

The Use of Google Trends Data as Proxy of Foreign Tourist Inflows to Portugal

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Abstract

Over the last 20 years, we assisted to a technology revolution and the Internet was the driver. The tourism has been appointed as a sector which more impacted with these technology changes, namely in what concerns the gather of tourism information or making online reservations. Usually, the process of searching starts by using a search engine and, actually, enterprises like Google do the tracking of its users behavior by using their own tools and make this data available to the public through the Google Trends tool. The purpose of this paper is to show that Google Trends data can provide important information to tourism stakeholders and help to understand the interests of foreign tourists in Portugal, earlier than the official statistical data. In the pursuit of our goals we correlated the Google Trends data on a set of search terms with official tourism data of Portugal. The paper demonstrates that Google Trends can provide information about the intentions of individuals about accommodations needs country wise or specifically in its tourism regions. The results show that the actual nights spent in accommodations establishments by the residents in foreign countries are strongly correlated with the Google Index, namely with residents in Spain.

Keywords: Google Trends, Tourism, Internet data, Portugal

JEL Classification: Z Other Special Topics

1. Introduction

Given the specificities of the tourism sector and its dependence on the available information, the tourism stakeholders need access to timely information about the preferences and tendencies of tourist consumer to act accordingly. In Portugal, the tourism statistics are provided by Statistics Portugal but this information is insufficient given the rapid changes occurring in society and new tendencies in tourism demand. Besides that, this information is released quite late and is not available for all geographical areas.

Internet is being increasingly used by the tourist consumers to find information or select and purchase tourism products/destinations and, normally, this process through the use of a search engine. According to StatCounter Global Stats, the search engine Google led the market since July 2008 until September 2016, dominating almost 90% of the searches worldwide. This enormous quantity of information about Internet users' searches is recorded by Google Inc. and the Google-based search data is available to the public, for free, via the Google Trends (GT) tool.

The GT provides data since 2004 until present, on a daily or weekly basis about the searches performed on Google about various issues, highlighting and showing the content about travel classified in travel categories. Therefore, GT data can give us information about the interests and intentions of the tourist consumer at a region or country level in a timely manner, which means sometimes a few months before the trip.

The aim of this paper is to explore the GT data in order to understand the behavior and interests of foreign tourist about Portugal tourism and to verify if the Google-based search data can reflect what happens in the real world. For that, we correlated GT data regarding the foreign tourist, namely from Germany, United Kingdom and Spain, with conventional tourism statistics of Portugal. Moreover, we intended to examine whether the correlation applies in the same way to different Internet users and geographical areas.

This paper starts with a literature review followed by a detailed description of the used methodology for the univariate variable analyses and for the correlation study of the GT and the tourism official data. Finally, we present the results and the performed analysis, ending with the conclusions.

Our results contribute to increase the knowledge on the potential of Google-based search data in order to understand the intentions and behavior patterns of foreign tourists. Additionally, our paper adds to the available knowledge in the literature because it is the first in the field of hospitality and tourism applied to Portugal and that used several keywords to define the Portugal and Algarve tourist destination, namely the municipality's names with the most number of overnights in the hotel accommodations in mainland Portugal in 2011.

2. Literature Review

Since last decades of last century, the Information and Communications Technology (ICT) influenced significantly the way the tourist consumer finds tourism information and proceed to tourist reservation services. Nowadays, the new technologies allow access to information and reservation of products and services at any time and place, making the process of travel planning and booking flexible (UNWTO, 2011).

According to Poon (1993) ICT create the flexibility for suppliers to segment the market and meet consumer needs at competitive prices. Furthermore, the organizations need to understand the needs of consumers, bet on the quality of their products and focus on consumer promotion and sales actions.

Pratas, Vale and Brito (2014) refers that tourism organizations are more competitive and adaptable to the surrounding environment if they have an information system that allows them to base their decisions based on updated information on a permanent basis.

