

Using Mobile Technologies for the 2018 Algerian Census and the Implementation of the Code of Practice

Tarik BOUREZGUE

Office for National Statistics, Algiers, Algeria
bourezgue@ons.dz, tarikbourezgue@gmail.com

Abstract

Nowadays, to achieve progress in this era of data revolution, it is necessary to make use of the rapid emergence of new technologies. This is, once more, a challenge for official statistics. Algeria is planning to carry out its sixth General Census of Population and Housing (RGPH) in 2018. ONS intends to use, for the first time, tablets (equipped with mobile chips) as a collection tool instead of the paper questionnaire. So we need a system that segregates data as and when data is entered. Another challenge in this method is the accuracy of data entered: the mobile applications environment has a multitude of particularities. This requires an adaptable approach for performance analysis in terms of quality management. Based on the context described above, the development of our quality approach relies essentially on the capitalization of cooperative work with Eurostat on the principles of the European Quality Assurance Framework for official statistics and the implementation of the Code of Practice. In driving the process step by step, to optimize its management, our paper will address the issues related to the implementation of the Code of Practice, in using mobile technologies, so as to present the census data meticulously and identify the relevant features (e.g. interaction time, volume of provided information, error management, data security, transaction security, ...) and which properties should be highlighted for ensuring usability in a practical environment.

Keywords: Census Mobile Application, Quality Management, Code of Practice.

1. Introduction

The rapid emergence of new technologies brings about some concern. What the world needs now is not the aptitude in the production of new technologies but the capacity of understanding the impact of technology on society and individuals as well as the capability to implement ICT as to positively impact human development. This is, once more, a challenge for statistics. We need to produce statistics with a certain depth of understanding

of the environment and the difference between technological development and human development.

The main feature of the first 2011 Economic Census RE was the use, for the first time, of the optical scanning technology for the exploitation of questionnaires. Moreover and through The Office for National Statistics (ONS), Algeria is planning to carry out its sixth General Census of Population and Housing (RGPH) in 2018. As part of the framework of the United Nations recommendations for the 2020 round of censuses of population and housing, advocating greater use of Information and Communication Technology (ICT) in statistical operations, Algeria's plans to use for the first time, tablets as a collection tool instead of the paper questionnaire, namely tablets equipped with mobile chips.

The usual census data collection system involves an enumerator, who collects the census data manually on a paper questionnaire. So in today's world of data communication, a mobile tool for a portable system becomes important to access and update a database.

Innovative technology helps us to improve the existing system. So, we thought the finest solution for this handicap would be using a tablet. We are in the process of designing and developing an ICT solution using mobile technology, mainly 3G, as a communication tool. Our idea is to implement this by providing a tablet containing the census application to every authorized enumerator through which they can collect census data and update the collected data to the census database. A second and important module of the solution is the supervision and monitoring platform. We are motivated by the fact that "*Technology*" allows statistical processes to meet important society requirements and expectations, namely:

- ✓ Timeliness of data;
- ✓ Accuracy;
- ✓ Relevance;

so, as to achieve "*Quality*" improvements as it is recommended by all international guidelines on the subject.

2. Problem description

2.1 Census preparation

In the RGPH census preparation, generally these steps are to be followed:

- Identifying the houses i.e., dwelling places and places that are usually used for living. This is the first step.
- Then the municipal delegate prepares the construction list. Once the list is prepared, he prepares sketches of blocks of houses that give the primary information about the type of houses and facilities that are being used by the population in that area.

2.2 Census execution

With this information in hand census enumerators go to the census houses and collect data. The collected data would be used for analysis of the population in various aspects like finding population ratio, employment reports, and facilities available to people etc.

In the traditional method, everything is done on paper. An authorized enumerator visits every single house and establishment and collects the complete information. This system has dual work of collecting the data on paper and then feeding it in computer. This also takes a vast amount of manpower into it. The information is subjected to change as it is taken as a written work on a paper.

3. Proposed solution

For RGPH 2018, 50,000 agents will be recruited and trained as enumerators and 13,000 agents will be recruited and trained as controllers, in addition to the municipal delegates used in the preparation.

3.1 The enumerator

Each enumerator will be equipped with a tablet for data entry and a paper district notebook that is provided by the municipal delegate (The first five district notebook columns are already filled by the municipal delegate, the remaining columns will be filled in throughout the execution of the census).

