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Census Mapping Technique is the Best Practice
To Support Egypt's
Population, Housing and Establishments 2016 Census

Eng.Nahla Seddik Mohamed

GIS Unit Director

GIS Department, CAPMAS, Egypt

Pres_capmas@capmas.gov,eg

Summary

Census mapping is used in all census phases including preparing, data collection and dissemination.

It is used in a pre-census practice in terms of updating available maps including administrative boundaries, urban and rural areas maps and delineating the country into enumeration areas (EAs) and supervisory areas (SAs).

The census mapping are also useful during data collection stage in order to eliminate overlapping or omission of enumeration areas.

It also used in enhancing dissemination of the census results using spatial analysis techniques for producing statistical thematic maps.

This report summarizes practical implementation of the census mapping technique for the preparation of Egypt's Population, Housing and Establishments 2016 Census.

It reviews the lessons learned from using GIS in 2006 Census that include difficulties and problems faced us during implementation and how to overcome of those problems in the implementation of 2016 census.

Also, it highlights the success of the approach to use the enumeration areas and supervisory areas in the processing of the first pre-test and pilot project for census 2016.

Finally the report represents the challenges and gives insight of the future plan to ensure successful implementation of the 2016 census.

Acknowledgements

I wish to honor and acknowledge the contributions of all GIS Department members (cartographers, surveyors, quality control engineers, developers).

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Abbreviation and Acronyms:

GIS	Geographic Information System
EAs	Enumeration Areas
SAs	Supervisory Areas
GPS	Global Positioning System

1. Introduction

Census plays an essential role in all elements of the national statistical system. The population and housing censuses are the main sources of data for effective development planning and objective decision –making.

The use of new technologies and approaches (GIS and digital mapping) facilitate all phases of census process for generating reliable statistics on population and housing.

The main advantages of using census mapping techniques are the following:

- Maps ensure consistency and facilitate census operations (pre-enumeration phase).
- Maps support data collection and can help monitor census activities (during –enumeration).
- Maps make it easier to present, analysis and dissemination census result (post-enumeration).

2. Institutional Implementation of a Census Mapping Techniques program.

Developing a formal program for census mapping includes the following activities:

2.1 Establishing CAPMAS GIS Branches in all provinces of Egypt

The mapping project teams will be responsible for specifying the requirements of the Census for mapping products and coordinating arrangements with the provider of Mapping Services.

The implementation of census mapping will be decentralized. CAPMAS has main GIS unit in headquarter in Cairo and eight GIS offices in eight governorates.

Currently under processing CAPMAS will complete the remaining governorates of Egypt with GIS offices.

The following map describes the locations of GIS branches already exist and GIS branches are Planned to be established.

Fig (1) : Source : http://goo.gl/maps/pnmS3

GIS branches already exist

Planned to be established

2.2 Developing a time table.

Choosing the time of mapping activities is very important in census planning operation. The mapping program must starts early in the census cycle to allow sufficient time to produce full national coverage of maps before the enumeration phase and before training of surveyors. The mapping program started three years early. It started at 1\1\2013 and will be end at 31\12\2015.

2.3 The status of basic maps and digital geographic data.

In Census 2016, we'll use digital large scale maps for the whole coverage of all urban and rural areas of Egypt. Therefore, the following processes are taken into consideration:

- List and code areas for which maps are needed.
- Make and maintain inventory of existing resource materials.
- Prepare priority list of areas for compiling maps.
- Prepare and verify map compilation packages.
- Digital data conversion (digitizing, scanning, editing,..).
- Review and verify digital base maps—print large format maps for quality control.

2.4 Staff responsibilities.

In the field, the tasks of the census mapping teams are the following:

- To update the base maps including all administrative boundaries and names, as well as plotting area boundaries.

- To geo-locate socio-economic infrastructure such as schools, mosques, churches, factories, hospitals, gardens and land marks.

- To carry out listing of households/dwelling units and EAs based on the updated maps.

This data is considered as the primary estimation of population in EAs.

2.5 Training requirements.

Census mapping training is different from regular cartographic activities. The mapping field staffs have to undergo training on mapping procedures. In Census 2016, we'll use GPS to obtain point feature locations, then the mapping staff needs to be trained on the procedure for collection and storage these locations.

