Agricultural Open Data in the Caribbean

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Institutional perceptions, key issues and opportunities

In Collaboration with

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About CTA

The Technical Centre for Agricultural and Rural Cooperation (CTA) is a joint international institution of the African, Caribbean and Pacific (ACP) Group of States and the European Union (EU). Its mission is to advance food and nutritional security, increase prosperity and encourage sound natural resource management in ACP countries. It provides access to information and knowledge, facilitates policy dialogue and strengthens the capacity of agricultural and rural development institutions and communities.

CTA operates under the framework of the Cotonou Agreement and is funded by the EU.

For more information on CTA visit, www.cta.int

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Executive summary

Open government data and open agricultural data are rapidly emergent focus areas in Caribbean policy, research and development circles. Interest has been catalysed by initiatives that illustrate the potential impact of 'openness' in governance, service delivery and public sector data on the development challenges that most constrain the region.

The Technical Centre for Agricultural and Rural Cooperation (CTA) has been investigating open data through different activities to contribute to agricultural knowledge acquisition, policy and value chain development in African, Caribbean and Pacific countries.

CTA has commissioned this baseline study in the framework of its 2014 AgriHack Talent Caribbean activity, which aims to support youth Information and Communication Technology (ICT) innovations and entrepreneurship in Agriculture in the Caribbean.[1] The study seeks to support the hackathon and provide data for future work in the field.

The Open Data Baseline Study was commissioned to:

1. Identify agriculture open data that is most useful for the development of ICT applications;

2. Ascertain the perceptions of agriculture open data by key Caribbean Stakeholders; and

3. Evaluate the readiness of young Caribbean people to develop software for agriculture, as well as their perception of business opportunities in the sector.

This report focuses on the first two objectives. It details the perspectives of Caribbean Institutional stakeholders on open data in the Agriculture Sector and, subsequently, how CTA and key institutions, such as Inter-American Institute for Cooperation on Agriculture (IICA) and Caribbean Agricultural Research and Development Institute (CARDI)[2], may support greater adoption of agricultural open data policies and practices across the region to support innovation, entrepreneurship, and knowledge management and agricultural development as a whole. Emphasis was placed on regional and national institutions and stakeholders that, because of their mandate, are significant producers, consumers or publishers of agricultural data and knowledge products within the agricultural sector.

The report was carried out through a combination of an online survey and in-depth interviews. There was common consensus on the importance of data and information in the agriculture sector, and the value-add of open data would provide. Over 90% of survey respondents indicated that they believed open data was 'very important' or 'important' to the agricultural sector within their country. However, awareness of open data resources and knowledge of open data resources publishing organisations among research participants was limited.

While discussing how their own organisations used, sourced and shared information, many institutional stakeholders were able to provide several tangible examples, however they did not identify their organisations as publishers of open data. This could indicate the lack of connection between existing organisational practices and provision of open data.

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[1] More information http://hackathon.ict4ag.org – The AgriHack Talent initiative is undertaken in the framework of   the Agriculture, Rural Development and Youth in the Information Society (ARDYIS) project

[2] The Caribbean Agricultural Research and Development Institute (CARDI) and the Inter-American Institute for Cooperation on Agriculture (IICA) have collaborated on the Agrihack Talent Caribbean activity and on the production of this study.

In discussions on the applications of data and technology across the region, it appears that institutional stakeholders are exploring similar challenges and service delivery responsibilities, such as investigating the effects of climate change on crop yield, managing farmer and farm registration and assets, and the development of market information systems. However agencies are choosing to re-create information systems and localised data collection, rather than contributing to or adopting shared platforms and common data standards.

In discussing the factors that enable or constrain data sharing and usage, awareness of what data assets are available, how to access them, and specifics about the data, such as frequency of updates, data formats, and accuracy were key barriers identified by stakeholders. These factors are compounded by the often manual means through which information is shared by data providing institutions, thus creating friction in accessing information even when it is available.

The research findings provide CTA, IICA, CARDI and institutions interested in this subject matter with several entry points to support greater adoption of open data within the Caribbean. Many of these recommendations leverage the organisation's high regard as knowledge resources by Caribbean institutions and also align with their core mandates and competencies. These range from advocacy, policy, community engagement connecting regional fore-runners in the adoption of open data with other global practices, to the provision of technical assistance, for example, in the area of stronger government statistical capabilities.

As a respected knowledge resource with experiences across African, Caribbean and Pacific (ACP) territories, CTA is uniquely positioned to communicate the benefits of open data to institutional stakeholders based on its knowledge of tangible experiences in various contexts. Similarly, through initiatives such as the AgriHack Talent programme, CTA can engage and convene agricultural institutions, domain experts and ICT innovators to exchange ideas and competencies in developing new solutions for the agricultural sector.

There is a need to encourage better cataloguing and communication of data resources by data publishers. Key in enabling access to these resources is the adoption of clear open data policies, platforms and data standards that facilitate sharing and utilisation of information across different contexts.

While adoption of open data in the Caribbean remains nascent, momentum has been steadily built among key stakeholders in the region. Agriculture, in particular, has been the focus of many early initiatives. The work of CTA and this baseline study on open data are timely, and can prove influential in positively impacting an important sector in the Caribbean's development.