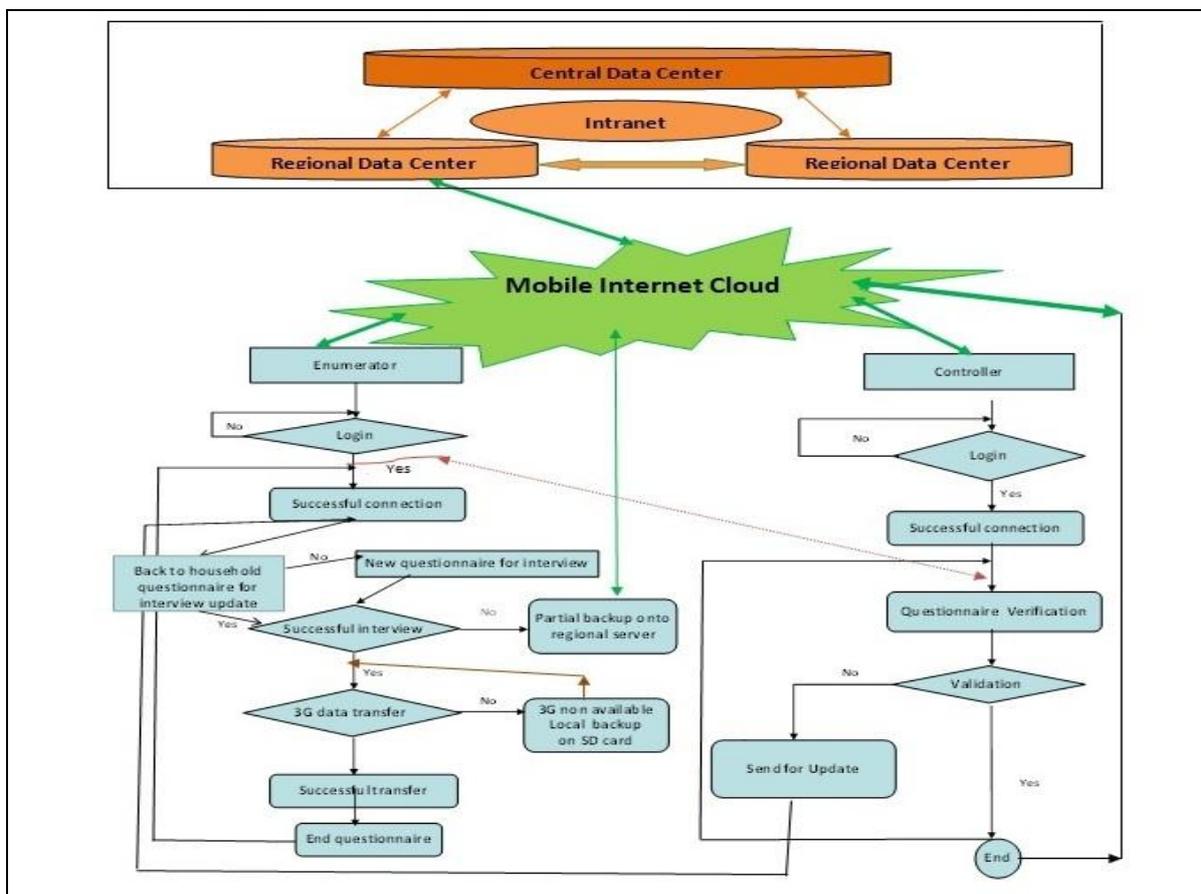
3.2 The controller

Each controller is also equipped with a Notebook tablet (for an overall vision of the questionnaire) to verify the quality of work of the five enumerators, under his supervision, and have a status of the collection in the field and daily statistics on households surveyed and enumerator performance.

3.3 Authentication of enumerators and controllers

For the purposes of authentication of enumerators and controllers, login lists (username and password) will be defined following the use of mobile chips' PINs affected by the mobile operator: the login could be defined as the concatenation of the wilaya, municipality and district codes (given at the conclusion of cartographic updates) , which is an exact identification of the enumerator.

