

# Big Data, Business Intelligence and Tourism: a brief analysis of the literature

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## 1 Problem Definition

Big Data is, today, a very popular buzzword (a Google search provides more than 55 million items containing the expression). The term identifies, as known, the massive volume of both structured and unstructured data apparently available on the Web and difficult to process using traditional software techniques or by using traditional statistical methods. It is a rapidly emerging field of inquiry, often hailed as a crucial factor for increasing economic prosperity and understanding or resolving societal problems (Mayer-Schönberger & Cukier, 2013).

Big Data (BD) are considered by many an incredible opportunity for its supposed capacity to provide answers to practically any question that could be asked about people's behaviours, views and feelings. As a matter of fact, it is rather surprising to see that a phenomenon once considered causing puzzlement and confusion, the so called *information overload*, once changed name into *Big Data* is now believed to be a kind of silver bullet, able to provide a wealth of valuable and unquestionable insights into many aspects of the modern life of individuals, organisations and markets (Mayer-Schönberger & Cukier, 2013; McAfee et al., 2012).

Many of these claims, though, look more than reasonable and, actually, the capability to examine complex phenomena by combining so widely available sources of information can be a remarkable advantage for those who can fully exploit them (Bedeley & Nemati, 2014).

On the other hand, BD present a good number of challenges and risks, well discussed in a number of works (Boyd & Crawford, 2012; Fan et al., 2014; McFarland & McFarland, 2015). They mainly refer to the technical and methodological difficulties in treating so large volumes of rapidly changing sets of data. Besides that, there is a need for a good set of specialised skills and resources, and a different approach is deemed necessary with respect to the one that for the last centuries has characterised the collection and the analysis of data (Chen et al., 2014).

Nonetheless, scholars and practitioners overall agree that there are remarkable benefits in having access to a vast amount of data that cover practically any aspect of human life, mainly because they are "spontaneously" generated so do not suffer from selection biases that can be present in traditional investigation methods. In any case, even taking into account the methodological issues, BD can be a useful and important complement to more stable, rigorous research methods (Kitchin & Lauriault, 2015).

Big Data have also started to be a source for Business Intelligence (BI) activities. The tradition of BI analytics is longer, but the field is very sensitive to all data and information sources that can provide a better return on the investment. Therefore both subjects are highly complementary. Advanced analytics and better and richer sources can provide a deeper perspective on the data, that can benefit from more structured and rigorous experience. The interpretation layer provided by business intelligence can thus be crucial to making advanced BD analytics actionable (Liebowitz, 2013).

In the last years, tourism has widely recognised the need for a more *customer-focused* approach, that primarily values tourists' needs, preferences and requirements in order to increase the goodness of their experience and achieve a better satisfaction, that turns out to be an important determinant in all travel choices and decisions (Correia et al., 2013; Prayag et al., 2013).

Given these premises, the question is: to what extent is tourism academia aware of, and is working on these subjects?

To answer, at least partially, this question this short note presents the results of an analysis of the recent literature on Big Data and business intelligence and the application of the related techniques to the field of travel, tourism, hospitality and leisure.

## 2 Materials and Methods

The source for this work is the Scopus database. Although, obviously, not a complete source of academic works, with its more than 20,000 titles from about 5,000 international publishers, it can be well considered one of the most comprehensive repository of the world's research output across a wide range of fields. To this we add the IFITT digital library (<http://www.ifitt.org/resources/digital-library/>) which indexes 936 works published in the Journal of Information Technology and Tourism and in the proceedings of the Enter conferences.

A search with "Big Data" in the titles, abstracts and keywords returns 14,051 works. The time distribution is largely uneven and testifies the very recent growth of interest in the subject. A look at Fig. 1 (works published in the last 15 years) shows an almost exponential growth, with an acceleration in the last five years.

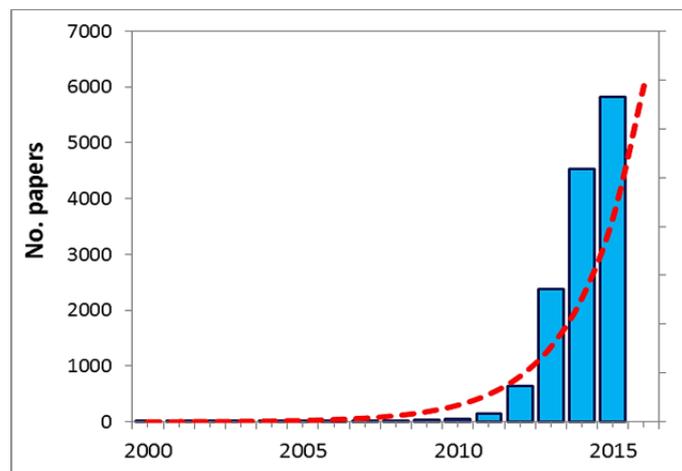


Fig. 1 Time distribution of Big Data works published in the last 15 years

The situation with BI is different. Here we find 16,496 works (with "Business Intelligence" in the titles, abstracts and keywords) with a much wider distribution over time and a moderate growth in the last 15 years (Fig. 2).

