As a consequence, the potential economic benefit to Africa has been largely overlooked, and this paper seeks to address this issue. Based on plausible and cautious assumptions, and using a variety of estimated methods, the economic potential of open data to Africa could equate to roughly 1–2 percent of the region's GDP. There are particular opportunities to be gained for the Africa region in the agriculture sector, in public procurement, and in geospatial data, and there is far greater upside potential than downside risk.

Achieving such benefits not only requires the right datasets to be available, it also calls for innovators and entrepreneurs to convert these datasets into data-driven services, and for the installation of appropriate

infrastructure to deliver those services. So far only a small amount of open data has been released in Africa; and in many countries economically important datasets, such as geospatial data, are non-existent or of poor quality. Nevertheless, in a number of African countries innovators are already demonstrating their ability to deliver data-driven services, including some that could increase small farmers' incomes by 20 percent or more. Indeed, in the region there exists a groundswell of skills and innovative ideas capable of converting open data into economic growth.

This report makes a number of recommendations to help Africa realize the economic potential of open data. Specifically, it calls for: greater knowledge sharing; the need to focus on creating and releasing key datasets; taking strategic steps to invest in "African Information Infrastructure" alongside physical infrastructures; removing the barriers that governments encounter in implementing open data initiatives; and facilitating innovation and data-driven services geared to the needs of the continent.

The African Development Bank is already a leader in promoting and facilitating open data in Africa, especially through its Africa Information Highway (AIH) initiative. Indeed, the AIH was selected in 2015 by PARIS21 as one of the most innovative initiatives globally to enable and inform the Data Revolution. Similarly, in endorsing the enhancement of the General Data Dissemination System (e-GDDS), which forms part of the IMF's Data Standards Initiative, the IMF Board decided that the AIH's Open Data Platform (ODP) would be used as the core data management and dissemination platform for African countries – a model to be emulated in all IMF developing member countries across the globe. This report illustrates how the Bank can build on this success and spearhead the drive to maximize economic benefits for Africa from open data and the implementation of the recent "Africa Data Consensus."

1. Introduction

Recent studies have suggested that open data policies could deliver significant economic benefits for both developed and developing countries. The African Development Bank has spearheaded the promotion and facilitation of open data policies in Africa. Indeed, in 2012, when the implementation of the open data approach was still in its infancy in many developed and developing countries, the Statistics Department of the African Development Bank launched the Africa Information Highway (AIH) initiative as part of its third-phase Statistical Capacity Building (SCB) program in African countries. This provided a data publishing platform for all its 54 African regional member countries. This paper was commissioned as a subsequent stage of this SCB work, in order to:

- Assess the economic value that is being created and/or could potentially be generated by accelerating the adoption of the open data approach in Africa.
- Make recommendations for action to ensure that African countries maximize the full economic potential of open data.

2. What is Open Data?

Open data is data that can be freely used, reused, and redistributed by anyone – subject at most to the requirements to attribute and to share alike.¹ “Freely” in this context means both free of legal restriction and free of charge. Open data imposes no restriction on who can use the data or what it may be used for, or with whom it may be shared.

Open data is made available free of charge, except perhaps for the marginal cost of distribution. For information downloaded over the internet, the marginal cost of distribution is effectively zero. The most common case is for open data to be available

online and downloaded without charge. For other forms of distribution, such as physical media, the charge should not exceed the cost of the media itself and the cost of distribution.

In addition, open data is most useful when it meets a few other requirements. First, it should be available in a “machine-processable” form, i.e. in a machine-readable format that can be easily processed by a computer program; conversely, data printed in a book or placed on a website in a Portable Document Format (PDF) file may be accessible but is not easily reusable. Second, it should be available in an “open format” that does not require the ownership of a specific, commercial, computer program to publish. Third, it should comprise primary “raw” data, timely and granular as possible, so that it can be used, aggregated, and combined in ways not foreseen – or foreseeable – by the original data holder.

Most discussion on open data focuses on data from governments, other parts of the public sector, state owned enterprises and international institutions. Public services collect and generate a great deal of data for their own purposes and from their operations. They are funded to do so because the collection and generation of this data are necessary in order to meet their own objectives – for instance, to inform policy-making or operational management, or to meet requirements for transparency and accountability. In addition, governments collect other data that is not directly or primarily needed for their own purposes but which is essential for services provided to the wider economy or society – for instance, the data provided for company registration or property registration. Finally, some governments collect data where they are the best-placed (or sole) actor able to provide it, for instance, maps and weather information.

There are, however, other sources of open data, such as “crowd-sourcing” data from the general public, which typically use mobile technology for its collection. This and various market-based approaches may complement government data, or they may represent a data source that a

¹ <http://opendatahandbook.org/guide/en/what-is-open-data/>

government is unwilling or unable to provide for free reuse. Academic research data is increasingly being released as open data, particularly if it is publicly funded.² And while the release of open data by private companies is still relatively rare, there have been examples of firms releasing data publicly, such as Goldcorp's release of geological data.³

Although some governments have released data on essentially "open" terms for decades, the last six years have seen at least 46⁴ national governments launch open data programs to make their digital, machine-readable data freely available on the internet for businesses and citizens. For most governments, the policy objectives have been a mixture of four distinct drivers:

- **Economic growth**, including business innovation, the creation of new companies and jobs, greater private sector efficiency and productivity, and the provision of information useful to investors.
- **Improving public services**, particularly by giving citizens information on standards of provision and service performance. This can drive greater citizen engagement and encourage more active "consumers" of public services, so complementing top-down targets and minimum standards with bottom-up local pressure to improve.
- **Increased transparency and accountability**, sometimes as part of wider open government programs or of National Action Plans for the Open Government Partnership.⁵ Open data can boost transparency by making it easier for the press and for civil society groups to expose mismanagement and wrongdoing. Further, it can have a positive effect on investment by reassuring potential investors about the business environment.
- **Greater efficiency in government**, for instance through enhanced decision-making via access to data from other agencies and through better knowledge of what information is already available.

3. Open Data in Africa

3.1. National and Regional Open Data Initiatives

At least 14 of the 54 countries in Africa have some form of national open data initiative:

- **Morocco** was the first country in Africa to establish a data portal. However, the Open Data Barometer found that "the quality, timeliness, and relevance of the datasets currently being made available are limited"⁶ and an evaluation of the initiative noted that "despite its innovative nature, the Moroccan open data initiative did not enjoy the interest it deserved; the released datasets are/ have remained very limited."⁷
- **Kenya** was also an early mover, launching an open data portal in 2011. However, the Open Data Barometer reported in 2014 that few updates had been made to the data on the portal in recent years.
- **Tunisia** established an open data portal in 2012 and has continued to maintain the site. However, the Open Data Barometer suggests that there is limited engagement with civil society users, and that the open data user community has not expanded substantially over the last year.
- **Nigeria** launched a national open data initiative in January 2014, following on from a state-level initiative in the state of Edo in September 2013. A number of civil society organizations in Nigeria have sought to develop information and advocacy-based work with open data, including BudgIT, who work to simplify and communicate the Nigerian budget.
- **South Africa** has not established an open data policy but the City of Cape Town launched its open data policy in 2014.⁸
- **Ghana** launched an open data initiative in 2012. While there has been a steady growth in open

² See, for instance, US NSF Data Management Plan requirements <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>

³ <http://www.ideaconnection.com/open-innovation-success/Open-Innovation-Goldcorp-Challenge-00031.html>

⁴ <https://www.data.gov/open-gov/>

⁵ See, for instance, US NSF Data Management Plan requirements <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>

⁶ <http://www.ideaconnection.com/open-innovation-success/Open-Innovation-Goldcorp-Challenge-00031.html>

⁷ <https://www.data.gov/open-gov/>

⁸ <http://www.opengovpartnership.org/>

data supply, the Open Data Barometer records no evidence of impacts from open data use in Ghana.

- **Burkina Faso** has an open data initiative, although most of the 50 datasets on its initial portal were sourced from outside the government itself.⁹
- **Tanzania** has made open data commitments as part of its Open Government Partnership National Action Plan¹⁰ and is using open data within its “Big Results Now” public service improvement program.
- The early stages of open data initiatives have also been reported in **Botswana, Uganda, Ethiopia, Mauritius, Rwanda, Sierra Leone¹¹** and **Senegal**.

Like the rest of the world, all of these initiatives have been launched in the last five years, and with a gathering pace. Nonetheless, it is clear from the Open Data Barometer 2014 that in some countries in Africa, as elsewhere, there have already been difficulties in maintaining momentum and engagement.

The Open Data Index 2014 also surveyed the availability as open data of 10 key datasets in 97 countries, including 20 countries in Africa. The Index is based on local reporting from open data activists. It found that only one dataset (in Côte d'Ivoire) of the 200 studied met all the criteria for open data, although legislation in Kenya also ranked highly.¹² A total of 16 out of 200 datasets scored 60 percent or better, with 9 only failing to get 100 percent because they did not have an explicit “open” license.

3.2. African Development Bank Initiatives

In support of national open data initiatives in Africa, and similar initiatives by some subregional and regional organizations, the Statistics Department of the African Development Bank (AfDB) operates a

number of data platforms under its Africa Information Highway initiative. The portals can be accessed via Dataportal opendataforafrica.org.

The AfDB initiative is a series of open data portals using a common Open Data Platform (ODP), including a pan-African portal (<http://opendataforafrica.org>) and 54 individual nationally branded portals (such as <http://rwanda.opendataforafrica.org/>). The Platform is based on the Knoema IT platform. These portals contain statistical and other data contributed by the institutions of the relevant government, the AfDB, other international institutions, companies, civil society bodies, academic institutions, development specialists, and other individuals. Each national portal supports both national and pan-African datasets. The portals allow users to upload their own data for analysis and sharing, and to put it forward for inclusion in the public catalog available to all. The platform allows the selection and filtering of data, an extensive range of visualizations, and the ability to download visualization, tables and underlying data in a range of formats¹³ suitable both for end users and for developers.

In the basic version of the platform supplied to each country, tools are provided for users to search for data, to display relevant data on an administrative map or on dashboards, and to filter and select data in order to build custom tables (which can then be visualized or downloaded in a variety of formats). Some countries (for instance Botswana¹⁴, Mali¹⁵ and Benin¹⁶) have simply adopted the standard portal design. Other countries have adapted the Data Portal and integrated it more closely with other statistical data that they publish on the web. For instance, the National Institute of Statistics of Rwanda's¹⁷ version of the Data Portal looks different from the standard Portal and contains links to its DevInfo website, to its Central Data Catalog, to its Survey database, and to its Geographical Information System reference information on administrative boundaries.

The greater availability of census data (50 out of 54 African countries participated in the 2010 census round) also prompted the African Development Bank

⁹ <https://theodi.org/news/burkina-faso-launches-open-data-initiative-with-mentoring-from-the-odi-and-funding-from-the-world-bank>

¹⁰ <http://www.opengovpartnership.org/country/tanzania/commitment/transparency>

¹¹ http://news.sl/drwebsite/publish/article_200527620.shtml

¹² Legislation in Kenya scored 90 percent, and only failed to get 100 percent because it was not clear that it could be downloaded in bulk.

¹³ Including, depending on the data, PDF, Excel, PowerPoint, PNG, JSON, CSV, SDMX and OData.

¹⁴ <http://botswana.africadata.org/>

¹⁵ <http://mali.africadata.org/en>

¹⁶ <http://benin.africadata.org/>

¹⁷ <http://rwanda.africadata.org/>

to extend its platforms to provide dedicated census portals linked from national Open Data Platforms.¹⁸ So far 10 countries¹⁹ have published census data through these portals.

To enhance the open data on agriculture and food security, the African Development Bank is working with the European Commission's Joint Research Center on the "Africa Food Price Collection Project." The main objective of this program is to collect weekly prices of various commodities from multiple market locations in Africa using modern technologies and crowd-sourcing techniques. The data that are collected weekly build an African Food Price Index, which monitors food price volatility; it is published in the Africa Food Prices Collection Portal²⁰ for free usage by anyone.

This is one tool available to governments in the region to help stave off food crises that beset the continent, particularly in the aftermath of extreme weather patterns (e.g. drought and flood) which appear to be more prevalent with global warming. Such extreme conditions dramatically affect the availability of different foods and cereals, driving up prices and leading to famine. For example, the drought in East Africa in 2011 affected 13 million people leading to severe famine in Somalia and massive displacements of population.²¹ The Famine and Early Warning Systems Network (FEWS NET), founded by USAID in 1985, exemplifies how different open datasets (including geospatial, weather, markets and trade, and agricultural productivity), can be used to help monitor the food security situation across all five subregions of Africa and assist in planning.

Also relating to the agriculture sector and food security, the African Development Bank is piloting the implementation of a new project on Farming Digitalization and Farms Registry. The objective is to use innovative technology strategies and infrastructure to reinforce cooperation between farmers, governments, and the private sector. The overarching objective is to improve food security and income generation throughout the food production chain. Greater use of technology, with a particular

focus on geospatial analysis, is intended to help unlock the potential of the agricultural sector and to strengthen monitoring and timely intervention. The project will provide a sophisticated information technology platform to generate digitized agricultural maps and implement registries for farms and farming. Such a platform will also include the collection of real-time information using mobile technology for planning and other decision making. Access to digital maps will enable easy location of farms and their produce and will further enable on-time intervention, providing targeted farmers with the technical assistance they need to increase their productivity and their incomes. In addition, by locating plant production in their region, smallholder farmers will be able to dialog and coordinate among themselves for better market connectivity. While the system is still under development, a demonstration of its potential is already available.²²

In **infrastructure**, the African Development Bank also hosts a rich store of databases, spatial datasets, and models as part of the Africa Infrastructure Knowledge Program (AIKP).²³ This builds on the Africa Infrastructure Country Diagnostic (AICD) program of 2005-09 initiated by the World Bank. Once the AICD's initial round was completed and the findings published,²⁴ it was agreed that the project would be transferred to the AfDB, to act as the central repository of infrastructure data on Africa going forward. The Bank takes the lead role in the regular collection and assessment of infrastructure indicators, the production of knowledge products, and the timely policy analysis of emerging infrastructure trends on the continent to guide future policy and funding decisions. This role involves enhancing the original AICD database into a long-term sustainable data system of infrastructure indicators. It goes further by defining and developing analytic knowledge products to inform development policy and program management activities.

