

JRC CONFERENCE AND WORKSHOP REPORT

Evidence from the "Food Price Crowdsourcing in Africa" (FPCA) project in Nigeria

*Stakeholder and expert
workshop at the EU
Delegation Office, Abuja,
Nigeria, 24th September 2019*

Solano-Hermosilla, G., Genovese, G., Gomez y
Paloma, S.

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Contact information

Name: Gloria Solano-Hermosilla
Address: Edificio Expo – Inca Garcilaso, 3, E-41092 Seville – SPAIN
Email: Gloria.SOLANO-HERMOSILLA@ec.europa.eu
Tel.: +34 954 48 8475

EU Science Hub

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Contents

Acknowledgements2

Abstract3

1 Introduction.....4

2 Summary of Workshop Presentations and Discussions5

 2.1 WORKSHOP INTRODUCTION.....5

 2.1.1 Welcome and approval of the agenda5

 2.1.2 Tour de Table5

 2.2 WORKSHOP PRESENTATIONS.....5

 2.3 WORKSHOP DISCUSSION10

 2.3.1 Data output.....10

 2.3.2 Online dashboard.....10

 2.3.3 Methodology10

3 Conclusions11

References12

List of abbreviations and definitions13

List of figures14

List of tables15

Annexes16

 Annex 1. Venue and List of Participants16

 Annex 2. Workshop Agenda.....18

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Authors

Gloria Solano-Hermosilla, Giampiero Genovese and Sergio Gomez y Paloma from the European Commission's Joint Research Centre (JRC).

Abstract

This report presents a summary of the discussions that took place during the *Food Price Crowdsourcing Africa* (FPCA) workshop with relevant stakeholders at the EU Delegation of Abuja, Nigeria on the 24th September 2019. The workshop had a double purpose: (a) to provide an overview of the work done at the Joint Research Centre (JRC) of the European Commission, in particular of the JRC-D4- Economics of Agriculture Unit's activities in the areas of agriculture, trade, markets and development in Europe and Sub Saharan Africa, and (b) to present and exchange ideas and perspectives on the results of the FPCA project implemented in Nigeria between September 2018 and June 2019. The main objective of the FPCA project was to test a *crowdsourcing* or *citizen-driven* approach to collect, quality check, structure and make easily accessible in real-time through an online dashboard data on food prices at different stages of the food chain from voluntary data contributions of citizens of varying knowledge, heterogeneity and number, by using a smartphone app. Timely and reliable data on food prices are of interest to food supply chain participants as well as to government and other organisations to plan and implement appropriate interventions. The online price indicator dashboard is accessible at the following link ⁽¹⁾:

https://datam.jrc.ec.europa.eu/datam/mashup/FP_NGA/index.html

⁽¹⁾ Please, consider that the data collection was conducted in two States in the north of Nigeria (Kano and Katsina) and the project duration was from Sep 2018 up to the end of June 2019. Since then, the digital platform and the online dashboard have been kept open and updated to collect and disseminate data but no financial reward or behavioural tool have been further used to encourage citizen participation, which explains the gradual decrease in the number of data submitted through the app.

1 Introduction

Timely and reliable monitoring of agricultural and food prices is important for the assessment of market and food security developments and risks, and the provision of early warnings, in particular, in developing economies. However, regional or national systems to track changes in agricultural and food prices are either missing in sub-Saharan Africa or lack sufficient timeliness and geographical granularity to inform localized interventions and decisions in time. Yet, market actors, governments and other organizations need to rely on available commodity price data.

The rapid growth of mobile phone and smartphone (one that can access internet and apps) adoption by citizens, as well as the improvement of mobile phone networks and Internet coverage in developing countries represents a unique opportunity to produce new and complementary statistics within citizens' participatory approaches, such as crowdsourcing⁽²⁾. Since 2012, Africa has seen an expansion of crowdsourcing initiatives to collect food price data from citizens' contributions through their mobile phones or internet platforms—e.g. from the World Bank (WB), World Food Programme (WFP), European Commission (EC), African Development Bank (AfDB), Food and Agricultural Organization (FAO) (Hamadeh, Rissanen, and Yamanaka 2013; Donmez et al. 2017; Blumenstock and Keleher 2015; Standard Chartered 2014; Seid and Fonteneau 2017). These initiatives represent the exploration of different crowdsourcing approaches, as described in a recent review of these methods in Africa (Zeug et al. 2017). While many of these initiatives are based on classic mobile phones and/or selected and trained participants, the expansion of smartphones and Internet enables the development of better solutions for (a) collecting geo-located data through digital contributions from a larger number of citizens, which are usually not trained for the task and (b) making data available through online dashboards to the crowd and other data users in real-time, helping so to reduce transaction costs related to information search and information overload.

