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Integration of geospatial data in Morocco's statistical business register (MSBR)

Abstract

The statistical business register holds great significance in the national statistical system of Morocco, as it serves as a vital pillar for conducting business surveys and generating precise economic statistical indicators that effectively depict the reality of the country's productive sector.

This paper addresses the importance and the methodology of integrating geo-spatial information into the SBR. This integration process aligns with Morocco's national digitization strategy, implemented by all departments, including the High Commission for Planning (HCP), the country's national statistics office. As part of this upgrade, Morocco is conducting the national economic census using new technologies and employing specific approaches to the mapping of economic establishments, with the objective of exhaustive geo-referencing all units.

The integration of geospatial data into the SBR allows for a deeper understanding of the geographic distribution of economic activities and enables the identification of spatial patterns and trends. This integration should raise the level of maturity of the Statistical Business Register to a higher level. The paper discusses the technical aspects of integrating geospatial data and the associated benefits, such as improved data analysis, spatial visualization, and enhanced decision-making capabilities. Furthermore, it displays the potential applications of geospatial data in the SBR, such as analyzing regional economic trends, identifying spatial patterns, and supporting policy formulation and investment orientation.

Overall, the integration of geospatial data in the Moroccan Statistical Business Register (MSBR) represents a significant milestone in the evolution of the HCP's SBR. This paper presents a case study that can serve as a reference for other statistical agencies considering similar advancements.

Keywords: Moroccan SBR, geospatial data, economic establishments mapping.

1. Introduction

As part of its program to upgrade the national business statistics system, the High Commission for Planning engaged in an ambitious process – the 2023 economic establishments mapping (EEM), which was a pioneering initiative for Morocco. This project aspires to be more than just a spatial database. It aims to offer a panoramic view of the economic structure, set up the framework for methodical sampling, and open doors for intricate spatial analyses.

Once the fieldwork has been completed and the collected data validated, the process of structuring the SBR data will start. This data promises to infuse the SBR with a high level of accuracy, enabling the assignment of accurate geographical coordinates to each economic unit.

This document outlines (1) the coverage of the Moroccan statistical business register; (2) the data sources employed and data integration techniques used; (3) the management tools; (4) the integration of geospatial data;

2. Coverage of the MSBR

The statistical business register managed by the HCP in Morocco covers businesses operating across industrial, service, construction and commercial sectors. Its specifically excludes the agricultural sector, notably divisions 01, 02, and 03 of the Moroccan activity classification. To avoid redundancy and duplication, this delineation was established in partnership with the Ministry of Agriculture, which has a separate register exclusively for agricultural activities.

Additionally, this register includes "enterprise" independent economic structure classified as profit making. These can be either private or public units engaged in commercial activities and are registered with tax authorities. However, the register does not include non-profit organizations, public institutions, or dependent establishments. Indeed, units eligible for inclusion in this register must conform to the following criteria:

- Exhibit Legal and economic independence
- Be registered with the tax authorities
- Pursue a profit-making aim

3. Data sources for the MSBR

The MSBR relies on a variety of sources for its updates. The data sources employed are targeted to ensure good coverage and improve the quality of the MSBR content. The data sources employed ought to deliver regular updates over time. The data sources used to update the MSBR are the following:

3.1. Economic Census

The economic census holds significant importance as a fundamental data source that contributes significantly to the development and maintenance of the statistical business register. It consists of an exhaustive statistical enumeration of all economic units in both private and public sectors and all administrative and nonprofit units operating on the national territory.

During the period 2001-2002, the High Commission for Planning (HCP) conducted the first economic census in Morocco. Then, from June 2023 to May 2024, the HCP will carry out a

second census in parallel with the economic establishments mapping. This operation is essential, as it is the main source for updating the register.

3.2. Administrative sources:

Updating the MSBR using administrative sources was the result of close collaboration with all the stockholders of Business data. In this regard, the HCP has succeeded in negotiating partnership agreements with several administrative departments.