Introduction

The Technical Centre for Agricultural and Rural Cooperation (CTA), in collaboration with the Caribbean Agricultural Research and Development Institute (CARDI), the Inter-American Institute for Cooperation on Agriculture (IICA), ConnectiMass, and the Caribbean Open Institute have organised the AgriHack Talent Caribbean programme. The main objectives of this activity are to support the development of Information and Communication Technology (ICT) innovations and to promote entrepreneurship in the agriculture sector by teenagers and young adults. It encompasses a series of activities, at the heart of which is a regional hackathon/coding championship. Following the hackathon, the winning teams are given mentorship and training in entrepreneurship, ICT and agriculture, as well as promotional support of the product(s) developed. The Caribbean phase of this programme followed an early pilot experience that was held in East Africa in 2013.[3]

In support of the AgriHack Talent Caribbean activity, an Open Data Baseline Study was commissioned to:

4. Identify agriculture open data that is most useful for the development of ICT applications;

5. Ascertain the perceptions of agriculture open data by key Caribbean Stakeholders; and

6. Evaluate the readiness of young Caribbean people to develop software for agriculture, as well as their perception of business opportunities in the sector.

The Baseline study consists of two reports: one focused on institutional perceptions and capabilities related to open data (objective 2); and a second on the readiness of Caribbean youth and educators to take advantage of the opportunities open data presents (objective 3). The identification of agriculture open data and open data platforms (objective 1) is a cross-cutting theme across both reports.

This report details the findings on institutional perceptions. Emphasis was placed on regional and national institutions and stakeholders that, because of their mandate, are significant producers, consumers or publishers of agricultural data and knowledge products within the agricultural sector. The supporting research for the baseline study of both was captured through online surveys complemented by follow up in-depth interviews. The supporting research for the baseline study of both was captured through online surveys complemented by a selection of follow up in-depth interviews.

Open data and agriculture: A brief overview

International open data

Open Data rose to global prominence in 2009 when the then newly appointed President of the United States, Barack Obama, signed the US Open Government Directive on his first day in office. Since then, open government has become one of the most significant public policy and technological trends around the world, culminating in the September 2011 launch of the Open Government Partnership (OGP). The OGP is an intergovernmental organisation that brings together 63 countries in the pursuit of openness and accountability. To join the OGP, member countries make public commitments through action plans co-

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[3] http://hackathon.ict4ag.org

designed with civil society. These action plans are aimed at making them more transparent, participatory and collaborative.

The rise to prominence of open data has coincided with a renewed emphasis on the role of data and information in the field of International Development. This increased importance is largely a result of advances in Information and Communication Technologies (ICTs), and the increasingly ubiquitous mobile phone. With more than 3.5 billion unique mobile subscribers, the mobile phone has not only become one of the most rapidly adopted technologies in history,[4] but has also proven itself as a significant tool for improving data collection.[5] The recognition of this value has been reflected in the High Level Panel on the Post-2015 Development Agenda's call for a 'data revolution' for sustainable development, with greater focus on improving statistics and information capabilities to track progress, increase data-driven decision making and strengthening accountability.[6]

Agriculture and information

Information has played, and continues to play, a significant role in agriculture, which is heavily dependent on the flow of information among market participants.[7] Studies have shown that ICT infrastructure improvements, such as increased mobile coverage, information services, real-time pricing and weather data, directly result in improved income of farmers[8] and lower market prices.[9]

Recognising this importance, the first G8 International Open Agriculture Data Conference was held in 2013 to leverage the momentum of the open data movement. This event brought together practitioners, technical working groups, academia and civil society to discuss statistics, data standards, platforms, and geospatial information, among other topics. One major outcome of the conference was the formation of the Global Open Data in Agriculture and Nutrition Initiative (GODAN), which was launched in October 2013 at the OGP Annual Summit. GODAN's objective is to build high-level policy and institutional support for open data across the public and private sector. Initially led by the UK Department for International Development (DFID) and the United States Department of Agriculture (USDA), GODAN has grown to include over 80 member governments, NGOs and private sector organisations.[10]

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[4] The Mobile Economy 2014. http://www.gsmamobileeconomy.com

[5] Mobile Based Technology for Monitoring & Evaluation: A Reference Guide for Project Managers, M & E Specialists, Researchers and Donors. http://www.theclearinitiative.org/mobile-based-tech.pdf

[6] LIVES, ENSURE HEALTHY. 'A New Global Partnership: Eradicate Poverty and Transform Economies through Sustainable Development.' (2013).

[7] Jensen, Robert T. 'Information, efficiency, and welfare in agricultural markets.' *Agricultural Economics* 41, no. s1 (2010): 203-216.

[8] Mittal, Surabhi, and Gaurav Tripathi. 'Role of mobile phone technology in improving small farm productivity.' *Agricultural Economics Research Review* 22, no. 2009 (2009).

[9] Waverman, Leonard, Meloria Meschi, and Melvyn Fuss. 'The impact of telecoms on economic growth in developing countries.' *The Vodafone policy paper series* 2, no. 03 (2005): 10-24.

[10] 'Statement of Purpose.' Global Open Data for Agriculture and Nutrition. Accessed November 11, 2014. http://www.godan.info/statement.html.

Open data in the Caribbean

The overlap of open data and agriculture is particularly relevant to the Caribbean context. Historically, agriculture has played an important role economically and socially in the Caribbean, and many Caribbean countries have demonstrated a strong institutionalised commitment to freedom of information (FOI).

As of 2011, of the 16 member countries of the Caribbean Community (CARICOM), 7 had enacted FOI laws, 4 had drafted FOI legislation, and two had guaranteed FOI as a constitutional right.[11] While this has not translated into the enactment of open data policies or representation in global initiatives such as the OGP (to date, in the region, only the Dominican Republic and Trinidad & Tobago have taken measures to join), sub-national institutional collaborations continue to gain momentum.