Also, listing of households/dwellings, collection of coordinates for point feature and finally EA demarcation. Therefore, it is important to divide the staff into teams. A geographical area can be accomplished by a single team. Each team consists of two persons who are responsible for updating area boundaries, one person for listing the households and one person for collecting point features.

2.6 Design criteria for enumeration areas.

The principal objective of EAs delineation is to create EAs have ideal population size. The ideal population size is the number of people that one surveyor can enumerate in the time period scheduled for enumeration.

The procedures to delineate enumeration areas are:

- By dividing the smallest administrative units (districts "Shyakha" in urban and village in rural) to SAs according to the number of units for shyakha or village, each has approximately 1500 units the units are in buildings grouped by blocks.
- Each SA divides into EAs, each EA has around 200 households.

2.7 Mapping activities in the post-enumeration stage.

- Maps play an increasingly important role in the dissemination of information. Maps are produced and effectively used to relate statistical data to the geographical area to which the census results refer. This makes the statistics easier to understand and more readily usable both by expert users and the general public.
- The use of digital mapping can also bring an enormous workload and requires sufficient expertise in the process. Digital maps can be analysed, manipulated and disseminated to suit the requirements of the many users. Digital mapping techniques ensure accessibility of data and geo reference information (relating information to geographic location) for the decision makers.
- The primary purpose of GIS is to provide support for information based decision making. In the context of census cartography, GIS will be used to assemble EA data to facilitate logical planning.
- The quality of geo-information, including maps that are used in the census undertaking, has a major influence on the quality and reliability of census data collected.

3. Lessons Learned from 2006 Census.

3.1 The problems that we faced in Census 2006:

- By using enumerating streets techniques, the supervisor may have to pass through the whole shyakha to cover his streets as shown in the fig (2).

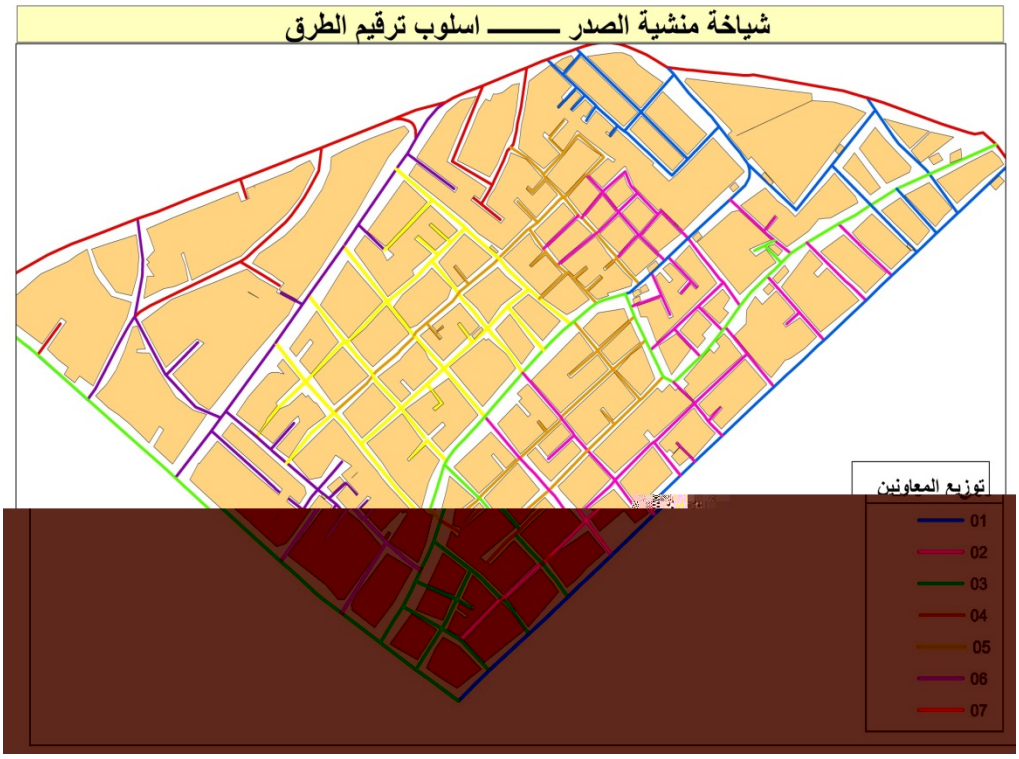

Fig (2): The distribution of supervisors according to enumerate streets.