Initially, an agreement was established with the National Social Security Fund (CNSS) in 2009, along with a Contract to acquire annual databases containing accounting data from the Moroccan Industrial and Commercial Property Office (OMPIC). HCP also maintained an efficient partnership with the Ministry of Industry, Trade, and Green and Digital Economy to obtain industrial business data. Furthermore, the HCP is negotiating a permanent data exchange agreement with the Tax Authority.

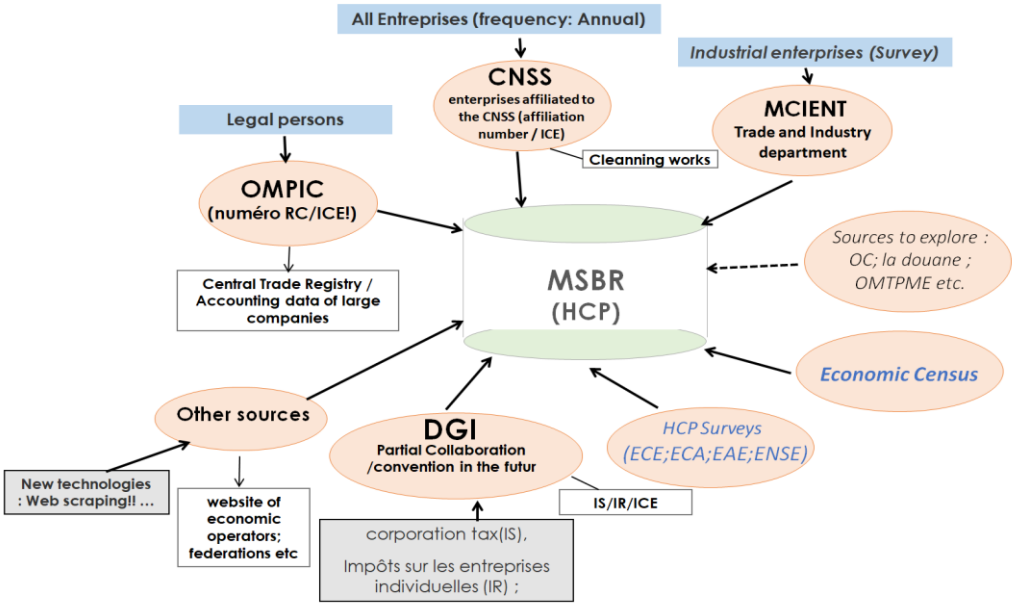
3.3. Statistical surveys

The feedback from business surveys including Quarterly Business Surveys, Annual Surveys, and Structural Business Surveys, serves as a crucial tool for data updating. It furnishes essential information for refreshing contact details and refining stratification characteristics.

3.4. Other sources

Beyond administrative data and feedback from business surveys, various online sources play a pivotal role. The HCP uses the official websites of professional federations and other online sources to guarantee the timely and accurate update of the SBR. In addition, business directories provide a comprehensive database of companies, listing their names, addresses, contact information, and activity. News articles and press releases available on the internet are also useful for tracking major business events, such as mergers, acquisitions, or closures.

Figure 1: schematic diagram of the various data sources for MSBR



4. Management tool

The MSBR is mainly used as a sampling framework for all economic surveys on businesses. Every year, a new sampling framework is established from the MSBR, containing all the necessary information about businesses.

To meet these requirements efficiently, the HCP is working with Statistics Denmark to implement a new MSBR system as part of their strategic partnership agreement. This new system will enable local management and facilitate the cooperative efforts of our department's regional offices to update and feed the database from regional sources. It is currently in the testing phase.

5. Integrating geospatial data into the MSBR

The integration of geospatial information into the MSBR is an important step for building a comprehensive statistical geospatial infrastructure. The HCP acknowledges this significance and has embarked on a widespread initiative to sustainably weave geospatial data into the MSBR, ensuring its long-term integration.

To carry out this operation, the HCP deployed enormous resources to initially geo-locate the buildings containing economic units and residential units. Then, a dedicated visit was made to the economic units to collect the required information.