Across the region, members of the ICT, NGO and academic communities, in collaboration with government agencies, have begun to implement activities that illustrate the potential impact of 'openness' in governance, service delivery and public sector data on the development challenges the region it is most constrained by.

The Caribbean Open Institute (COI), a coalition of organisations supporting open approaches to addressing development issues in the region, was founded in 2011 with the support of the International Development Research Centre (IDRC). One of the largest initiatives of the COI has been the organisation of the Developing the Caribbean Open Data Conference and Code Sprint (DevCA), an annual regional open data and development event held simultaneously across multiple Caribbean islands. DevCA combines a two day conference highlighting global best practices in the open data space and progress made regionally, with a 24-hour code sprint in which technologists and domain experts from across the region work on regional problems in thematic areas, such as Tourism and Agriculture, using Caribbean data.

Agricultural open data in the Caribbean

In Trinidad and Tobago, the Caribbean ICT Research Programme at the University of the West Indies, St Augustine, has made significant progress in the application of ICTs and open data within the Fisheries domain through its mFisheries project. mFisheries is a suite of mobile phone applications designed to improve market conditions, efficiency and safety for small-scale fisherfolk in Trinidad and Tobago.[12]

In Jamaica, an ongoing collaboration between the Mona School of Business & Management, the SlashRoots Foundation and the Rural Agricultural Development Authority has focused on the issues of praedial larceny and access to information among agricultural stakeholders. The collaboration has resulted in the creation of HarvestAPI, an open data platform for publishing and sharing agricultural sector information, and Clip, an SMS information service that provides access to agricultural information via mobile phones.

More recently, a study of the economic value of open data to the Jamaican economy was executed by the Caribbean Policy Research Institute (CAPRI) and the Mona School of Business and Management (MSBM). The study evaluated the potential economic value of open data to the Jamaican economy to range from a lower bound of JA$ 0.21 billion to an upper bound of JA$ 2.42 billion.[13] Agriculture, a key industry in Jamaica, was selected as one of three sector analyses. The study estimated that open data would enable a 10 percent

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[11] Taylor, Keisha C. 'A Review of Freedom of Information, Data Protection and Open Data in the Caribbean.' Lecture, Internet Governance Forum, Nairobi, Kenya, September, 2011.

[12] Caribbean ICT Research Programme. 'MFisheries Background.' mFisheries. Accessed November 12, 2014. http://www.cirp.org.tt/mfisheries/index.php/about/background.

[13] Centre of Excellence for IT-enabled Innovation. *Open Government Data: A Catalyst for Jamaica's Growth and Innovation Agenda*. Kingston, Jamaica: Caribbean Policy Research Institute, 2014

improvement in value-add from productivity gains in the agriculture sector alone – an additional contribution of approximately US $92 million to Jamaica's GDP.

While adoption of open data in the Caribbean remains nascent, momentum has been steadily building among key stakeholders in the region. Agriculture, in particular, has been the focus of many early initiatives. CTA's AgriHack Programme, baseline study on open data, and potential engagement with regional partners around open data, are all very timely. These initiatives will capitalise upon the growing interest in both agriculture and open data. The aforementioned information is an important framing for interpreting the baseline study findings.

Research overview

Research themes and key questions

The overarching objectives of this baseline study are to (1) ascertain the state of the agricultural open data landscape in the Caribbean; and (2) identify key open data sets that support the development of applications and ICT-driven innovations in the industry. In support of these objectives, the study aimed to explore a number of key thematic areas, including:

Theme 1: Current understanding of open data and perceived alignment with organisational goals

- What are the priorities of interviewee organisations, and what role does information play in pursuing them? What are the key data sets? How are they created and utilised within the organisation?

- What is the current understanding of open data? What value do interviewees believe it can create for their organisation?

Theme 2: Existing applications of data and technology, and mechanisms for information sharing

- How do interviewee organisations currently use data and technology in their operations? Are there plans to expand usage or collection in the future?

- Where is the information used by the organisations sourced and do the organisations share their information? What costs are associated with sourcing information, both internally as well from external sources?

Theme 3: Factors that enable or constrain data usage, sharing, and data-driven decision making

- How is information maintained and kept updated? How is it resourced?

- How would an organisation or individual gain access to interviewee organisations' information?

- What information do interviewee organisations wish they had access to?

Methodology

The research methodology employed to execute the baseline study combined an online survey with in-depth interviews with key institutional stakeholders. The online survey aimed at capturing a broad base of institutional perspectives and was prepared by CTA. It was distributed among a wide range of regional agricultural stakeholders and saw participation from 74 respondents.

The institutional stakeholder in-depth interviews were carried out via phone and in-person conversations with government agencies and regional institutions, and sought to gain a deeper understanding of perceptions of open data and how technology and data are used in supporting organisational goals and initiatives. 6 in-depth interviews were completed for the institutional. Below is a breakdown of respondent demographics:

In-depth interviews -- 6 participants

- Regional

  - CARDI (2 Country Representatives)

- Jamaica

  - Jamaica Meteorological Office (Applied Meteorologist)

- Barbados

  - Ministry of Agriculture

    - Information Services Unit (Senior Agricultural Assistant)

    - Planning Unit (Economist and Statistician)

- Trinidad & Tobago

  - Extension Services, Ministry of Agriculture

Survey demographics

Top five countries and types of organisations[14]

Other organisations that responded included farmer organisations, regional/international organisation and ICT innovation centres.