Systematic data on the usage and users of the AfDB's portals and platforms is not readily available. However, in total the Data Portal and the Open Data Platform house over 1,000 datasets. This though

¹⁸ See for instance <http://rwanda.opendataforafrica.org/gallery/Census-Data>.

¹⁹ Cameroon, Djibouti, Egypt, Nigeria, Namibia, Togo, Tunisia, Rwanda, Seychelles, and Zambia.

²⁰ <http://africafoodprices.io/>

²¹ OXFAM (2013) "Growing Disruption: Climate change, food, and the fight against hunger", OXFAM Issue Briefing, September.

²² <http://dpengine.prognoz.com/afi/demo/map.html>

²³ <http://www.infrastructureafrica.org/tools>

²⁴ World Bank, *Africa's Infrastructure: A Time for Transformation*, 2009.

underestimates the value and depth of the data, since some datasets include more than 100 indicators on a wide range of economic, social, and demographic issues. Some countries' Open Data Platforms (such as Rwanda's) have attracted considerably more contributed datasets than others (such as Botswana's), while some countries' data is updated more regularly than others. This is to be expected; while the provision of high-quality portals such as these seeks to reduce the technical skills shortages and design barriers to the publication of data, the quantity and quality of the data available also depend on the determined and sustained contribution of data publishers.

Overall the portals are an excellent step, forging a more strategic and pan-regional approach than has taken place in other global regions. Moreover, the AfDB portals have clearly focused on facilitating wider public access to official statistics and other data, and to support countries in their efforts to improve data quality and dissemination for better policy formulation, monitoring, and evaluation. The Recommendations section at the end of this paper proposes a number of ways in which the portals could be further enhanced in alignment to the principles of the open data movement and in support of the UN's call for a Data Revolution for the Sustainable Development Goals.

3.3. Other Open Data Initiatives in Africa

Other pan-African open data resources include:

- The **openAFRICA** data portal <http://africaopendata.org> created by Code for Africa with support from the World Bank Institute, the Open Knowledge Foundation, the Africa Media Initiative, and Google. It is not a government portal; instead *"much of the data has been 'liberated' by pioneering organisations, volunteers or activists. It is therefore an eclectic collection that is far from comprehensive."*²⁵ It aims to provide open, "actionable" datasets that are difficult to access elsewhere.
- **SmartGov Africa**, <http://africa.smartgov.co/>, supported by a number of donors and NGOs,

which claimed at launch to have 1.2 million data points available across 54 African countries.²⁶

- An **Africa Open Data Lab** being scoped by the World Wide Web Foundation as a center for research and innovation, based on their successful Open Data Lab in Jakarta, Indonesia.²⁷

3.4. The Open Data Charter, the Data Revolution, and the Africa Data Consensus

In 2013 the G8 leaders signed an Open Data Charter which promised to make public sector data openly available, without charge and in reusable formats. It espoused five fundamental principles:

- (i) Open Data by Default
- (ii) Quality and Quantity
- (iii) Usable by All
- (iv) Releasing Data for Improved Governance
- (v) Releasing Data for Innovation.

In short, the Charter recognized a "new era in which people can use open data to generate insights, ideas, and services to create a better world for all."²⁸

Also in 2013, the UN High-level Panel of Eminent Persons on the post-2015 development agenda called for: *"a Data Revolution for sustainable development, with a new international initiative to improve the quality of statistics and information available to people and governments. We should actively take advantage of new technology, crowd sourcing, and improved connectivity to empower people with information on the progress towards the targets. Data must also enable us to reach the neediest, and find out whether they are receiving essential services."*

In response to the UN report, a High Level Conference on the Data Revolution in Africa, held in Addis Ababa in March 2015, endorsed the Africa Data Consensus. This called for: *"a sustained data revolution ... needed to drive social, economic and structural transformation in every African country"* and a

²⁵ <http://africaopendata.org/about>

²⁶ <http://democracyinafrica.org/data-and-debates-launch-of-smartgov-africa/>

²⁷ http://webfoundation.org/wp-content/uploads/2015/06/ODAsia_and_Africa.pdf

²⁸ G8 Open Data Charter, June 2013, Preamble, p. 1. Accessible at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/207772/Open_Data_Charter.pdf.

“broad data ecosystem that spans the entire value chain driven by national priorities and underpinned by the Fundamental Principles of Official Statistics. This ecosystem must be inclusive of all forms of data — including official and other data — and involve all stakeholders.”²⁹

One of the key principles espoused in the Africa Data Consensus is that “Official data belong to the people and should be open to all. They should be open by default.” This aligns to the one of the tenets of the G8 Open Data Charter. It is important to note that African leaders too have effectively endorsed an “open by default” policy for data. This can increase transparency on what government is doing and how it is spending public funds; it allows individuals and organizations to develop new insights and innovations that can improve lives; it also improves the flow of information within and between countries, thereby supporting the African integration agenda.

The Africa Data Consensus builds on the foundations laid by three earlier African-owned and led initiatives, namely the Reference Regional Strategic Framework for Statistical Capacity Building in Africa (2007), the Strategy for the Harmonization of Statistics in Africa (SHaSA) (2009), and The African Charter for Statistics (2009).

The Reference Regional Strategic Framework (RRSF) for Statistical Capacity Building in Africa was adopted by the Conference of African Ministers of Finance, Planning and Economic Development in 2007. The framework provides guidance and appropriate mechanisms for advancing the development of sustainable statistical capacity in Africa. It emphasizes country ownership in the preparation of the National Strategy for the Development of Statistics.

The Strategy for the Harmonization of Statistics in Africa (SHaSA) was formulated by pan-African institutions including the AfDB, African Union Commission (AUC), United Nations Economic Commission for Africa (UNECA), and member countries of the African Statistical System to support the African integration agenda. Its main

purpose is to enable the African Statistical System to generate timely, reliable, comparable, and harmonized statistics that conform to the highest international standards. The data cover all aspects of political, economic, social and cultural integration in Africa. In short, the Strategy aims to drive the continental integration agenda forward by providing reliable and comparable statistics for the design, implementation, and monitoring and evaluation of regional integration and development programs in Africa. It was endorsed by the Heads of State and Government in July 2009, although progress has been so far been limited by shortages of human and financial resources.

The African Charter on Statistics was also adopted by African Heads of States and Governments in 2009. It underscores the importance of statistics for decision-making at all levels and urges member countries to develop statistics that are consistent with international standards.

These three earlier strategies provide country-owned instruments for the coordination of country statistical activities, the overarching objective of which is to improve the scope, quantity and quality of official statistics in support of evidence-based policy planning and decision-making.

4. Evidence for the Economic Benefits of Open Data

One of the objectives of the open data movement has been to stimulate economic growth. This is made clear in Principle 5 of the G8 Open Data Charter 2013, which focuses on “Releasing Data for Innovation.” It states: *“the more people and organizations that use our data, the greater the social and economic benefits that will be generated.”³⁰* Moreover, open data fosters a cross-fertilization of innovative ideas among individuals, organizations, and nations and spurs better decision-making based on hard evidence. Because open data

²⁹ http://www.unece.org/sites/default/files/page_attachments/final_adc_-_english.pdf

³⁰ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/207772/Open_Data_Charter.pdf

initiatives are in their relative infancy, there is no systematic evidence yet on their overall economic effect. However, a number of recent studies have attempted to estimate the potential economic value of open data globally, regionally, or nationally, drawing on empirical examples of how open data, and other data, have added value in specific markets or jurisdictions.

4.1. The McKinsey Global Institute Report

The most frequently cited study is that of the McKinsey Global Institute.³¹ It claimed that globally, seven sectors³² alone could generate more than US\$ 3 trillion per annum – and perhaps as much as US\$ 5 trillion a year – in additional value through the use of data. Although often cited as a figure for open data, and although McKinsey themselves use the term “open data” in their report, the analysis actually used a broader definition, namely “liquid

data.” According to this term, openness was not a binary definition but a matter of degree employing four metrics: breadth of access, machine readability, cost to obtain, and limitations on rights to reuse. This meant that some of their examples covered data being used in innovative ways but which had not been released to the public (for privacy or other reasons) and included “MyData,” which involves sharing information about an individual with, and only with, that individual.

While the McKinsey Report of 2013 recognized that open data was at an early stage, it demonstrated how it could help to unlock additional value in a number of ways: to generate entrepreneurial businesses; to assist established companies to segment markets; to define new products and services; and to improve the efficiency and effectiveness of operations. The five main value-creating processes underlying the analysis are presented in Table 1 below.

Table 1. McKinsey’s five value-creating processes (US\$ billions per year)

Value-creating process	Personal sector benefit	Private sector benefit	Public services ³³ benefit	Total benefit
Better consumer decisions by using better information	1,160-2,210	-	-	1,160-2,210
Better matching of supply/providers with demand/consumers	90-130	90-190	50-70	230-390
Better public procurement in education services	-	-	230-290	230-290
Improved processes by driving decisions with data	310-370	85-155	90-100	485-625
Optimization of operations using data on performance and best practice	-	470-1040	550-750	1,020-1,790
Total ³⁴	1,560-2,710	645-1385	920-1210	3,125-5,305

³¹ “Open data: Unlocking innovation and performance with liquid information” 2013 http://www.mckinsey.com/insights/business_technology/open_data_unlocking_innovation_and_performance_with_liquid_information

³² Education, Transportation, Consumer Products, Electricity, Oil & Gas, Health Care and Consumer Finance.

³³ For the purposes of this analysis, education and health services have been assumed to be in the public sector and electricity and oil & gas industries in the private sector.

³⁴ Totals do not exactly match the McKinsey report because of missing data in the Consumer Finance part of the report.

The analysis in Table 1 helps to explain some of the processes that would be at work to generate the benefits.

- About half of the suggested benefits would go directly to the personal sector, mainly through consumers being able to make better informed decisions. The personal sector could also potentially benefit from lower prices and lower taxes as private and public sectors optimize their operations and reduce costs.
- The two main value-adding processes at work are: (i) better consumer decisions and investment and (ii) operations optimization.
- McKinsey's figures only estimate a value for better public procurement in education services. This is based on an assumed 8-10 percent saving in the cost of procurement, based on case studies in the USA, UK, and Romania. However, the mechanisms to achieve these savings – purchase analysis, benchmarking and open bidding/auctions – are not specific to the education sector. Similar savings could be made in other parts of the public sector.
- Even within the private sector benefits, most of the benefit goes to the companies using data to optimize their own operations. They may be helped to do so by new (or old) firms providing data-driven services; however, the prime value is that obtained from the use of those services, rather than the value of the data-driven service firms themselves.
- The value-creating mechanisms at work also provide a basis for assessing how long it could take for the benefits to be fully realized. The fundamental and wide-reaching change postulated across sectors such as health and education could take some 20 years to be broadly adopted. Indeed, even widespread business process optimization and data-driven decision-making could take over 10 years to be widely adopted in sectors such as banking, insurance,

and energy, even in developed countries. However, the adoption may be accelerated by the providers of data-driven services to those businesses, not least because they will have a strong commercial interest to promote adoption (as has happened, for instance, in precision agriculture in the United States). Moreover some of the education benefits are valued on the basis of the expected lifetime earnings enhancement, which could take 40 years to be fully realized, even after all the changes have been made to the education system itself.

McKinsey estimated that the potential value would be divided roughly between the United States (US\$ 1.1 trillion), Europe (US\$ 900 billion) and the rest of the world (US\$ 1.7 trillion). However, it is not clear how these shares were calculated, and the issue of the distribution of benefits is not discussed in the main text report. These numbers would constitute around 6.5 percent (US), 5.0 percent (Europe) and 4.2 percent (Rest of the World) of nominal GDP.

4.2. Lateral Economics

Another high estimate of the potential value of open data was produced by Lateral Economics for the Omidyar Foundation in 2014.³⁵ This included a critical review of the McKinsey value estimates, and concluded that implementation of open data policies – including in areas corresponding to G20 agenda items – could increase G20 output by around US\$ 13 trillion over the next five years. This would boost cumulative G20 GDP by around 1.1 percentage points over the 2 percent growth target over five years. Importantly, Lateral Economics tried to estimate potential value on a different basis to McKinsey, using the 2014 G20 agenda as the framework. The main areas they deemed to contribute to economic growth and boost GDP were:

- **Trade Data** (0.1 percent of GDP) from harmonized and open-trade data across the G20. The data that each country generates was seen as a potential global public good, as each party to improved trading patterns would gain. Using

³⁵ https://www.omidyar.com/sites/default/files/file_archive/insights/ON%20Report_061114_FNL.pdf

empirical evidence on the costs of information barriers to trade, Lateral Economics assumed a plausible potential benefit of open-trade data to be 0.6 percent of merchandise trade, which for Australia would be equivalent to around AU\$ 1.6 billion or 0.1 percent of GDP.