Euromonitor International (2013) points out that tourism organizations must develop multichannel strategies, with levels of personalization/services consistent across all channels. VFMLeonardo (s.d.) refers that the tourist consumers needs all kind of information to help them making a decision, thus to reach this consumers, tourism organizations needs to be represented in all marketing channel and accessible through all type of devices. Law, Qi & Buhalis (2009) argues that understanding the behavior of consumers online and,

particularly, the consumer behavior for what concerns information search, may help tourism managers to develop and personalise their websites and optimize their presence in search engines. In the opinion of Cai Cai, Feng & Breiter (2004) it is essential to understand the consumer search behavior and incorporate these lessons into the development and delivery of information in the appropriate channels.

According to Google (2014), the travel cycle is developed in five steps, these are: dreaming, planning, booking, experiencing, and sharing, and according to Moreno de la Santa (UNWTO, 2011) the dreaming and experiencing phases are an opportunity to influence the decision of the tourist consumer, that has not been exploited by travel marketing experts.

Regarding the EU survey about the "Attitudes of Europeans towards tourism", conducted by the European Commission, in 2012, 40% of European citizens consider Internet to be important in the decision-making process, and more than half of the respondents refers that they use the Internet to organize their holidays (European Commission, 2012). With the aim of understanding the behavior of travellers in the Internet in 12 different countries, Travelpoint (2010) conducted a study, in early 2010, where more than 12.000 travellers were analysed for what concerns the process of planning and purchase of travel and concluded that most travellers used multiple sources of information and the leisure travellers used more than business travellers. Furthermore, regarding the type of sites used to search for information, they concluded that 66% of leisure travellers and 59% of the business travellers mentioned that they used search engines to plan the last trip, it is the type of site most mentioned by both kind of travellers.

According to a study developed by Rheem (2012) with the aim of analysing how consumers in the United Kingdom, Germany, USA, India, Russia and Brazil make their decision about online leisure travel in present and future, the general search engines are the sites normally more used by this consumers to select the destination and buying tourism services, with exception of USA. However, it is important to emphasize that 50 percent of the Americans use search a engine in the phase of destination selection. Besides that, the tourist services more searched in the Internet by the respondents are air transport and accommodation. In addition, the autor concluded in relation to travel planning that the British are the consumers that start earlier the trip process planning (116 days) and the first reservation occur 84 days before the departure.

According to Xiang and Fesenmaier (2006), the search engine is an essential tool in the travel decision-making process. Regarding the model of online search information travel develop by Fesenmaier (s.d.), the searches happen in the different phases of the trip.

The search engine that was the market leader, according to StatCounter Global Stats (2016), since July 2008 until September 2016, was Google, dominating almost 90% of the searches worldwide. The way the consumers query formulation in the search engine, namely the search terms used, provide important information about the interests of the future tourist consumer. This query formulation in the tourism area according to several authors (Xiang & Pan, 2011; Xiang, Gretzel & Fesenmaier, 2009); Jones, Zhang, Rey, Jhala & Stipp, 2008), Pan, Litvin & Goldman, 2006), are normally short, composed of three or more terms, undiversified and on functional aspects of travel, and the terms are related to geographic area (country, city or state) often combined with other tourist resources, mainly accommodation and transport.

The queries formulation is recorded by the suppliers of search engine and according to Kaushik (2007), this data is perfectly suitable for gain knowledge about the behavior and trends of keywords in search engines and to understand the demographic profile of the organizations site visitors and their competitors. Actually, some enterprises like Google Inc. have tools that are available to the general public that provide data based on searches performed on the search engine - one of this tool is GT.

GT was launched in 2012 and allows comparing search volume patterns by search terms, geographic location and time ranges. The GT classified the search terms in categories and the searches related to travel and tourism are classified in the travel category which means that we have the guarantee of the Google Inc. that the searches are made with that purpose. The data is available in relative values, due to confidentiality reasons, on a daily or weekly basis, and can be downloaded in .csv format.

Given the fact that the tourist consumer seeks information in search engines before the trip, the GT data can give us data about the intentions, interests and desires of these individuals that can be used as proxy of tourist movements of a specific destination. Therefore, the GT data can be of great interest to the tourism stakeholders because they are available before tourist travelling to the destination, which means that this data can help the stakeholders in decision making. In Portugal, financial constraints have restricted the application

by the Statistics Portugal of sample surveys that allows to obtain data on the movements of foreign visitants to Portugal, which means that since 2007 tourist stakeholders don't have access to this information, that is, they really don't know the statistics of inbound tourist to Portugal. Besides that, the tourism statistics that are published in Portugal by Statistics Portugal are released months or years later, are insufficient to face the changes in tourist consumer behaviour and don't cover lower geographical levels, such as cities.

