Big data tools and tourism market intelligence

Federico Zerba, Buenos Aires Tourist Board
fzerba@buenosaires.gob.ar

Abstract
Since 2017, the Buenos Aires City Tourist Board has begun to implement Big Data techniques to generate key information as a new tool for tourism decision making. As a result, on top of the traditional use of surveys to gather information, the implementation of the Big Data initiative has allowed mass data to be collected and analysed far more quickly. This allows a more effective focus for strategies of communication and promotion, as well as to identify new business and investment opportunities for companies and entrepreneurs.

The new information is integrated into the Tourism Intelligence System (SIT), a comprehensive tool for the analysis of multiple sources of information, transforming data into useful knowledge for both public sector management and companies in the private sector, including associations and chambers, service providers (accommodation, travel agents, tour operators and gastronomic establishments), investigators and academic institutions.

The Tourism Intelligence System (SIT) is based in five specific key points: Electronic flight booking and searches from abroad to Buenos Aires, entrees and exits from Customs in the main airports of Buenos Aires, air connectivity, opinions by the tourist related to accommodation and gastronomy, mobile phone data from national and international tourists.

Big Data allows us to understand Buenos Aires’s position compared to other destinations in the region, to anticipate the main tendencies for forthcoming months, to understand the behaviour of different segments of tourists who visit the city and to recognise the movement of visitors across the different neighbourhoods and tourism attractions. At the same time, it allows us to evaluate the competitiveness of our accommodation and gastronomic establishments and to strengthen product and service development strategies.

Keywords: Big Data, Tourism Intelligence System, Competitiveness, Information.
Introduction

In an increasingly demanding and competitive tourism market, in which the digital transformation of destinations is also causing great changes, it is necessary to apply new techniques of investigation in order to improve processes of governance and contribute to the sustainability of tourism destinations.

This Big Data initiative has benefited tourism governance in the city, boosting opportunities for the public and private sector through obtaining original and novel information on market trends and visitors’ behavioural habits. It impacts positively on the local community by granting free access to this information, allowing all actors involved in the tourism value chain to implement projects that maximise the benefits of their activities in a sustainable way, encompassing economic, sociocultural and environmental dimensions. Furthermore, this initiative integrates numerous sources of information through collaboration with other organisations, both public and private, including the National Tourism Secretariat, SEGITTUR Spain, Amadeus, Telefónica Argentina, Aeropuertos Argentina 2000, and the National Department of Migration, among others.

There are three key points to resume the main aspects of this initiative,

1. **The characteristics of the data sources.** Big Data is an innovative phenomenon in itself that it stems from the use of new sources of information such as:
   a. Digital e-commerce platforms related to accommodation and gastronomy.
   b. Social networks with travellers’ comments and opinions.
   c. Registers of electronic searches and flight bookings from abroad to Buenos Aires.
   d. Mobile phone data from national and international tourists.

2. **The processing and analysis of mass data.** A specific and rigorous methodology that has been designed to deal with the data, using processes that guarantee privacy and confidentiality in accordance with international recommendations and the UNWTO’s Global Code of Ethics.

3. **Identification of new trends and generation of strategic knowledge for decision making:**
   a. Forward-looking information on tourism demand from searches and flight bookings to Buenos Aires.
   b. Analysis of tourists’ opinions and evaluations of accommodations, gastronomic establishments and tourist attractions in the city.
   c. Estimates of flight occupancy rates through air connectivity.
   d. Provenance of visitors according to flights.
   e. Tourist mobility through city neighbourhoods and tourism attractions.

This whole process has impacted positively on decision making by:
- Prompting the development of a fiscal incentive to boost hotel investment through identification of the need for improvements in accommodation offer and infrastructure.
- Anticipating the behaviour of demand from the city’s strategic markets.
- Studying potential demand to drive new air connections to the city.
- Redefining and segmenting digital marketing and communication strategies, identifying new target markets and strengthening actions in current markets.
- Improving processes in strategic destination planning.
- Developing new products and experiences based on market needs and profiles (gastronomic tourism, educational tourism, MICE tourism, cultural tourism, sports tourism, among others).
- Discovering the interests and behaviours of tourists in the city to understand the profile of the new consumer.
- Serving as a reference to predict the apparition of potential problems or obstacles that may affect tourist activity, whether at a commercial or territorial level.
- Identifying opportunities for the development of areas with low tourist flows.
- Improving visitor experience in the city.
- Interacting with other areas of local government to strengthen general governance of the
destination through synergies in the definition of strategies on security, transport and traffic, public space and other areas.
- Improving the measurement of tourist inflows at gastronomic, sporting and cultural events that strengthen the development of tourism in the city.
- Managing the flow of visitors in different areas and neighbourhoods in the city.
- Evaluating Buenos Aires’ competitiveness compared with other destinations in the region.