Figure 2: Illustration of a work area with geo-located buildings

The main objectives of the 2023 Economic Establishments Mapping (EEM) are: to provide a thorough update of the statistical register of enterprises; to provide an updated picture of the productive tissue; to establish a geospatial database of enterprises and their local units; to conduct detailed spatial analyses of economic activities; to establish a new sampling framework for economic surveys.

5.1.Methodology and Approach

Statistical unit: For this census, the observation unit is the local unit. For this purpose, a business or part of a business located in a geographically identified area, and in which an activity is carried out on a principal, secondary or auxiliary basis by one or more persons, is considered the unit to be observed.

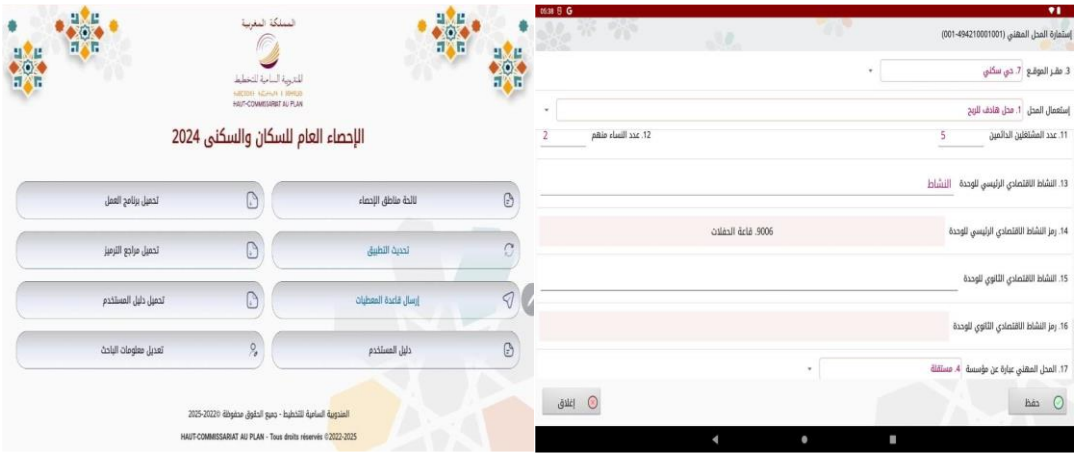
The suggested method for this census mapping uses modern mapping techniques in a mobile GIS platform, commonly known as nomadic mapping.

The method adopted for this census based on new mapping techniques using a platform integrated into the mobile geographic information system GIS, usually called nomadic cartography. This approach allows for capturing and updating a wide range of vector-based and descriptive data in the field, using tablets equipped with GPS, internet and loaded with satellite images.

The new data collection system provides multiple benefits, including improved cartographic quality, enriched geographical data with detailed geocoding, remote fieldwork monitoring, and reduced complexities of traditional mapping, all while saving time and cost.

Exclusively HCP's experts developed the system. Three types of profiles were involved in the project: IT engineers, statistical engineers and geomaticians.

Figure 3: IT solution capture: CAPI



Data collection is gathered using a mobile software application CAPI. This app is installed on an Android tablet, designed specifically for cartographers and EEM enumerators and operates in offline mode. It manages both cartography and EEM tasks. Additionally, there's an online web application for fieldwork management and monitoring. Each user has access to a personalized space according to their profile, allowing them to perform the tasks assigned to them.

For this purpose, the HCP has procured satellite images from Morocco's Royal Center for Remote Sensing (CRTS), which is the national institution responsible for the promotion, use and development of remote sensing applications in Morocco. To support this effort, a GIS team, part of the HCP staff, was formed with the task of updating roadways, as well as shapes and

positions of urban blocks. The team uses these satellite images combined with information from Google Open Street Map, all managed through the QGIS software.