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[14] Respondents were mainly nationals of the Caribbean. Some stakeholders who seem to have information on data issues in the Caribbean (some working in the region) also responded. Almost all Caribbean countries provided inputs in the survey.

Research findings

Perceptions of open data

Among agriculture stakeholders involved in both the online survey and in-depth interviews, there was a common consensus on the importance of data and information within the agriculture sector, and recognition of the value-add that open agricultural data offered. Over 90% of survey respondents that answered the question indicated that they believed open data was 'very important' or 'important' to the agricultural sector within their country.
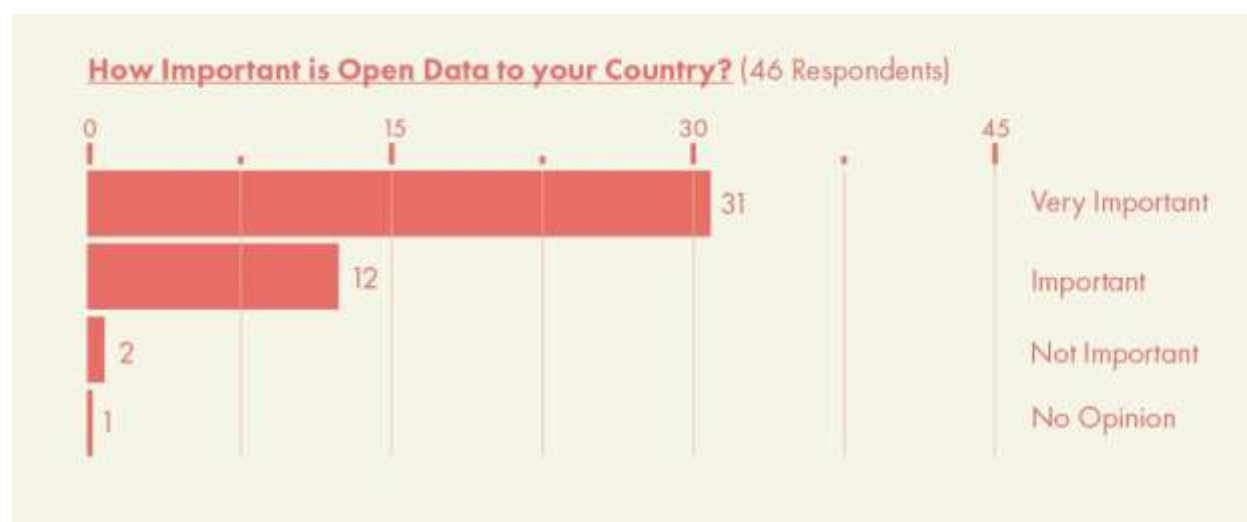
Survey respondents provided a variety of answers in support of its importance. Some of the perceived benefits of open data respondents identified include: (i) Greater access to information for academic research policy or entrepreneurship; (ii) Catalyst for economic activity and entrepreneurship; and (iii) Increased farmer productivity. One survey respondent shared the following:

"Its importance is relevant to the future growth of the sector from the perspectives of: 1. Making data available in multiple formats for decision making; 2. Extend the usefulness of agricultural data outside of mere statistics; 3. Provides opportunity for greater synergies between ICT and agriculture; 4. Provides avenues to build on existing agricultural datasets; 5. Demonstrates that the sector is advanced in its efforts to share its data resources."

- Manager & IT Practitioner, Government Agency

While most respondents cited one or a combination of the above benefits, only a few respondents provided more specific use-cases to illustrate how open data could be of value. One such explanation is provided below:

"Open data in the agricultural sector is tremendously important. Generally in the Caribbean, data is a reservoir of latent energy that can be tapped to release its awesome potential. Climate change can be averted through data conversion into visual information. Crop yields can be increased through data conversion into production analytics. Returns on investment in agriculture can be made more efficient through data conversion into market intelligence. Open data may very well open the way for the next agricultural revolution following the industrialization age."

- Development Practitioner, Co-operative

Similarly, institutional stakeholders often provided high-level responses to the perceived benefit of open data and seldom identified their own organisations as providing open data. However, when discussing how their organisations shared and utilised information, particularly with other government and research bodies, respondents were often more specific and illustrative in their responses. In some cases, such as with the Jamaican Meteorological Office and the Jamaican and Trinidadian Agricultural Information Systems, respondents provided examples of how the public or private sector organisations could make data requests, such as through weather analysis reports.

This could indicate that while organisations are accustomed to sharing information among themselves and understand its value, they have not yet made the connection between this ongoing practice and opening data more broadly for consumption by innovators or the general public.