- The same region may be covered by three supervisors to count the buildings in this region as shown in fig (3).

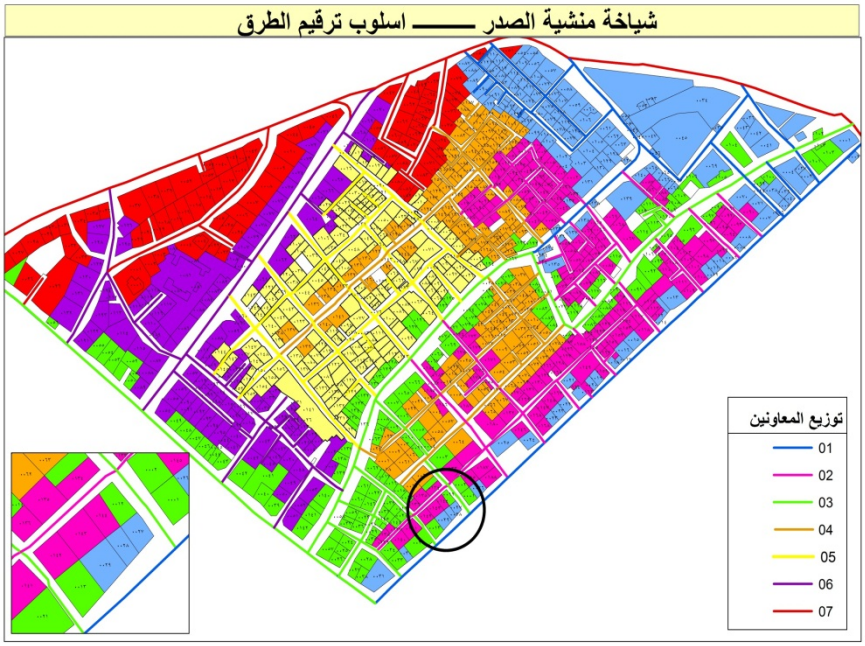

Fig (3): The work regions of supervisors.

3.2 The solution of the above problems.

The solution is using EAs technique in 2016 Census to:

- Facilitate the field work.
- Data Dissemination will be till the SA and EA level not only to the least administrative boundary level (Shyakha).
- The EAs can be used in different surveys not only in the census.

4. The first pre-test and pilot project 2012-2013 for census 2016.

4.1 The time and place of first pre-test.

The time was 9/2012 and the place: Urban Area: “Shyakha Tasea” in Cairo Governorate, Rural Area: Village”23 July” in Qalyobiyya Governorate.

4.2 The preparation of field work stage.

- Updating the administrative boundaries.
- Updating the base maps by using new satellite images.
- Printing the paper maps for field work as shown in fig (1).

Fig (3): “Shyakhat Tasa” –Nasr City Section- Cairo Governorate

4.3 Field Work Stage of Census Mapping Teams.

Achieve the maximum degree of inclusiveness (100% for all buildings, units, establishments, households) by updating maps according to field work and filling the form attached with map and review the administrative boundaries of shyakha or village**.**

The team of maps survey consists of two persons updating area boundaries, one person listing the households and one person collecting point features.

Fig (4):Picture from the field work

4.4 The output of the field work stage.

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التعداد العام للسكان والإسكان والمنشآت ٢٠١٦
التجربة القبلية الأولى

نموذج (١ ت.س ٢٠١٦)

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Fig(5):The form (1TC) after data collection

Fig (6) : The shiakha is divided into (5) SAs according to the number of units for skiakha, each has around 1500 units consists of group of blocks and buildings without natural separators and the form(1TC) is filled with the detailed data of blocks , units and households.