For this purpose, the European Commission Joint Research Centre (EC-JRC) launched the Food Price Crowdsourcing in Africa (FPCA) initiative implemented in collaboration with International Institute of Tropical Agriculture (IITA) in Nigeria and Wageningen University and Research (WUR). The main objective of the FPCA project was to test a *crowdsourcing* or *citizen-driven* approach to collect, quality check, structure and make easily accessible in real-time through an online dashboard data on food prices at different stages of the food chain from voluntary data contributions of citizens of varying knowledge, heterogeneity and number, by using a smartphone app during their routine market visits.

The workshop had a double purpose: (i) to provide an overview of the work done at the Joint Research Centre (JRC) of the European Commission, in particular of the JRC-D4- Economics of Agriculture Unit's activities in the areas of agriculture, trade, markets and development in Europe and Sub Saharan Africa, and (ii) to present and exchange ideas and perspectives on the results of the FPCA project implemented in Nigeria between September 2018 and June 2019.

⁽²⁾ Crowdsourcing is a term coined by Jeff Howe (2006) and consists of "a type of participative online activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task" (Estellés-Arolas and González-Ladrón-De-Guevara 2012).

2 Summary of Workshop Presentations and Discussions

2.1 WORKSHOP INTRODUCTION

2.1.1 Welcome and approval of the agenda

Montse Pantaleoni opened the meeting. Giampiero Genovese welcomed the participants and explained the purpose of the meeting: (i) to provide an overview of the work done at the Joint Research Centre (JRC) of the European Commission, and in particular of the JRC-D4 ("Economics of Agriculture" Unit) activities in the areas of agriculture, trade, markets and development in Europe and Sub Saharan Africa and (ii) to present and exchange on the results of the *Food Price Crowdsourcing Africa* (FPCA) project implemented in Nigeria between September 2018 and June 2019.

As foreseen in previous work of the European Commission's Directorate General for International Cooperation and Development (DG DEVCO), the Joint Research Centre (JRC) of the European Commission has been involved in researching innovative methodologies for real-time data collection and analysis in developing countries to support analysis and better decision and policy making. This meeting represents the final phase of the FPCA project implemented in Nigeria and an opportunity to exchange on results and get feedback from relevant stakeholders.

Gloria Solano-Hermosilla presented the agenda of the meeting (see Annex 2).

2.1.2 Tour de Table

The workshop participants presented themselves with view on their experience and expectations in relation to innovative data collection methods (see Annex 1 for the list of participants).

Organisations present were the Federal Ministry of Agriculture and Rural Development (FMARD) of Nigeria; the National Agricultural Extension and Research Liaison Services (NAERLS) of FMARD; Famine Early Warning System Network (FEWS NET); Centre for Dryland Agriculture (CDA), Bayero University, Kano (BUK); International Institute for Tropical Agriculture (IITA); Wageningen University & Research (WUR), Netherlands; University of Göttingen, Germany; and Makvid Technology Services LTD. The EU delegation was also present during the stakeholder meeting and in the debriefing meeting that subsequently took place with several members of the delegation.