The flow of information is as follows:



3.4 Technical requirements

In order to insure that the process of data collection goes as planned, a few technical elements need to be in place such as:

- A relational database management system such as SQL Server is needed to administer and manage the RGPH database to guarantee quality, continuity and confidentiality of information.
- A global database at the central site to store and retrieve real-time data entirety.
- An implementation of database levels at regional collection sites.
- Software installed at regional levels for supervision, control and monitoring of the implementation on the field.
- Entry applications for entering data collected on tablets as well as the transcript of paper questionnaires¹.
- Establishment of specialized interconnection links between the central site (headquarters) and various regional sites.

3.5 Information flow estimates

We base our preliminary estimates on what follows:

- i. 50 000 enumerators spread over the four regional annexes.
- ii. 150 questionnaires per enumerator during the period of execution (average of 10 daily).

As per our benchmark, the size of a questionnaire is about few Kilobytes (we assume 50 Ko per questionnaire). As bandwidth is the rate of a connection expressed in bits per second, we can estimate that we will face a rate of transfer of 100Ko/s and the necessary bandwidth should be around 2Mo.

¹ As per international recommendations, 10% of the questionnaires will be on paper as to take charge of the specific cases on the field.

4. Quality dimension: The implementation of the code of practice

The general perception of census quality is often restricted to the quality of the census data outputs with some consideration of the impact of major census design aspects. However, there is more to achieving quality census data than ‘merely’ quality assuring the data processing operation and the final results. The quality of the census outputs is dependent on the quality of the processes that lead up to it.

The census poses unique quality management issues when compared to usual surveys, especially in relation to:

1. How to achieve the target level of quality. Most surveys, designed and administered according to standard practice, involve quality improvement through enhancement between short rounds. While, a census is carried out between long cycles, and;
2. How to manage the scale of a census. Surveys are likely to be designed and conducted according to straightforward procedures by statisticians who do it at every turn. The 2018 Algeria Census will be very costly and will include tens of thousands of field staff, working with multiple partners.

A project of this scale and complexity increases the number of actors that can influence the quality of the final census outputs when compared to a long-established survey. To achieve a desired level of census data quality a global view of census quality must be in place – one which is much wider in scope and scale than that of a traditional survey. The 2018 Algeria Census Quality Strategy sets out an approach, inspired by our cooperative work with Eurostat on the principles of the European Quality Assurance Framework for official statistics and the implementation of the Code of Practice, to achieve this through considering the standard dimensions of quality: project quality management, design quality, operational quality management, quality assurance, and quality reporting. The 2018 Census strategy in implementing The Code of practice for the ENP South countries, by principle, is as follows:

- 1-PROFESSIONAL INDEPENDENCE: General scope and part of ONS’ quality commitment.
- 2-MANDATE FOR DATA COLLECTION: General scope and part of ONS’ quality commitment.

3-ADEQUACY OF RESOURCES: To watch specifically for the 2018 census and is subsequent to budget impact study and approval.

4-COMMITMENT TO QUALITY: General scope and part of ONS' quality commitment.

5-STATISTICAL CONFIDENTIALITY: To watch specifically for the 2018 census and the national mobile operator is committed to statistical law precepts on confidentiality.

6-IMPARTIALITY AND OBJECTIVITY: General scope and part of ONS' quality commitment.

7-SOUND METHODOLOGY: To watch specifically for the 2018 census and methodological studies are done with the different partners (institutional, territorial authorities, national telecommunications operators).

8-APPROPRIATE STATISTICAL PROCEDURES: To watch specifically for the 2018 census and internal technical work sessions, international benchmarking and exchange with other NSO's experiences are conducted.

9-NON-EXCESSIVE BURDEN ON RESPONDENTS: General scope and part of ONS' quality commitment.

10-COST EFFECTIVENESS: General scope and part of ONS' quality commitment.

11-RELEVANCE: General scope and part of ONS' quality commitment.

12-ACCURACY AND RELIABILITY: To watch specifically for the 2018 census and internal technical work sessions, international benchmarking and exchange with other NSO's experiences are conducted.

13-TIMELINESS AND PUNCTUALITY : To watch specifically for the 2018 census and internal technical work sessions, international benchmarking and exchange with other NSO's experiences are conducted.

14-COHERENCE AND COMPARABILITY: General scope and part of ONS' quality commitment.

15-ACCESSIBILITY AND CLARITY: To watch specifically for the 2018 census and internal technical work sessions, international benchmarking and exchange with other NSO's experiences are conducted.

16-COORDINATION AND COOPERATION: General scope and part of ONS' quality commitment.