4.5 Data entry and validation stage

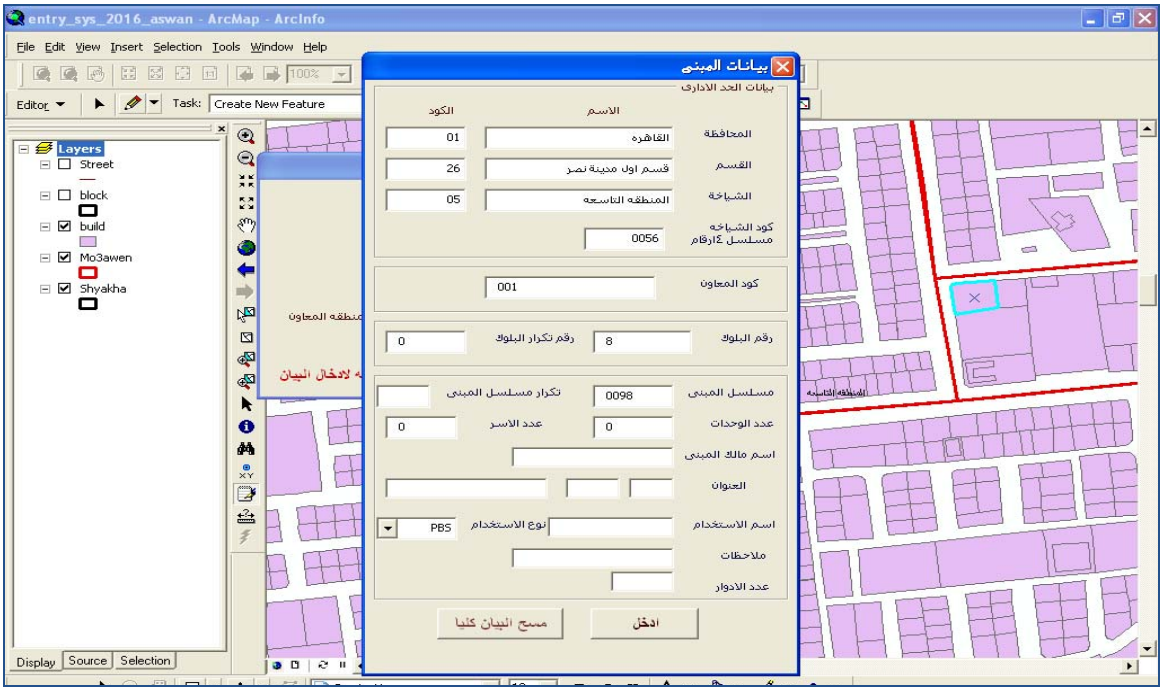

Fig (7): Office work to update the digital maps and data entry of buildings.

4.6 The field work of supervisor stage.

The supervisor received SA map to enumerate the buildings on SA by the same numbers located on the paper maps and also updated the maps.

