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A Management Indicator Program For Water Operating Agencies

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A MANAGEMENT INDICATOR PROGRAM FOR WATER OPERATING AGENCIES

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The management indicator program for operating agencies (PIGOO, for its initials in Spanish) specifies a set of 28 management indicators that help to measure the operational aspects, financial aspects and efficiencies of potable water supply systems.

Ideally, the performance indicators of an operating agency should be linked to an objective or strategy established by that same agency.

The performance indicators are calculated based on annual data, variables such as the volume of water produced, the number of employees, total income and expenditures, rate of leaks and claims.

The Mexican Institute of Water Technology has conducted PIGOO since 2005. From 2005 to 2013, the number of operating agencies has increased from 50 to 130. Correspondingly, the number of management indicators has increased from 12 to 28. Information is available for the 185 participating agencies at http://www.pigoo.gob.mx/.

The quality of service offered by an operating agency can be measured according to the following criteria: the efficiency and effectiveness with which it provides water and collects and treats wastewater; the satisfaction of its customers; whether the water supply is continuous in terms of quantity and quality; knowledge of all elements that make up its infrastructure; whether there is a reliable record of its users; knowledge of how much water is produced and how much is delivered to consumers; whether it uses the full capacity of its treatment units; whether all complaints from users are addressed in a reasonable time and in turn if payment is received for the service; and the ability to recoup all operating, maintenance and administrative costs of the system.

The webpage provides, among other options, the possibility of comparing indicators. Information can also be found in the geographical search section, where it is possible to use search filters related to demographical and geographical aspects, as well as to examine the value ranges of the management indicators.

The present article will address the diverse topics covered by PIGOO and provide an analysis of the results.

INTRODUCTION

According to the economic census of the Mexican National Institute of Statistics and Geography (INEGI, for its initials in Spanish) (2009), the collection, treatment and supply of water in Mexico involves 2,157 identified operating agencies. Of these agencies, 44 are classified as belonging to the private sector. The rest are in the public sector.

Given the type of geographic coverage, 1,302 water operating agencies serve only urban areas where higher concentrations of population and economic activity generate greater water service infrastructure demands. The other 1,215 agencies service both urban and rural areas.

Therefore, it is important to develop a system of indicators for evaluating the behavior of the development and modernization processes used by operating agencies to provide potable water, sewer and sanitation services, as well as to establish standards that contribute to the transparency of national information.

The present article shows the results of the study carried out in 2013 by the Mexican Institute of Water Technology (IMTA, for its initials in Spanish).

OBJECTIVE

The main objective of the project was to "grade and monitor, through a set of strategic indicators, the performance and behavior of the main potable water operating agencies in the country".

METHODOLOGY

To define the strategic indicators to be evaluated for the operating agencies, a review of the technical literature was carried out, initially defining twelve indicators. The number of indicators increased to 28 over the course of the project, 19 of which were used to evaluate the operational aspects, 4 of which were financial indicators and 5 of which were efficiency indicators. The behavior of the participating agencies is shown in Figure 1.
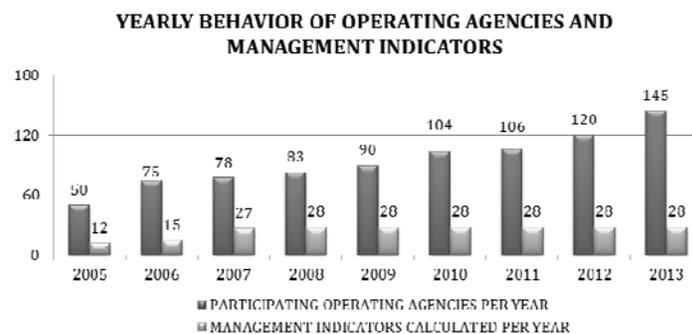

Figure 1. Yearly behavior of the operating agencies and the indicators under evaluation.

Operating agencies in cities with populations of more than 20,000 were invited to participate in the project. These agencies were sent a list of necessary data to be provided to evaluate the indicators. The obtained data were classified by population and administrative region.

The following analyses were performed: *i)* management indicator systems per city, *ii)* comparison of the management indicator system by population level; *iii)* comparison of the management indicator system by administrative region; *iv)* comparison of the management indicator system of operating agencies located in the northern border of the country and *v)* a general comparison of the management indicator system.