Until now several authors (Ginsberg, Mohebbi, Patel, Brammer, Smolinski & Brilliant (2009); Smith (2012), Granka (2010); Judge & Hand (2010); Chamberlin (2010); Choi & Varian (2009), Shimshoni, Efron & Matias (2009), Suhoy (2009), Smith & White (2011), Artola & Galán (2012), Gawlik, Kabaria & Kaur (2011), Saidi, Scacciavillani & Ali (2010), Pan, Wu, Song (2012)) of different areas used GT data in their investigations and most of them show that GT data are correlate with the official statistics and prove that when GT data is used as independent variable in a forecasting model improves its performance. However, we don't know any study that uses several keywords to define a tourist destination and used as a criterion to select the keywords the names of municipalities that integrate the tourist destination. Furthermore, this study is applied to Portugal and intends to know better the main tourist markets for this country and, in particular, the interest of British for a specific tourist region of Portugal – Algarve

The GT data can be very useful, however, when tourism stakeholders analyse the data they must have in consideration some caveat of GT tool, with emphasis to the use of relative rather than absolute volumes of searches, and that it refers is referent only to a portion of Google web searches. Furthermore, the geographic location identified by the GT tool is based on the IP address of the users and the investigator need to have some care when choosing the search terms for analysing because they can be pronounced in other languages or have another meaning who do not wish.

3. Methodology

This paper aims to empirically verify if GT data can be used in the analysis of the foreign tourist intentions related to the Portugal tourism and the interest of the British by Algarve as tourism destination. For that, we correlated the variable overnights spent by residents in hotel establishments by month, published by Statistics Portugal, with the searches made by Google users related to hotels. We applied this research to the users Google located in Spain, United Kingdom and Germany because these are the main tourist markets for Portugal, representing almost 50% of the overnights of foreign residents in the accommodation establishments.

For what concerns GT data, we considered a combination of search queries based on the geographic area, mainly the municipalities' name. However, since mainland Portugal is constituted by various municipalities and GT only allowed 30 search terms, we considered the name of the municipalities that, according to Statistics Portugal, registered the biggest number of overnights in the accommodation establishments in mainland Portugal in 2011. Regarding the Algarve, since this region consisted of 16 municipalities, we consider as search terms, in addition to the municipalities' name, localities with tourism interest in that municipalities, which means that, we have added the localities of "vilamoura", "alvor", "quarteira", "eulalia", "almancil", "altura" and "armação" in the combination of search terms to represent the Algarve region.

Furthermore, we using used the plus sign between the search terms to grouped the search terms in a single entry and using the minus sign to exclude search terms that can negatively influence the results, for instance other forms of accommodation (rural accommodations, camping sites, young hostels and hostels), and the quotation marks when we wanted to detect the searches that match that an exact expression. The GT data was obtained from <https://www.google.pt/trends/>, by year, from 2004 until 2012, from the category travel and subcategory hotels & accommodations. Since the GT data is available by week and the tourism official data by month, we transformed the GT data in monthly values by arithmetic average like authors, such as Schmidt & Vosen (2009) and Willard & Nguyen (2011). When the GT data are is presented in monthly values, as in the case of the data extracted for users located in United Kingdom and in Germany for 2004, we considered the monthly values of GT.

We have performed a univariate and bivariate analysis. The series were analysed and processed in relation to missing cases and observations with value “zero”. Furthermore, the series are evaluated in relation to the distribution using the normality test, when the distribution is not normal the variable is subject to a logarithm transformations (Corrar, Paulo & Filho, 2007). To assess the relation between the time series, we applied the Pearson correlation coefficient when the distribution are normality and the coefficient of Spearman when, after carrying out the transformation of the variables, the normality of the distribution has not been reached. The statistical software used to analyse the data is was the SPSS, version 20.0.

In figure 1, we can see the combinations of search terms used in the empirical study.