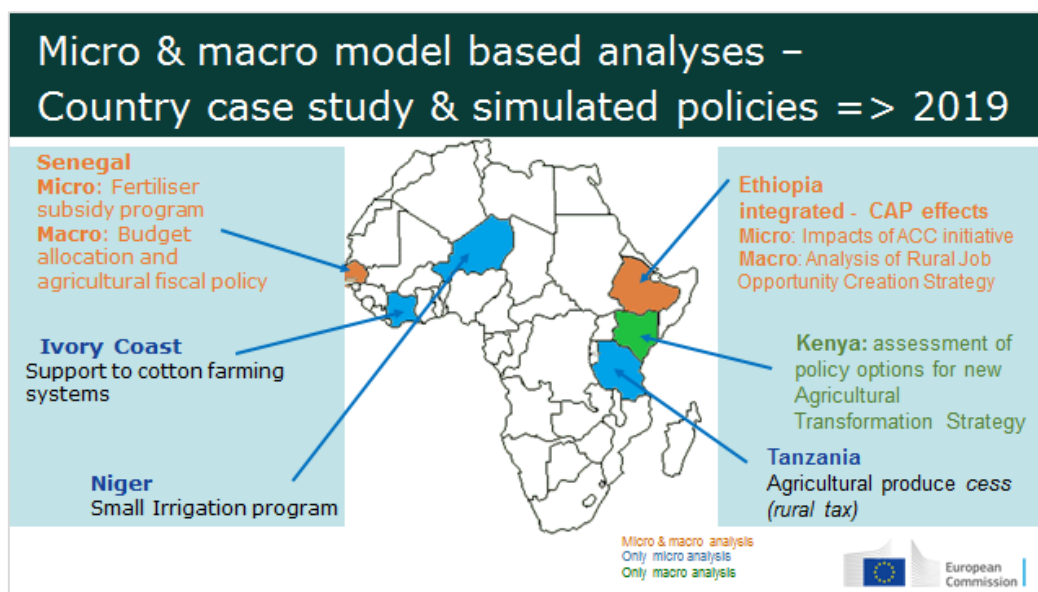
2.2 WORKSHOP PRESENTATIONS

JRC introduced the presentation prepared for the meeting about the JRC as the European Commission's knowledge and science service, the activities on agro-economic and policy research conducted at JRC-D4 Unit for Africa and the Pan African Network for Economic Analysis of Policies (PANAP). Two presentations were made:

- The European Commission research in agri-economic policy in support to AU-EU alliance (by Giampiero Genovese, JRC)
- Methods and data for Policy Impact Analysis: Selected results from applications on sub Saharan Africa. The Pan African Network for Economic Analysis of Policies (PANAP) (by Sergio Gomez y Paloma, JRC)

Figure 1 shows an overview of the JRC ongoing micro- and macroeconomic analysis, case studies in several African countries.

Figure 1. Micro and Macro model based analyses, country cases studies 2019.



Source: Presentation by Gomez y Paloma et al. 2019, EU Delegation, Abuja, Sep 2019.

JRC then introduced the FPCA project, its motivation, objectives and results. The motivation for this project was the need of timely and reliable data on food prices to support decision making of market actors (from farmers, through wholesalers and retailers to consumers), government, donors and international organisations. The aim of the FPCA was to test a *crowdsourcing* approach to collect, quality check, structure and make easily accessible in real-time data on food prices at different stages of the food chain from voluntary data contributions of citizens of varying knowledge, heterogeneity and number, by using a smartphone app during their routine visits to the market. The improved internet connectivity and increasing degree of smartphone adoption offered new possibilities for data collection compared to previous initiatives.

Previous work done at JRC-D4 on innovative data collection methods was (i) a pilot for data collection on food prices from selected markets in 54 African, run in cooperation with the African Development Bank (AfDB) (2014 – 2015) (ii) an expert workshop in Brussels (2015) and a (iii) methodological study (Zeug et al. 2017). The main conclusions from previous work were that (1) the strength of crowdsourcing and mobile phone technology is the possibility to engage many citizens to collect a large amount of geo-located data with no a priori selection of markets or enumerators. It became clear that this approach of spontaneous volunteers compared to selected ones and targeted markets needed further testing; (2) crowdsourcing requires new statistical tools to aggregate and create information of quality—i.e. timely and reliable price estimates— from a large amount of data collected without following traditional methodologies for the collection of official data—i.e. without a sample design; and (3) concerning data dissemination, more price data with higher temporal frequency, higher spatial / regional and supply chain stage disaggregation (comparison between prices at different stages / in different regions to analyse market dynamics), as well as multiple entry points, are all beneficial for improving economic analysis and decisions. However, different purposes for the use of data imply different needs in terms of data dissemination. In addition, for the purpose of dissemination, it is important that data are open and accessible.