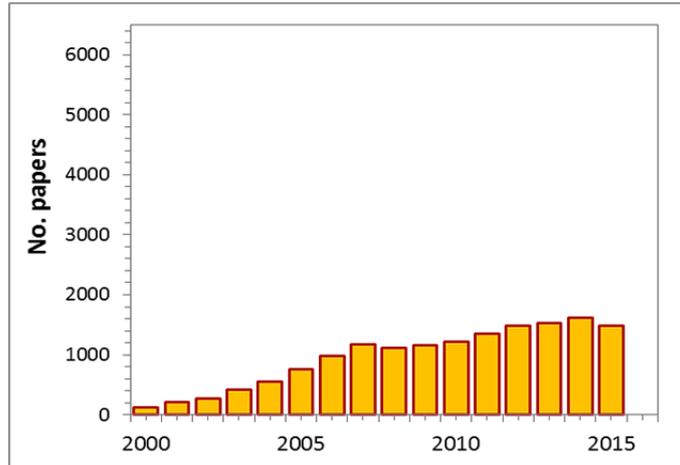


Fig. 1 Time distribution of Business Intelligence works published in the last 15 years

The works related to the wide area of tourism have been identified by restricting the search to these works having “*travel, tourism, tourist, hospitality or leisure*” in the titles, abstracts and keywords. Of these, then, the papers published in tourism and hospitality journals have been selected (Scopus indexes about 80 journals in the field).

Finally, titles and abstracts have been manually inspected to further pick out the works actually dealing with BD and BI.

### 3 Results and Discussion

The total number of BD works in the area of tourism selected as described above is 127. the BI works are 529. Their time distribution is given in Fig. 3 (for the last five years).

Incredibly, it seems that besides the much hype about the BD issue, not many tourism researchers have decided to pay some effort in studying these topics, and only a handful of them have invested time and resources in considering the possibilities of an application of Big Data to the tourism and hospitality field. The BI field, instead, can count on a relatively higher throughput, even if still of a very limited size (at least with respect to the total production).

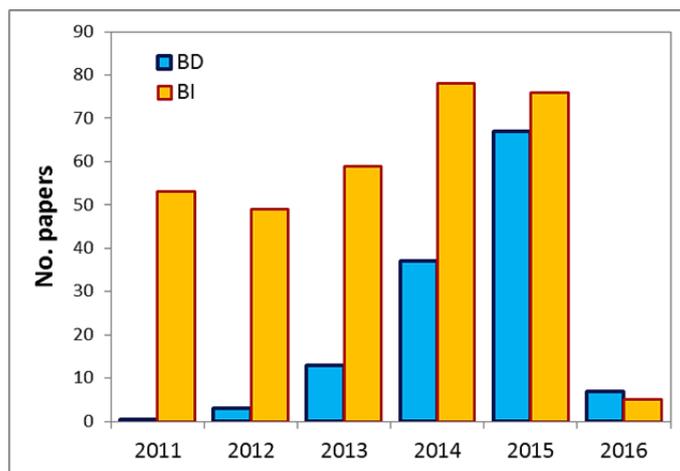


Fig. 3 Time distribution of BD and BI tourism related works for the last five years





One interesting factor emerge: among the most recent tourism BI works, four (actually 22%) are also catalogued in the BD listings (Fuchs et al., 2014; Lam, et al., 2013; Marine-Roig et al., 2015; Qiao et al., 2014). This is a clear indication of the fact that tourism scholars (at least those few who treat these topics) have well understood the capability of BD to provide insights that are useful, or should be used, for enriching the business intelligence practices of destinations and operators.

#### 4 Concluding Remarks

Although quite popular and strongly pushed by many, the idea that Big Data can be a very useful source of information for the tourism sector seems to be still a bit ignored by the researchers in the field, at least when “real” work is concerned. Same situation seems to happen for what concerns business intelligence studies. It is difficult to understand the reasons for this situation.

A hint may be that the resources (hardware and software) needed to actually treat huge quantities of data are not normal available to tourism researchers, but rather sit in computer science departments, and many of the modern analysis techniques require a good knowledge of some computer programming language or database management system that are not very popular among the scholars in the tourism field. For BI, the same could be said, as good practices call for well and rationally designed, organised and managed information systems.

These issues could be solved by establishing good interdisciplinary collaborations. Moreover, for the future generations, it is important to start introducing well-tailored educational programs in the tourism studies curricula.

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