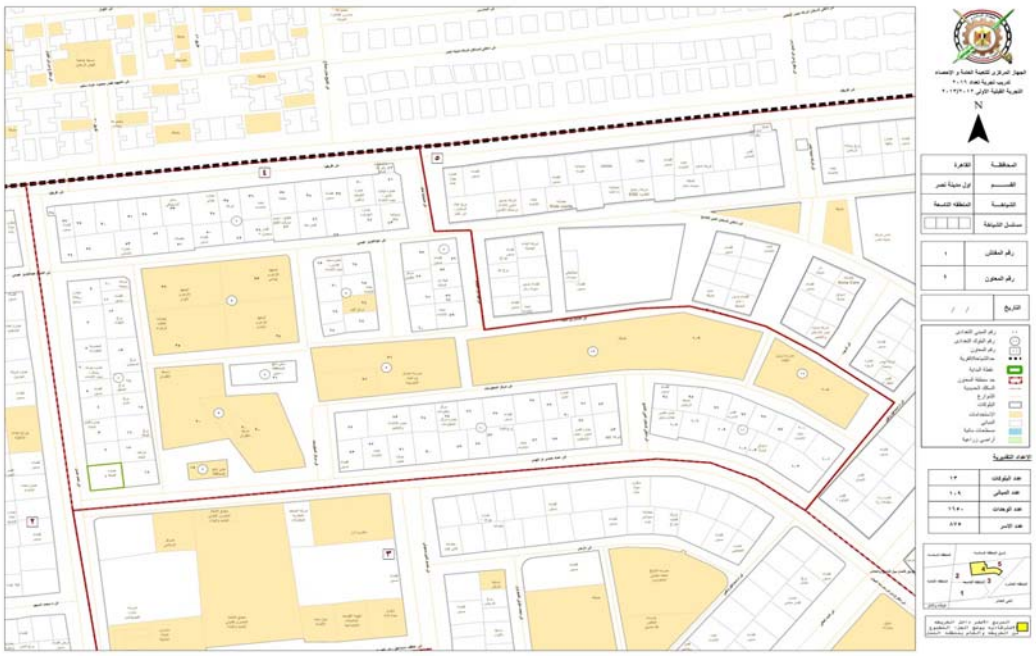

Fig (8): SA Map

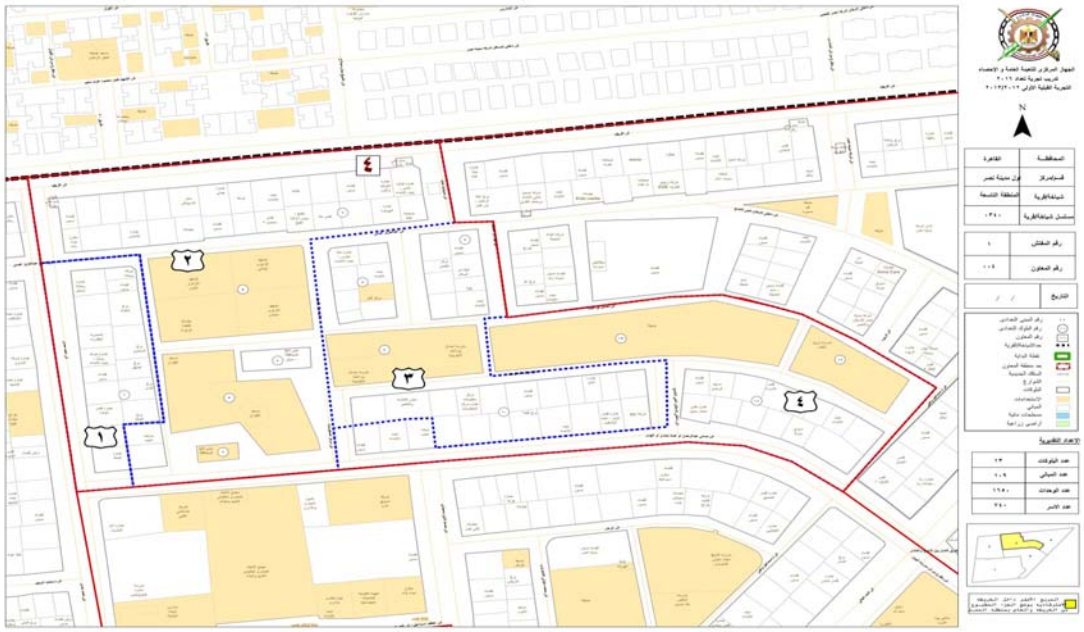

Fig (9): EAs Map

The supervisor divided its SA to EAs, each EA has around 200 households.

