Brussels Development Policy Briefing no.40

Data: the next revolution for agriculture in ACP countries

Organised by CTA, the ACP Secretariat, the European Commission, Concord
18th February 2015, 14h00-18h00 (preceded by lunch)
ACP Secretariat, 451 Avenue Georges Henri, 1200 Brussels, room C
http://brusselsbriefings.net

1. The Data revolution: from data collection to real-time digital data

Data has become a key asset for the economy, as important as human and financial resources. Whether it is geographical information, statistics, weather data, research data, transport data, energy consumption data, or health data, the need to make sense of "Big data" is leading to innovations in technology, development of new tools and new skills.

More data was created in 2013 than in all the preceding years of human history combined, and every minute the world generates enough data to fill more than 360,000 standard DVDs.[1] These data hold the potential—as yet largely untapped— to allow decision makers to track development progress, improve social protection, and understand where existing policies and programmes require adjustment.[2] Whereas in previous generations, a relatively small volume of analog data was produced and made available through a limited number of channels, today a massive amount of data is regularly being generated and flowing from various sources, through different channels, every minute in today's Digital Age.

The phenomenon of big data - where information comes from different sources ranging from connected devices to sensors and GPS - offers enormous potential to develop innovative products and services. Turning Big Data—call logs, mobile-banking transactions, online user-generated content such as blog posts and Tweets, online searches, satellite images, etc.—into actionable information is key. New insights gleaned from such data mining should complement official statistics, survey data, and information generated by Early Warning Systems. Generating value at the different stages of the data value chain will be at the centre of the future knowledge economy.

The public sector cannot fully exploit Big Data without leadership from the private sector which includes mobile phone carriers, credit card companies and social media networking sites and manages enormous data sets that hold rich insights. Companies analyze this data to support decision-making or provide market intelligence. More recently, public sector institutions have begun leveraging similar techniques to generate actionable insights for policymakers.
The "traditional data" (official statistics and survey data) will continue to generate relevant information, but the digital data revolution presents a tremendous opportunity to gain richer, deeper insights into human experience that can complement the development indicators that are already collected. The growing role of 'crowdsourcing'[3] and other "participatory sensing" efforts bringing together communities of practice and like-minded individuals through the use of mobile phones and other platforms including Internet, hand-held radio, and geospatial technologies present promising opportunities.

- **Some concepts**

"Big Data" is a popular phrase used to describe a massive volume of both structured and unstructured data that is so large that it's difficult to process with traditional database and software techniques. The characteristics which broadly distinguish Big Data are also called

[1] http://capacity4dev.ec.europa.eu/article/big-data-big-potential#sthash.sFrWbRij.dpuf
[2] UN Global Pulse.The report is available online at http://unglobalpulse.org/
[3] The word "crowdsourcing" refers to the use of non-official actors ("the crowd") as (free) sources of information, knowledge and services, in reference and opposition to the commercial practice of outsourcing. "

the "Four Vs": volume (massive and passively generated); variety (originating from both individuals and institutions at multiple points in the data value chain); velocity (generally operating in real time); and veracity (referring to the uncertainty due to bias, noise or abnormality in data). This data comes from everywhere: sensors used to gather climate information, posts to social media sites, digital pictures and videos posted online, transaction records of online purchases, and from cell phone GPS signals to name a few. This data is known as "Big Data" because, as the term suggests, it is huge in both scope and power.[4]

Big Data for Development sources generally share some or all of these features: [5]
(1) **Digitally generated** – i.e. the data are created digitally (as opposed to being digitised manually), and can be stored using a series of ones and zeros, and thus can be manipulated by computers.
(2) **Passively produced** – a by product of our daily lives or interaction with digital services
(3) **Automatically collected** – i.e. there is a system in place that extracts and stores the relevant data as it is generated
(4) **Geographically or temporally trackable** – e.g. mobile phone location data or call duration time.
(5) **Continuously analysed** – i.e. information is relevant to human well-being and development and can be analysed in real-time

Advances in computing and data science now make it possible to process and analyze Big Data in real time. However, due to its size and often complex and unstructured nature, Big Data presents several analytical challenges that demand continually updated tools and expertise. Legitimate concerns about privacy and the digital divide also present new obstacles to harnessing Big Data sets for public benefit.