The FPCA Project had the aim to address these three issues. The results of the FPCA case study in two States (Kano and Katsina) in the north of Nigeria show that the method developed makes it possible to obtain, validate and disseminate in real-time a large amount of geo-located data on food prices. Data are open and accessible in an online data dashboard that can be accessed at the following link:

https://datam.jrc.ec.europa.eu/datam/mashup/FP_NGA/index.html

Three presentations were done to present the final results of the FPCA project. The structure and content of the presentations included three main areas (all presentations can be made available upon request):

- Analysis of the feedback obtained from a survey to stakeholders and potential data users (by Tomaso Ceccarelli, WUR).

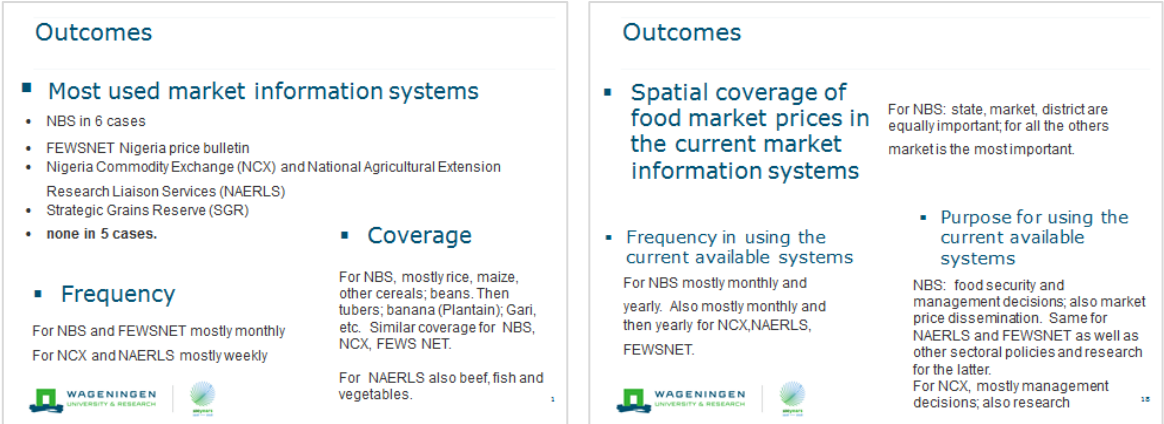
A starting point of the project was to understand the data availability and needs of potential data users and stakeholders in Nigeria. For this purpose a questionnaire was designed and a survey was launched. From the responses to the survey a number of profiles or “personas” (a character representing a particular type of user of the information which can incorporate one or more respondents) have been identified and associated to the most frequently received answers.

The following “personas” were identified:

1. The trader. Includes importers and exporters of agricultural goods
2. The agro-processor
3. The government manager, at FMARD and in the extension services
4. The technical assistance advisor, operating in development cooperation including bilateral and multilateral organisations; also private consultants are included
5. The researcher, which includes data analysts and researchers from academia.

The following two slides (Figure 2) summarize the main outcomes.

Figure 2. Main outcomes from the stakeholders’ survey.



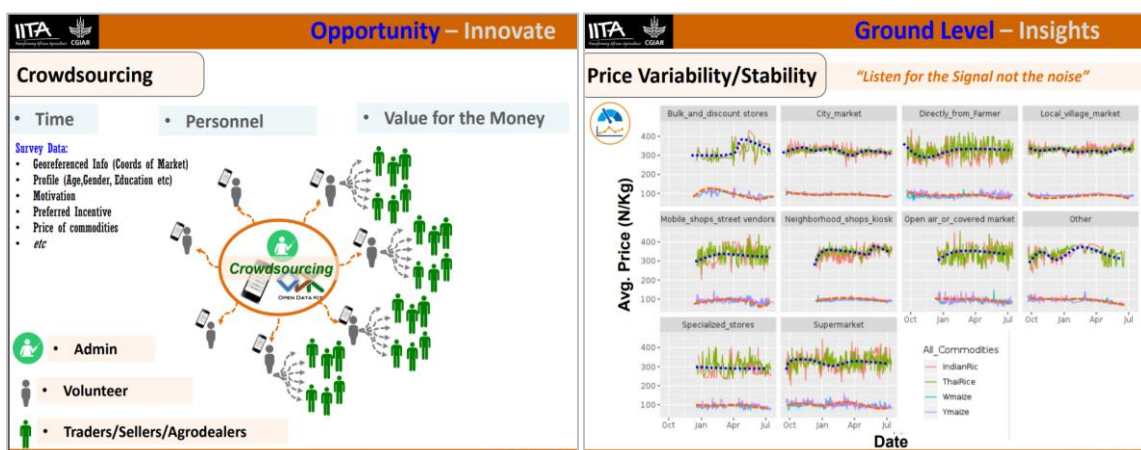
Source: Presentation by Tomaso Ceccarelli, EU Delegation, Abuja, Sep 2019.