- **Economic Management** (0.23 percent of GDP): Lateral Economics considered that open data could improve the management of economic cycles. This would involve three key strategies: (i) exploiting existing rich government real-time data that, even today, is not open or even routinely accessed by government macroeconomic managers; (ii) public discussion and subsequent improvement of sophisticated economic models to forecast and assess alternative policy settings; and (iii) the use of real-time snapshots of the macro-economy from e-commerce and cloud services, which would enable governments to “take the pulse” of the economy in real time.
- **Anti-corruption** (0.1 percent, potentially rising to 0.5 percent of GDP). A growing body of evidence suggests that open data could help to combat corruption by reducing its private returns and by making it easier to detect. Lateral Economics deduced that open data could reduce the costs of corruption by around 10 percent. The estimate of 0.1 percent of GDP was based on a European Commission estimate of the cost of EU corruption to be around 1% of GDP, although it was noted that the same EC study had suggested that costs of corruption amounted to 5 percent of GDP worldwide.
- **Employment** (0.22 percent of GDP). Open data could transform labor markets. The study considered that higher-quality information on employment conditions would facilitate better matching of employees to organizations, producing greater job satisfaction and improved productivity. This finding was similar, at least in terms of process, to one of the McKinsey benefit estimates from better matching of employers and employees and so reducing labor turnover.

- **Energy** (0.11 percent of GDP). The report noted that many opportunities had been identified in using open data to reduce the cost of energy supply and improve energy efficiency. These opportunities will enhance information for resource exploration and development, investment decisions, efficient operations management, and energy efficiency by consumers. The open data agenda also offers the possibility that greater transparency will lead to a better understanding of regulatory costs and benefits, and serve as a catalyst for regulatory reforms. This finding also has parallels with the McKinsey estimates for potential value from open data in the electricity and oil & gas sectors.
- **Infrastructure** (0.23 percent of GDP). Again paralleling McKinsey, Lateral Economics considered that open data could assist in both maximizing the value of existing infrastructure, and ensuring the efficient development of new infrastructure. It could help improve utilization in numerous ways; for example, by using real-time information to manage traffic congestion; by providing services associated with the infrastructure; and by facilitating regulatory reform (e.g. congestion pricing). It could also improve implementation planning and coordination and procurement processes, as well as stimulating closer public scrutiny and so better governance of investment decisions.

4.3. European Commission (EC)

The European Commission (EC) commissioned two studies³⁶ as the evidence base for their proposals to amend the EU Reuse of Public Sector Information directive. The first study, by Graham Vickery of the consultancy Information Economics, reviewed the evidence from studies on public sector information reuse as a whole and other market developments related to data. The Vickery study found that there was a developed EU market in public sector information and that open public sector information policies, easier access to information, and the abolition of charging would further stimulate the

³⁶ Vickery: <http://ec.europa.eu/digital-agenda/en/news/review-recent-studies-psi-reuse-and-related-market-developments>
Deloitte/POPSIS: <http://ec.europa.eu/digital-agenda/en/news/economic-analysis-psi-impacts>

public sector information reuse market, with direct public sector information use and reuse activities increasing to €40 billion per annum.

Importantly, the Vickery study also investigated the indirect benefits of open data, for instance, the additional benefit to personal or business customers of using the data-driven services provided by the “direct” reusers. With easier access, improved infrastructure and lower barriers, they estimated that aggregate direct and indirect economic benefits of a pan-EU open data policy could have amounted to around €200 billion in 2008. This represented 1.7 percent of the GDP of the EU economy as a whole.

The second study commissioned by the EC was the Deloitte “Pricing of Public Sector Information Study” (POPSIS). This looked at case studies where previously restricted data had been made open. The study revealed a consistent pattern of much greater usage as a result. Based on seven case studies of public bodies in the EU, it showed that the amount of reuse of data increased by a factor of 10 to 100 after it was made free, and that the economic value of its reuse increased by a factor of between 5 and 10 times. Importantly, the POPSIS study also showed that making the data open led to a significant increase in the use of the data by local SMEs, which highlights its role in promoting local innovation and start-ups.

4.4. Warsaw Institute for Economic Studies (WISE)

Another European study was undertaken for Demos Europa by the Warsaw Institute for Economic Studies (WISE) in 2014. This estimated benefits for the EU-28 economy of €200 billion by 2020 (1.9 percent of GDP) from open data and big data. Of this total, 6 percent would come from increased competition driven by open data alone, 51 percent from using open data and big data analytics to increase data-driven decision-making, and 43 percent would derive from increased efficiencies through the use of big data alone.

WISE modeled the impact of open data and big data on 21 different sectors. They found that differences in the sectors’ contributions to the overall growth relate to their different relative sizes, distinct economic features, and technological characteristics. For the EU as a whole, applications of data-driven solutions in manufacturing, trade, and logistics were predicted to produce almost half of the total big and open data impact, whereas ICT, finance, and public administration would deliver a further third of it. This outcome is of course partially driven by the relative size of the different sectors in the EU in the first place, with manufacturing and trade accounting for 26 percent of total GDP and agriculture only about 2 percent.

Interestingly, WISE also modeled how the benefits were distributed among the 28 EU member states and among three groupings: 11 Northern European states, 4 Southern European states, and 13 new member states. They found that states with larger global enterprises, as well as those more advanced in the ICT field, would benefit to a greater extent than those that lag behind in these areas. Northern European countries that have favorable structural compositions, both in terms of sectors constituting their economies and their average company size, were predicted to gain 2.0 percent of GDP. Conversely, Southern European states, where both sectoral composition and the average company size were less compatible with big data applications, were predicted to gain only 1.6 percent of GDP. The new member states were predicted to also expect substantial gains of 1.8 percent of GDP, based on an increasing efficiency; however, in their case there was concern that limited investments in the knowledge-intensive services, R&D, and innovations might become a serious bottleneck.

4.5. UK Shakespeare/Deloitte Review

In the United Kingdom, where the economic benefit has always been strongly on the open data agenda and where there was a particular concern with some remaining charges for public data, an independent review³⁷ was commissioned from

³⁷ *Shakespeare review: an independent review of public sector information*, <https://www.gov.uk/government/publications/shakespeare-review-of-public-sector-information>

Stephan Shakespeare, supported by Deloitte and published in 2013 as the “Shakespeare Review: An Independent Review of Public Sector Information.” It “conservatively” estimated the direct economic benefits of public sector information at around GBP 1.8 billion a year, with an overall impact including direct and indirect benefits (such as time saved by access to real-time travel data) of around GBP 6.8 billion.

4.6. Developing Countries

One of the principal drivers for open data in developing countries has been to enhance economic growth. However, there is a shortage of studies estimating the potential economic benefit to developing countries. As previously mentioned, where studies do exist, they tend to focus on qualitative transparency and accountability issues.

One exception is a study by the Caribbean Policy Research Institute,³⁸ examining the potential economic growth value of open data to Jamaica. This suggested a potential contribution of 0.6–1.2 percent of GDP from improvements in the education, agriculture, and tourism sectors. The agricultural contribution is particularly interesting for other developing countries: agriculture contributes 6.5 percent to Jamaica’s GDP calculated on a “modest” 10 percent improvement in Jamaica’s agricultural value added. This figure is based on the authors’ experience in the development of open data-based solutions to farmers in Jamaica and elsewhere in the Caribbean. By contrast, the McKinsey report did not consider the agricultural sector at all, while the WISE report predicted a very small contribution to total benefits from improved agriculture productivity, partly because of agriculture’s much smaller share in the EU’s GDP.

There is, however, no established literature on the potential economic value of open data to Africa as a region.

4.7. Summary

The studies summarized above present a wide range of estimates of benefits — and considerable uncertainty about the timescale in which they might be achieved. One reason for the disparate estimates is that the European Commission and UK studies focused on the potential growth of data-driven businesses and the benefits of such services to their customers. That is easier to extrapolate because, in Europe and in some other developed countries, there are already data-driven businesses delivering both economic activity and benefits to their customers. The policy issue that the studies were examining was the extent to which making data available as open data would grow this sector and, likewise, the end-user benefits. By contrast, the McKinsey and Lateral Economics research estimated the total potential benefit of open data, including benefits delivered by mechanisms other than data-driven businesses, such as transparency itself. It is undoubtedly the case that there would be benefits from open data delivered by these other mechanisms, but estimating them is inherently more difficult than extrapolating from existing business activity.

Nonetheless, an important consideration is that even benefits at the relatively modest end of the scale are worthwhile, given that these still greatly exceed the costs associated with open data. The Vickery study for the EC estimated the costs of making data open, including both loss of actual revenue and the loss of potential revenue, at less than €1 billion. So even if the benefits were overstated by a factor of 5 and the costs were understated by a factor of 5, there would still be a strong business case for proceeding with open data. This is borne out by the POPSIS study in Europe and an Australian study, which showed early returns on investment from open data policies of between 5:1 and 10:1 (the ROI would be expected to increase over time as the take-up of services increases and further uses of the data are found).

³⁸ http://issuu.com/capri/thinktank/docs/capri_issue_4_

5. How the Economic Benefits Could Apply to Africa

5.1. Top-down modeling

A simplistic, top-down model for estimating the economic benefits of open data to Africa would be to scale the benefits estimated elsewhere in proportion to the relative size of the GDPs of the areas covered. This assumes that the increase in GDP from open data would be in the same proportion as found elsewhere. However, this would be a crude assumption. Nevertheless, while there would undoubtedly be differences between regions, the extensive modeling by WISE for their study showed that, for Europe, the estimates for each of the different regions were within 10 percent of the European average. Similarly, the McKinsey estimates for the USA, Europe, and the Rest of the World were all within 20 percent of the global average. Given the other estimating uncertainties involved, an assumption of a similar proportion of GDP would not be unreasonable.

For Africa, this approach would give estimates of total economic value ranging from a high of around US\$ 84 billion annually (based on the structure adopted by McKinsey and Omidyar) to US\$ 34 billion (based on the EC and Warsaw reports), down to a low of around US\$ 18 billion (the UK Shakespeare report). A cautious estimate would put the potential long-term benefit to Africa at between 1 percent and 2 percent of GDP.

An alternative simplistic model would be to take the Lateral Economics/Omidyar structure and consider the extent to which, in the near future, each of the benefit drivers might apply in Africa. For example, it would be perfectly reasonable to assume that the availability of open data for economic management would have a greater impact in many African countries than it would in Australia (because of the existing high quality of data and of economic management in

Australia). Similarly, the beneficial impact of open data on reducing corruption might be greater in Africa than in Australia. This is based on the assumption that the underlying trend of corruption in Africa aligns to the global estimate of 5 percent, in comparison to the EU/Australia figure of 1 percent. A further example is the power of open data to galvanize infrastructure investments; this could be especially important in Africa, which suffers from a significant “infrastructure gap” that holds back wider economic development.³⁹ Depending on the assumptions made, these three drivers alone (Economic Management, Corruption, and Infrastructure) could contribute 1 percent of GDP to Africa, with some potential for further economic benefit from the other drivers as well.

Notwithstanding, there are many arguments why such simplistic extrapolation could be misleading in the context of Africa. There are both supply-side and demand-side considerations that need to be taken into account, including the following:

- The implications of different mixes of sectors in the economy. For instance, agriculture is largely ignored in the developed-country evidence, because even if the benefits in that sector were large, the sector itself is small. By contrast, in Africa agriculture is much more significant both economically (around 15 percent of total GDP) and in terms of other development priorities (such as food security).
- The extent to which the use cases of open data that underpin the studies – either as scaled-up examples or as existing business activity that would grow – are relevant to Africa countries, given the latter’s differing stages of development. Conversely, the question arises whether there might be additional significant use cases for open data in some or all African countries which are not relevant or have not emerged elsewhere (cf. Kenya’s M-PESA, which has developed an innovative approach to money transfer precisely because of the absence of the type of extensive retail banking system found in North America and Western Europe).

³⁹ See for instance McKinsey http://www.mckinsey.com/insights/economic_studies/africas_path_to_growth_sector_by_sector at pp8-10

- Another consideration is the availability of timely and high-quality data in individual African countries, and whether it is available in forms and to a standard that allows economic benefit to be generated from it in individual countries.
- The capacity of the local innovation ecosystems to generate sustainable business ideas using open data.
- The capacity of the local innovation and entrepreneurship ecosystems to provide the finance and other resources to enable new ideas to be brought to market and be scaled up.
- The availability of a suitable delivery infrastructure for data and for the services based on it. This includes both a suitable technical infrastructure and relevant business infrastructure, including payment systems. Africa generally is less well placed than other global regions in terms of internet access and take-up/ access to banking services by the general population and by small and medium enterprises (SMEs), although the situation is improving. Indeed, there is already a history of innovation with the use of SMS to provide banking and other services at scale, and to collect revenue from them, which does not exist elsewhere.
- The extent to which data-driven service providers from outside the region will provide services to Africa, and the extent to which this is a net benefit to Africa.
- The extent to which there could be additional indirect economic benefits from non-business uses of open data – for instance, to improve education and health, or to use transparency to improve the efficiency and effectiveness of public spending and regulation.
- Policy constraints, including any dependency on charging for data to finance its collection.

It is evident that the factors governing the benefits of open data may differ significantly between countries

and between regions, and these are not directly quantifiable. The WISE report was based on a plausible model but it lacked sufficient data points to establish hard correlations (let alone causality); moreover the countries taken as case studies were more homogeneous in their characteristics than African countries. Nevertheless, to understand the potential economic benefits for Africa and to allow suitable policy interventions to be designed, it is worth examining some of these individual issues in more detail.

5.2. Bottom-up modeling

An alternative approach would be, first to identify key economic sectors and types of data for Africa. A second step would be to draw evidence from within Africa and elsewhere, to estimate the economic benefit of open data to those identified key sectors or from those types of data. The third step would be to sum the components to give a total estimate of economic benefit for the Africa region. Such an analysis should reveal not only where open data experience from other regions might not apply to the region (in which case, the top-down approach would lead to overestimates), but also where regional possibilities exist for economic benefit in Africa that have not been considered elsewhere. To this end, the present study focuses on four key sectors — agriculture, transport and logistics, public procurement, and geospatial data — together with the potential economic benefits from the use of open data in transparency and public services more generally.

Agriculture

Perhaps the most striking difference when comparing Africa to other regions is the much greater importance of agriculture to the African economy as a whole, and the priority given to improving agricultural output and productivity.