After a cartographer has mapped out the buildings and information has been collected about them, such as the presence or absence of commercial activities, the EEM census agent is tasked with carrying out an in-depth examination, block by block. We distinguish three types of economic activity: profit-making activities, associative activities and public services. For each type of activity, an appropriate form must be completed.

The questionnaire is specially designed to meet the objectives of this operation. The initial module focuses on gathering information about profit-driven establishments that have physical locations, the second is specifically for non-profit entities, and the terminal module concentrates on acquiring data about public service spaces. The questionnaire predominantly touches upon:

- ✓ Geographical location ;
- ✓ Identifying attributes;
- ✓ main characteristics (activity and employment)

Understanding the nature of a business's activity is crucial for classifying various business entities. Acquiring this data in real-world settings and aligning it with established classification can be a challenging task. To address this, comprehensive training has been given to data collection teams. Additionally, an aiding reference chart is incorporated into the software, designed to streamline field coding, enhancing the precision and speed of the process.

5.2.The anticipated outcomes of integrating geospatial data into the MSBR

HCP's decision of integrating geospatial information into the MSBR reflects its anticipatory and innovative approach. As technology evolves and the importance of data-driven decisions continues to gain prominence, having a business register that not only provides numerical data but also its spatial distribution will be invaluable.

The upcoming integration of the EEM data is set to deliver a wide range of significant benefits:

- **Development of Thematic Maps:**

The integration of geospatial data into the MSBR will enable the creation of thematic maps. Once geospatial data is integrated, mapping tools and software can overlay this spatial information with various business characteristics to produce these maps. Thematic maps translate complex datasets into easily interpretable visual representations. The integration of geospatial data with the MSBR is more than a technical enhancement; it is a transformative step towards advanced data visualization and accessibility. Thematic maps, born from this integration, not only simplify data interpretation but also empower stakeholders with actionable, visually rich insights, fostering informed decisions.

- **Improved Stakeholder Collaboration:**

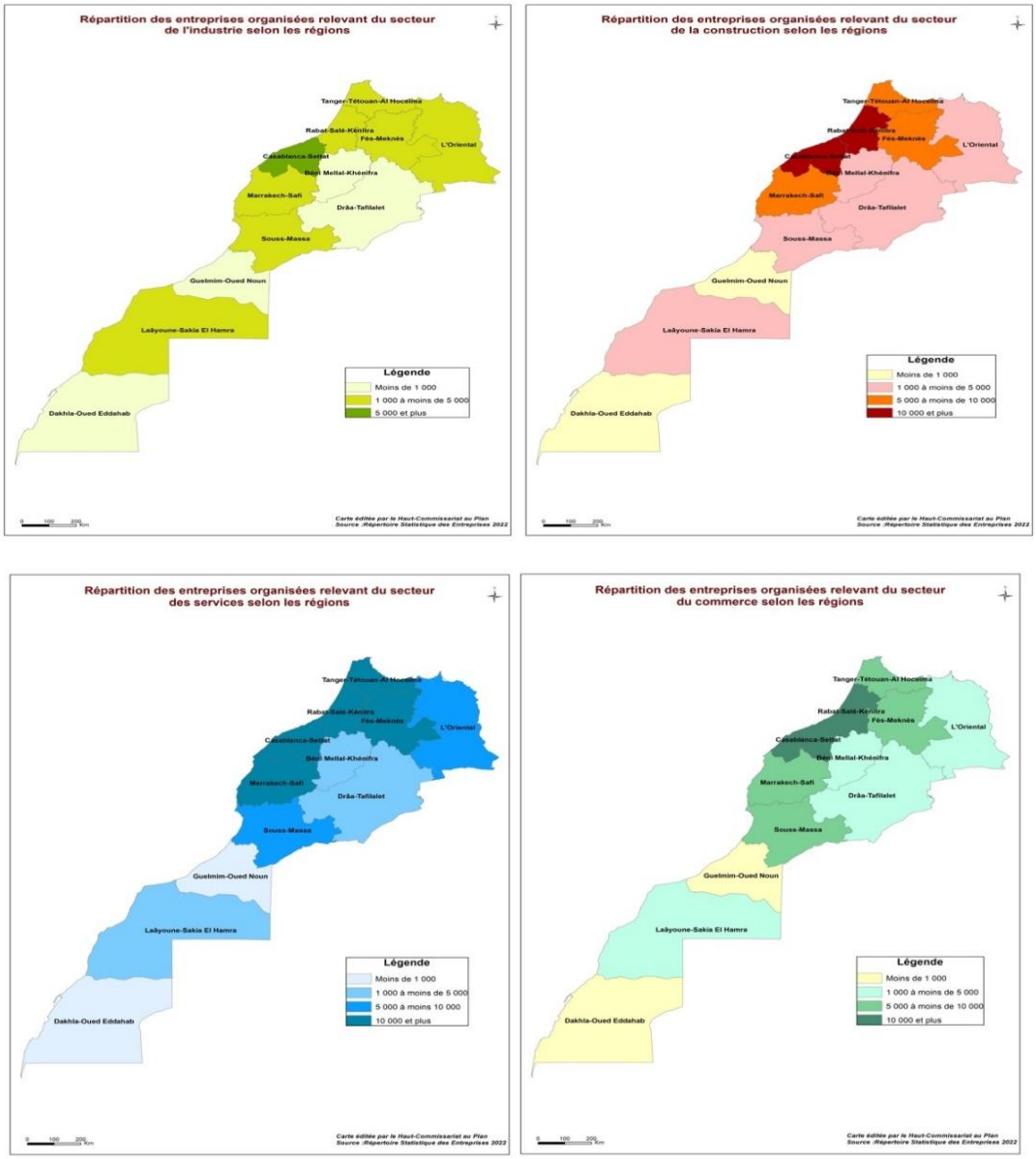
The integration of geospatial data into the MSBR fosters enhanced collaboration among stakeholders. Geographic insights provide a common ground for discussions and decision-making, enabling diverse groups, including government agencies, businesses, researchers, and