Figure 1. Search terms used in the study

Spain	Mainland Portugal	portugal +lisboa +alentejo +algarve + “porto” +albufeira +cascais +ourem +fatima +portimao +coimbra +aveiro +tavira +gaia +douro +loule +setubal +sintra +braga +almada +evora +matosinhos +faro +varzim +guimaraes - rurales -camping -albergue - hostel
Germany	Mainland Portugal	portugal+ lissabon +lisboa+ alentejo +algarve +albufeira+portimao+ lagos+ “porto” - seguro +douro +cascais +montegordo + loule +sintra +tavira +evora +silves +faro – jandia +gaia +ourem +fatima +sesimbra + bispo +matosinhos +setubal +braga -ländlichen – camping -jugengherbergen - hostel
United Kingdom	Mainland Portugal	portugal+lisbon+alentejo+algarve+ albufeira+loule+portimao+lagos - “porto”- seguro + carvoeiro+douro+cascais+tavira+faro+ montegordo+sintra+silves+evora+coimbra+almada+ varzim+ gaia+oeiras +matosinhos +bispo +braga + sesimbra - country - camping - hostel
United Kingdom	Algarve	algarve+ albufeira+ loule+portimao+ montegordo+ tavira+ faro+carvoeiro+lagos+sagres+silves+ “castro marim” +monchique+olhao+aljezur+vilamoura + alvor + quarteira + eulalia+ almancil+ altura+ armação- rural-camping-hostel

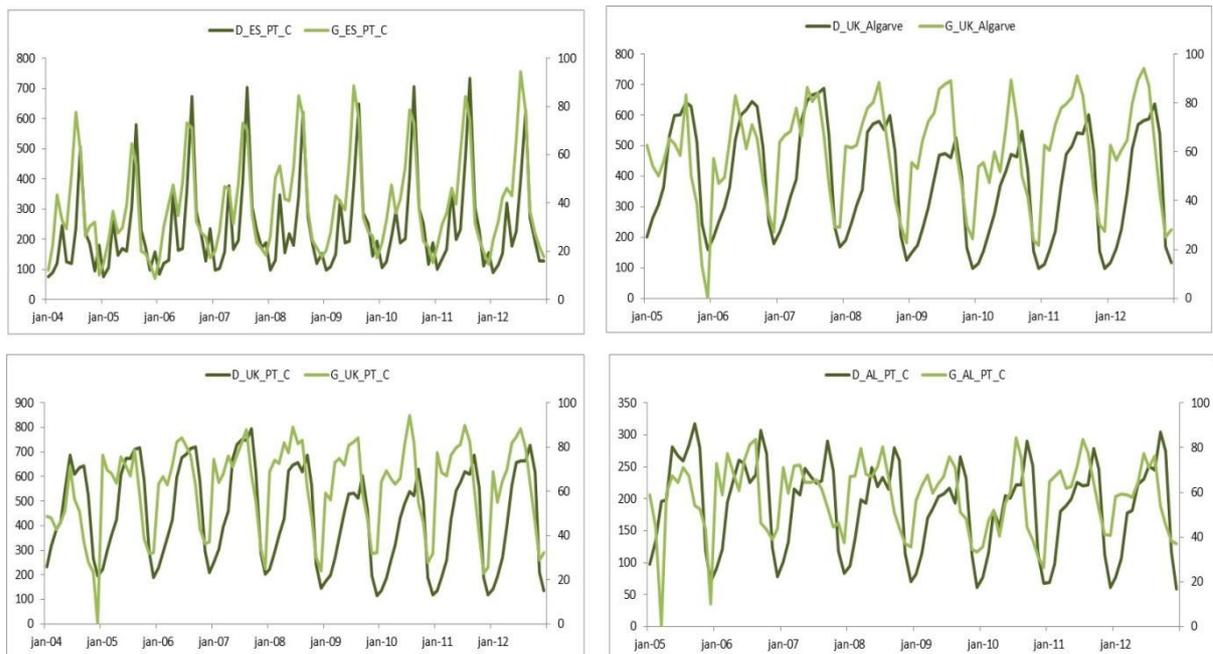
4. Results

In figure 2, we can observe the graphical representation of the variables “overnights spent in hotel establishments” in Portugal, between 2004 until 2012, made by the main foreign tourism markets, namely Spain, United Kingdom and Germany, and the GT index for Portugal relating to accommodation and hotels. Furthermore, we can observe the interest of searches of the British by hotels and accommodation in Algarve region and the overnights of this market in the establishments of that region in the same period.