While agriculture does not feature highly in the global studies, there are a number of use cases where open data has aided agricultural productivity in developed countries. For instance:

- **Climate Corporation** was acquired for US\$ 930 million by Monsanto in October 2013. It uses 60 years of detailed crop yield data, weather observations from one million locations in the United States, and 14 terabytes of soil quality data (all three types of information provided free from the US government) to provide advisory and insurance services to farmers to select the most profitable crops and to protect their incomes against bad weather.
- **US Geospatial data**, including GPS, is estimated to give the US agricultural sector productivity and cost-saving gains of US\$ 19.9 billion per year.⁴⁰
- Studies of investment in **GPS-assisted precision agriculture techniques** in Australia⁴¹ and elsewhere suggest that, although significant capital investments are required to take advantage of the data, these can pay for themselves in 2 to 5 years through savings in seed and fertilizer inputs, fuel and labor, and increased yields.

Some of these above-cited techniques could be hard to replicate widely in Africa at present because of the capital investment needed by farmers. However, there is evidence⁴² that some of the elements are being adapted to come within reach of small-scale farmers in developing countries in Africa and elsewhere.

The African Development Bank recognizes the importance of data for agricultural productivity and food security. In collaboration with the European Commission's Joint Research Center, and in partnership with Knoema, it collects weekly food prices using web/mobile based Collection Tool and crowd-sourcing techniques. The collected data is compiled into a comprehensive commodity price dataset which is published in the Africa Food Prices Portal.⁴³ The Food Prices Dataset and related dashboards and reports can be accessed free of charge by log-in to the Portal. The AfDB is currently implementing a Farming Digitalization and Farm Registry project, which will further assist farmers in their decision making, and enhance productivity and farm incomes.

There is increasing evidence of other innovators in Africa using data to give tangible benefits to local farmers. There is a particular focus on small-scale farmers, consistent with 85 percent of farms in Africa being 2 hectares or less.⁴⁴ While this data is often not technically or legally fully "open," the evidence demonstrates that there are innovators and entrepreneurs with the skills to create and deliver data-driven services.

Agriculture: Main Use Cases

There are three main use cases: (i) market price data; (ii) advisory services; and (iii) insurance, financial and management services.

(i) Market price data

Market price data allows farmers to judge better when to bring produce to market and to overcome their information disadvantage relative to traders. Examples include:

- **M-Farm**⁴⁵ (**Kenya**) was originally a market price information application for farmers, but it has developed into a collective marketing platform. There are claims that some farmers' incomes have doubled through joining M-Farms.
- **LimaLinks**⁴⁶ (**Zambia**) provides market price data to 15,000 farmers, achieving a 30 percent increase in prices.
- **ECAMIC**⁴⁷ (**Ghana**) supports around 15,000 members in 24 cooperative farmer communities in the Eastern Corridor. Price Information collected at the local district markets is combined with relevant other agriculture information.
- In **Niger**, grain traders with access to a mobile grain price information application report⁴⁸ income growth of 29 percent.
- **Manobi**⁴⁹ (**Senegal**) is a suite of mobile applications focused on agricultural market information.

⁴⁰ http://www.gpsalliance.org/docs/Economic_Study_Backgrounder.pdf

⁴¹ <http://www.grdc.com.au/uploads/documents/Economics%20of%20Precision%20agriculture%20Report%20to%20GRDC%20final.pdf>

⁴² <http://www.theguardian.com/global-development-professionals-network/2014/jun/04/subsistence-farming-precision-agriculture>

⁴³ <http://africafoodprices.io>

⁴⁴ FAO figures quoted by McKinsey.

⁴⁵ <http://www.mfarm.co.ke/>

⁴⁶ <http://www.slideshare.net/ctospace/sango-ne-tardyisnmay2012> - see slide 7

⁴⁷ <http://www.iicd.org/projects/ghana-ecamic>

⁴⁸ World Bank 'Maximising Mobile 2012'

⁴⁹ <http://www.manobi.com/index.php?IDPage=2&M=3>

- **Infotrade⁵⁰ (Uganda)** is a platform to integrate the collection, analysis, and dissemination of agricultural and other market information.

(ii) Advisory services

Advisory services supply information that allows farmers to improve output and productivity, thereby increasing their incomes:

- **SALI⁵¹ (Kenya)** provides farmers with weather forecasts by SMS to optimize planting decisions: “about two-thirds of farmers attributed an increase of 15 percent or more in yield to decisions they had made differently as a result of using forecasts.”
- **Kuza Doctor⁵² (Kenya)** provides “Expert farming advice delivered to your mobile phone/ A Farmer’s Mobile Toolkit from Farm to Fork.”
- **Agro-Hub⁵³ (Cameroon)** is a start-up venture set up to address the needs of rural farmers. Agro-Hub seeks to achieve this through the innovative use of the web and mobile technology to drive demand for farmers’ products, attract better prices, and increase farmers’ incomes.
- **Mkulima Calculator⁵⁴ (Kenya)** is a web-based application that allows farmers in Kenya to predict their crop yields, giving them access to statistics on soil fertility, required fertilizers, and expected crop diseases. M-Calc aims to optimize production and reduce the losses that farmers incur when they plant specific crops in unsuitable areas.
- **CocoaLink⁵⁵ (Ghana)** is a mobile technology service that delivers timely farming, social, and marketing information to cocoa farmers in 15 communities in western Ghana to improve their livelihoods. Cocoa farmers who subscribe to CocoaLink receive and share practical information via SMS text and voice messages with industry experts and other farmers.
- **iCow⁵⁶ (Kenya)** allows small-scale dairy farmers to manage and trade livestock. The platform has allowed users to increase milk production by over 50 percent and to boost their incomes by 42 percent.
- **E-TIC⁵⁷ (Senegal, Mali)** is a toolbox responding to the needs of farmers, herders, and fishermen in West Africa. It helps them gain access to knowledge related to organic farming and to ultimately better sell their products on local and international markets.

(iii) Insurance, financial, and management services

These services provide insurance products and financial and management services to farmers:

- **Kilimo Salama⁵⁸ (Kenya, Rwanda)** provides a variety of insurance products for smallholders. For example, it uses weather data from satellites and automated weather stations as a proxy to estimate farmers’ harvest situation.
- **Lactation Record System⁵⁹ (Kenya)** increases the value of smallholder cattle by 100-400 percent by certification of lactation records.
- **Farmis⁶⁰ (Uganda)** is a platform that, among other functionalities, enables farmers to effectively store records, and assists financial institutions to review farmers’ performances over a period of time so that they may make an informed decision regarding credit risk.

Many of these cases do not currently use data that is fully open in either a legal or a technical sense. This is hardly surprising, given that very little agricultural data is currently available on “open” terms in Africa. Nonetheless, these use cases indicate that capacity exists in the region to develop agricultural, data-driven services, as well as applications tailored to local African needs. This conclusion is based on the following facts:

⁵⁰ <http://www.infotradeuganda.com/index.php/about-infotrade.html>

⁵¹ <http://cdkn.org/2012/12/features-forecasts-benefit-farmers-at-risk-from-weather-extremes/> and <http://www.christianaid.org.uk/pressoffice/press-releases/March-2012/kenya-farmers-use-science-traditional-forecasting-survive-climate-change-2603.aspx>

⁵² http://www.backpackfarm.com/site/1075kris/KuzaDoctorFAQ_FINAL.pdf

⁵³ <http://community.ihub.co.ke/blogs/11182/how-mobile-technology-has-been-used-to-create-an-impact-in-cameroon>

⁵⁴ <http://www.e-agriculture.org/news/m-calc-web-based-application-predict-crop-yields>

⁵⁵ <http://worldcocoafoundation.org/cocoalink/>

⁵⁶ <http://icow.co.ke/>

⁵⁷ <http://www.e-tic.net/index.php?what=project>

⁵⁸ <http://www.syngentafoundation.org/index.cfm?pageID=562>

⁵⁹ <http://www.slideshare.net/ctaspacesango-ne-tardyisnmay2012> (slide 3)

⁶⁰ <http://farmis.ug/benefits>

- Although Kenya features most often, these examples are drawn from nine different African countries.
- Some services are delivered through SMS, which demonstrates the ability of some valuable applications to overcome the lack of rural mobile internet access.
- There is evidence of companies leveraging initial market-information services to develop a wider range of services to farmers. In fact, there are opportunities for these services to be incrementally enhanced as further relevant open data becomes available. This will increase the value to farmers and leverage the existing customer base to generate quickly realizable value.
- There is evidence of the growth of “platforms” and of innovators from three countries (Kenya, Ghana, and Senegal) extending their services through partnerships with neighboring countries.
- There are viable business models operating at scale.

The effect on farmers’ incomes is reported to be substantial, with benefits of over 20 percent cited. This is a higher percentage than precision agriculture in the United States, albeit from a much lower base. This level of benefit to farmers in developing countries has been reported elsewhere. For example, a similar, well-established market price system Tradenet⁶¹ in Sri Lanka increased farmers’ incomes by 23 percent, and similar results have been achieved in the Caribbean.

Agriculture contributes 15 percent to African GDP. So if the income from just 20 percent of that production were to increase by the 20 percent typical of the benefits already demonstrated, this would give an overall economic benefit of 0.6 percent of GDP.⁶² This would have a strong positive effect on incomes and poverty reduction.⁶³

Transport & Logistics

There are well-proven use cases of economic value being derived from open data relating to urban public transport systems and road systems in developed countries.⁶⁴ However, it is not clear how applicable these are to the majority of African countries at their current stage of urban infrastructure development. Nor is it clear how open data could help address specific African transport and logistics issues, such as delays at borders.

In Kenya there is some evidence of the local adaption of use cases from elsewhere, such as Digital Matatus⁶⁵ and Sasa Cabs,⁶⁶ and novel new applications such as Matserve Msafiri⁶⁷ for local problems of bus safety that could apply more widely in Africa.

A further consideration is that as development increases, the absence of data could restrict growth in important sectors. For instance, e-commerce depends on efficient retail logistics. However, there is some evidence that e-commerce in Gaborone, Botswana, is inhibited by the lack of address and urban map data, rendering home deliveries difficult and time-consuming (historically, postal delivery has been to post office boxes).

Public Procurement

The McKinsey study cited multiple examples from the US and Europe of the use of transparent, open data-related tenders and online auctions to widen markets and obtain procurement cost savings of 8-10 percent. However, while the examples were drawn from the sector of education, the key processes used were not specific to that sector, so a similar approach might produce similar savings in other sectors. In the UK, the publication in 2010 of open data on government tenders and contracts revealed that local SMEs had become more successful in winning government contracts because, through open data, they had become more aware of business opportunities.

⁶¹ <http://www.inruled.org/iERD/Cases/Tradenet.pdf>

⁶² $15\% * 20\% * 20\% = 0.6\%$

⁶³ Christiaensen, Demery and Kuhl “The Evolving Role of Agriculture in Poverty Reduction” (2010), Working Paper 2010/36, UNU-WIDER. Their paper found that a 1 percent increase in agricultural per capita GDP reduced the poverty gap five times more than a 1 percent increase in GDP per capita in other sectors.

⁶⁴ <http://www.worldbank.org/content/dam/Worldbank/document/eca/russia/Open-Transport-Data-in-St-Petersburg-ENG.pdf>

⁶⁵ <http://www.digitalmatatus.com/>

⁶⁶ <http://yourstory.com/2014/08/kenya-sasa-cabs/>

⁶⁷ <http://appsafrika.com/2014/03/31/kenyan-road-safety-app-aims-to-change-transport-in-africa/>

In Africa, at the start of the Kenyan open data initiative in 2011, Dr. Bitange Ndemo, Permanent Secretary of Kenya's Information and Communications Ministry, estimated that Kenya could save up to US\$ 1 billion (around 2 percent of GDP) annually by using online procurement. However, he saw the open data agenda and greater public scrutiny as bringing its own risks: "If we put the prices for toilet paper in the public eye, the public will ask, 'Are you buying this for toilets made of gold?'"⁶⁸ Unfortunately, the Kenyan government do not appear to have implemented transparency of this data yet.

Across Africa, government procurement averages around 10 percent of GDP,⁶⁹ which is somewhat lower than in the EU (16 percent), but it is still very significant. Savings in procurement could be recycled either in lower taxes and charges to the private sector, so boosting economic growth, or in further public investment that should also increase growth. Some savings are already being realized through public procurement reforms underway in African countries, some of which involve greater transparency in the whole process of tenders and contracts. However, progress in this area has been slower than anticipated in some countries, hence the recent development of the Open Contracting Data Standard.⁷⁰ There is also an overlap here with anti-corruption savings from open data. Nevertheless, overall there could be significant value from timely and accessible open data on individual public procurements.

McKinsey reported three case studies of open data in education procurement, which led to savings of 8–10 percent of spending. If such a level of savings were applied across public procurement in Africa, this could conservatively contribute economic value of 0.8 percent of GDP. The Kenyan statement would suggest considerably more, but there is as yet no practical experience of that.

Geospatial Data

Perhaps the most important part of a National Information Infrastructure is core reference

geospatial data. This constitutes an essential building block for the broader sharing of data under a National Spatial Data Infrastructure.

In the EU, geospatial data alone is estimated to contribute around half of the economic value of public sector information.⁷¹ A study⁷² by Oxera for Google estimated the Gross Value Added (GVA) by the Geospatial Services Sector at US\$ 113 billion per annum, with additional indirect benefits of US\$ 17 billion in time savings, US\$ 5 billion in fuel savings, and US\$ 13 billion in education — with an annual growth rate of 30 percent per annum globally. A study of the importance of the Global Positioning System (GPS) to the US economy alone⁷³ found that, as of June 2011, US\$ 96 billion in annual direct economic benefits were attributable to GPS and 3.3 million US jobs were dependent on it. (The agriculture sector alone had productivity and cost-saving gains of US\$ 19.9 billion per annum due to GPS, with the promise of further potential gains as adoption was then only around 60 percent.) However, the report found that it was difficult to estimate the total economic value of GPS because it had already become so pervasive.