4.7 The output from Supervisor stage.

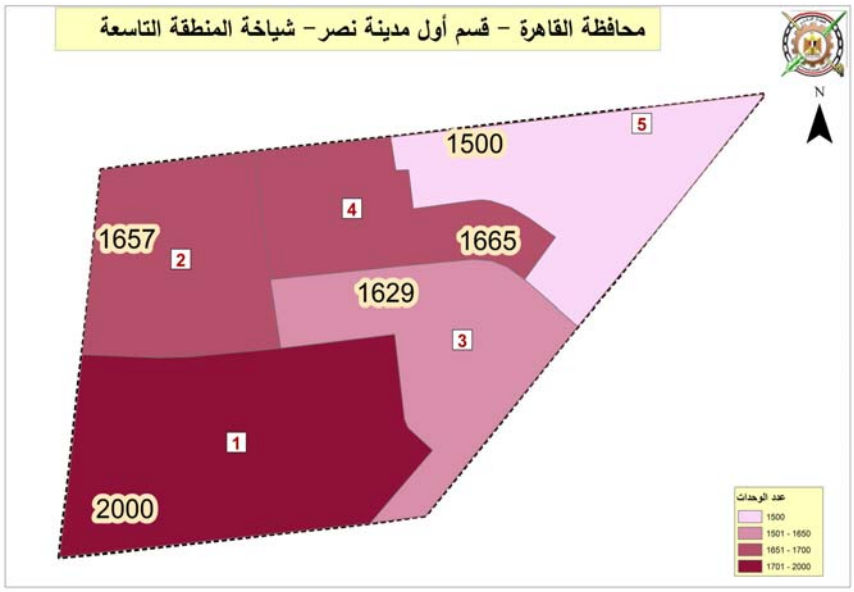

Fig (10): Showing the number of units for SAs.

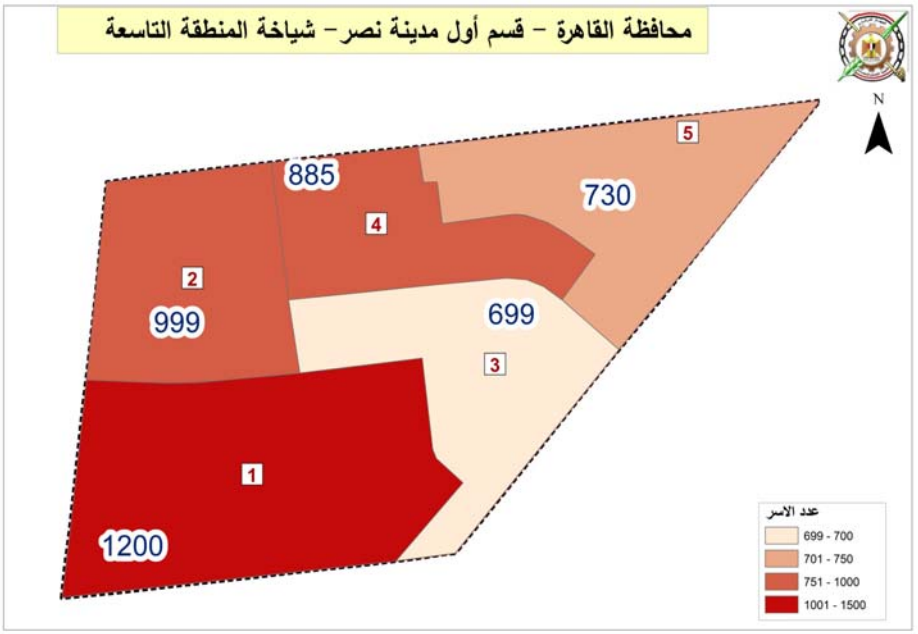

Fig (11):Showing the number of households for SAs.

4.8 The objective of the first pre-test.

- Efficient estimation of the number of EAs based on field work on maps which is more accurate than traditional estimation of numbers of EAs in previous censuses.
- Measuring performance rates of workers, and accurately estimates their numbers, and census mapping teams.
- Measuring the efficiency of timing for the implementation of the first pre-test.
- Measuring the efficiency of the training program for employees.
- Recognizing the obstacles which surveyors may face for establishing procedures to eliminate them in 2016 Census.

5. Challenges and Future Plans.

We could brief challenges as follows:

- Empower human resources to deal with new technologies like GPS and to have sufficing training.
- There are unsecure areas which need special procedures in field work.
- There is continuous urbanization which affects on changes in maps and therefore there is need of updating maps periodically before 2016 census.

Our future plan is to use census mapping in all 3 phases of 2016 census and in most surveys which CAPMAS holds also in dissemination and spatial analysis of CPMAS statistics.

The most important point of 2016 census is that the land of Egypt (urban and rural) will convert to detailed digital maps at the level of SAs and EAs.

This achievement will be facilitate the future censuses and field research.

6. References.

Guide lines and technical references issued by the United Nations in this regard