EVALUATION OF THE RESULTS

Table 2 shows the results obtained for certain indicators, as well as the agency behavior over the last four years.

Table 1. Results obtained for certain indicators (national averages)

INDICATOR	OBTAINED (2012)	DESIRED	BEHAVIOR (2002-2012)
Intakes with continuous service (%)	70.38	100	4.3↓ (74.73-70.38)
Networks and installations (%)	60.97	100	9.8↓ (70.75-60.97)
User Registry (%)	96.73	100	1.7↑ (94.99-96.73)
Macro-metering (%)	79.25	100	0.91↑ (78.34-79.25)
Micro-metering (%)	61.05	100	4.8↑ (56.17-61.05)
Volume treated (%)	47.23	100	9↑ (38.23-47.23)
Complaints (complaints)	140	NON-EXISTENT*	26↓ (163-140)
Users with up to date payment (%)	55.64	95	3↓ (58.25-55.64)
Costs per volume produced ($)	6.31	5.00	3↑ (2.90-6.31)
Employees for every 1000 intakes (employees)	5.5	4	↔ (5.55-5.5)
Employees working on controlling leaks (employees)	14.5	NON-EXISTENT*	3↑ (11-14.5)

NOTES:
*NON-EXISTENT: NO DATA WERE FOUND THAT COULD ESTABLISH THE DESIRED LEVEL

These results can also be presented graphically, as those shown in Figure 2. The graph on the left shows the national averages of the macro-metering indicators, as well as a comparison with the records provided by the National Water Commission (Comisión Nacional del Agua; CONAGUA) [1] in the document "Status of the Potable Water, Sewer and Sanitation Subsector, 2013". The graph on the right shows the coverage of the sewer and potable water supply systems of the participating operating agencies in Baja California.

In 2005, to disseminate the results, a webpage was established at http://www.pigoo.gob.mx, where all of the indicators of the participating operating agencies were made available to the public. The PIGOO website is hosted by the Mexican Institute of Water Technology. Free software technologies were used for its development.
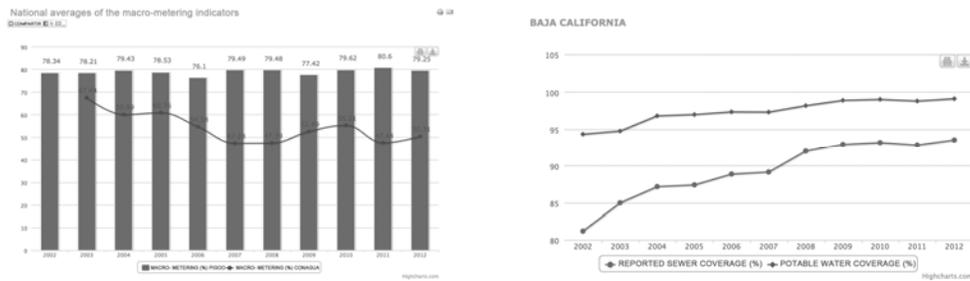
Figure 2. Graphs representing the behaviors of certain indicators

In 2011, the site was updated with a new design (Figure 3) that implements the usability characteristics to facilitate access to the information through more direct and simple navigation. It incorporates graphs and automatic comparisons in addition to allowing information to be downloaded in common CVS formats (the format recommended by the Digital Government Unit) and PDF. It also provides a record of the historical files for the management indicators gathered from other sources, such as the following: CONAGUA[1], the Water Consulting Council (Consejo Consultivo del Agua[2]) and BAL-ONDEO[3].
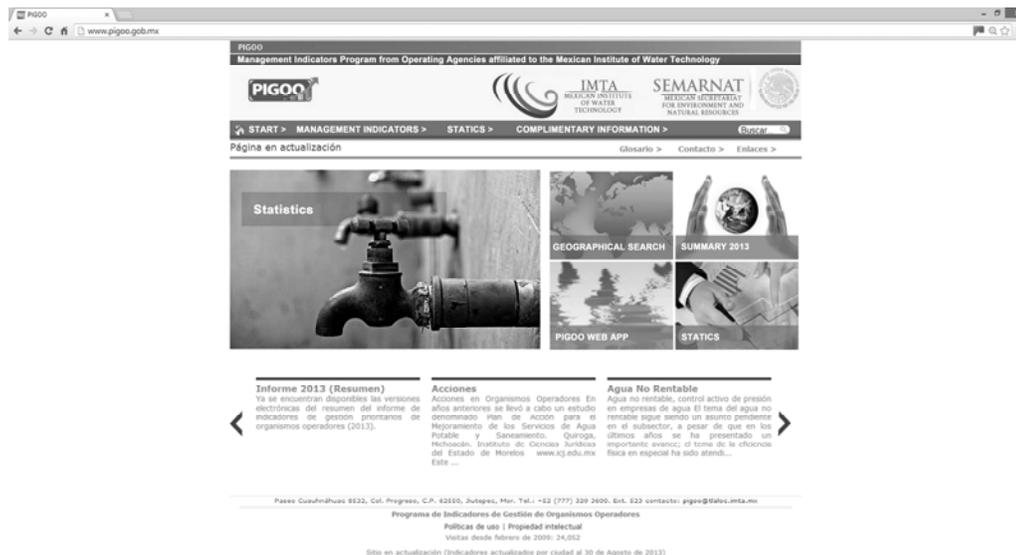