In Australia⁷⁴ it is estimated that the spatial information industry in 2006–07 could have had a gross value added of around AU\$ 682 million. This underscores the large economic footprint of spatial information as it was being used in most sectors of the economy, as well as its direct impact on productivity. The accumulated impact of these direct impacts contributed to a cumulative gain of AU\$ 6.43–12.57 billion in GDP, equivalent to 0.6–1.2 percent of GDP.

The economic value of the Dutch geo-information sector in 2008 was estimated at €1.4 billion, or 0.23 percent of national GDP. This was based on detailed surveys covering private, governmental, and research sectors, but did not include geo-information activities outside of the core primary geo-information products and services. Meanwhile, in Denmark the program to create a single, national, open register of addresses created direct financial

⁶⁸ http://www.mckinsey.com/insights/public_sector/innovation_in_government_kenya_and_georgia

⁶⁹ <http://www.ccsenet.org/journal/index.php/par/article/download/30860/18170>

⁷⁰ <http://standard.open-contracting.org/>

⁷¹ PIRA study for the European Commission ftp://ftp.cordis.europa.eu/pub/econtent/docs/2000_1558_en.pdf

⁷² http://www.oxera.com/Oxera/media/Oxera/downloads/reports/What-is-the-economic-impact-of-Geo-services_1.pdf

⁷³ http://www.gpsalliance.org/docs/Economic_Study_Backgrounder.pdf

⁷⁴ <http://www.crcsi.com.au/assets/Resources/7d60411d-0ab9-45be-8d48-ef8dab5abd4a.pdf>

benefits of around €62 million in the period 2005–2009 for total costs of around €2 million.⁷⁵

There is less evidence to put a figure on the potential economic value of geospatial data in developing countries, although some surprisingly large numbers have been reported from applications flowing from India's remote sensing program.⁷⁶

In Africa, a 2010 study⁷⁷ revealed that 20 out of the 29 countries responding to a survey had a body working to formulate a National Spatial Development Initiative (NSDI). The study also revealed though that there was minimal political support for National Spatial Data Infrastructure initiatives and only six countries expressed satisfaction in the participation of different stakeholders in the NSDI initiatives. There was considered to be a general lack of appreciation of the benefits of a NSDI.

There have been a number of follow-up studies, including work by UNECA on the most important fundamental geospatial datasets needed for African countries.⁷⁸ This builds on work in the Nigeria Geo-spatial Data Infrastructure, which identified initial fundamental datasets as a geodetic control database; topographic database/DEM (at the scale of 1:50,000 pending availability of 1:25,000 national coverage); digital imagery and image maps; administrative boundaries; cadastral databases; transportation (roads, inland waterways, railways, etc.) data; hydrographic data; land use/land cover data; geological database, and demographic database. Many of these key datasets had been used for economic benefit in the developed country examples cited above. There have also been some attempts at basic pan-African geospatial coverage, such as AFRICOVER, sponsored by the Food and Agriculture Organization (FAO).

UNECA has said, *"The geospatial technology industry is an emerging sector of the African economy that is expected to see tremendous growth in the coming years. It can also be a very lucrative one."*⁷⁹ UNECA have not produced a quantified estimate. Nevertheless, a range of data points from developed

countries suggests that geospatial data contributes about half of the total benefits of open data. So, using the top-down estimate of a total benefit of all open data (worth 1–2 percent of GDP), the pan-African availability of good-quality open geospatial data could alone contribute benefits worth 0.5–1 percent of GDP in Africa.

It should be noted that in the development of geospatial core reference information in Africa, countries will need to manage conflicting pressures. How can countries finance data collection through charges for data (some, such as Botswana, are already considering greater cost recovery) and how can they extract the maximum economic value from the data, if the data needs to be freely available? After two decades of cost-recovery from users, the EU is beginning to move away from this approach and to make core reference data, including geospatial data, available to all users free of charge.⁸⁰ This is discussed further in the Recommendations section at the end of this paper.

Other Sources of Economic Benefit from Open Data in Africa

The most direct way to derive economic benefit from open data is through the development and use of data-driven services, involving different economic actors. However, open data can provide other positive economic effects in several indirect ways, as detailed below. These concern: Transparency & accountability; Improving public services; and Improving health care and education.

Transparency and accountability. Open data can increase transparency and accountability by: (i) making it easier for the press and for civil society groups to expose mismanagement and wrongdoing by government organs or individuals; (ii) prompting behavior change on the part of public officials and (iii) facilitating broader-based participation in public policy. To be most effective in this way, open data needs to be an integral part of an "open government" cycle, including civic engagement and a government that is prepared to foster participation in policy-

⁷⁵ http://www.adresse-info.dk/Portals/2/Benefit/Value_Assessment_Danish_Address_Data_UK_2010-07-07b.pdf

⁷⁶ <http://geospatialworld.net/Magazine/MArticleView.aspx?aid=30534>

⁷⁷ <http://sacj.cs.uct.ac.za/index.php/sacj/article/viewFile/36/19>

⁷⁸ http://www.uneca.org/sites/default/files/publications/geoinformation_socio_economic_dev-en.pdf

⁷⁹ <http://www.gsdi.org/gsdiconf/gsdi14/papers/H.E.AbdallaHamdok.pdf>

⁸⁰ <http://ec.europa.eu/digital-agenda/en/news/what-changes-does-revised-psi-directive-bring>

making. It has also been shown that transparency and accountability lead to better governance and to less fraud, waste, and corruption. In this way, open data policies should deliver economic benefits via the more effective use of public resources and by fostering greater confidence and higher levels of FDI and domestic private sector investment.

It is difficult to quantify this effect or to determine how to apportion any gains to open data. Notwithstanding, there is a strong interest in transparency and accountability among open data activists in Africa. Indeed, there are some excellent examples of its use, by for instance BudgIT⁸¹ in Nigeria, and in tracking down budget mismanagement and ghost workers in Uganda,⁸² and in the Africa Media Initiative.⁸³

Improving Public Services. Open data can also inform citizens about their local public services and induce them to dialog and advocate for improvement to those services. Case studies of this include:

- The provision of health service data as part of community monitoring of local health services in rural Uganda,⁸⁴ which led to a 32 percent decline in under-5 deaths.
- The use of public information, distributed through newspapers, to reduce the capture of educational funds in Uganda.⁸⁵ This increased the average grants received from 25–30 percent of entitlement to 75–84 percent of entitlement over six years.
- The “Toilets and Grades” data journalism project⁸⁶ by Irene Choge in Kenya linked record lows in primary school students’ grades in two counties with disease levels at the primary level and to reduced levels of expenditure on education infrastructure. She found that the funding allocated for children’s toilet facilities had disappeared, resulting in high levels of open defecation, illness and low attendance, in particular among girls. This led in turn to poor student performance in examinations. As a result, the government acted to correct the toilet deficiency across the most underserved primary schools.

- Open data on education, health, and water is a key component of the Tanzania “Big Results Now” program of public service improvement. For instance, the National Examinations Council has created an open data site with school-by-school examination results to “bring community awareness and engagement as well as improve transparency and accountability.”⁸⁷

Improvements to the sectors of health and education have a highly geared impact on economic growth. It has been estimated⁸⁸ that a 10 percent improvement in life expectancy at birth is associated with a rise in economic growth of some 0.3–0.4 percentage points per annum. The McKinsey report estimates benefits based on the enhancement to lifetime earnings through better educational outcomes. While open data alone will not achieve this level of benefits, open data can empower citizens to drive improvements in public services and in turn achieve better economic outcomes.

Conclusions of the Bottom-up Analysis

This bottom-up analysis suggests that open data in individual sectors and specific types of open data could contribute significant economic benefits to Africa. These could include, based on conservative assumptions: 0.6 percent of GDP from the use of open data in agriculture; 0.8 percent from the use of open data in public procurement; and 0.5–1 percent from the use of geospatial data, with potential additional growth through the use of open data to improve public services, particularly in transport, health, and education. *This would support the conclusion of the top-down analysis that the economic benefit of open data could equate to around 1–2 percent of GDP in Africa.*

Because only a limited number of sectors have been analyzed, there may be even more upside potential than this estimate suggests. This is supported by the observation that in agriculture, the potential proportionate gains from optimization benefits are higher in Africa than in more developed regions. This may be because agriculture in regions like the EU and

⁸¹ <http://www.yourbudgit.com/infographics/>

⁸² <http://aiddata.org/blog/open-data-bad-for-the-corrupt-good-for-everyone-else>

⁸³ <http://africanmediainitiative.org/activities>

⁸⁴ http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2014/08/26/000158349_20140826090814/Rendered/PDF/WPS7015.pdf

⁸⁵ http://siteresources.worldbank.org/EXTHDOFFICE/Resources/5485726-1271361195921/Reinikka-Svensson-power-of-information_Uganda.pdf

⁸⁶ <https://hbr.org/2013/03/open-data-has-little-value-if>

⁸⁷ <http://www.necta.go.tz/opendata/opendata.html>

⁸⁸ http://www.oecdobserver.org/news/archivestory.php/aid/1241/Health_and_the_economy:_A_vital_relationship_.html#sthash.g1E0D26W.dpuf

US has already been partially optimized by non-open data methods. If this pattern were to be repeated in other sectors, then the potential overall economic benefits of open data as a proportion of GDP could actually be greater in Africa than elsewhere.

The realization of benefits would nevertheless depend on the availability and usability of data, the capacity and scalability of the innovation itself, the capacity of the entrepreneurship ecosystem to exploit it, and the capacity of national infrastructure to deliver data-driven services. The next sections address these issues in Africa.

5.3. Availability and Usability of Data

Some datasets have greater potential for economic benefit than others. Some of the most important datasets for economic and social value have been identified in the G8 Open Data Charter,⁸⁹ the Open Knowledge Foundation Open Data Index,⁹⁰ and the World Bank Open Data Readiness Assessment methodology.⁹¹

There is no systematic tabulation of the availability or quality of these datasets for the 54 countries of Africa. However, generally the availability of open data in Africa lags far behind that of the developed regions:

- As already described, the Open Data Index 2014 surveyed the availability as open data of 10 key datasets in 20 countries in Africa – 200 datasets in total. Only 16 out of these 200 African datasets scored 60 percent or higher for open availability. Furthermore, the countries surveyed tended to be those more advanced in open data activity, including those who had announced a government open data initiative.
- Africa has a poor mapping coverage at the scale of 1:25,000. This is equivalent to only 2.9 percent of the entire area, compared to 86.9 percent for Europe and nearly 100 percent for Russia.⁹²

The challenge is already well recognized. In a speech delivered at the Global Geospatial Conference in Addis

Ababa in 2013, Abdalla Hamdok, Deputy Executive Secretary of UNECA, summed up the situation: *“African countries face the perennial challenge that statistical data needed to support development requirements is often either not collected, nor compiled, nor disseminated in a timely manner. This is due to a number of impediments that range from erratic coordination, standardization and data quality assurance across the continent, to limited institutional capacity, inadequate data management systems and statistical infrastructure.”*⁹³

It is generally acknowledged that there is wide variation in the availability and quality of data across different African countries; indeed, a number of programs have been launched to extend the range and quality of data available over time. Moreover the increasing appreciation of the wider economic benefits of open data should lead to greater prioritization of investments in data by governments and other institutions. This is evidenced by the rapid take-up of the “Data Revolution” initiative in Africa and by actions already taken by the African Development Bank to facilitate the wider availability of data, including through its Africa Information Highway.

The importance of data collection and dissemination was clearly shown in the 2010 round of Population and Housing Censuses. This saw the highest participation rate ever by Africa in the history of census taking. In all, 50 African countries out of 54 participated. This is a significant improvement over the 2000 census round, when at least 15 countries failed to participate. Further, the public availability of census data is improving, with 10 countries⁹⁴ making data available through the African Development Bank’s census portal, linked to their Open Data Portal.

In addition, Africa has many examples of people finding alternative and innovative ways of collecting the data that they cannot obtain easily from official sources. This is seen, for instance, in the collection and dissemination of market prices to farmers and in the community mapping of the Kibera area of Nairobi. Indeed, the Ushahidi data collection platform,⁹⁵ which

⁸⁹ <https://www.gov.uk/government/publications/open-data-charter/g8-open-data-charter-and-technical-annex>

⁹⁰ <http://index.okfn.org/>

⁹¹ <http://opendatatoolkit.worldbank.org/en/odra.html>

⁹² UN Economic Commission for Africa <http://www.gsdi.org/gsdiconf/gsd14/papers/H.E.AbdallaHamdok.pdf>

⁹³ UN Economic Commission for Africa <http://www.gsdi.org/gsdiconf/gsd14/papers/H.E.AbdallaHamdok.pdf>

⁹⁴ Cameroon, Djibouti, Egypt, Nigeria, Namibia, Togo, Tunisia, Rwanda, Seychelles, and Zambia.

⁹⁵ <http://www.usahidi.com/>

was originally created in the aftermath of Kenya's disputed 2007 presidential election, has become a widely used data source.

