PREDICTING THE PRESENT AND FUTURE OF AQUAPONICS

Maria Dos Santos [1],

[1] DINAMIA'CET—ISCTE–IUL, Escola Superior Comunicação Social —Instituto Politécnico de Lisboa, Av. das Forcas Armadas, Edificio, ISCTE, Sala 2W4-d,
1649-026 Lisboa, Portugal; mjpls1963@iscte.pt

Introduction

Nowadays the increasing volumes of 'big data' reflecting various aspects of our present activities and represent a crucial new opportunity for scientists and experts to study the fundamental questions about the complex world we inhabit (Preis et al., 2013; Axtell, R. L. Zipf, 2001; King 2011; Vespignani, 2009; Perc, 2012; Petersen et al., 2012; Christakis et al., 2009).

On the other hand, research on innovative topics, whose technology is still in constant progress, development and improvement of efficiency on the use of inputs and the production of outputs like is the case of aquaponics in Europe, sometimes results in difficulties in obtaining data. These difficulties arise, or because there is no data available from private companies, or because either there are data from other continents, or countries whose production systems do not allow comparability, or because the soil-climatic conditions, or technical-institutional-economic conditions (Goddek, et al. (2015; Dos Santos. 2016). Because they use different production techniques due to the difference in quality and quantity of inputs available *in loco*.,

In today's world, information gathering often consists of searching online sources. Recently, the search engine Google tends has begun to provide access to aggregated information on the volume of queries for different search terms and how these volumes change over time, via the publicly available service Google Trends. In the present study, we investigate the intriguing possibility of analyzing search query data from Google Trends to provide new insights about the importance and the role of the Aquaponics Hub from COST FA 1305 in the growth and research of aquaponics and aquaponics related terms such as aquaculture and hydroponics in the world; Europe and European countries involved in this Action.

Literature Review

According the Google trends search (2017) the world is paying increasing attention to aquaponics and aquaponics associated terms based on the figure 1 that presents the searching terms across the world. That date is based on google trends research between 2014 and 2016. Since the beginning of January 2004, Google has been collecting data on the number of search queries that it receives for various search terms. From these raw data, Google can then compile a weekly Google Trends query index for the number of searches completed for any particular search term (Hand, & Judge, (2012). Data provided by Google Trends are already normalized over each selected period and downloaded online in .csv format. The normalization process is reported as follows: "each data point is divided by the total searches of the geography and time range it represents, to compare relative popularity. The resulting numbers are then scaled to a range of 0 to 100" (Google Trends, 2016; Google Trends, 2017, Mavragani and Tsagarakis, 2016).

Methodology

The methodology includes the Google Trends search from 2014-2016 at European; world and per country level search. After we use univariate analysis and econometric models namely an ARIMA model based on Choi and Varian (2009):

$$\ln y_t = \alpha_0 + \alpha_1 \ln y_{t-1} + \alpha_{12} \ln y_{t-12} + \beta x_t + u_t$$

Results

Figure 1 presents the present and prevision of aquaponics across the world. The prevision of aquaponics and aquaponics related terms show an increasing trend in the future. Besides that, the searching of aquaponics at the present (from 2014-2016) presents more or less constant values at the world level. But at the same time in Europe aquaponics and aquaponics related terms presents an increasing trend. This fact could not be separate from the importance and the ward scientific, professional and at politic level work developed by the Aquaponics Hub. These results were, as well, confirmed by the partial searching per country where the searching in aquaponics and aquaponics related terms show, in general an increasing in the Google trends search after the country becomes part of this Action, but the results vary depending the country.
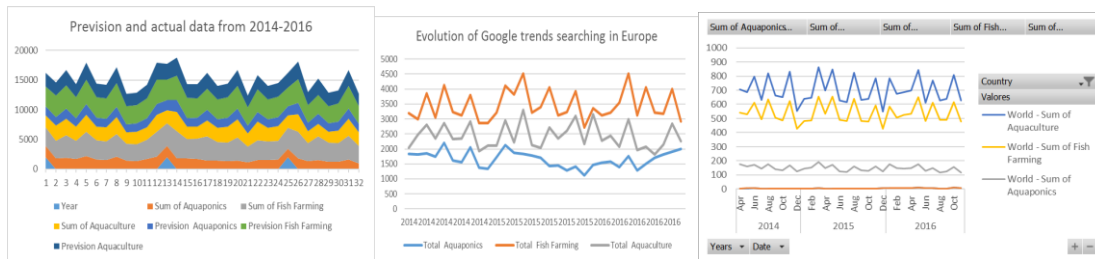
Fig.1 - World Google trends searching Fig 2 – Aquaponics searching in Europe Fig 3 – Aquaponics searching in World

References

Axtell, R. L. Zipf distribution of US firm sizes (2001). Science 293, 1818–1820.

Choi, H., & Varian, H. (2012), "Predicting the present with Google Trends". *Economic Record*, 88(s1), 2-9.

Dos Santos, Maria José Palma Lampreia. (2016)."Smart cities and urban areas—Aquaponics as innovative urban agriculture." *Urban Forestry & Urban Greening* 20, 402-406.

Fehr, E. (2016). Behavioural science - The economics of impatience. Nature 415, 269–272

Goddek, S., Delaide, B., Mankasingh, U., Ragnarsdottir, K. V., Jijakli, H., & Thorarinsdottir, R. (2015). Challenges of sustainable and commercial aquaponics. Sustainability, 7(4), 4199-4224.

Preis, T., Moat, H. S., & Stanley, H. E. (2013). Quantifying trading behavior in financial markets using Google Trends. *Scientific reports*, *3*.

King, G. (2011). Ensuring the Data-Rich Future of the Social Sciences. Science 331, 719–721.

Perc, M. (2012). Evolution of the most common English words and phrases over the centuries. J. R. Soc. Interface 9, 3323–3328.

Petersen, A.M., Tenenbaum, J. N., Havlin, S., Stanley, H. E. & Perc, M. (2012). Languages cool as they expand: Allometric scaling and the decreasing need for new words. Scientific Reports 2, 943.

Christakis, N. A. & Fowler, J. H. (2009). Connected: The surprising power of our social networks and how they shape our lives (Little, Brown and Company,.

Vespignani, A. (2009). Predicting the Behavior of Techno-Social Systems. Science 325, 425–428.