Open data refers to data that is free from copyright and can be shared in the public domain. That is not a defining characteristic of Big Data, which can be privately owned or have varying levels of access control.
The Global Open Data for Agriculture and Nutrition initiative (GODAN) aims to demonstrate the value of Open Data in Agriculture and convince more governments to encourage its availability.

2. Towards "data-driven decision-making"

The data deficit and its implications for policy decision processes

The availability of timely, relevant, and reliable data on the agriculture sector is necessary for effective planning, monitoring, and evaluation of agricultural and rural development policies and field interventions. However, at a time when more than ever, reliable data are needed on this sector, several studies point to a steady decline in the quality of agricultural statistics in many developing countries, particularly African countries[6].

The numbers we use in development, and most of what we think of as facts, are actually estimates. In the absence of robust statistical systems, the household survey is the foundation on which most development data is built but population census are limited in numbers and frequency (only around 12 of the 49 countries in sub-Saharan Africa have held a census in the past 10 years and 21 African countries haven't had a survey in the past seven years). Furthermore, methodologies differ which makes comparing countries or combining data from different countries very difficult. A recent experiment by World Bank researchers in Tanzania, comparing results from the different methods, found that estimates of how many people in the country are hungry varied from just under 20% to nearly 70%, depending on the method chosen.

---

[4] ibid

[5] UN Global Pulse. The report is available online at http://unglobalpulse.org/

[6] A report of the Independent External Evaluation of the Food and Agriculture Organisation concluded that "the quantity and quality of data coming from national official sources has been on a steady decline since the early 1980s, particularly in Africa" (FAO, 2006).

Unreliability of data might well be in some cases purposely ignored as not to loose funding fro programmes or question its findings. Better data might challenge some comfortable and familiar myths about development.
Donors aren't funding it – the share of official aid allocated to statistical development halved between 2011-12, to a vanishingly small 0.16% of all aid.[7]

The UN Secretary-General's Independent convened an Expert Advisory Group on a Data Revolution for Sustainable Development (IEAG) to propose ways to improve data for achieving and monitoring sustainable development. The report highlights two big global challenges for the current state of data: (i) The challenge of invisibility (gaps in what we know from data, and when we find out); (ii) The challenge of inequality (gaps between those who with and without information, and what they need to know make their own decisions) and calls for a UN-led effort to mobilise the data revolution for sustainable development through:

- **Fostering and promoting innovation to fill data gaps.** New technologies offer new opportunities to improve data, if they are used for the common good. The IEAG proposes a programme for experimenting with how traditional and new data sources (including big data) can be brought together for better and faster data on sustainable development, developing new infrastructures for data development and sharing (such as a "world statistics cloud"), and supporting innovations that improve the quality and reduce the costs of producing public data.
- **Mobilising resources to overcome inequalities between developed and developing countries and between data-poor and data-rich people.** The group stresses the need for increased funding and resources, used both to develop national capacity and global data literacy, and for public-private partnerships to leverage private sector resources and knowledge in the global interest. The international conference in July 2015 to discuss financing for new Sustainable Development Goals provides an opportunity for this.
- **Leadership and coordination to enable the data revolution to play its full role in the realisation of sustainable development.** The group proposes a global effort to improve cooperation between old and new data producers, ensure the engagement of data users, and develop global ethical, legal and statistical standards to improve data quality and protect people from abuses in a rapidly changing data ecosystem.

3. Harnessing new opportunities of the data revolution for ACP agriculture

3.1. From technology to actionable information: key game changers

Gathering data via traditional means can be difficult in ACP countries, an in particular in Africa. Remote populations, lack of infrastructure, paucity of landlines and insecurity add up to an extremely challenging environment for traditional information gathering.
Constraints for ACP countries range from limited capacity and insufficient resources of Government and statistical agencies which affect the quality and frequency of household surveys to reliance on donor' support.