— Implementation of the data collection methodology (by Julius Adewopo, IITA)

The methodology for data collection was thoroughly explained, including the means for making awareness and engaging participants, the incentive scheme consisting of a mix of monetary rewards and behavioural tools, the smartphone app and the data platform. Further, the commodity selection and the list of commonly used packaging units were explained. Finally, an overview of the collected data on food prices, geographic distribution, frequency and trends was provided.

The following two slides (Figure 3) reflect the opportunity to innovate (left) and some data insights on price variability and stability by comparing two imported commodities (Indian and Thailand rice) with two locally produced commodities (maize yellow and white) (right).

Figure 3. Crowdsourcing as an opportunity to innovate (left) and ground data insights (right).



Source: Presentation by Julius Adewopo, EU Delegation, Abuja, Sep 2019.

— System sustainability, data validation and dissemination tool (by Gloria Solano-Hermosilla, JRC)

Crowdsourcing through timeliness, openness and empowerment of citizens may contribute to better private but also better public decision-making. Digital participation platforms are considered important tools for enhancing the engagement of citizens and the responsiveness of governments. Yet, collecting a lot of data does not necessarily translate into having more information usable to produce better knowledge and better decisions. Before including a large amount of raw crowdsourced data of an a priori unknown quality in any kind of analysis or decision-making process appropriate steps must be taken to ensure their quality. A second major concern is how to assure that individuals feed information into the system on a voluntary basis. The presentation offered some important results on the efficacy of using behavioural tools ('nudges') (Sunstein 2014), such as 'descriptive social norms' (based on what others participants do) (Demarque et al. 2015) and 'information disclosure' (Loewenstein, Sunstein, and Golman 2014), for enhancing citizen participation and hinted at the potential impacts on market actors of increased market transparency through the crowdsourced data.

Further, the analysis and process to quality of a large amount of citizen-driven data can be very time-consuming, which may prevent from its use in sound decision-making. To address the concerns about data quality and data processing time the presentation described the automated quality procedure implemented during the FPCA project consisting in a set of algorithms fully developed in R code (Arbia et al. 2018) for:

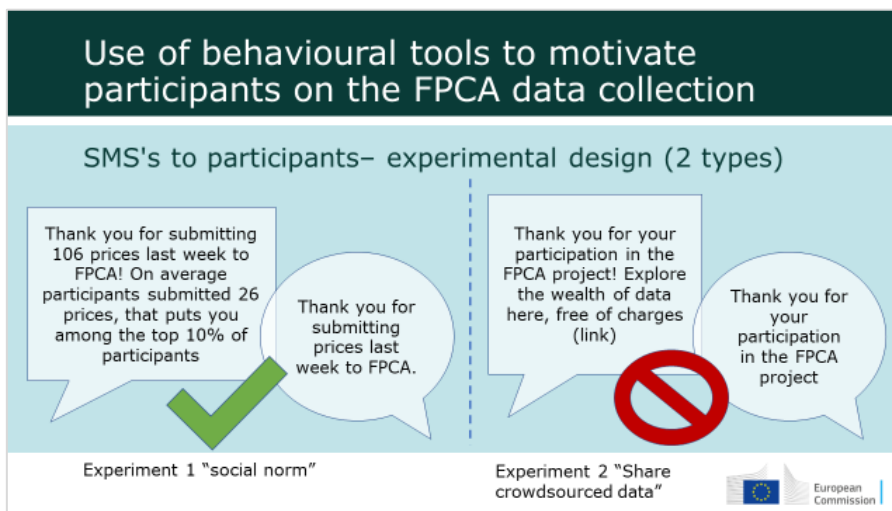
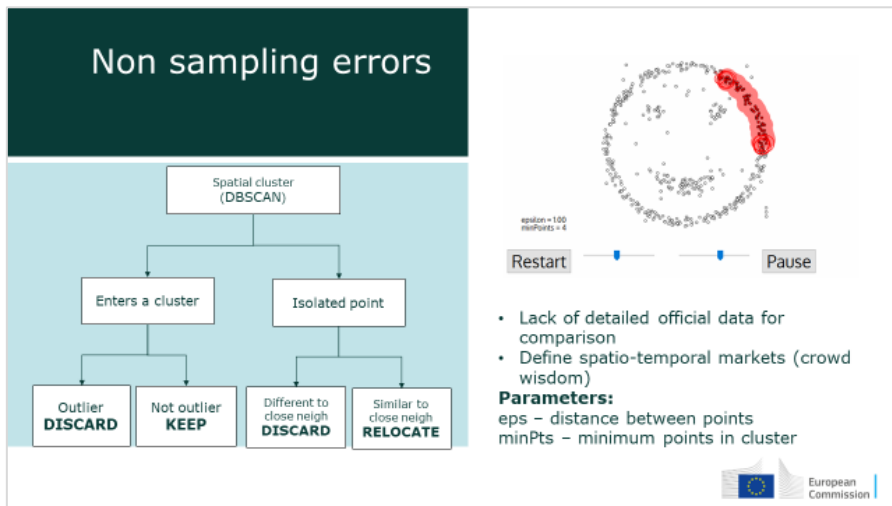
- data retrieval from the digital platform,
- data editing and quality check
- data aggregation into reliable price estimates at the local and regional level that are accessible for the public through the open data online indicator dashboard.

The proposed methodology aims to increase timeliness, accuracy and reliability, accessibility and at the same time ensure data consistency in order to enhance the usability for the task at hand. A set of quality indicators accompany the methodology that can help to increase trust.

Figure 4 (above) shows a piece of the quality procedure; in particular, it presents the data validation strategy that ends with the acceptance or refusal of data points. Figure 4 (below) shows the description of the experimental approach and results of the use of behavioural tools to enhance participation.

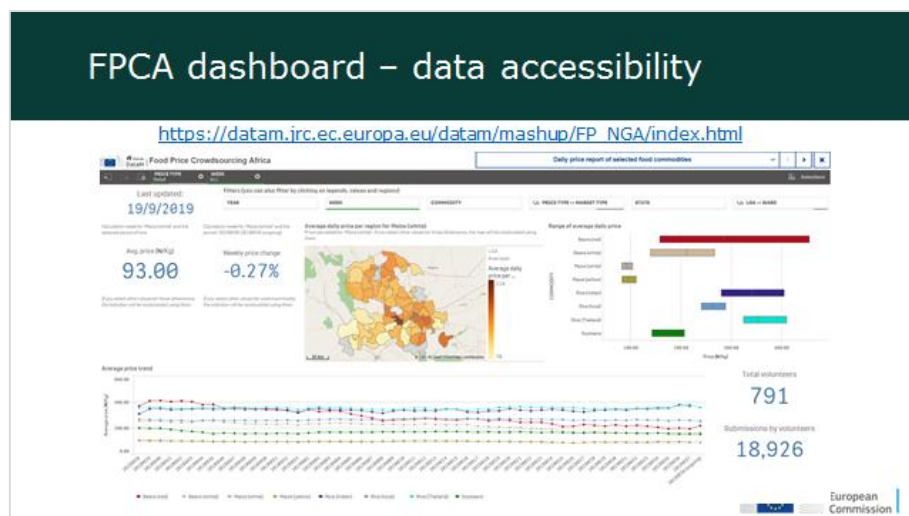
Figure 5 shows a screenshot of the dashboard of indicators of prices levels, changes and trends.

Figure 4. Data validation strategy (above) and behavioural tools (below).



Source: Presentation by Gloria Solano-Hermosilla, EU Delegation, Abuja, Sep 2019.

Figure 5. FPCA dashboard of indicators.



