

# SAPIO

ANALYTICS

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2021

# CASE STUDY: SMART DIGITAL CENSUS

# About this Case Study

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Note: A Smart Digital Census can also be replicated for diversified localities and organizations and a combination of multiple purpose surveys can be covered using this tool.

This Case Study is of a Smart Digital Census Survey used in the State of Uttar Pradesh & in Delhi NCT during the Saksham Initiative to make villages smart and self-sustainable; certain names have been anonymized based on the instructions from the respective clients. **This document is to be considered confidential and used only for private circulation, as it has not been approved by the respective client for usage or distribution.**

It also portrays how Artificial Intelligence driven Decision Support can unravel complicated understanding of policies and recommend actions that need to be taken on a hyperlocal (ward/village/locality) level. The results of these recommendations in the context of this case study are yet to be seen and measured in terms of wide-spread impact, but their acceptance and their revelations show the potential of a transformed technology.

# Purpose of this Case Study

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The purpose of this Case Study is to show how Data Driven (and AI Enabled) Decision Making using SMART DIGITAL CENSUS tool by **Sapio Analytics** on a Hyperlocal level (level of ward/village) can lead to much more effective decisions, that eventually lead to better policy execution, higher impact on the citizens, and improved satisfaction of the citizens. It is to show the importance of such decision making, especially when driven by the unique systems created by Sapio Analytics. .

# Background of the Product

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## Short brief

The essential purpose of the population and housing census is to provide assessment for the national activities. Beside from the answer to the question “How many are we?” there is also a need to provide an answer to “Who are we?” in terms of age, sex, education, occupation, economic activity and other crucial characteristics, as well as to “Where do we live?” in terms of housing, access to water, availability of essential facilities, and access to the Internet.

With this, **Sapio Analytics brings a Smart Digital Census Tool that takes conventional digital census to the next level, by using unique technologies that can help improve the process of census while it is being conducted, and in the process making the entire process smarter and much more effective than a conventional digital census.**

## Problem Statement

**The districts and the states were using traditional and digital approaches to conduct the survey. But the hassles of knocking on each door and collecting data on papers and the fear of losing it, data security concerns for digital surveys, the list is endless.**

So, to bridge the gaps between the conventional and the digital method, Smart Digital Census is where enumerators go on ground to take surveys, but they use new age technology enabled systems to do the same, with a lot of technology-driven pre-work that makes their process easier, faster and much more accurate, while also making it real time for immediate actions driven out of recommendations out of the surveys.

Prior to the implementation of the solutions, **the major problems being faced by the districts, through the concerned authorities,** were identified as follows:

- **Very high cost:** The main cost item is for the temporary workforce (enumerators, supervisors, etc.) that has to be recruited and trained, and has to work for a few weeks or longer periods.
- **Data Accuracy-Issues Around Sensitive Questions:** One major issue raised was that census enumerators did not necessarily ask all relevant questions. People reported that census enumerators filled questions about gender without asking the question.
- **Real time data not available:** Data visibility is not in real-time, to process complete census is a huge undertaking and will require many years to complete the whole tabulation program. By the time the data is published, it becomes out of date and cannot be used for any policy matter.
- **Census may not be conducted due to Natural Calamities:** Census activities are generally not possible in the event of natural calamities which put the safety of workers at stake. Due to COVID-19 pandemic, many countries of the world postponed their Census taking.
- **The risk of respondent data loss is high:**
  1. Responses lost due to mail or sorting problems
  2. Handwriting that cannot be interpreted 100% accurately
  3. Stray markings that otherwise result in a misread, preventing complete data capture.

## Solutions to the Problems:

**Think of it this way** - what if the enumerator on ground doing data collection using the digital technology is also supported by an artificially intelligent guide who is constantly making the process easier for them; while also making the outputs easier for the administrators in real time.

- **Multi-Layer Audit and Recommendations**
- **Real Time Data** - Real-time analytics helped us pinpoint issues the moment they arise, and in some cases, catch them before they occur.
- **Quicker Collection and Processing of Data** - Our smart digital survey enables the enumerator to have a predetermined questionnaire, recommended based on their location and other demographic parameters as instructed to them, with certain known fields already filled.

# Benefits of Smart Digital Census:

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## FINANCIAL BENEFITS

- Lesser enumerators covering larger population
- No post-processing work as Real Time feature available
- Cost efficient technology for long term benefits

## SOCIAL BENEFITS

- More personalized interactions with the citizens
- Feeling of contribution to change
- Increased reach to all households

## ADMINISTRATIVE BENEFITS

- Better results in lesser time
- Intelligent recommendations at a reduced cost
- High digital utility during pandemic

# APPLICATIONS OF THE TOOL

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## 1. CASE STUDY OF A SMART DIGITAL SURVEY IN THE STATE OF UTTAR PRADESH

Commissioned by the Department of MSME, Government of Uttar Pradesh to UPICO (UP Industrial Consultants Limited), this project undertaken by the team of Sapio Analytics working for UPICO, with support from UFS Limited, was focused on one of the least studied segments that there is, **the unorganized sector**.