community organizations, to work more cohesively towards shared goals. This collaborative synergy not only promotes data sharing and knowledge exchange but also strengthens partnerships, ultimately leading to more holistic and effective strategies for economic development, urban planning, and disaster response. As stakeholders align their efforts with a spatially informed perspective, the potential for innovative solutions and sustainable growth within the region significantly increases.

- **Efficiency in Data Collection:**

Geospatial data can streamline the data collection process. Enumerators can plan their routes better, minimizing the time and resources spent on data gathering. Furthermore, the chances of errors or data duplication decrease when you have precise geographic coordinates for each economic entity.

Figure4. Overview of the geospatial distribution of businesses in Morocco by activity (MSBR 2022)



6. Perspectives

The HCP's objectives concerning the EEM 2023 touch on both national and international dimensions.

Nationally, the expected outcomes of this initiative will provide invaluable tools for a variety of stakeholders, including policy makers, business leaders, economists, and researchers. They will benefit from the ability to analyze spatial distributions and monitor the dynamics of production units. Through these efforts, the HCP aspires to usher in a novel approach, fostering large-scale statistical coordination. This will empower political decision-makers with insights into emerging phenomena and potential economic opportunities.

Internationally, by employing rigorous methodology and techniques for geographic data integration, the HCP intends to align itself with countries that have successfully intertwined geospatial statistics and information. This endeavor not only amplifies Morocco's voice in regional discussions but also serves as a valuable case study for the broader international community.

A primary challenge for the SBR team lies in aligning with global standards pertaining to geospatial statistical data. Of significant note is the integration of the Global Statistical Geospatial Framework (GSGF). The GSGF bridges the gap between statistical and geospatial authorities, facilitating collaboration between National Statistical Organizations (NSOs) and geospatial information agencies. This unified approach promotes consistent standards, methodologies, workflows, and tools across both domains. For this integration to truly make an impact, it must be sustainable and encompass a broader perspective that involves all business data providers.