Source: <https://datam.jrc.ec.europa.eu/>

2.3 WORKSHOP DISCUSSION

Following the presentations the methodology and results were discussed and valuable feedback was provided.

Both the presentation of the agro-economic and policy research activities conducted at JRC.D4 Unit for Africa, including PANAP, and the results of the FPCA project were taken with interest. The following is the feedback received on the FPCA project from the different stakeholders:

2.3.1 Data output

- The representative of the Ministry of Agriculture and Rural Development (FMARD) stressed the importance of this type of price data tools to support policy decisions (design and assessment).
- In addition, it was suggested that this type of data tool could help farmers in their commercial decisions (e.g. trade from surplus to deficit areas), although the fragmentation of the market in Nigeria could still difficult the movement of commodities across the country. Additional data on transport and other input costs were mentioned as potential elements to enhance the tool for improved decision making.
- The EU Delegation indicated their readiness to partner on this type of approach to support (or include in) their next wave of investment portfolio within the high priority regions on northern Nigeria, based on their focus on profitability/economic outcomes among farming communities vis-à-vis inputs/labour.
- FEWS NET Nigeria, organisation that monitors staple food and fuel price data on a number of markets in Nigeria in cooperation with the World Food Programme (WFP), shared their document on best practices for data collection and management and pointed to the importance of the correct management of unit conversion in different markets. He stressed that they would welcome more detailed (spatio-temporal) information on price developments for their analysis and monthly bulleting with regard the assessment of food security and welfare of citizens and support to policy formulation and assessment.
- Calibration with official data can be useful, even if only available in lower frequency and for similar but not identical commodities.
- The EU Delegation expressed interest (in the debriefing) in such a price monitoring tool to assess, for instance, the effectiveness of cash support provided to households to reduce food insecurity as compared to in-kind support.

2.3.2 Online dashboard

- The potential of the dashboard to monitor food prices in real time was welcomed and understood, although the internet connectivity was not good enough to show the full functionality of this online tool. This is one important takeaway of the meeting providing insight into the difficulties that online dashboard users may encounter in Nigeria.
- The data feedback to data users should act as the main motivation for the voluntary data contribution and for that purpose a better integration of the data dissemination and data submission tool could add value to the FPCA tool.

2.3.3 Methodology

- Several discussions took place around the sustainability of such a data collection system based on voluntary contributions. Whereas a financial reward seems indispensable at least at the beginning, it is the use of data that should be the main motivation for participating.
- Interest was expressed with regard to receiving the technical report containing the full description of the data collection approach, the quality methodology and the online dashboard.

3 Conclusions

- The FPCA has proved to be able to obtain, process, validate and disseminate in real-time a large amount of geo-located and validated data on food prices submitted by citizens in its case study in two States in the north of Nigeria, Kano and Katsina (accessible at https://datam.jrc.ec.europa.eu/datam/mashup/FP_NGA/index.html).
- Feedback to participants (on their performance and on final citizen-generated data) through an online dissemination tool (the dashboard) is considered of particular importance.
- This type of tool is seen as useful for different purposes:
 - Providing real-time data on prices can help farmers in their commercial decisions (e.g. trade from surplus to deficit areas). Additional types of data such as transport and inputs costs have the potential to enhance the tool for better informed decision making.
 - Supporting decisions (design and assessment) of governments and other organizations. For example, it could help to assess the effectiveness of cash support provided to households to reduce food insecurity as compared to in-kind support.
- Scalability and expandability of the methodology (data collection approach, quality methodology and dissemination dashboard) to other regions and other type of data is possible and was considered of great interest for food price monitoring to support market and policy decisions.
- There is still a need for further discussion as regards the integration of innovative data collection methods as a complementary source of information in institutions / organizations that collect data with traditional methods.