Availability alone is not sufficient for many applications, particularly for sustainable business use. Research suggests⁹⁶ that if businesses are building new products or services, or relying on data to inform their strategies, openness is only one of the characteristics needed to determine success. There is also a need for:

- **Completeness and accuracy.** Are the quality and scope of the data understood and documented? Business users can sometimes derive value from lower-quality data, if that is all that is available, but they need to understand the risks involved.
- **Consistency.** Is the data published in a consistent, easy-to-access, and well-documented format? Are any changes in the methodology of production or the format of delivery documented and flagged sufficiently in advance to data users? This lowers barriers to reuse and ensures that products and services consuming the data do not unexpectedly fail because the upstream data format has changed. This requirement applies not only to the format but also to any coding or definitions used for the data. Moreover, it is important that there is consistency not only among different releases of the same dataset but also among the coding and definitions used in different datasets, so that they can be combined to create additional value.
- **Timeliness.** Is the data available when it is most useful? In general, up-to-date data is the most valuable and many of the use cases, for instance in the sectors of agriculture and transport, are about using open data and technology to supply up-to-date and actionable information to people to take day-by-day or week-by-week decisions. Of course, historical data can also be useful for research, for the identification of trends and for the identification of relative rare events (for instance in insurance).
- **Provenance.** What is the source of the data and how was it collected? One of the attractions of open data from governments is that it is often collected systematically for governments' own purposes. However, the processes by which it is collected and maintained need to be communicated to prospective users.
- **Richness.** Does the data contain a level of detail sufficient for the purpose? In general, the more detailed the data the better: local weekly market prices are more useful to individual farmers than national annual averages. Furthermore, data about individual entities or events (subject to any privacy or confidentiality constraints) may give greater insight and value than aggregates, particularly for applications that assist individual consumers to make better informed decisions (such as in transport).
- **Guarantee of continued availability.** Will the data continue to be made available in the future? Sustainable businesses need to be confident that the data on which they depend will not cease to be available. This requires not only policy stability – e.g., that a government will not suddenly stop publishing data – but also confidence in the operational management of the open data initiative. The experience in Kenya and in Ghana, where after an initial launch, data has not been extended or updated, will be of concern to those considering using their data.

Many of these issues are challenges, at least at an operational level, for open data initiatives even in the leading African countries in the field. They also require government agencies to go further than simply “publishing” data by providing supporting documentation, engaging with data users, and sometimes changing their own data collection and maintenance processes to make the data more useful. Furthermore, while these are good practices for all open data, they are particularly important for sustainable business use of data. In this respect, a prime objective is to give businesses the confidence to invest.

⁹⁶ Harvey Lewis, Research Director of Deloitte Analytics <http://www.computerweekly.com/blogs/Data-Matters/2014/11/what-do-businesses-really-look-for-in-open-data.html>

It is possible though to view the issue of availability from another perspective: investing in the collection and availability of suitable data could be economically beneficial in the same way as other targets of investment. There are some well-recorded instances of this: for example, the national address database in Denmark,⁹⁷ and more generally governments have started to talk about a “National Information Infrastructure”⁹⁸ or “Good Basic Data for Everyone.”⁹⁹ In this context, core reference data maintained by government agencies is a public good that is widely beneficial for many sectors of the economy, and for society more generally, in the same way as other infrastructure investments.

5.4. Innovation and Entrepreneurship

A strong local innovation and entrepreneurship ecosystem is important for the realization of benefits from open data. Delivering business value from open data requires the ability to spot opportunities to provide value-added services, to optimize businesses based on the availability of open data, to draw together the necessary skills and resources, and possibly to adapt solutions demonstrated elsewhere to local needs and conditions and bring them to market.

The 2014 Global Innovation Index (GII)¹⁰⁰ showed that, compared to Western Europe, the 37 African countries surveyed had lower scores, with Mauritius the highest performer with a ranking of 40th out of 143. Nonetheless, in 2014 Africa recorded the most significant improvement of all regions in the GI rankings; the report found that many African countries “are fostering innovation through the implementation of various initiatives and programs.” It cited examples such as a Rwandan endowment fund, which aims at furthering innovation in manufacturing and agriculture. It also found that Kenya, Uganda, Mozambique, Rwanda, Malawi, Gambia, and Burkina Faso all achieved a significantly better innovation score than low-income country peers in other global regions with similar per capita incomes.

This finding is supported by evidence to date of innovation in data-related applications – and there is a particularly rich crop of such applications in Kenya. There is supporting evidence from a World Bank/Digital Data Divide survey that looked at 41 open data-driven businesses in 11 African countries.¹⁰¹ *The Economist* has also reported positively on Africa’s growing strength in technology-based innovation.¹⁰² Indeed, the construction of the Global Innovation Index, with elements including academic research, may underestimate the potential of countries like Kenya, Ghana, and Senegal, and perhaps others in Africa with young and entrepreneurial cultures. These countries demonstrate the kinds of ICT-based and small-scale innovation that can be a foundation for the successful exploitation of open data. Ironically, the cost and poor coverage of mobile internet has, as in India, prompted a wide range of regional innovations that use the much more widely available SMS. The best-known example is M-PESA, which provides mobile payment services which banks in developed countries have been much slower in deploying.

It is also notable that innovators in Kenya, Ghana, and Senegal have demonstrated the capacity to turn a local application into a platform for similar applications in neighboring countries. In this way, innovation “hot spots” can have a wider influence on the delivery of benefits from data outside the country in which they are based. This has been seen in agricultural applications such as Esoko (Ghana), Manobi and E-TIC (Senegal) and Kilimo Salama (Kenya), and also in areas of civic technology, such as data collection (Ushahidi) and election applications (GoToVote, originally developed in Kenya, was then adapted and adopted in Malawi and Zimbabwe, and further adoption in Ghana and Uganda is planned for the 2016 elections¹⁰³).

Of course, it is also possible for African countries to benefit economically from services that use their data but which are developed elsewhere. Both the Vickery and Shakespeare studies found that around 80 percent of the economic benefit from open data goes to the users of the data-driven services and

⁹⁷ http://www.adresse-info.dk/Portals/2/Benefit/Value_Assessment_Danish_Address_Data_UK_2010-07-07b.pdf

⁹⁸ For instance http://data.gov.uk/sites/default/files/library/odugUK_NII_final%20%281%29.pdf

⁹⁹ http://www.fm.dk/publications/2012/good-basic-data-for-everyone/~media/Publikationer/Imported/2012/Gode%20grunddata%20til%20alle/BasicData_UK_web_2012.10.08.ashx

¹⁰⁰ <https://www.globalinnovationindex.org/content.aspx?page=GII-Home>

¹⁰¹ <http://blogs.worldbank.org/opendata/new-surveys-reveal-dynamism-challenges-open-data-driven-businesses-developing-countries>

¹⁰² <http://www.economist.com/news/middle-east-and-africa/21649516-innovation-increasingly-local-pioneering-continent?fsrc=scn/tw/te/pe/st/ed/the pioneering continent>

¹⁰³ <http://ijnet.org/en/blog/gottovote-site-preps-ghana-uganda-2016-elections>

only 20 percent to the businesses that provide those services. In the vast majority of cases,¹⁰⁴ when a country releases its data, the users of services based on that data will be its own citizens, businesses, and investors, as well as visitors to that country. For example, if geospatial data is released, it will be taken into global mapping platforms such as Open Street Map, Google Maps, and Bing Maps. Yet the people who use the maps and so benefit from open data will be predominately doing so because of their association in some way with the country concerned. (There may also be some in-country economic activity because foreign service providers may need to adapt their services to local markets or languages, or to support customers locally).

What is certain is that for African countries to benefit in this manner, it is essential that the data is open. If the data is open, there is no barrier to a local innovator later establishing a rival service, perhaps better adapted to local needs. Alternatively, the local innovator may exploit or expand from local niches which foreign service providers cannot reach. Indeed, it is possible that countries could quickly gain additional benefits from their data with the help of foreign service providers, while local challengers develop services more attuned to local needs. Conversely, if the data is not open but is charged for, then this can constitute a significant barrier to entry for local SMEs and start-ups. Evidence comes from the POPSIS study in the EU, which found that removing data charges not only significantly increased the total economic value realized from the data, but also significantly increased the use of data by SMEs.

Policies that try to distinguish between domestic and foreign service providers (for example, by instigating a differential structure of charges or by allowing use of the data only by domestic service providers) are problematic in a number of ways. Most importantly, they are likely to be suboptimal in terms of producing the maximum overall economic benefit from the data. This can only be achieved by ensuring that data-driven services are made available as quickly as possible to the greatest number of potential end-users.

5.5. Delivery Infrastructure

A high-quality ICT infrastructure is not necessary for the delivery of some of the economic benefits of open data. For example, the use of data to optimize public services or business operations does not necessarily require continuous internet access. Nonetheless, many data-driven services are delivered electronically and so the quality of the ICT infrastructure will be material to the level of benefits that can be achieved in practice.

International Telecommunications Union (ITU) figures for 2014 have shown that Africa has 19 active mobile broadband subscriptions per 100 inhabitants. This is low by the standards of Europe and the Americas (both over 50) but the Africa region is catching up Asia & Pacific (23 in 2014). The progress is clear in the comparison with the figures for 2012 (Africa 8.5 compared to Asia & Pacific 15.3). ITU figures also show mobile-cellular subscriptions in Africa at 69.3 per 100 inhabitants, and others project 100 per 100 by 2019.

African innovators have already shown how to maximize SMS and other uses for data-driven service delivery. In addition, the costs of smartphones are falling and there are likely to be improvements in both internet availability and cost, due to greater wholesale connectivity to and within Africa.¹⁰⁵ No doubt more benefits will accrue when specific countries adopt a policy of open data and when they achieve sufficient infrastructure capacity (and innovative skills) to make best use of it. For instance, 39 percent of Kenyans and 38 percent of Nigerians are internet users compared to 19 percent of Africans overall.

5.6. Conclusions

The analysis and examples in this section lead to the following broad conclusions about the economic value of open data in Africa:

- Simplistic top-down extrapolations of studies conducted globally or in other regions suggest

¹⁰⁴ There may be some exceptions, for instance if a country's health data is used to develop global therapies which the country's own health service cannot then afford. See for instance the case of Indonesia and flu samples <http://www.ft.com/cms/s/0/ee41f5ea-032c-11dc-a023-000b5df10621.html#axzz3Z2fmrHA>

¹⁰⁵ For instance through the WACS and EASSY cable systems.

that an economic benefit in Africa from open data equivalent to 1–2 percent of GDP is plausible.

- However, there are many reasons why such simplistic extrapolations may not be valid. The figure may be higher or lower depending on the assumptions made.
- The economic benefits could be unevenly distributed because the achievability of benefits in individual countries will depend on the existence and quality of their data, the policies under which they are prepared to release it for commercial use, and the strength of the innovation community in particular and the business environment in general to grow new, data-driven services.
- In developed countries, agriculture is typically a relatively small economic sector, and does not feature as a significant contributor to benefits in the main global studies. However, agriculture is much more important economically in Africa and there are already medium-scale applications using data to improve agricultural productivity and farmers' incomes. If more suitable data could be made available, and if it were more freely available as open data and similar applications were adopted more widely, then on plausible assumptions, agricultural open data could give value of up to 0.6 percent of GDP.
- The use of open data in public procurement could give an 8 percent saving in expenditures. Since public procurement represents 10 percent of African GDP, such a saving equates to 0.8 percent of GDP. Moreover a Kenyan report indicated that it could be considerably more.
- UNECA has reported that geospatial information could be "very lucrative" for Africa. Evidence from elsewhere suggests that its overall economic potential could be 0.5–1 percent of GDP.
- The release of open data for transparency and for improving public services may also have economic

benefits, for instance in public procurement and in improving health and education outcomes.

- Overall, a bottom-up analysis suggests the potential economic value of open data to Africa to be around 1–2 percent of GDP – with arguably more upside potential than downside risk.
- The sustained availability of consistent and regularly updated data is essential to realizing its economic value. Africa has a lot to do in this area. The recently launched African initiative on the Data Revolution will be a valuable driver for this, as will initiatives such as the AfDB's Africa Information Highway. In addition to statistics, the availability of other parts of a National Information Infrastructure is essential. Indeed, the wider availability of good-quality geospatial reference data has been a major contributor to growth in a large number of sectors in other regions, and the same is likely to be true in Africa. Financing sustainable data improvements will be a challenge; however, charging user fees for data would significantly reduce the overall economic benefits.
- Although innovation and infrastructure are both challenges for Africa, the evidence is that innovators in the region are already making good use of data through the available infrastructure. Since innovation and infrastructure are likely to improve in tandem with data availability, they are unlikely to act as a major constraint on the realization of economic value from data.

The realization of economic benefits from open data in Africa will depend on a wide range of actors, including innovators, businesses, governments, and others. Their objectives may differ — whether they are using open data to provide services that add value for their users; or to improve policy decisions; or to bring about behavioral changes (for instance to improve transparency and accountability or greater public engagement).

Evidence suggests that governments often fail to appreciate how wider economic benefit can be

realized from their data; moreover they often lack the skills of innovators to deliver applications that can maximize economic and social benefits.¹⁰⁶

Therefore, in addition to the need for governments to release open data, their policies and other interventions need to be geared to stimulating the development of applications more generally. They should aim to reduce barriers to entry and to innovation, and instead to create an “eco-system” of skills, tools, and resources to support open data innovations.

6. Recommendations

6.1. Open Data Action Plan for Africa and the role of the AfDB

Building on the Africa Data Consensus, an Open Data Action Plan for Africa should be developed and agreed, together with responsibilities for its implementation.

The Africa Data Consensus included a set of key, high-level actions to implement the Data Consensus. It was also agreed that the pan African institutions (AfDB, AUC, and ECA) should take the lead in the realization of the Data Consensus, in cooperation with other development partners.

The lead institutions on the Consensus now need to develop a comprehensive Open Data Action Plan for Africa, with more detailed specification of tasks and deliverables, the responsibilities of the different actors, and a timeline for actions. The recommendations of this report may serve as a contribution to that Action Plan. (*Recommendation 1*).

The AfDB should continue to promote the economic benefits of open data, and work with member countries to provide relevant information, tools, and leveraged support across Africa.