While support for open data was high, only 17 of 46 survey respondents indicated that they knew of any publicly available agricultural datasets in the Caribbean (27 participants opted not to answer the survey question). However, this is unsurprising as research identified only a few agriculture focused data generating organisations and data sets that were published online, with only a handful publishing what could be classified as open data. Interestingly, a similar question inquiring to survey respondent's awareness of any regional open data activity indicated that more than half (27 of 46) of the respondents were aware of such activities taking place in the Caribbean. A more detailed analysis of data resources identified by respondents is discussed in the Key Opportunities Section below.
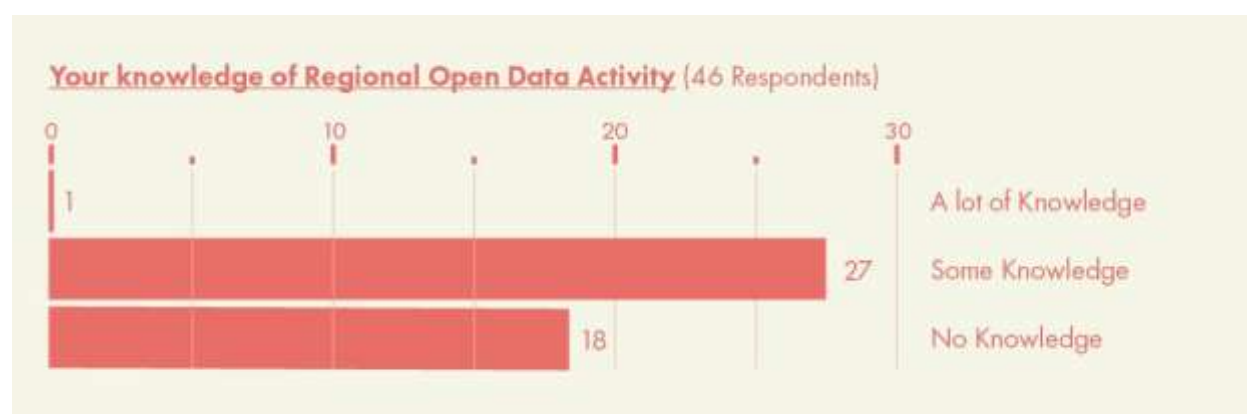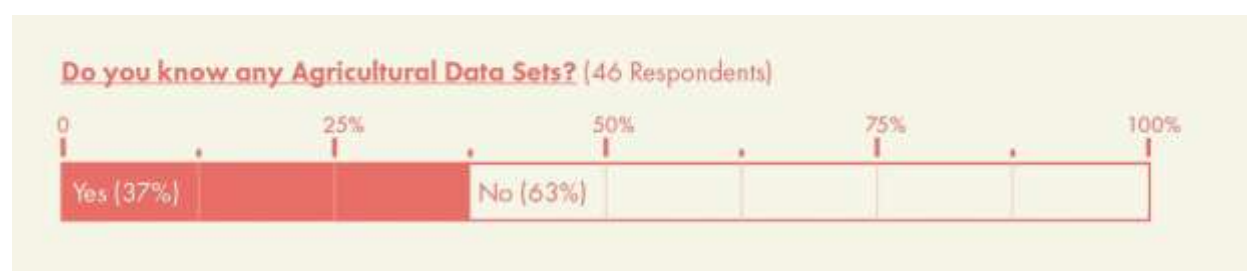
Existing applications of data and technology

Across the region, institutional agriculture stakeholders are investigating similar problems ranging from the effects of climate change on crop yield, managing farmer registration information, praedial larceny, and the control of pests and invasive species. Several key data sets were consistently referenced both by institutional stakeholders and survey respondents. These include:

- Weather/Climate Change:

    o Rainfall (Historic and Forecast)

    o Wind speed

    o Moon phase

- Production:

    o Price

    o Volume

    o Producer

    o Buyer & Exporter

- Environment:

    o Soil type

    o Pest incidents

The below figure provides a breakdown of open data datasets survey respondents were aware of:

Weather data

Weather data was one of the most consistently referenced data resources identified by research participants.

Types of Open Data you are Aware of (12 Respondents)

Production 8 | Extension Information 2 | Market Information 10 | Weather Information 4 | Agriculture Policy 4

Consumer Information 4 | Forestry 1 | Crop Production 9 | Pastoralism 1 | Animal Husbandry 4

Fisheries 2

Typically, weather data is acquired from both the respective countries' local meteorological offices, as well as international organisations such as the National Oceanic and Atmospheric Administration (NOAA). This data is often used in crop production forecasting as well as in the study of the long term impact of climate change on the agricultural sector.

Organisations such as CARDI utilise weather data in predictive models to analyse the incidence and spread of pests and invasive species. These applications require weather and climate data to be layered on other datasets which are often produced by the stakeholder organisation. Weather data is, in some cases, collected through automatic weather stations that transmit readings via satellite. However, due to the added cost of automated machinery, manual weather stations that require physical collocation to be read are sometimes preferred. The Jamaican Meteorological Service employs a hybrid network of automated and manual weather stations, with the latter read on a monthly basis. Manual stations, due to their increased human labour requirements, often make it difficult to keep data assets updated.

Market information

Similar to weather data, market price information and crop production was another common data resource managed by some of the engaged agricultural stakeholders. To manage this resource, many countries in the region have established market information systems (MIS) through which information on production volume and price data as well as farmer, exporter and buyer data is collected, stored and distributed.

In Trinidad & Tobago, the Ministry of Agriculture created the National Agricultural Management Information System (NAMIS). Inspired by the former, in Jamaica, the Ministry of Agriculture and the Rural Agricultural Development Authority (RADA) created the Jamaican Agricultural Management Information System (JAMIS) to manage price information, and the Agricultural Business Information System (ABIS) to manage farmer, farm and crop production data. At the time of the interviews, participants from the Barbadian Planning and Development Unit, within the Ministry of Agriculture, shared that they were in the process of developing and testing their own Management Information System.

Extension officers in Jamaica, and shortly in Barbados, use handheld tablets to collect data which is stored in central databases. The data is either made accessible via web pages or web forms (JAMIS, Barbados MIS), downloadable datasets (NAMIS), or, more recently, Application Programming Interfaces (APIs) as in the case of ABIS and JAMIS, through the HarvestAPI platform.[15] The exposure of JAMIS through an API is still under development, and this form of publishing information is not widespread in the region.

