**The Effect of Using New Technology and Geographic Information System on the Quality of Official Statistics: the Implementation of the General Palestinian**

**Census 2017 as a Case Study**

**Keywords:** GIS, census, official statistics, statistical survey, data quality.

# Introduction

It has been confirmed that one of the most vital requirements necessary for planning and decision making in any field of human endeavour is the quality of information available on its human resources. In this sense, Palestinian Central Bureau of Statistics (PCBS) has always sought to offer the most objective and accurate statistical number relying on the latest techniques and methodologies, in order to be inline with the international recommendations regarding data collection and statistics production.

As Geographic Information System (GIS) technology is used in a wide spectrum of official statistics activities nowadays, from data collection, to statistics compilation, and data dissemination, PCBS is very keen to keep pace with the revolution in GIS technology. PCBS has implemented the third Population, Housing and Establishments Census 2017 using GIS technology in all phases of the census process that improved the overall quality of census activities compared with the last census of 2007. Also, using this technology was of a great benefit in data coverage through the access to many remote areas and buffer zones in Gaza Strip and the West Bank.

The contribution of this paper is twofold. Firstly, it introduces the usage of procedures and methodologies in conducting the census through the technical and field operations in detailed. Also, it shows the main resulting benefits of using GIS applications, arising challenges and obstacles during each phase. Secondly, the paper focuses on the main differences between this census and 2007 census in which traditional techniques (paper-based) has been adopted, and their effect on data quality and coverage.

# Methods

This paper is prepared referring to the data of the actual implementation as well as the documents that summarize each phase of General Population, Housing and Establishment Census 2007 and 2017. On the other hand, various comparisons have been made on coverage and quality indicators between the two censuses.

Also, a review of regional and international experiences in IT – supported census, standard international recommendation together with the UN manual, 3rd Edition are taken into consideration regarding the implementation of censuses using modern technology and GIS.

# Results

For best efficiency, a strict procedures were set up to control data quality in all census stages, including the preparation, Implementation and dissemination stages, in order to achieve the required efficiency and accuracy. The control over data quality in the planning stage is highly significant since next stages would be based on it. Therefore, each stage had the sufficient time and measures that guaranteed high census data quality.

## Data quality of the preparation stage

The quality of the spatial data in Census 2017 is improved using new technologies and GIS depending on electronic applications in updating maps of administrative and statistical borders including all geographical features unlike the previous 2007 census in which geographical elements were updated manually using paper maps.

## Data Quality in the Implementation Stage (Fieldwork Stage)

Entered data during the fieldwork was of better quality since all the applications used were supported with logical checks to allocate errors and send warning messages to supervisors, crew leaders, and enumerators to ensure the accuracy of data collected. Parallel to data collection, the data entered were verified centrally and returned to the field for amendment during data collection.

1. Field teams were prevented from collecting data outside the boundaries of the enumeration areas (smallest statistical level) designated to them to avoid any overlapping.
2. Geographic locations of field teams were audited before entering into the buildings and establishments by saving the geographic coordinates of every building using Global positioning system (GPS) and comparing them to the geographic location registered for the building. Field teams were prevented from completing their work if they exceeded the specified distance.
3. GPS was used for accurate identification of the location of field teams (tracking system).
4. Automated editing databases were activated in the data collection applications regarding census questionnaires to avoid registration of inconsistency in data and to complete all the questions in sequence. Each application does not allow for moving to the next question before responding to the previous one. Also, display and hide questions according to the automated editing databases uploaded on them.
5. Representation of buildings data on the e-map using specific symbology and different colours to enable field teams identify the status of the building (unvisited, incomplete, complete, removed, non-census buildings).
6. post enumeration survey was conducted to cover 4% of the enumeration areas to assess the rate of coverage of individuals and households. Full count was repeated for all households and individuals in the selected enumeration areas. The survey showed that the under coverage rate was 1.7%.

## Data Quality in dissemination stage

Preliminary results of the census were published in March 2018 after full verification of databases to ensure coverage and quality of data and following evaluation during the post-enumeration survey. Furthermore, different indicators were compared against the actual data from previous censuses and surveys.

The final findings was published after completion of databases and comparisons with previous censuses and surveys in both hard and soft copies on the Internet and through computerized statistical reports in addition to geographic publication application and on CD’s and databases with sample of 20% as a public use file (PUF).

# Conclusions

This paper aims to come up with new recommendations regarding the use of GIS technology in future statistical surveys and censuses, in order to achieve better data quality and higher coverage rate.

# References

1. Principles and Recommendations for Population and Housing Censuses, Revision 3, United Nations (New York: United Nations, 2017), para. 3.47
2. Census Final Results Summary, 2017:

<http://www.pcbs.gov.ps/Downloads/book2383.pdf>