The spread of mobile phone technology to the hands of billions of individuals may be the single most significant innovation that has affected developing countries in the past decade. Across the developing world, mobile phones are used daily to transfer money, buy and sell goods, and communicate information including test results, stock levels and prices of commodities. Mobile technology is used as a substitute for weak telecommunications and transport infrastructures as well as underdeveloped financial and banking systems. The numbers of real-time information streams and people using social media are growing rapidly in developing countries as well. Tracking trends in online news or social media can provide insights on emerging concerns that can be highly relevant to global development.[8]

---

[7] http://www.theguardian.com/global-development/poverty-matters/2014/jan/31/data-development-reliable-figures-numbers

[88] Millennium Development Goals Report, 2011) www.unglobalpulse.org

The growing role of 'crowdsourcing'[9] and other "participatory sensing" efforts bringing together communities of practice and like-minded individuals through the use of mobile phones and other platforms including Internet, hand-held radio, and geospatial technologies etc.. are key in delivering real-time digital data,

3.2. Precision agriculture for all?

Devised for industrialised farms, precision agriculture now has the potential to increase the yields of smallholder farmers.
Precision agriculture is closely associated with technology and its application to large-scale farms in developed countries. GPS-equipped sensors on tractors, for example, enable farmers to measure and respond to soil variability across vast tracts of land, and dispense the right amounts of fertiliser and water exactly where it's needed.
For many years, this was widely seen as irrelevant to small-scale farmers in developing countries. How much variability can there be on a two hectare plot? And how could poor farmers afford the technology? But there's a growing body of research now to support the idea that small-scale farmers can benefit from precision agriculture. One of the reasons for this is greater awareness of how much variability can exist in even the tiniest plot of land.
The technology which has driven precision agriculture in the global north is becoming more widely accessible. For example, a new handheld device known as the GreenSeeker can be used to measure the health and nitrogen status of plants, enabling farmers to make more precise assessments of fertiliser requirements. With evidence that precision agriculture techniques can work, the challenge is creating appropriate enabling environments to encourage take-up.

ICT tools for data collection and M&E
Using ICT – mobilephones, tablets, applications and software – to collect data in the field and to perform M&E in development projects, while also working closely with rural communities and taking their feedback. Some tools include:
iFormBuilder: An iOS mobile data collection platform that features an application that requires no paper or connection and is available worldwide. This application is being used for data collection in over 110 countries and it allows real time data upload and offline data collection, while immediately sending any updates to a mobile workforce with server assignment. Catholic Relief Services used iFormBuilder to register and distribute vouchers to beneficiaries during a seed fair in Central African Republic, and they were able to save over a week of preliminary work and reduce staff by 50%.
Cropster: is an initiative that seeks to support sustainable agriculture by empowering farmers with access to key information and ensuring data transparency. It enables them to make informed decisions, and also supports people and communities at all levels of supply chain. This app offers an M&E tool that facilitates data collection as well as the exchange of information within producer groups, NGOs and commercial partners in Latin America. This tool provides decentralised monitoring, real-time information, and the ability for users to customise data and verify input.
EpiSurveyor: An award winning mobile app that lets users create an account, design forms, download them to their mobile phones, collect data and send it to a server. According to a World Bank report, in 2010, nine data collectors used EpiSurveyor to interview beneficiaries in 25 municipalities in a secondary survey (the first one, conducted in 2009, used paper and pen) in a World Bank Conditional Cash Transfer project in Guatemala. Digitisation cut the cost of an interview by 71%, increased the sample size from 200 to 700 beneficiaries, and reduced the individual interview time by 3.6%.

3.3. New data, new opportunities: some successful applications

- The retailer Tesco combines weather information with its own sales history to predict demand for certain items and prevent waste. Adidas is able to immediately redirect supply trucks to stores running low on a particular style of shoe, based on its real-time monitoring.