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List of abbreviations and definitions

ABU	Ahmadu Bello University
CDA	Centre for Dryland Agriculture
EC	European Commission
FEWS NET	Famine Early Warning System Network
FMARD	Federal Ministry of Agriculture and Rural Development
FPCA	Food Price Crowdsourcing Africa
IITA	International Institute of Tropical Agriculture
JRC	Joint Research Centre
NAERLS	National Agricultural Extension and Research Liaison Services
WUR	Wageningen University and Research

List of figures

Figure 1. Micro and Macro model based analyses, country cases studies 2019. 6

Figure 2. Main outcomes from the stakeholders' survey..... 7

Figure 3. Crowdsourcing as an opportunity to innovate (left) and ground data insights (right). 8

Figure 4. Data validation strategy (above) and behavioural tools (below). 9

Figure 5. FPCA dashboard of indicators. 9

List of tables

Table 1. List of workshop participants16

Annexes

Annex 1. Venue and List of Participants

Venue

Nigeria, Abuja – EU Delegation premises

Date and time

24/09/2019 - @10:00

List of Participants

Table 1. List of workshop participants

No.	Name	Organization	Email
1	Frank Isioma Okafor	Project Manager External Relations, EU Delegation Abuja, Nigeria	Frank-Isioma.OKAFOR@ec.europa.eu
2	Dr. Murtala M. Badamasi	Centre for Dryland Agriculture (CDA), Bayero University, Kano (BUK)	mmbadamasi.geog@buk.edu.ng
3	Dr. Makama S. Aliyu	National Agricultural Extension and Research Liaison Services (NAERLS), Ahmadu Bello University (ABU), Zaria of the Federal Ministry of Agriculture and Rural Development (FMARD)	makama@naerls.gov.ng
4	Stephan von Cramon	University of Göttingen, Germany	scramon@qwdg.de
5	Isa Mainu	Famine Early Warning System Network (FEWS NET), National Technical Manager for Nigeria	imainu@fews.net
6	Olutayo Oyawale	Makvid Technology Services LTD	tayo@makvid.com.ng
7	Sergio Gomez y Paloma	European Commission, Joint Research Centre (EC-JRC)	Sergio.GOMEZ-Y-PALOMA@ec.europa.eu
8	Giampiero Genovese	European Commission, Joint Research Centre (EC-JRC)	Giampiero.GENOVESE@ec.europa.eu
9	Daniel Mekonnen	Wageningen University & Research (WUR), Netherlands	Daniel.mekonnen@wur.nl
10	Julius Adewopo	International Institute for Tropical Agriculture (IITA)	J.Adewopo@cqiir.org
11	Buba B. Godobe	Federal Ministry of Agriculture and Rural Development (FMARD), Abuja, Nigeria	bbgodobe@gmail.com
12	Gloria Solano	European Commission, Joint	Gloria.SOLANO-

No.	Name	Organization	Email
	Hermosilla	Research Centre (EC-JRC)	HERMOSILLA@ec.europa.eu
13	Fabio Micale (VC)	European Commission, Joint Research Centre (EC-JRC)	Fabio.MICALE@ec.europa.eu
14	Tomaso Ceccarelli (VC)	Wageningen University & Research (WUR), Netherlands	tomaso.ceccarelli@wur.nl
15	Montse Pantaleoni	Team Leader, Health, Nutrition and Resilience, EU Delegation Abuja, Nigeria	montse.pantaleoni@eeas.europa.eu ; Montserrat.PANTALEONI-GIRALT@ec.europa.eu
16	Kurt Cornelis (only to debriefing)	Minister Counsellor, Head of Co-operation, EU Delegation, Abuja, Nigeria	kurt.cornelis@eeas.europa.eu ;

Annex 2. Workshop Agenda

Food Price crowdsourcing in Africa (FPCA)

EU Delegation, Abuja (Nigeria) 24 September 2019

10:00-10:10 Welcome at the EU Delegation

10:10-10:30 The DG.JRC activities in Africa: the PRICE project — Mr. Giampiero Genovese, HoU Economics of Agriculture Unit, European Commission - Joint Research Centre

10:30-11:00 Stakeholders' Survey — Mr. Tomaso Ceccarelli, Wageningen University and Research

11:00-11:30 Crowdsourcing in practice — Mr. Julius Adewopo, International Institute for Tropical Agriculture (IITA)

11:30-12:00 Data validation, indicators dashboard and results — Mrs Gloria Solano-Hermosilla, European Commission - Joint Research Centre

12:00-12:30 Conclusions and discussion

The European Commission's science and knowledge service

Joint Research Centre

JRC Mission

As the science and knowledge service of the European Commission, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle.



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