### Problem Statement:

The unorganized sector, due to its sheer nature of being unorganized, has not been studied in such depth. **The traditional approach of conducting a census has its own limitations and to enable the Government of Uttar Pradesh to carry out an effective survey of the unorganized labor, Sapio Analytics has come forward to assist with an innovative approach with its SMART DIGITAL CENSUS tool.**

### Core aim of the survey:

To study the informal sector in the State of Uttar Pradesh to identify the issues faced by them as well as to suggest policy recommendations to bring them under formal economy through digitization, thereby, enabling their social, health and financial growth.

# Need for changing Census Undertaking Method:

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- **Speed:** Speed of conducting the survey was of paramount importance so that the knowledge gathered by the same can be used immediately for the economic growth of the state that was reeling under the impact of COVID-19.
- **Changes in the construct of the society and families:** The pandemic brought in a wave of Reverse migration to the state of Uttar Pradesh due to the pandemic changed a number of aspects about the society, particularly in the households that had members working for the unorganized sector.
- **Limitations in on-ground travel:** With the pandemic looming, door to door traveling was not easy, hence innovative methods to handle the same were needed.
- **Fear of bias:** It was important that any such bias based on functions of assumptions did not color the outputs in the wrong manner.

This marks the inception of a unique concept of **digital survey done using an Android based mobile application** with novel methods of auditing integrated with the SMART DIGITAL CENSUS tool.

## Methodology:

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### Secondary research to understand:

- District level hyperlocal plan
- Department level understanding
- Demographic details

### Teams involved in the study:

- Enumerators and their supervisors, responsible for conducting on-ground survey work and collecting data in a pre-planned manner
- Secondary researchers did effective data collection through a mobile app rather than the traditional method of using paper and pen.

### Continuous input parameters from the authorities with regards to:

- All the departments
- Requests made to the policymaker
- Assurances made by the policymaker
- Tracking of multiple correspondences by the policymakers

## How did we do it differently?

- **Use of Mobile Applications** for real time data collection
- **Use of Algorithms** (combining existing Econometric Models with modern Machine Learning Techniques) to derive real time outputs
- **Auditing Methods** to compare real time outputs with expected outputs, and improve the processes accordingly
- **Use of WhatsApp chat bot** to study the outputs through self-surveys and comparing the same with on-ground surveys to further improve the direction of on-ground surveys, based on required audits
- **Enumerator Guidance Systems** in the mobile application to help them cover more households in less time

## Outcome of the project:

- Identification of the impact of government schemes and services on a **hyperlocal level**
- Digitization leading to **inclusion of these informal sector** into the mainstream economy
- **Economic growth** of the state and the nation
- **Digitized records** for future generations
- Better **effectiveness of policies**

## Success so far with Smart Digital Census:

- Innovation of Smart Digital Census Tool for **real time digital data collection, audit and analytics** using new age technologies of Artificial Intelligence.
- The innovation was **published** by the International Journal of Scientific and Research Institute (**IJSER**), one of the biggest research publications in the world.
- Completion of surveys in the **pilot district of Lucknow, Meerut, Gorakhpur and Varanasi** wherein a total of **50,000 sample data** was collected.
- Policy recommendation report is in progress.

## 2. CASE STUDY OF A SMART DIGITAL SURVEY IN DELHI NCT

There are thousands of villages in India where basic needs aren't being fulfilled. They are struggling with social problems like education, employment, health & hygiene, drainage system, water & electric supply, etc.

**We have successfully worked on a pilot project which was done in 5 villages of NCT Delhi with a main aim to extract the main problems of the village, by not just getting a list from villagers but using methods to understand the same in-depth.** Along with problems, various opportunities in the village could also be extracted.

### Problem Statement:

There are numerous datasets available with the Government to deal with. The Government of Delhi is wanting to make all its villages 'self-sustainable'. So, to back the Government and to make meticulous use of data and provide intelligent data solutions to fulfil the goal of the Government.

### Core aim of the survey:

To identify key problem areas of a village and convert them into smart and sustainable 'Saksham' villages.

### Input parameters from the Authorities:

- Visualization platform for the data points collected
- Drawing insights from these data points to understand:
- Performance & Status of the work in the said department as well as the hyperlocal plan.
- Predictive Analytics to understand the requirement as well as foresee the issues which may occur in future
- Recommendation engine to provide suggested policy measures across those issues

## How did we do it?

- Using our Smart Digital Census tool, we **conducted a scientific data collection** in few identified pilot villages of Delhi NCT region
- Based on the data collected and analytics drawn, using new age technologies, insights were generated to **identify the key problem areas** as well as the suggested policy recommendations for the decision makers.
- With the help of our Smart Digital Census tool, we were able to **identify the bifurcation of the population** and advise the Government on taking the necessary steps.