Figure 3. 2013 Design of the PIGOO WEBSITE

By navigating the website, information can be obtained is provided in a tabulated format for the management indicators, where data are divided by city, state and hydrological region (Figure 4).

Once a city is selected, the management indicator information is presented in two graphs that include the most important indicators, as well as two options to export the information (CVS format (the format recommended by the Digital Government Unit) and PDF).

The indicator information can be compared by selecting any indicator in the table. A message then appears asking to confirm the comparison of the indicator selected. If "Yes" is selected, a screen appears to select the cities and the references that offer the PIGOO general averages and the range of years for the management indicator comparison.
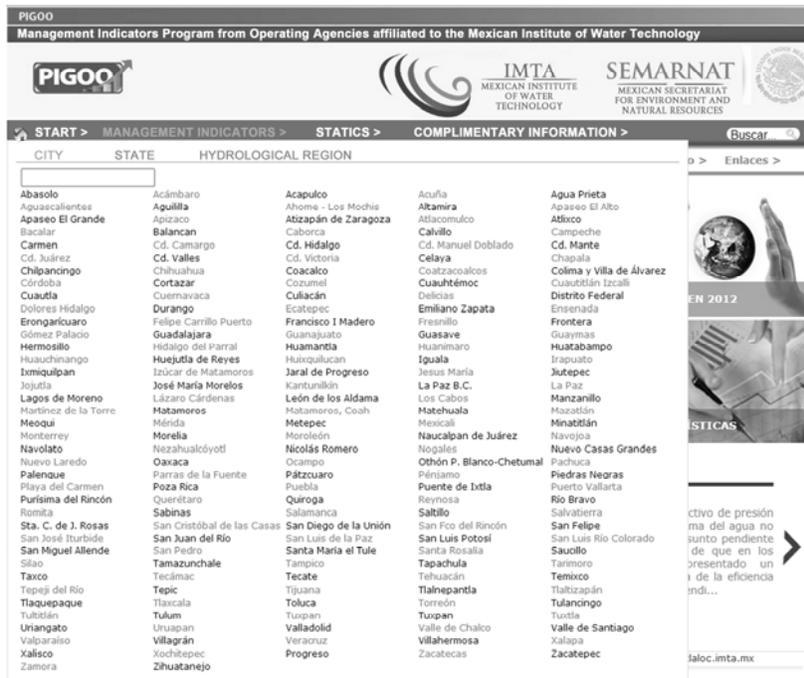
Figure 4. Management indicator information by city, state and hydrological Region

The comparison of the indicators with respect to the selected criteria is shown in tabulated format to accompany the graph of the indicators, including the option to export the information to other formats.