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[15] Information on the HarvestAPI platform is provided in the 'Key Opportunities' section.

> **HIGHLIGHT:** Price Data...an alignment of supply and demand
>
> In discussions with institutional stakeholders, the collection of price information across farm gate, market and retail locations is one of the highest priority activities within the Ministry of Agriculture. Moreover, the importance of timely and accurate price data to both private and public sector stakeholders seems to have incentivised the development of relatively high capability to capture, maintain and share data, when compared with other data assets discussed through the research process. Comparatively, this has resulted in price data being one of the best maintained datasets among institutional participants.
>
> Across the Ministry of Agriculture websites for Jamaica, Trinidad and Tobago and Barbados, price data is collected and published weekly for use. In Jamaica, the Ministry of Agriculture distributes weekly price reports on farm gate and markets to supermarkets and hoteliers across the island to support negotiations between retailers and middlemen.
>
> While many challenges still remain in collecting accurate price information, it represents a valuable reference point in how aligning incentives among data collectors and data users can lead to increased information capabilities. Best practice in opening data indicates that simply publishing data online via portals or websites is not sufficient to incentive usage.
>
> As more data is opened up to the public, it will be important that the right stakeholders are engaged in the reuse of data through applications, services and research to support further investment by data providers.

Factors that enable and constrain data sharing and usage

The in-depth interviews and online surveys identified a number of factors that both constrain and enable data sharing and usage that are relevant to enabling greater adoption of open data moving forward.

A key factor in the utilisation of information is stakeholders being aware of what data assets are available, how to access them, and specifics about the data, such as frequency of updates, data formats and accuracy. As discussed earlier, institutional survey respondents admitted to having limited knowledge about agricultural data assets available from Caribbean stakeholders. As a result of this lack of clarity, very few individuals or organisations outside of traditional agricultural circles have used much of the publicly available data. One survey respondent highlighted training as a means to doing so:

> *"Open data are very important to the agricultural sector. However this importance is seriously limited by the ability of the farmers to use and understand the data. Therefore any open data initiative MUST have a user training component. Also some thought must be given at the input level. Open data is only as useful as the accuracy and continuity of its original collection..."*

> *- ICT Policy Specialist*

Notwithstanding the awareness of data, only a few respondents identified the importance of going beyond simply sharing data as key to realising the benefits of the increased access to information that open data provides. One such respondent stated:

"Open data would certainly be a powerful resource[;] however I am unsure if the demand for it exists. Many in agriculture are unaware of open data and its benefits. This should be communicated first. Following this the regional agri network (IICA, CARDI, ministries of agriculture and their networks etc) should be made as hubs or info centres to disseminate the necessary info and act as [a] support system. Additional individuals and groups outside of these groups but working diligently in agriculture should be involved as well."

- Writer & Agri-blogger

The challenges around better communicating data assets are often constrained by the mechanisms through which data is collected and maintained. Stakeholder interviews revealed that regional governments and research agencies typically collect data as part of ongoing organisational activities, information services (e.g. soil sampling), or through grant-funded projects. Grant-funded and project-funded data collection are quite common. However, these types of resources introduce sustainability challenges to maintaining the data, as sporadic resource availability constraints the regularity, quality consistency and expansion of data collection.

Compounding the general lack of awareness of data resources, the mechanisms through which information is shared further increase the barriers to information usage. While MIS such as NAMIS and JAMIS, as well as open data portals managed by the COI and Data.tt, make data available online in various formats on demand, most regional organisations do not share their data in this way. More common is data sharing in response to formal requests.

For example, while the Jamaican Meteorological Office offers its information products free of cost and provide daily weather readings on its website, access to detailed or historical weather data is only prepared upon request. Once a request has been received, staff members manually retrieve the data, package it and then share it via email or physical media to the requester. Many other stakeholders take a similar approach to data sharing, which creates friction in collaboration and limits the types of solutions that can be built using agricultural data.

Few agencies share significant current or historic datasets via their websites or online portals. Among the institutional partners interviewed and information sources submitted by survey respondents, information is most commonly shared through reports published as PDFs, with HTML tables on websites or Microsoft Excel spreadsheets being the most common alternatives.

Key opportunities

CTA's engagement in the Caribbean, through initiatives like the AgriHack Programme, represents a unique opportunity to raise the awareness and accelerate the adoption of open data within the region. While still emergent, the open data movement in the Caribbean continues to build momentum among key regional stakeholders. Agriculture, in particular, has received significant focus in early initiatives. This section contains a profile of recommended datasets and data platforms identified through the research process. The datasets and platforms identified are maintained by government agencies, NGOs and research organisations.

Recommended datasets

National Agricultural Market Information System (NAMIS)

The NAMIS was developed by the National
Agricultural Marketing and Development
Corporation (NAMDEVCO) which is a statutory body
formed by the Government of Trinidad and Tobago.
NAMIS makes available buyer and exporter
information as well as price, volume and production data. This data takes the form of either Excel or Word files
or web based forms.

Source: http://www.namistt.com/

Maintainer: The National Agricultural Marketing and Development Corporation

Frequency: Daily and monthly

Caribbean Open Data Portal

The Caribbean Open Institute maintains an online portal
which makes available 36 datasets from across the region.
These include national crime statistics and census data from
Trinidad and Tobago, Agricultural price and production data
from Jamaica and Trinidad and Tobago, and many others.
The datasets are provided as XML, Excel spreadsheet, JSON
or CSV files.