## Steps followed:

- Influencer Survey
- Secondary Research
- Primary Citizen Survey Plan
- Execution of Survey
- Problem identification

## Methodology:

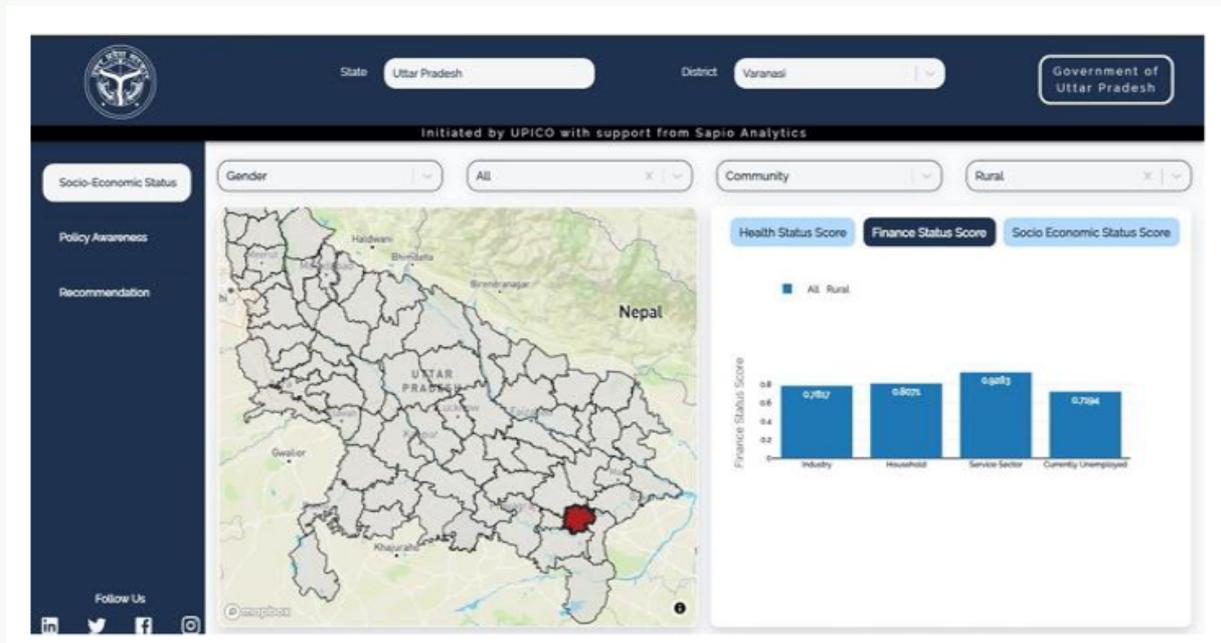
### Secondary research to understand:

- District level hyperlocal plan
- Department level understanding
- Demographic details

## Outcome of the Project:

- Identified 6 villages in the UT of Delhi NCT
- Appointed co-ordinators for each village and initiated with **data collection based on the scientific questionnaire.**
- Based on the methodology we followed, with the help of total population of a particular village, we could divide the male & female population number and calculate population for different age groups
- With this, we could **raise the opportunities** for the village.
- **Creation of an ideal 'smart village'** which shall be **replicable and scalable.**

# Proof of Impact



Sample Screenshot of Real Time Tracking

The application form consists of the following sections:

- III. OCCUPATION**: Where do you work?
  - a. Service Sector
  - b. Industry
  - c. Households
  - d. Currently Unemployed
  - e. Doesn't want to ans
- TYPE OF EMPLOYMENT**:
  - 1. What type of respondent?
    - a. Self Employed
    - b. Owns Business
    - c. Contractual work for other business
    - d. Doesn't want to answer
  - 2. Is your workplace a proper set-up?
    - a. Yes
    - b. No
    - c. Doesn't want to ans
  - 3. Do you have multiple sources of income (apart from the core work activity being done by you)?
    - a. Yes
    - b. No
    - c. Doesn't want to ans
- II. PERSONAL IDENTIFICATION**:
  - 1. Aadhar Number
  - 2. Mobile Number
  - 3. Registration Number
  - 4. UAN
  - 5. ESIC
  - 6. Name
- IV. HOUSEHOLD P&L**:
  - 1. Total Monthly Income in the Household (including income from cattle or land)
  - 2. Total Monthly Expenses of the Household
  - 3. Total Cumulative Savings :
    - Cash in Hand/Bank
    - Jewelry
    - Others
  - 4. Fixed Asset
    - Land
    - House
    - Cattle

Sample Screenshot of the Application

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# Conclusive Summary of the Case Study

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The major constraints while carrying out the Census of the population were resolved to a great extent with Sapio Analytics' Smart Digital Census Tool.

By carrying out these pilot experiments, we were able to see the drastic evolution in terms of technology and ease of accessibility. This will not only save time but also benefit the states in carrying out the Census efficiently and more effectively without having to worry about the fears faced due to earlier practices.

One of our key features of the Product being highly customizable will in turn take care of the diversity present in different states. With this initiation of our Product, we aim at assisting various States across the country catering to their unique requirements. The tool can be replicated and tailor-made, making a provision for being cost effective, and which will support the tracking of real time data with the flexibility of storage and compatibility with different operating systems. SMART DIGITAL CENSUS provides multitudinal benefits across the hierarchy, ranging from the Government, in the end benefitting its citizens.

The end goal of this project is to make Smart Digital Census benefit both public and private sector and to display the perfect model of public-private partnership with the use of a data driven decision support system powered by artificial intelligence.

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