The Statistics section shows the list of management indicators classified by national average and the average of the hydrological region (Figure 5).
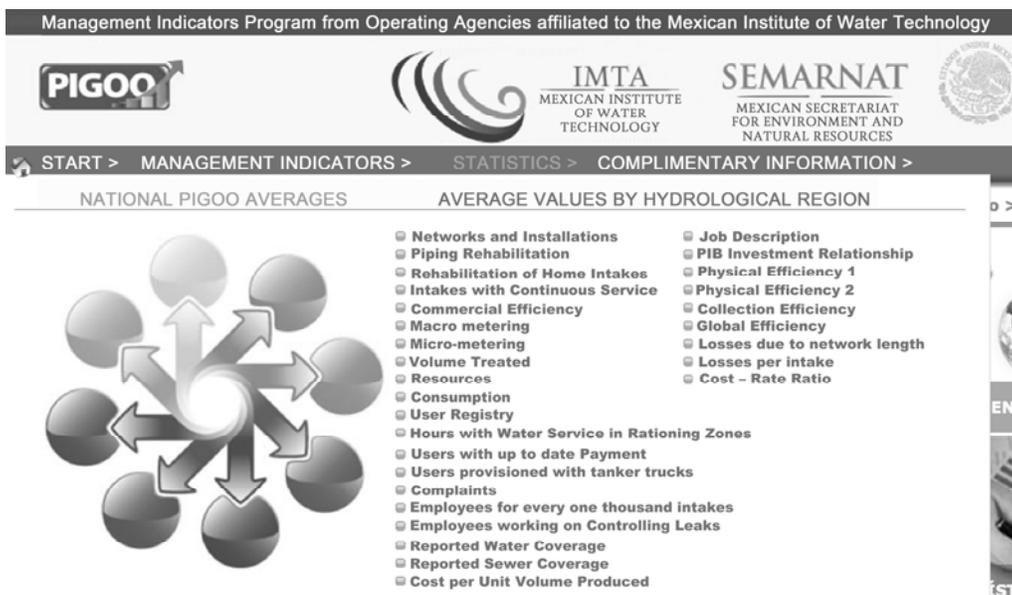

Figure 5. Management indicators by national average

The national average classification shows graphs (Figure 6) of the historically obtained averages with individual graphs showing the metering coverage range, for example, networks to installations (%). The same process applies for the averages of the hydrological regions and states.
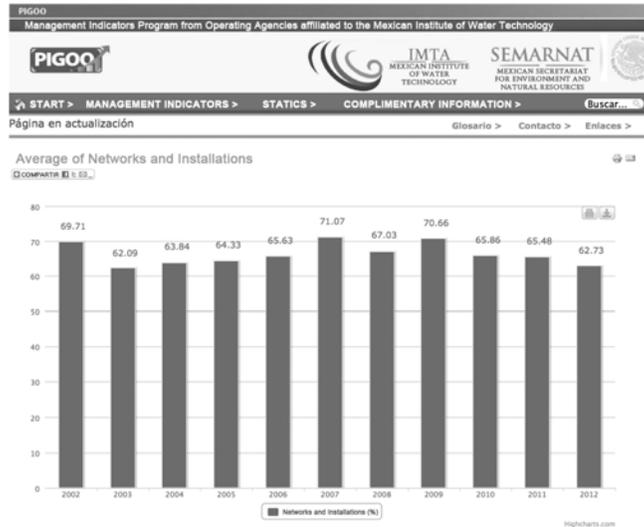

Figure 6. Averages of the network and installation management indicators

The geographical search section can also be used to access the information, where it is possible to use search filters related to demographical and geographical aspects, as well as the value ranges of the management indicators. The potable water operating agencies that comply with the criteria established in the form are indicated with blue circles. Clicking on one of them prompts an informative display that offers a link to the detailed values (Figure 7).
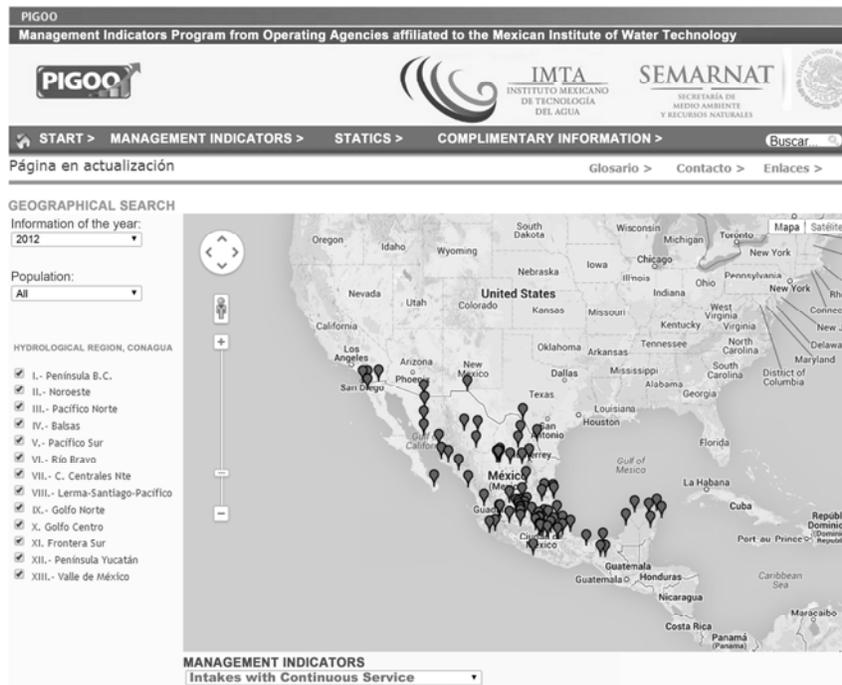