**Traveller’s reservations and Air connectivity**

Air connectivity has a major importance at the moment to choose a destination. Hours of flight, number of scales and flight fares are some of the variables that play a role at the tourist decision over her future travel destination. In order to respond on this issue, the Buenos Aires City Tourist Board started to measure the occupation rate of current flights arriving to Buenos Aires airports joining two databases provided by the National Department of Migration and concessionaire of the international airports (Aeropuertos Argentina 2000).

This analysis provides outstanding data about the performance on each international route with the rate of occupancy and the rate of foreign passengers. Therefore, every route can be evaluated by the number of seats available to bring new tourists. As an example, in figure 1 it is shown a high rate of occupancy in flights from Europe except Netherlands and Turkey, both represents an opportunity to encourage airlines operating those routes to promote Buenos Aires in order to fill up their flights.

![Figure 1. Occupation rate according to country of origin of flights. January – May 2017 and 2018.](image)

But even high occupancy rates can represent an opportunity to policy-makers. The composition by origin of the passengers in flights is crucial to understand if the routes respond to the inbound tourism or the outbound tourism. In case of an increase of outbound tourism there will be a raise in the rate of occupancy and the offer of seats will be limited causing an increasing in the flight tickets fares which can discourage inbound tourism. Therefore, a big challenge for public sector appears when there is a necessity to promote new and more flights frequencies instead of waiting private sector response to incentive more arrivals.

From another point of view, Amadeus provides information about flights searches and reservations from over 20 cities to Buenos Aires and other cities of South America. Thus, it is possible to anticipate the following tendencies of inbound tourism. In fact, during July and August there was an increase of 15% year over year in reservations for the following 12 month which represents 7100 more passengers who will travel to Buenos Aires. According to this information it is possible to expect an increase of tourists in the near future.
When information is detached by city, the analyses gets deeper as we try to understand the dynamic of each origin and find out what are the main characteristics of the route like also the trend flowing changes in an immediate way which allows anticipating and responding in an agile way before the change occurs.

It also provides the possibility to evaluate significant changes of connectivity among two cities such as the impact of the new non-stop flight among Los Angeles and Buenos Aires starting in December 2018. As figure 3 reflects, reservations between both cities increased 58% year over year and a 100% in January 2019.
Regardless the information showed before, this analysis can provide more accuracy when marketing areas try to promote and positioning the destination. Knowledge of average of days in advance people book their fights from different cities or preferred days for booking flight turns crucial in order to select which days and periods of the year ads and advertisement will be publish. This is not only an improvement of efficiency of the economic resources, but also raises the opportunity to reach more people who can be interested.

Tourist mobility

Telefonica’s database provide a sample of residents, national tourist and international tourist (only those with roaming activated) on each hour and every day distributed in 161 zones of Buenos Aires.

In the map of the figure 4, highlighted areas represent the touristic hallway in Buenos Aires, focusing in three specific neighbourhoods: Microcentro, Palermo and Recoleta.

![Mapa de calor de movilidad de los turistas internacionales](image)

*Figure 4. International tourist in Buenos Aires distributed in 161 zones.*

This information can be also disaggregated by country of residence, what allow us to know the most visited attractions and preferred times of the day to visit them for each one.

A big number of policies can be proposed with this information such as: segment neighbourhoods by nationality to improve the efficiency in promotion; recommend owners of shops in an area to open earlier or close later because of the presence of tourists in non-usual hours or also promote better security in the evening in some neighbourhoods to encourage tourists to go. These are only some examples to show the enormous potential mobility data have for policy-makers.