Source: http://data.caribbeanopeninstitute.org/

Maintainer: Caribbean Open Institute

Last updated: May 2014

Frequency: Unknown

Data.TT

Maintained by Patrick Hosein, data.tt makes available 8 datasets predominantly from Trinidad and Tobago.
These datasets include weather data, crime data and agricultural data from NAMIS. The datasets are provided
as either Excel files, JSON or CSV files.

Source: http://data.tt

Maintainer: Various

Frequency: NAMIS data are updated daily and/or monthly. Other data last updated May 2014

Jamaica Agricultural Marketing Information System (JAMIS)

The JAMIS is maintained by the Jamaican Ministry of Agriculture and Fisheries. It provides farm gate, market, wholesale and retail price data on a weekly basis. This data is provided via web forms and pdf downloads.

Source: http://www.ja-mis.com/CompanionSite/home.aspx

Maintainer: Ministry of Agriculture and Fisheries, Information Division & RADA

Frequency: Weekly

Recommended platforms

HarvestAPI

The Harvest API is an open data platform for the publishing and sharing of agricultural sector data across government and with the public. It was developed by the SlashRoots Foundation in collaboration with Jamaica's Rural Agricultural Development Authority's (RADA) and Ministry of Agriculture (MoA). Through HarvestAPI RADA and the MoA publish and manage the sharing of crop production and farmer and farm registry data from RADA's ABIS database as well as market price information from the MoA's JAMIS database.

Source: www.harvestapi.io

Comprehensive Knowledge Archive Network (CKAN)

CKAN is a powerful data management system that makes data accessible – by providing tools to streamline publishing, sharing, finding and using data. It is aimed at data publishers (national and regional governments, companies and organisations) wanting to make their data open and available and it the most popular open source open data publishing. CKAN is the platform that powers the data.tt and Caribbean Open Data portals.

Source: www.ckan.org

Other data resources

- CIARD Ring - http://ring.ciard.net/

- NOAA Caribbean Tagged Datasets on Data.Gov - http://catalog.data.gov/organization/noaa-gov?q=Caribbean

- Climate.Gov - https://www.climate.gov/

- World Bank Open Data Portal - http://data.worldbank.org/indicator

- FAO Data - http://data.fao.org/

Recommendations for CTA and its partners

Advocacy

Communicate benefits of open data

Open Data continues to build momentum among key stakeholders within the Caribbean, driven by the efforts of organisations from civil society and academia. However, early successes have not yet manifested in high-level government adoption, institutionalised through adoption of open data policies or participation in international coalitions such as OGP or GODAN. The presence of ongoing agricultural open data initiatives in the Caribbean provide CTA with existing partners and bodies of work to leverage in advocating for open data adoption within the region. Given CTA's established relationships and stature among within the Caribbean Agriculture sector, it can further add credibility to ongoing efforts by becoming a strong advocate at the policy maker level for open data and its benefits to the agricultural sector.

Recommendation

- Leverage existing agricultural open data efforts and partners in the Caribbean in engagement with policy makers on the benefits of open data adoption to the region's sector.

Encourage institutions to better communicate available data assets

A common point of feedback shared across both the institutional survey participants and participants of the developer study was the lack of information on available data resources relevant to the Caribbean context. Prior to the AgriHack Programme, most participants indicated that they had never heard of or used open agricultural data sets. Outside of the somewhat closed circle of ICT stakeholders, awareness and access to open data is limited.

CTA or relevant institutions can aid in addressing this issue by encouraging regional producers and publishers of data to communicate to the wider community of researchers, developers, educators and entrepreneurs the data assets, products and services they offer.

Recommendation

- Engage regional institutions in the cataloguing and communication of organisational data sets

Policy and community engagement

Open data policy formulation

As interest in open data has grown within regional government agencies, the need for an interest in adopting policy to guide the opening up of information has also increased. While many of the countries in the region have policies that govern FOI requests, similar progress has not been made in the definition of open data policies. Given CTA's strategic focus on strengthening agricultural and rural development policy processes and its experience in ACP countries, it is well-positioned to act as a facilitator in the discourse among regional governments to frame new open data policies that incorporate best practice and experiences from ACP contexts.

Recommendation

- Provide technical assistance to government agencies and policy makers in the creation and adoption of open agriculture data policies

- Connect regional fore-runners in the adoption of open data with global communities of practice

Community engagement

Initiatives such as the AgriHack Talent Programme and the Developing the Caribbean Open Data Conference bring together innovators, agricultural institutions and domain experts to exchange ideas and challenges in a unique way. It exposes the participants to the opportunities that exist within agriculture. For technologists, this type of access is often difficult to gain otherwise, but is key to motivating interest in the agriculture sector.

Recommendation:

- CTA and relevant partners should continue to emphasise the importance to agriculture institutions within the region of engaging youth, technologists, and other non-traditional partners

- CTA and relevant partners should continue the engagement of youth and technologists through initiatives like AgriHack as well as its other events and programmatic engagements with institutional stakeholders

Technical assistance

Update current data sharing practices

Survey respondents indicate strong support of open data throughout the region. Furthermore, initial in-depth stakeholder interviews reveal that several key regional and national organisations already share data and information among themselves. However, the lack of automation and data formats through which many organisations share data do not lend themselves to increased demand and usage by external data subscribers or in applications. Moreover, agricultural institutions seem to have not made the connection between the benefits of bilateral information sharing, and more broad based open access to this information for others.

Therefore, CTA and relevant partners should consider, as part of the AgriHack Programme process, engaging with strategic producers and publishers of data to communicate the benefits of adopting more open and automated means of publishing information.