Figure 7. Geographical search of operating agencies by hydrological region

CONCLUSIONS

This paper reviews the results of a project that started in 2005 to address the management indicators related to operating agencies in Mexico. This work was possible thanks to the cooperation of the 187 participating agencies.

This project has promoted a culture of generating information that allows operating agencies to more precisely examine how their different institutional areas are working.

Based on an analysis of the published management indicators, demographic behavior, availability of water resources and relevant budget and context information, the potable water operating agencies can implement actions that improve parameters such as coverage and quality of the service, economic sustainability and elimination of water leaks. It is necessary to identify the best practices associated with actions that have positive impacts on the indicator values. Each operating agency should identify the relevant performance indicators according to their particular objectives or goals.

The Mexican Federal Government grants incentives through federal programs to operating agencies that meet certain performance guidelines; however, measuring volumes in collecting sources (macro-metering) is a decisive variable for obtaining incentives. Therefore, the certainty of these metering values is very important. Despite its importance, most service providers lack the infrastructure, instrumentation and means necessary to perform reliable macro-metering. The percentage of macro-metering in Mexico reported by CONAGUA in their publication on the water, sewer and sanitation subsector in 2012 was 50.31%. For PIGOO, the average was 79.25% for the same year. This difference was due to the sample size used to calculate that indicator, with 400 Agencies participating that year for CONAGUA and 116 participating for PIGOO.

The Mexican National Development Plan 2007-2012, Axis 4, Environmental Sustainability, lists Strategy 2.1 Strengthening the technical and financial self-sufficiency of water operating agencies in improving the efficiency of water supply systems. The Management Indicator Monitoring Program to Fulfill Global Efficiency Goals was structured to monitor this indicator, with a global efficiency for 2010 of 38.65%, a lower figure than projected by the National Hydraulic Program (41.2%). For 2011, the goal was adjusted to 44.4%, which is 5.75 percentage points higher than what was reached in the previous year. The original six-year goal for 2012 was to reach 44.2%, although a level of 41.02% was reached. Among the actions taken to increase efficiency, we highlight the detection and repair of leaks in the distribution network, macro-metering, micro-metering, collection of outstanding debts, updating the user registry, zoning, updating rates and updating the commercial system.

Even though the priority goals regarding coverage were reached in the period reported, there are still great challenges and issues to be resolved within the water subsector. Among these challenges are the consolidation of operating agencies within the country and the treatment of wastewater.

ACKNOWLEDGEMENTS

REFERENCES

[1] CONAGUA, Situación del subsector Agua Potable, Alcantarillado y Saneamiento, [Situation of the Water, Sewer and Sanitation subsector] (2003-2013), disponible en [available at]:
http://www.conagua.gob.mx/CONAGUA07/Publicaciones/Publicaciones/DSAPAS2013.pdf

[2] Consejo Consultivo del Agua, Gestión del Agua en las Ciudades de México [Water Management in Mexican Cities], (2011), disponible en [available at]: http://www.aguas.org.mx/sitio/descargas/reporte2011.pdf

[3] BAL-ONDEO, Reporte Anual de Desempeño [Annual Performance Report] (2008), disponible en [available at]: http://www.bal-ondeo.com.mx/noticias-y-publicaciones/

[4] Martha P. Hansen and Víctor H. Alcocer, (HC1308.1) Indicadores de Gestión Prioritarios en Organismos Operadores, *Informe final*, [Priority Management Indicators in Operating Agencies, *Final Report],* IMTA (2013), Resumen disponible en [Abstract available at]: http:// http://www.pigoo.gob.mx/