5. Challenges and perspectives

As we are well aware of the main risks and challenges in implementing such a solution, we always keep in mind the fact not underestimate how much work it takes to properly implement a census, even with the use of the latest technology (IT or ICT). Our continuous international benchmarking has helped identify the following challenges:

- Consideration should be given to how and where the data are held on devices, any intermediate steps and the master database.
- Selection and training of enumerators and controllers: Proper selection and thorough training is crucial for the success of the program. The training should cover interviewing skills, types of questions, administration of the paper questionnaire (as recommended for an overall view), and proper use and handling of tablets, Internet and mobile protocols for data flows.
- Maintaining data security: Data security is a prime issue; daily backup of the data should be done properly.
- Immediate feedback on data quality: Regular, even immediate, feedback should help to resolve technology and census-related problems in a timely fashion, and will undoubtedly result in improved data quality.
- Adequate preparation: Sufficient time must be allocated to designing and pretesting of the electronic questionnaire and to overall testing and debugging of the software, particularly for questionnaires in multiple languages and in a non-Latin script, as it is the case for Arabic in Algeria.

The use of tablets and mobile technology to administer a census in Algeria has the potential to improve data quality and reduce data treatment time. These benefits outweigh the manageable challenges mentioned above, such as battery autonomy, storage and transport of the tablet. Use of technology holds great promise for improving data availability and quality, even in a context with limited infrastructure and difficult terrain. Because use and evolution of such technology is growing rapidly, it may be helpful to carry out, post census, further

detailed research, including cost-benefit analysis, to precisely report the time, cost, and human resource savings and improved data quality through the use of technology.

6. Conclusion

Thus, our paper comforts us in knowing that this solution will make it possible for ONS to enumerate and present the census data meticulously with minimum hardship. In a vast country like Algeria, we need a system like this so that we can minimize risks and yet have an accurate data. This year, preparations are being made for the taking of our 6th census (RGPH2018), the new methodology like the use of tablets and mobile transfer of data will be studied and tested thoroughly. For the upcoming 2018 population and housing census (RGPH2018), we are aware of difficulties that may arise on the field (based on international benchmarking) and the need for adequate training and preparation. A key ingredient also, is our ongoing consultation with the different users and producers of statistical information as well as our national technology partners, namely mobile operators, internet providers and IT manufacturers. Our paper, if not more, will be very helpful for maintaining our vision and plan for the 2018 census.

Acknowledgements

This work was done in collaboration and with valuable input from the technical departments at ONS and unconditional support from our Director General Mounir Khaled Berrah; with a special mention to Zineb Hentabli, Amel Lakehal, Soraya Saadi, Samia Salmi and Hamid Zidouni.

We would also like to thank the colleagues from UN Economic Commission for Africa; and, the colleagues from the ENP South countries quality working group for their valuable input and that made this work possible.

References

Arthur Dan (2013), Overview of Data Collection using Mobile Devices, LSHIM seminar.

European Statistics Code of Practice (2011), revised edition.

IBGE (2010), Brazil census reports.

Olmsted Erica L. (2004), Usability Study on the use Handheld Devices to Collect Census Data, Professional Communication Conference.

Paudel Deepak, Ahmed Marie, Pradhan Anjushree and Lal Dangold Rajendra (2013), Successful use of tablet personal computers and wireless technologies for the 2011 Nepal Demographic and Health Survey, *Global Health Sci Pract.*, 1(2), pp. 277-284.

Statistics Code of Practice for the European Neighbourhood South countries (2015).

Tadashi Ooishi, Takashi Nanaumi, Yoshiyuki Takei and Akihito Yamauci (1998), Automated Census System for Densely Inhabited Districts, Proceedings, 18th Annual ESRI International User Conference.

UNICEF Design workshop (2014), Use of PDAs in Surveys/Census,.

United Nations Statistical Commission (2012), Report of the United States of America on the 2010 World Programme on Population and Housing Censuses, Document N°E/CN.3/2012/2.

United Nations Statistics Division (2014), Document N°E/CN.3/2014/8.

Vijayaraj A. and Dinesh Kumar P. (2010), Design and Implementation of Census Data Collection System using PDA, *International Journal of Computer Applications*, 9, pp. 28-32.

Yacob Zewoldi (2011), Seminar on New Technologies in Population and Housing Censuses: Country experiences, United Nations Statistics Division, Side event of the 42nd session of the, Statistical Commission, New York.