

Rimini Fiera

Mobility analysis through Big data



Descriptive report of
the dashboards

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Rimini Fiera Mobility analysis through Big Data

Descriptive report of the dashboards

Project manager

Eng. Daniele Mancuso

Prepared by

Eng. Giulia Cascone

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INDICE

1. ABSTRACT.....	7
2. DATA SOURCES.....	8
3. ANALYSIS	9
4. RESULTS.....	10

1. Abstract

The PUMS, Piano Urbano per la Mobilità Sostenibile (Urban Plan for Sustainable Mobility) of the Municipality of Rimini has launched a study on the participation to **ECOMONDO Expo** in November 2018.

GO-Mobility has carried out a study about several aspects of the same event, such as statistics on visitor comings, main access points and mobility features trough the Rimini's Area during the central days of the manifestation.

The study was conducted by mounting different database on a single product that can be queried via interactive dashboards. The outcome is a flexible tool, well suited to the visualization of the current state and therefore to the identification of the critical aspects.

Possible developments could be implemented to allow the assessment of scenarios related to particular solutions, concerning, for example, planning of functional public transport system and rethink the private one in order to reduce negative impact of traffic flows; designing strategies to increase the accessibility of the Fair's facilities; promoting multi-modal integrated transport system.

The mentioned study is based on Big Data collected during the same period in which has taken place "Ecomondo" event in Rimini Fair in November 2018.

"Ecomondo" is one of the events with a higher turnout of visitors, the analysis relating to those days, therefore, can be significant for the identification of the critical issues arising from events of similar scale.

2. Data sources

The Big data analysis has involved aggregating information from disparate sources with the goal of drawing meaningful conclusions about travel behaviours, mobility and transportation system analysis in terms of network performances (average speed and travel times), in full respect of the privacy of the users.

This mix of different data types, makes the analysis more valuable, as it allows to investigate many facets under the same initiative.

The data used to compile the analysis are in detail:

CSLI (Cell site location information): Telephone Data from a mobile phone operator, derived from the location of mobile devices, then anonymized and aggregated, in full respect of privacy;

- **Floating Car Data (FCD):** punctual data transmitted by black boxes installed on cars and other vehicles that provide information in terms of traffic flows and speeds on the road network; they are very useful for traffic and network performance estimation;
- **Traffic Detection Cameras:** placed on site provide measurements on Traffic flows, subsequently processed and grouped by vehicle type. The analysis data refer to what was detected by four double stations (one for each direction of motion) located near the North, South, East and West Fair's entrances;
- **Traffic Control System (TCS) with fixed detectors locations:** provides vehicles flows along some roads of Regional and National interest, subsequently processed and broken down by vehicle type. Five different sections were taken into consideration, on both directions, along regional roadway (source Regional Open Data Portal) and the A14 Rimini Nord and Rimini Sud motorway tollbooths.

3. Analysis

The following analyses investigate the dynamics of mobility related to events held at the Rimini exhibition Center. Data have been processed and mounted on different dashboards, containing filters that allow to view the information on the desired days (so see the differences that exist between event days and non-event days), select time slots, the type of vehicle, the area of analysis.

More detailed information on the outcomes can be found in the "results" section.

Thanks to telephone data (CSLI), visitors' origins have been investigated, both for regional and provincial aggregation level, with reference to central days of the Event "Ecomondo" (7th and 8th of November 2018). The same statistical source also provides information about number of overnight stays by visitors in Rimini and Riccione, attendance distribution throughout the day and main poles used for access and exit the Fair's area.

This information was then associated with the analysis of flows distribution, which enter and leave the Fair, between the different roads connections. In this case, as the source is FCD database, the sample refers only to the private transport mode.

The same FCDs, extrapolated from the exhibition area on the days of the event, were also used for an in-depth analysis of the travel times and distances, aggregated by class and distributed by percentage, so that to each class of travel distance is attributed a distribution of the evaluated travel times.

The third field of study concerns the network performance, in terms of both use and speeds. The related dashboards investigate the different components of vehicular traffic (cars and heavy vehicles) and variability of speed over the area, comparing the values of days of the event with the average ones.

To further investigate the impacts of the event on the road network, data obtained from TCS were also processed, displaying the daily trend (data aggregated at quarter of an hour). The flows were also investigated in the area closest to the exhibition facilities, through Traffic Detection Cameras installed at the main access roads and at parking lots. In this regard, the data of the measurements made with the camera were used to create the daily distribution of enter/exit flows to the Fair, classified by vehicle's type, with a focus on the transited bikes. As for parking, through FCD points, for each parking lot of the Fair (West, East, South, Central) the dwell times were classed and the percentage distribution processed.

4. Results

During the two central days of the event were recorded 73,367 total admissions, Italians and foreigners (about 5%), with a greater turnout during the second day.

Among Italians, about 65% of visitors came from Northern regions, mainly from Emilia Romagna and Lombardy. At a provincial level the main origins are from Milan, Rimini, Rome and Bologna.

Most of the visitors arriving by car (Source FCD) access the Fair between 8 and 10 am, while the cumulative total attendance (telephone data) reaches its peak in the range between 1 and 2 pm. The "Exit curve" has a more pronounced peak than the incoming one, especially between 17 and 18. The concentration of people outgoing in such a short time frame usually causes congestion problems.

A very high percentage of visitors made an overnight stay in the areas of Rimini and Riccione (42% the night between 6 and 7 November and 47% the next), with a clear preference for the areas of the North Marina and Rimini downtown.

On the first of the analysed days (November 7th), it is estimated that about 55% of the visitors passed through one of the four points of interest selected (Co-visit analysis), up to 24 hours before arriving at the Fair (the day before is also considered). Among these almost 60% passed through the Rimini Nord motorway tollgate, the others come from the other three POI considered (Rimini Sud motorway tollgate, Rimini central railway station and Rimini Airport). The remaining 45% that has not been detected in these Point of Interest used other roads.

The origin of users travelling by private car, investigated by FCD, reports consistent results with those obtained from the Co-visit analysis undertaken with telephone data. Always referring to November 7th we see that 31% of users surveyed in the Fiera has passed through the Rimini Nord motorway tollgate, 14% from the Rimini Sud motorway tollgate and the rest is distributed on the other five routes considered, mainly serving the local traffic. From the comparison with the traffic flows at the toll booths, provided by "Autostrade per l'Italia", we can note that, while the "Rimini Sud" Exit is usually much more frequented than the "Rimini Nord" exit, during the days of the Event the result is reversed.

The 7% of the vehicles going to the Fair, monitored by FCD, represents the heavy traffic component. Thanks to the representation of the points released by cars, georeferenced on a map, it is possible to identify which road infrastructures are used by this traffic component, so to make some considerations about the network occupation.

Network performance was investigated using the speed of detected points. The reference dashboard shows the variations of speed on the network during the day, both for a circumscribed area around the Fair, and for the wider area. Focusing on the surrounding area of the Fair, the study shows as here the network is more affected by congestion, especially on roads having a mixture of traffic components, coming from the Fair and commuting to and from Rimini. During the days of the event, particularly in the afternoon rush hour, important changes in average network speeds were detected and, focusing this analysis on the circumscribed area around the Fair, we can see that these differences increase further, reaching around 30%. This particular analysis has therefore made it possible to locate, both in geographical and temporal terms, the congestion dynamics and to compare them among different dates (event and non-event days).