Analysing this figure, we found that the series in under analysis show a seasonal pattern, repeated year after year, which consists shows their highest values in the summer and the minimum values during the winter months. The variables referents to United Kingdom and Germany market presents seasonal peaks of lower dimension, which means, that the interest of the British is greater in the summer months, but while in the case of the Spanish market that focuses primarily in the month of August, in case of these markets the season with greater flow of tourists is concentrated between May and September. In July 2012, we observed

the greater values of the search volume index by the Spanish and United Kingdom market for accommodation in the Portugal and Algarve, respectively.

Figure 2. Overnights spent by residents of the United Kingdom, Germany and Spain in hotel establishments in mainland Portugal vs. the GT index



Source: Own elaboration from Google (www.google.pt/trends/) e INE (2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012,2013)

Furthermore, we observed that the variable “overnights spent in hotel establishments” and GT index presents a similar behaviour, which means that when the variable overnights increases the GT index increases also and vice-versa, with a two-month deferment in the case of United Kingdom and Germany, and one month in case of Spain, similar to that was found by Frazão (2013). Besides that, it is important to emphasise that in case of Britain and Germany we can observe a peak of searches in the first months of the years in analyse. In view of this, we affirm that tourism stakeholders should undertake strong marketing activities in these markets at the beginning of each year.

Table 1. Descriptive Statistic and Kolmogorov-Smirnov Test

Variables	N ^o	Missing values	Descriptive Statistic										K_S Test	
			Mean	5% Trimmed Mean	Median	Mode	Variance	Std. Deviation	Minimum	Maxmum	Skewness	Kurtosis	Outliers	Sig.
D_ES_PT_C	108	0	237,2	220,7	188,3	75,3 ^a	22996,1	151,6446	75,3	733,7	1,70	2,55	8	0,000
D_UK_PT_C	108	0	440,3	440,7	442,2	294	39910,3	199,8	116,5	794,7	-0,06	-1,42	0	0,002
D_AL_PT_C	96	0	187,3	187,8	202,1	215 ^a	5129,7	71,6	58,7	317,5	-0,26	-1,13	0	0,003
D_UK_Algarve	96	0	380,7	380,3	379,7	628	33164,9	182,1	96,4	688,9	-0,28	-1,12	0	0,002
G_ES_PT_C	108	0	39,3	38,2	34,5	37	404,3	20,1	8,8	94,3	0,86	-0,09	3	0,001
G_UK_PT_C	108	0	61,2	62,0	66,3	82,00 ^b	393,0	19,8	0,0	94,5	-0,67	-0,36	1	0,000
G_AL_PT_C	96	0	57,6	58,3	59,9	59,75 ^a	254,0	15,9	0,0	84,3	-0,81	1,01	2	0,017
G_UK_Algarve	96	0	59,2	59,8	62,4	29,80 ^b	415,6	20,4	0,0	94,3	-0,50	-0,25	1	0,061

Source: Own elaboration from SPSS data

Analysing the descriptive statistic from table 1, we verified that the variables "D_AL_PT_C", "G_AL_PT_C", "D_UK_Algarve" and "G_UK_Algarve" have less observations than the others variables (96 observations). This justified is justifiable because we have eliminated the missing values referent to the year 2004. In general, the variables don't look to be sensitive to the maximum values because the values of the 5th 5% trimmed mean is similar to the mean values.

The mean values, mode and median are not coincident in any of the variables, indicating that this is an asymmetric distribution. The set of variables "D_ES_PT_C" and "G_ES_PT_C" Skewness values are positive, which means that the distribution is positively skewed. The variables "G_UK_PT_C", "G_UK_Algarve" and "G_AL_PT_C" have "zero" as a minimum value, having proceeded to their replacement by the GT index with lower below the "zero", thereby reducing the number of outliers observed in the table. The K-S test confirms that "G_UK_Algarve" ($p > 0.05$) have a normal distribution, the remaining variables were submitted to logarithmic transformation and only the set of variables "D_ES_PT_C" and "G_ES_PT_C" reached normality. The Pearson coefficient was applied to variables that presented a bivariate normal distribution, i.e., to the "D_ES_PT_C" and "G_ES_PT_C" variables. To the other variables we decided to apply the Spearman coefficient.