Recommendation

- Engage data key publishers and producing within the Caribbean to communicate the benefits of adopting open data principles and technologies as a means of sharing information, providing technical guidance as needed.

Propagating common data standards and shared platforms

The use of open standards, where possible, in the publication of open government data has emerged as best practice globally. Open standards enable greater interoperability among data sets and lowers the barriers to propagating innovation across contexts. Agriculture stakeholders in the Caribbean share common responsibilities, service provision expectations and challenges. However, many organisations are expending resources to re-implement systems that have already been developed elsewhere. As interest in publishing

open data grows, an opportunity also emerges to advocate for the adoption of shared data standards and investment in common platforms among the region's agricultural organisations.

This will create benefits for both innovators and agricultural stakeholders. For innovators, it will make it easier to scale solutions or products developed for one organisation to another context. Similarly shared platforms and data standards will allow agricultural institutions to share the cost of developing core technologies, while also benefiting for each other's investments in functionality. CTA, IICA, CARDI or other relevant institutions can play a key role in communicating the value of open standards, provide technical assistance on best practice around data standards, and convening the necessary stakeholders to support adoption.

Recommendation

- Collaborate with regional agricultural institutions encouraging the adoption of shared data standards or platforms across core thematic data assets and functions, such as crop price publication, production data or farmer information.

Building in core government statistical capabilities

The value of open data increases with its usage. Similarly, the incentive for increasing the quality of data assets also increases as its importance to stakeholders grows. However, many agricultural agencies currently struggle to collect and maintain high quality data assets due to resource and technical capacity constraints.

Given CTA's mandate and experience in providing assistance around the adoption of ICTs and the management of information, it can provide guidance or resources to agricultural institutions to further develop internal national statistics capabilities.

Recommendation

- Provide technical assistance to strengthen internal data and statistical capability within key data generating institutions

Annex

1. Institutional survey questions

Personal details

1. Name

2. Gender

3. Nationality

4. Age range

Professional background

5. Affiliation / Employer/Organisation

6. Type of organisation

7. How do you define your profile or role in development?

8. Choose the option that best describes your profile/role: Job Title / Position / Occupation

9. Phone number (including country code)

10. Email address

Open data questions

11. What do you think about the importance of open data in the agricultural sector?

12. Please select one comment below regarding your knowledge of open data activity in the agriculture sector in the Caribbean:

13. In your opinion, how important is the issue of open data for the agriculture sector in your country?

14. Do you know of agriculture related publicly available online databases/open data/data sets that currently exist for the Caribbean?

    a. If yes, please give please the web address(es) of these platforms below (exact link of the database/dataset/open data).

Open data questions (2)

15. What domain(s) of the value chains or what specific theme/issue do these platforms address?

16. What organisation(s) is/are owner or producer(s) of these data/platform(s)?

17. Are these data maintained and up-to-date?

18. What organisation(s) have/has financed (or contributed to financing) the production of these data/platforms(s)

19. In what format(s) are these data available? (examples include.excel,.pdf,.csv and xml)

API questions and others

20. Do you know if any Application Programming Interface (API) for agriculture exists that could be used by software developers? (An API is a software programming tool that an institution can release to the public so that software developers can design services based on it)   If yes, please give its/their address(es)

Other comments

21. Please provide the name and contact details (email and/or phone number) of a person who could be contacted for queries on these data (for example if software developers want to request their use to build applications)

22. Other comments or suggestions relating to increasing open data access or use in the agriculture sector in the Caribbean?

2. Participating institutional respondent organisations (survey and interview)

Kushnet Wireless Solutions

Independent Consultant in Climate Smart Agriculture

Global Agro-Ecology/Permaculture Consultant

Wageningen University

Jamaica Organic Agriculture Movement

Trinidad & Tobago Foresight & Innovation Network

Mycologia Aplicada International

IICA (2)

Network of Rural Women Producers, Trinidad & Tobago (2)

Rural Agricultural Development Authority (RADA)

Benslyn Community Dev. Consultants

University of Hamburg

Ministry of Education, Trinidad & Tobago

University of Florida

Addis Alem Co-operative Society Limited

Management Control Systems

Stockholm Environment Institute

Trending Best Farmer's Group

St. Kitts Agricultural Youth Forum/Capisterre Farm

Ministry of Food Production (Trinidad & Tobago)

CARDI

Cocoa Board of Papua New Guinea

National University of Rwanda

Ministry of Education, Trinidad & Tobago

Caribbean Association for Youth Development

UON

COB

Toro Development Organisation (ToroDev)

UN ECLAC

Municipal Corporation, Trinidad & Tobago

NARO - NaCRRI

Likamis Software Limited

UWI, St. Augustine

Min of Agriculture, Trinidad & Tobago

Youth Partnership and Agricultural Development

Retired (Formerly, Sir Arthur Lewis Community College Saint Lucia)

Kipato Limited Company

University of the West Indies

PROMODEV

Alibeth Consults

EWSA LTD

ConnectiMass

The Technical Centre for Agricultural and Rural Cooperation (CTA) is a joint international institution of the African, Caribbean and Pacific (ACP) Group of States and the European Union (EU). Its mission is to advance food and nutritional security, increase prosperity and encourage sound natural resource management in ACP countries. It provides access to information and knowledge, facilitates policy dialogue and strengthens the capacity of agricultural and rural development institutions and communities.

CTA operates under the framework of the Cotonou Agreement and is funded by the EU.

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