Another possibility that this database can provide is the measurement of the impact of different kind of events that were carried out in the City or in a specific neighbourhood. For example, the analysis provided in figure 5 of the San Telmo fair, which is only available on Sundays, showed its relevance to attract tourists into that neighbourhood. In accordance with above detailed, one of the proposals outcome from these results is to extend the fair on Saturdays.
In addition, figure 6 focuses on a specific event like the Gay Pride march 2017 in Buenos Aires. The map shows the three areas where the event took place. The march started in Plaza de Mayo (blue area) at 5 pm when there was the higher differential of people between November 18th, 2017 and the average of the rest of Saturdays in November 2017. The following hour people started to move forward to the Congress crossing 9 de Julio Avenue (green area) and finally at 7 pm the march’s finest moment can be seen placed in the red area.

This kind of study allows a better planning on following editions where it is interesting to promote the visit of tourist.

To complete a variety of events presented, in figure 7 there is a comparison between two completely different events which took place in the same stadium. As it seems, Bon Jovi’s show had great impact on national tourists whereas Rugby Championship match between Argentina and New Zealand brought a higher quantity of international tourists. Measuring the touristic impact of these events could encourage policy-makers to improve its promotion and provide a better supply of touristic services pointing directly to the attendance.
Gastronomy reviews

The first objective on this theme was to find all the available restaurants online to understand how it is composed. The second stage consisted in categorizing them by their main type of food they provide. Finally, the research took into consideration the reviews of customers and their ratings as it is shown in figure 8.

Another point of view provided is the opening by neighbourhood in which it is possible to determine those where customers rated higher and lower and its evolution year by year. In figure 9, Retiro appears as the best neighbourhood for dining but in all the places analysed the quantity of negative rates tend to rise over the years, what can be explained by a decline of the restaurants food quality.
Accommodation reviews and prices

Accommodation websites are very much common these days than 10 years before. They bring a lot of information including the services each hotel provide, the prices on accommodation in future dates and the experience from guests who had stayed a night told by themselves.

Prices are one of the most important components connected with competitiveness when analyse accommodation. That is why we collect prices of 4 and 5 star hotels in Buenos Aires, Santiago and Lima in order to make a comparison and discover how they are positioned. The results are clear: Buenos Aires had the lowest price in 4 stars but the highest in 5 stars.

Going further into the analysis we collected two years of ratings which customers gave on every hotel they had stayed in over different aspects they were asked. The output for 4 stars hotels showed disappointing results in Buenos Aires as figure 11 shows, however it might explain a lower accommodation fare. In 5 stars hotels results more similar ratings between the cities.
Taking into consideration this key information the Tourist Board supports a new law to promote investment in construction or remodelling of hotels in Buenos Aires with a reduction of taxes which has been passed in the first days of November 2018.

Following into the analysis we collect prices of hotel rooms in six different dates of accommodations: 7 days in advance, 14 days in advance, 28 days in advance, 56 days in advance, 84 days in advance and 168 days in advance. This way it is possible to compare the same date over the time and also to follow how prices respond to a closer booking date.

To test it, we follow how prices respond for booking a standard hotel room in hotels of 4 and 5 stars in March 2018 with 7 days in advance. The results showed an important impact in the 4 stars hotels during the last days of the month, which is explained by the long weekend between the 29th of March and the 2nd of April. Almost the same happened with 5 stars hotel but in a different moment of March, more precisely in the third week when two events congregated in Buenos Aires: G20 meetings of presidents of central banks and finance ministers and Lollapalooza music festival.

Figure 12. Prices (US$) 7 days in advance for standard double rooms in 4 and 5 star hotels.

Another point of view can be seen when we aggregate prices by the day of the week, when we realized a big difference between 4 stars hotels and 5 stars hotels. The first ones increase their prices in the weekend because a higher demand from national and some international tourist from South America and the second ones have higher prices in labour days because their guest are more often connected with business travel.

**Conclusion**

In summary, against the backdrop of a changing and increasingly competitive climate, the Big Data initiative proposes new sources of information for a better understanding of the phenomenon of tourism. This promotes coordination between the public and private sectors to boost the benefits of tourism and minimise its negative impact. This way, Big Data grants quick and precise answers to help orientate government decisions, forming a fundamental base for the city tourist board’s public policies, as well as to promote opportunities to local businesses and entrepreneurs.