The Africa Data Consensus requested the AfDB to be one of the lead pan-African institutions in implementing that agreement. So the AfDB's key role in acting as the central hub for open data on Africa across all sectors needs to be sustained. In this respect, in endorsing the enhancement of the General Data Dissemination System (e-GDDS), which forms part of the IMF's Data Standards Initiative, the IMF Board decided that the AIH's Open Data Platform (ODP) would be used as the core data management and dissemination platform for African countries – a model to be emulated in all IMF developing member countries across the globe.

In addition, the Bank's ongoing statistical capacity-building efforts to train staff in regional member countries – including in national statistical organizations, ministries, and central banks — on how to collect, manage, and upload their data onto the AfDB's Open Data Portal is critical, going forward. This training allows staff to fully utilize the platform in terms of uploading and managing their country data, and in accessing, analyzing, and deploying information relating to countries and sectors across the continent.

The Open Data Platform should also help to stimulate innovation in the private sector and generate data-driven services in the region more widely. In this regard, the Bank is an important actor promoting the economic and social benefits of open data. It should continue to work with member countries and to provide relevant information, tools, and support in the region (*Recommendation 2*).

¹⁰⁶ For instance, the UK Transport Authority for London decided that their own applications could not compete with around 500 applications developed by others from the Authority's 25 real-time data feeds.

6.2. Knowledge Gathering and Transfer

Create a public information exchange about open data applications

Gathering information about what is happening in open data and associated fields can be even harder to obtain in Africa than in developed countries. This particularly applies to locally generated business applications, where wider communication by the innovators and entrepreneurs responsible is likely to be a low-priority task, and may be restricted by the perceived threat of competition. Yet the large number of local markets and the large number of potential data suppliers means that there would be considerable value in sharing knowledge of “what works,” as a stimulus to innovation elsewhere; it would also encourage other data owners to consider releasing their data.

A first step could be for the AfDB, possibly in collaboration with other pan-African institutions such as the AUC and UNECA, to create a publicly available information exchange about open data and its applications in Africa (*Recommendation 3*). This would focus on news and information about open data developments in Africa: both the development of policies and the many uses of data and their benefits. It could also draw in news and developments from elsewhere that are relevant to Africa. Passive information “noticeboards” or “mailing lists” are unlikely to be effective, particularly in garnering information and practical examples of economic uses of open data. Instead there would need to be a proactive seeking of information; following up leads to find out what was really happening – on what scale and with what benefits; and active editing and curation to ensure that the information was relevant and actionable by others.

One model from elsewhere that might be emulated would be the “European Public Sector Information Platform” (EPSI Platform), established by the European Commission at the start of their open data journey.

Based around a web portal but with an active curation staff and associated “push” newsletters and periodic conferences, it provides news on European Public Sector Information and open data developments. It highlights good practices and examples of new products and services created through open data reuse, including sponsoring thematic and country-by-country reports.¹⁰⁷ It is delivered through a contract to a service provider who draws on a virtual panel of experts, and the contract has been periodically re-tendered. A similar, although more focused initiative is the GovLab’s Open Data 500 database of 500 largely US companies using open data.¹⁰⁸ This model has subsequently been “exported” to Mexico¹⁰⁹ and is now being replicated in Australia¹¹⁰ and other countries, sometimes at government invitation.

Consider creating an “African Open Data Institute.”

A more substantial investment would be for pan-African institutions such as the AfDB, AUC, and UNECA to jointly consider creating an African equivalent of the UK Open Data Institute¹¹¹ (*Recommendation 4*). Its mission would be to help unlock the supply of data in African countries, to promote the economic and other uses of such data, and to disseminate knowledge generally about open data in Africa. This would be a more substantial investment than a Public Information Exchange recommended previously. Furthermore, it would need to operate from multiple locations in order to be credible in the different areas and markets of Africa and to play an active role in local innovation ecosystems.¹¹²

An African Open Data Institute could develop from foundations laid by the Public Information Exchange recommended above. Also, it might be associated with the structures created to implement the Africa Data Consensus and could work with the Africa Open Data Lab, which the World Wide Web Foundation are considering establishing. It would naturally need to

¹⁰⁷ <http://www.epsiplatform.eu/content/about-us>

¹⁰⁸ <http://www.opendata500.com/us/>

¹⁰⁹ <http://www.opendata500.com/mx/>

¹¹⁰ <http://www.opendata500.com/au/>

¹¹¹ <http://opendatainstitute.org/about-us>

¹¹² The UK Open Data Institute was deliberately located in the “Tech City” part of London in order to allow synergies with that area’s technology innovation and venture capital ecosystem.

have a specific Africa focus. Part of its mission could be to concentrate on sectors that are economically important for Africa but that have been less promoted elsewhere, such as agriculture, and to forge partnerships with sector-specific bodies in doing so.

6.3. Making the Right Data Available on the Right Terms

African governments cannot expect economic benefit from their open data unless they make the right data available on the right terms. In other words, the data not only needs to be open, but also of a quality and standard that will allow people and businesses to depend on it. Although some countries have launched open data initiatives, so far the data has not been of the type likely to generate specific economic benefits in Africa. In some cases – for instance with regard to geospatial information – data may not even exist for the government to use.

Conversely, it is possible that significant economic benefit could be achieved by releasing initially only a relatively small subset of public sector data. Looking outside Africa, about half the economic value of open data in the EU is considered to come from geospatial data, with significant contributions from weather data, company registration data, and detailed¹¹³ census data. Of course, this should not prevent African countries implementing full open data initiatives and so gaining the wider range of benefits, including non-economic benefits (such as improved transparency). Indeed, since political consensus is often easier to achieve in the name of economic growth, initially governments could move more quickly on datasets likely to reap economic benefits. This would then give those governments confidence to implement wider open data policies in due course.

The Africa Data Consensus,¹¹⁴ adopted by African Union Ministers in March 2015, provides a valuable framework for pan-African work on open data, including the appointment of the African Development Bank as one of the coordinators of

implementation. Although a number of the specific actions relate to statistical datasets, not all of which will have significant direct economic value, the framework does establish some important wider principles, such as that data should be “open by default.”

Identify the highest-priority open data to accelerate economic growth and business innovation in Africa.

Building on the Africa Data Consensus (and on the forthcoming International Open Data Charter, which is partly inspired by the Africa Data Consensus), the AfDB in collaboration with other institutions, businesses, and civil society should identify the highest-priority open datasets for economic growth and business innovation in Africa (*Recommendation 5*). These would include datasets of wide application to African economies (such as geospatial information, weather, detailed census, and company and other official registers) and key datasets in priority sectors, including agriculture, transport, and infrastructure. When compiling such a list, it is important to engage with potential data users to understand their priorities and concerns. The result would also constitute a model “National Information Infrastructure” for African countries.

Why is this prioritization of datasets important? First, a clear understanding of what constitutes the most valued data would allow countries with existing open data plans to prioritize the release of such data. Second, it would allow other countries to consider how the key data that they hold could be released in advance of a full open data initiative. Third, it would allow countries where such data is not currently available, even to the government, to prioritize and value the collection of that data. Finally, it would provide further context, stimulus, and support for pan-African data collection initiatives, such as the AfDB’s Africa Infrastructure Knowledge Program and Food Security Portal.

¹¹³ Detailed to the lowest level consistent with the protection of personal privacy.

¹¹⁴ http://www.uneca.org/sites/default/files/PageAttachments/final_adc_-_english.pdf

Map the existence, quality, and public availability of economically important data in the 54 African countries.

Having identified an initial list of priority datasets, the AfDB, in collaboration with other institutions and with national governments, should map the existence, quality, and public availability of these datasets, together with existing initiatives to create and release them, in all 54 countries of Africa (*Recommendation 6*). Some information is available, for instance on censuses and on geospatial initiatives. However, there is relatively little systematic data that would allow additional interventions to be considered and prioritized. This database would need to collect information on the availability and usability factors discussed above. The proposed knowledge exchange function could help with this, but it is likely also to need specialist help from experts in the particular datatypes to review what is actually available.

Consider strategic investments to create key datasets where these do not exist — or to improve the quality of existing datasets in conformity with the latest international standards.

The potential economic benefits of some key datasets create a strong case for investment to create them where they do not already exist, or to improve their quality in conformity with the latest international standards. National governments, donors, and pan-African institutions should consider strategic investments in such datasets (*Recommendation 7*). For instance, some geospatial information, such as mapping and addresses, has proven to be of considerable value in many jurisdictions. In Denmark, a project to create a national open address database brought direct benefits in the first five years, with a financial return of 31 times its costs. Conversely, in Botswana the growth of e-commerce may be

restricted by the lack of a database of structured delivery addresses.

Ensure a funded strategy for the improvement and compatibility of geospatial data across Africa.

Two specific types of data should be prioritized because of their clear high potential. First, UNECA has already identified the economic and other potential of better geospatial information, and this is supported by strong evidence of wide economic benefits elsewhere. While there are a number of initiatives on geospatial data across Africa, it is hard to see an overall strategy or investment program. The African Development Bank should consider working with African countries, UNECA, donors, and others, including the private sector, to ensure a funded strategy for the improvement and compatibility of geospatial data across Africa (*Recommendation 8*).

The AfDB should continue working with other organizations and member countries to establish standards, tools, and methodologies that African countries could deploy quickly to publish market price and other agricultural data for farmers, and to promote the growth of applications using this data.

A second priority sector is agriculture, due to its importance to the overall economy of Africa. The emergence of data-driven services for small farmers in Africa suggests that open data for this sector has great potential to boost incomes and increase GDP, as well as playing a major role in supporting food security and wider rural development. The African Development Bank should continue working with African countries, the FAO, the Global Open Data for Agriculture and Nutrition initiative,¹¹⁵ and others to establish standards, tools, and methodologies that African countries could deploy quickly to publish market price and other agricultural data for farmers, and to promote the growth of applications using this data (*Recommendation 9*).

¹¹⁵ <http://www.godan.info/>

African governments need to ensure that, wherever possible, they own all the rights to their own data, so they can make it available as open data whenever they choose.

When investing in key datasets, African governments need to ensure that wherever possible, they own all the rights to their own data (*Recommendation 10*) and so can make it available as open data whenever they choose. This is usually automatic for data produced by public servants. However, it may not be as straightforward for data produced as part of public-private partnerships, or by conventional contractors, or by third-party suppliers. It needs to be borne in mind that a substantial amount of commercial satellite imagery is restricted, and while governments can purchase rights to use it for their own purposes, legally it cannot be released for wider economic use. However, where data is produced at the request, and ultimately at the expense of government, then it is essential that the government acquires the ownership of the data so that it can be made freely available to all.

6.4. Ensure “Cost-recovery” Policies do not Undermine Business Innovation

A number of countries in Africa are introducing or examining “cost recovery” policies for public services, including information services, as a means of reducing fiscal pressures. Examples include statistical services, geospatial information, weather information, and company information. In some cases, cost recovery for information is seen as a means of sustaining the quality of information after a major investment injection in the system.

Cost-recovery for collecting and managing data may at first appear fiscally attractive. However, policy-makers need to understand that it also significantly diminishes the economic benefit of government data. Overall welfare is maximized when information is made available at the marginal cost of distribution; this means effectively free

when published on the internet, and at a marginal cost of media production and distribution for other media.¹¹⁶ Evidence suggests that the removal of cost-recovery charges greatly increases the usage of government data and significantly increases – by a factor of 5-10 – the economic value gained.¹¹⁷ This is not solely due to the reduction of input costs to the data user; it is also because, for charges above the marginal cost of distribution to be sustainable, it is necessary to restrict what users can do with the information. For instance, if the user were allowed to redistribute the information, this could undercut the government supplier. In the cost-recovery scenario, if data is supplied free of charge to other parts of the government or to the wider public sector, this means that the costs of production have to be recovered entirely from business users, who represent a subset of the total users. In effect then, this becomes a hidden subsidy or tax transferring additional resources from the private to the public sector.

Moreover cost-allocation policies may create barriers to entry or otherwise disadvantage start-ups and innovation relative to larger, more established businesses. For instance, charging for mapping data by analogy with paper maps, viz. at a set amount per sheet, means that data-driven services requiring national coverage have a high entry cost irrespective of the level of usage. So although a multinational internet firm may be able to afford it as an investment, a local start-up may find this much more of a barrier.

In cost-recovery policies, it should be noted that the economic interest of pricing at the marginal cost of distribution only applies to the supply of information. It is acceptable – and would be appropriate in many cases – to charge for non-information services such as recording registrations and issuing licenses. To take the example of company registration, it would be economically beneficial to make access to the database of company registrations available free of charge as open data, so that many actors can use it. However, it would still be economically justifiable to charge those registering companies a fee based

¹¹⁶ See, for instance, Pollock et al, “Models of Public Sector Information Provision” 2008 <http://ec.europa.eu/digital-agenda/en/news/models-public-sector-information-provision-trading-funds> and Pollock, “The Economics of Public Sector Information” 2008. http://rufuspollock.org/papers/economics_of_psi.pdf

¹¹⁷ For instance, the Deloitte POPSIS study for the European Commission which studied cases where charges were removed, <http://ec.europa.eu/digital-agenda/en/news/economic-analysis-psi-impacts>

on the staffing and other costs involved. Similarly, National Statistics Offices should make their regular data freely available without charge, but they could (and probably should) charge for customized analyses provided as an optional, additional service when requested by individual businesses and when not generally published.

In the United States, federal government information has always been available at the marginal cost of distribution because it is regarded as belonging to the people (a public good). In Europe in the past few decades there has been a growth in cost-recovery policies. However, in the early years of the decade 2000–2010, the policy direction changed as the value of information in the internet age became more widely appreciated. A number of European countries have eliminated or restricted charges for data.¹¹⁸ Indeed, in 2013 the EU passed a Directive whereby public data should be available at no more than the marginal cost of distribution.¹¹⁹ The Africa Data Consensus set out the important principle that “Official data belong to the people and should be open to all. They should be open by default.” However, the subsequent Directive that “Governments should take the lead in ensuring that the recurrent costs of production and dissemination of all required data are financed from sustainable domestic resources” might be interpreted as giving comfort to those still keen to promote cost-recovery policies.