In table 2 we can observe the correlations between overnights spent by residents in Spain, United Kingdom and Germany in hotel establishments and the GT index. Analysing the values it is possible to verified that, the correlation coefficients are all positive, which means that the variables tend to relocate together, in other words, large values of the variable "overnights spent in hotel establishments" tend to be associated with large values of the GT index. Furthermore, the Pearson Coefficient of the set of variables "D_ES_PT_C" and "G_ES_PT_C" is 0,68, which means that the overnights of the Spanish are strongly¹ related with the searches doing by this people about hotels in Portugal, at the 0.01 level. The correlation between the set of variables "D_UK_PT_C" / "G_UK_PT_C" and "D_UK_Algarve" / "G_UK_Algarve" is moderate (r is higher than 0.4) and

¹ According the interpretation of the Pearson Coefficient presented by Franzblau (1958)

between the overnights spent by residents in Germany and the GT index ($D_AL_PT_C / G_AL_PT_C$) is weak (r is approximately 0,3).

Table 2. Correlations between overnights spent by residents in Spain, United Kingdom and Germany in hotel establishments and GT index

Date	Overnights Google	N°	Variable	p	Correlation
2004-2012	Spain/Portugal	108	T	0,000	0,679**
	United Kingdom/Portugal	108	O	0	0,470**
	Germany/Portugal	96	O	0,000	0,286**
	United Kingdom/Algarve	96	O	0,000	0,578**
O: Original Variable; T: transformed variable					
** Correlation is significant at the 0.01 level (2-tailed)					

Source: Own elaboration from SPSS data

5. Conclusion

Over the last years we assisted to an increase in the use of the Internet with the propose of find tourist tourism information, make reservations of tourist tourism services and share the tourists experience to the others. Therefore, the travel life cycle process of travel life cycle is entirely happening on the Internet and this normally starts in a search engine.

The search engine of the Google Inc. is leader in the market and this enterprise has a tool that is available for free to the public that provides data about the search volumes performed by Google users in several areas, with the advantage of having a category specifically for the search terms related to travel. GT data is available on a daily or weekly basis and that can be disaggregated by the geographic location of the individuals, search terms or time ranges. This data is available just in time before the issuing of official tourism statistics allowing tourist stakeholders making informed and timely decisions. Furthermore, since the tourist consumers make their searches months before the trip, GT data can be used to anticipate tourist's interests and intentions in relation to a specific tourist tourism destination.

Until now, several researchers have used GT data in their investigations research in different areas and have shown that GT data is correlated with the official statistics data and that the use of GT data in the forecasting and nowcasting models improves its forecasting ability, but the studies in the tourism and hospitality field are scarce and none of them concern addresses the tourism in Portugal.

Our results show that there are similar movements and positive correlations between the variables in analyse, which means that when the variable GT index increase the number of overnights spent by foreign tourists in hotel establishments increases also and vice versa. Furthermore, we have shown that the interest and behaviour of the searches of foreign countries by the tourism in Portugal is related to the behaviour of the overnights in hotel establishments and that vary by country, in other words, we observed that the highest values higher of searches occur in the summer months and the

lower values in the winter. However, we verified that searches happen two months before the trip in case of British or Germans and one month for the Spanish. Besides that, we observed a peak of searches done by British and German in the beginning of the year, which leads us to affirm that it is increasingly important to start marketing activities in these markets at the beginning of the year.

This study presents some limitations most of them are inherent to the GT tool but requiring some caution when you are analyzing the data, the analyses are referent to individuals that use the Google search engine to plan their trips; it was not possible to integrate in the definition of the search terms that represent Portugal all municipalities of the country; it is possible that the data include some online searches made with another intention, although they have been categorized by Google in the context of the hotels and accommodation, or the search terms have another meaning in other countries. Furthermore, we used in analyses GT means values.

For future research, we suggest that this GT data could also be tested in relation to their capacity to improve forecasting accuracy in tourist demand in Portugal and Algarve tourism region using the GT data as explanatory variable in an inbound tourism forecasting model, such as the Transfer Function.

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