[9] The word "crowdsourcing" refers to the use of non-official actors ("the crowd") as (free) sources of information, knowledge and services, in reference and opposition to the commercial practice of outsourcing. "

- In one well-known study, researchers followed the position of 1.9 million active mobile phone SIM cards in Haiti around the time of the 2010 earthquake to track the displaced population.
- Another application could be the monitoring of development targets. One-third of all countries still have difficulty reporting on up to half of the Millennium Development Goal indicators. Yet as the world considers new objectives for the post-2015 development agenda, the need for up-to-date information on the success of existing priorities is essential.
- At the same time, Big Data allows novel ways to monitor a population's characteristics in real time. For example, researchers from Belgium used anonymised data on how much airtime credit mobile phone users in Cote d'Ivoire purchased to estimate the relative income of individuals, and the diversity and inequality of income. This analysis paints a nuanced picture of shifts in the distribution of wealth.
- Kenya puts Africa on map of space-based climate surveillance: Through the Regional Centre for Mapping of Resources for Development (RCMRD) in Nairobi, Kenya launched a satellite tracking system in mid-July that can collect real-time data from 75 percent of Africa's land area. Capable of capturing images with a 250-metre resolution, the Moderate Resolution Imaging Spectroradiometer (MODIS) monitors factors affecting the environment, like forest fires, in areas where human surveillance cannot reach without the aid of aerial photography. It enables the acquisition of direct data which can be processed into different products for a variety of applications, such as flood mapping, crop monitoring, fire assessment, water quality assessment and hailstorm prediction, among others.
- IBM Research Africa in Nairobi begins their project in using their supercomputer "Watson" to address agriculture problems on the continent.
- The African Development Bank continues work on reinforcing statistical data particularly in West Africa. This has resulted in an Open Data portal for Africa (http://opendataforafrica.org/).
- In the Caribbean a portal for open data with examples in agriculture already exists at http://data.org.jm. In addition, data is at the heart of the Post 2015 SDG 17 on "*Strengthening the means of implementation and revitalize the global partnership for sustainable development".*
- GeoPoll, a tool for surveying populations through cellphones, using text messages, voice recordings and Web applications. Database of more than 150 million users which allows to collect real-time data that can help businesses, organizations and governments make better-informed decisions.
- Data initiatives like the Africa Information Highway are taking off on the continent .Such data portals are giving better data access promising improvements in services. The new Partnership for Open Data hopes to further coordinate open data projects
- In February, the African Development Bank (AfDB) launched the Africa Information Highway (AIH), which comprises two types of portals for each participating country: a statistical data portal and an open data portal.[10]
- The East African Community (EAC) and the International Monetary Fund (IMF) have come together to help regional states in compiling finance statistics for their different governments. Once done, the initiative will assist the EAC partner states meet the fiscal data requirements associated with the East Africa Monetary Union (EAMU) Protocol.
- Data for insurance: the automatic weather stations can show insurance companies, governments and farmers how much rain is received over a given period of time much more accurately than the weather stations. The SERVIR platform, set up in 2008, integrates satellite observation and predictive models with other geographic information to track and forecast ecological changes, and respond to natural disasters.
- "Development under Climate Change (DUCC)," an application of the Systematic Analysis of Climate Resilient Development (SACRED) framework to quantify economic impacts of climate change in South Africa submitted by United Nations University WIDER in Finland

[10] http://www.scidev.net/global/data/news/africa-makes-inroads-on-open-development-data.html

As the volume, variety and velocity of data continues to increase, so too do the possibilities for how it can be applied to tackle global challenges such as agriculture. The era of big data is potentially transformational. But to achieve these benefits, we need a deeper understanding of several interdependent issues. Trust needs to be restored. We need to learn more about the dynamics of constantly changing data flows. New means and mechanisms for engaging individuals need to be developed.

Objectives of the Briefing

To improve information sharing and promote networking, CTA, the DG DEVCO from the European Commission, the ACP Secretariat, Concord organise bimonthly briefings on key issues and challenges for rural development in the context of EU/ACP cooperation. The Briefing on 18th February 2015 will focus on the potential the data revolution can bring to the agrifood sector of ACP countries. The objectives of the briefing are to: (a) document and review the key initiatives in data-driven development and agriculture; (b) present some achievements and successes of ACP countries on new tools for data and statistical management; (c) promote multistakeholder dialogue and transformative partnerships for data revolution of benefit to the ACP agrifood sector.

Target group

Around 150 ACP-EU policy-makers and representatives of EU Member States, civil society groups, research networks and development practitioners, private sector and international organisations based in Brussels.

Outputs

Input and comments before, during and after the meetings will be included in the Briefings Website: http://brusselsbriefings.net.
A short report and a Reader in printed and electronic format will be produced shortly after the meeting.