African governments should ensure that key datasets are available free of charge on the internet, and limit cost-recovery policies to value-added services.

In short, African governments should ensure that key datasets are available free of charge on the internet, and limit cost-recovery policies to value-added services (*Recommendation 11*). This would encourage innovation and stimulate a greater benefit to national finances through business activity

and economic growth than cost-recovery policies would do. Achieving this may require fiscal action to ensure that the production of good-quality data is sustainable.

Where cost-recovery policies for data cannot be eliminated immediately, African governments should ensure that any remaining charges do not deter innovation but allow SMEs to form and grow.

Where cost-recovery policies for data cannot be eliminated immediately, African governments should ensure that any remaining charges do not deter innovation but still allow SMEs to form and grow (*Recommendation 12*). This can, for instance, be done by “Freemium” pricing models, which make basic information openly available but charge for value-added services or higher quality or timeliness. So they allow small companies free access to the data; or they deploy usage-based pricing which will allow innovators or start-ups free use of the data until they are operating data-driven services on a large scale. (Differential charging based on the nationality of the company is not recommended, not least because it could be relatively easily evaded.)

6.5. Reducing Barriers to Releasing Data

The implementation of open data initiatives has proved burdensome for some countries – and not just developing countries. Before any data can be made available to users, it requires the creation of new functions that do not fit easily within existing structures, in addition to the preparation of detailed policies, processes and standards, and the development or procurement of a web-based “open data portal.” This can constitute a significant hurdle, even where expert international advice is at hand. Moreover, the human and financial resources needed to set up open data systems are often found at the expense of other crucial statistical work required to extract, transform, and publish key datasets and promote their use. So a lack

¹¹⁸ For instance, Norway and the UK on weather data, Germany and the UK on statistics and the UK, Denmark and the Netherlands on at least some geospatial data.

¹¹⁹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:175:0001:0008:EN:PDF>

of manpower, technical expertise, and financial resources exert major stresses.

Thus the provision by the African Development Bank of open data portals – which allow regional countries to publish and update indicators on their economies, census information, food prices, as well as indicators on infrastructure (water, energy, transport), tourism, and social aspects (health, education), etc. – has been a significant step in reducing some of these barriers. It has enabled National Statistics Offices to introduce an open data approach much more easily than would otherwise have been the case, and has increased the release of statistical data from countries where skills and resources are extremely limited.

While the Open Data Platform in no way prevents individual African nations creating their own open data portals, it allows them – and other actors – to publish datasets in advance of launching a full open data initiative. As part of a collaborative approach, other UN agencies (e.g. IMF, WHO) have agreed to use the AfDB Open Data Portal for the transfer of African data relating to their own specific areas (e.g. infrastructure, economics, and health). This means that resource-stretched African countries need only upload their data once to the AfDB's "one-stop center," rather than having to replicate the uploading and updating of statistics to several agencies. It also means that other users such as subregional organizations and research institutes can access all the information they need in one place.

The African Development Bank should consider building on its existing platforms to further reduce the costs and skills barriers in releasing data for governments, SROs, and individual public agencies in Africa.

The African Development Bank should consider building on its existing platforms to further reduce the costs and skills barriers in releasing data for

governments, SROs, and individual public agencies in Africa (*Recommendation 13*). This could include:

- Converging the separate portals to provide a single view of all the open data available about each country.
- Increasing the the types of datasets supported by the platforms. In addition to tabular and time-series data, economically valuable datasets are also likely to include different structures such as geospatial reference information, more complex data structures such as relational databases, real-time data, and application programming interfaces. If the advantages of reduced barriers to entry currently offered to statistical publishers are made available to others, then a richer set of data structures need to be supported in appropriate ways.
- Increasing the number and usability of tools to ingest data into the platforms. Currently the platform requires data to be pre-formatted in order to be ingested into the datastore. While this is not difficult for someone with the relevant technical skills, it requires a degree of confidence and trial-and-error which might be difficult for some government administrative staff to achieve. Tools and associated workflows to examine existing data files (such as Excel spreadsheets) and interactively work them into a format that can be ingested into the datastore would increase the platform's usability.
- Implementing the DCAT (Data Catalog Vocabulary) metadata standard, which is the de facto standard for government open data portals, and exposing the metadata so that the platforms can be federated with other platforms (and can itself ingest metadata from other African platforms). The pan-EU portal shows how additional value can be created through federating different open data portals across sovereign jurisdictions.
- Improving the searchability and discoverability of the data collections, for instance by more active

curation, by the greater use of tags (including user tags), and by search on DCAT-structured metadata fields.

- Implementing a full data API, with programmatic search, access, and download of data. While data can currently be downloaded manually in a range of useful formats, it would be easier for applications to reuse such data if datasets could be located and downloaded programmatically in part or as a whole.
- Increasing the interactivity, user engagement, and sense of community of the platform. This would include the ability for users to discuss individual datasets and to highlight applications and other uses of the data.
- Promoting the platforms to prospective data users and drawing them into an Africa-wide, open data community using the platforms.
- Promoting the availability and value of the platforms to donors and to other international and multilateral agencies operating in Africa.
- Improving the availability of management information to allow the success of the platforms to be demonstrated and to allow usage and user behavior to help prioritize improvements.
- A model “Open Data Policy,” reflecting both international and African best practice and the issues that early movers on open data in Africa have had to overcome.
- A standard for the licensing of government data, possibly using the widely recognized and best-practice Creative Commons Attribution International 4.0 licence.
- A model set of processes for the extraction, transformation, and publication of open data — building on the experience of developing processes for uploading datasets onto the African Development Bank’s own platforms.
- A model for open data organization and governance, covering not only public sector responsibilities but also the engagement of data users and the stimulation of applications and other uses of data for economic and other benefits.

In short, building on its existing work and drawing on best practice in Africa and elsewhere, the African Development Bank is in a good position to provide a toolkit “Open Data in a Box,” to make it easier for governments to start open data initiatives and to expedite the release of data that is economically beneficial.

The AfDB should consider providing other materials and tools to help governments release open data, in addition to the Open Data Platform.

In addition to enhancements to the Open Data Platform itself, the African Development Bank should consider providing other materials and tools to help governments release open data (*Recommendation 14*). This could also assist in the implementation of the Africa Data Consensus. It could include the following:

6.6. Engage with Businesses

African governments and individual ministries need to engage with businesses and other stakeholders to understand how businesses, innovators, and entrepreneurs use data and what is important to them.

African governments and individual ministries need to engage with businesses and other stakeholders to understand how businesses, innovators, and entrepreneurs use data and what is important to them

(*Recommendation 15*). The precise modalities for this will vary from country to country, but the African Development Bank might provide a model form of engagement that individual governments could adopt. In the early stages, this might be at the level of the government's central team on open data issues. Then, as time progresses, individual ministries should engage directly with businesses and innovators in their sector. It is important that engagement is sustained, in order to foster ongoing contacts, discuss any issues that may arise, and share views.

African governments should also consider making it part of the mission of each Ministry and Agency to promote economic growth through the business use of their data.

Governments should also consider making it part of the mission of each Ministry and Agency to promote economic growth through the business use of their data (*Recommendation 16*). This can be a good mechanism for setting new expectations and objectives for agencies previously focused on using their data only for cost recovery.

African governments need to consider positively requests from data users for additional datasets to be made open.

Governments are not necessarily the best judges of which datasets are most acutely needed, and in what form they are needed by businesses to build data-driven services. Moreover the relative lack of experience with business use of open data in Africa means that it will be even harder for governments to anticipate the types of data most badly needed. Recommendations above suggest that there is a core subset of key datasets that should be identified, but African governments also need to consider positively requests from data users for additional datasets to

be made open (*Recommendation 17*). Leading open data portals such as [data.gov](http://www.data.gov)¹²⁰ and data.gov.uk¹²¹ have a single point for businesses and others to make requests for specific datasets to be made available as open data (so that businesses do not have to identify which part of which Ministries is responsible for the data), and these countries have structured processes for the consideration of requests, including processes of wider government review should the Ministry responsible be reluctant to release its data.

6.7. Stimulate and Support Innovation and Data-Driven Services

Even the leading governments in open data have found it necessary not only to act as suppliers of data but also to stimulate their use. Various programs have been introduced across different countries. For example, the UK has seen the establishment of an Open Data Institute,¹²² while in the US a program of open data “business roundtables” bring together individual government ministries’ data suppliers and business users.¹²³ The EU introduced a program called “ODINE” – Open Data Incubator Europe – a “world-class” package of support to help European innovators grow their open-data idea into a sustainable business.¹²⁴ In Africa some innovation centers, such as the Kenyan iHub,¹²⁵ have been a focus for the development of applications using open data, while the Botswana Innovation Hub has been at the forefront of the country’s open data initiative.¹²⁶

African governments should ensure that their innovation ecosystems are appropriately funded and targeted towards the development of data-driven solutions as well as other innovative developments.

Governments should ensure that their innovation ecosystems are appropriately funded and targeted towards the development of data-driven solutions as well as other innovative developments (*Recommendation 18*). The recent improvements in

¹²⁰ <http://www.data.gov/data-request/>

¹²¹ <http://data.gov.uk/data-request>

¹²² <http://opendatainstitute.org/>

¹²³ <http://www.opendata500.com/us/roundtables/>

¹²⁴ <https://opendataincubator.eu/odine-call-announcement/>

¹²⁵ <http://www.urbanafrika.net/urban-voices/ihub-mecca-african-ict-entrepreneurs/>

¹²⁶ <http://www.bih.co.bw/detail.php?id=220>

innovation in Africa have shown that the potential exists, and so it is important that open data is one of the tools available to innovators and start-ups. This could also involve building links between those working on data within government and the innovation community: for instance the Ordnance Survey, the UK National Mapping Agency, has established a “Geovation” program¹²⁷ to engage with innovators and to help them use geospatial open data.

In the early stages of open data, it has become conventional to have “Hackathons” or competitions to develop in a short time proof of concept of applications. However, these have not been greatly successful in stimulating sustainable, commercial applications of open data. Effective economic use of open data is more driven by an entrepreneur spotting a customer need and seeing how open data could be used to meet it. Nonetheless, some Hackathons have been successful in raising the profile of open data and alerting entrepreneurs to its possibilities. So Hackathons and competitions might be best organized as part of the innovation ecosystem rather than as a separate open data initiative.

A World Bank study¹²⁸ discovered significant financing gaps for data-driven companies in all developing regions, including Africa. Venture capital firms tend not to recognize data as a separate sector but treat data-driven companies as a conventional information technology investment. It also reported that in a global context, data-driven start-ups find it particularly difficult to move beyond the seed investment stage. Since there is such great potential for economic benefit in Africa, the AfDB should collaborate with the AUC, UNECA, and other institutions to see how to scale up investments and other resources to generate and sustain data-driven services (*Recommendation 19*).

The AfDB, in collaboration with others, should consider in more detail how to scale up investment and other resources to generate and sustain data-driven services.

¹²⁷ <https://www.geovation.org.uk/>

¹²⁸ <http://blogs.worldbank.org/opendata/new-surveys-reveal-dynamism-challenges-open-data-driven-businesses-developing-countries>

Annex 1:

Summary of Recommendations

1. Building on the Africa Data Consensus, the Pan African Institutions (AfDB, AUC, and UNECA) should develop an Open Data Action Plan for Africa and responsibilities for implementing it.
2. The AfDB should continue to promote the economic benefits of open data, and work with others as necessary to provide information, tools, and leveraged support across Africa to assist governments to open their data.
3. The AfDB, in collaboration with other pan-African institutions, should create a publicly available information exchange about open data and its applications in Africa.
4. The AfDB, AUC, and UNECA should consider creating an African equivalent of the UK Open Data Institute.
5. The AfDB, in collaboration with other institutions, businesses, and civil society should identify the highest-priority open datasets for economic growth and business innovation in Africa.
6. The AfDB in collaboration with other institutions and national governments should map the existence, quality, and public availability of the highest-priority datasets, together with existing initiatives to create and release them, in the 54 countries of Africa.
7. National governments, donors, and pan-African institutions should consider strategic investments in creating key datasets, or in improving their quality in conformity with the latest international standards.
8. The AfDB should consider working with African countries, UNECA, donors and others, including the private sector, to ensure a funded strategy for the improvement and compatibility of geospatial data across Africa.
9. The AfDB to continue its drive to establish standards, tools, and methodologies that African countries could deploy quickly to publish market price and other agricultural data for farmers, and to promote the growth of applications using this data.
10. African governments should ensure that wherever possible they own all the rights to their own data so that they can make them freely available.
11. African governments need to ensure that key datasets are available free of charge on the internet, and should limit cost-recovery policies to value-added services.
12. African governments should ensure that, where cost-recovery policies cannot be eliminated immediately, any remaining charging policies do not act as a constraint to innovation but still allow SMEs to form and grow.

13. The AfDB should consider building on its existing platforms to further reduce the costs and skills barriers in releasing data for governments and other agencies.
14. The AfDB should consider providing other materials and tools to help governments release open data, in addition to the Open Data Platform.
15. African governments should engage with businesses and other stakeholders to understand how businesses, innovators, and entrepreneurs use, or could use, data and what is important to them.
16. African governments should consider making it part of the mission of each Ministry and Agency to promote economic growth through the business use of their data.
17. African governments should ensure that they respond to requests not only for key datasets, but for other data to be made open.
18. African governments need to ensure that innovation ecosystems are appropriately funded and targeted towards the development of data-driven solutions.
19. The AfDB should collaborate with the AUC, UNECA, and other institutions to consider in more detail how to scale up investment and other resources to generate and sustain data-driven services.



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