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Nowcasting and forecasting aquaponics by Google Trends in European countries

Maria José Palma Lampreia Dos Santos

ISCTE-IUL- DINÂMIA'CET – ESCS-IPL, Avenida das Forças Armadas, Edifício ISCTE-IUL, Sala 2W4-d, 1649-026 Lisboa, Portugal

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ABSTRACT

Aquaponics, an innovation in agricultural systems of production and food supply which combines aquaculture fish production with hydroponic production of vegetables, represents a valuable option to overcome the food needs of a constantly increasing world population, it can do so by improving production and supply with less inputs and in a sustainable way. Despite recent developments in this scientific area, there are still not enough commercial firms at a European level that allow for a consistent view of how this activity is evolving in society, as well as, to understand the impact of Aquaponics Hub in promoting the development of this activity in Europe - aquaponics is still at an early age and, despite innovative, it needs time to grow and evolve.

Thus, we used Google Trends data and a quantitative methodology, multivariate analysis and econometric models, in order to both nowcast and forecast insights about the importance, the role and the new trends in aquaponics. The results show an interesting trend of increasing popularity in aquaponics search terms as a proxi of aquaponics development in Europe, mainly in all the European countries belonging to the Aquaponics Hub. However, we conclude that there is still a long way to go for aquaponics before it becomes a commercial activity at economic level. Hence, European and public decision-makers are urged to be more concerned about legislation and the allocation of funds for research and for the commercial investment of companies and for their promotion and development in aquaponics.

1. Introduction

Aquaponics is nowadays the latest innovation in food production systems allowing reduced inputs use and short supply chains, with direct impacts on the sustainability of the entire sector. Due its great innovation your development at the commercial firms' level beginning now to take the first steps. But for research purpose this represents a constraint to obtain data for research at the microeconomic level, namely, at the firm level. Yet, innovation system on food production and short supply chain plays an important role to make agriculture and sector-wide changes more sustainable (Hoes et al., 2016) and cannot be neglected.

But nowadays the increasing volumes of 'big data' reflecting various aspects of our present scientific professional activities and represent a crucial new opportunity for scientists and experts to study the fundamental questions about the complex world we inhabit in different areas (Axtell and Zipf, 2001; Christakis and Fowler, 2009; Frizzo-Barker et al., 2016; King, 2011; Klievink et al., 2017; Perc, 2012; Petersen et al., 2012; Preis et al., 2013; Vespignani, 2009), namely, in management and business (Dittert et al., 2018; Frizzo-Barker et al., 2016) information and communication (Lu et al., 2018; Yu et al., 2018).

In today's world, information gathering often consists of searching online sources (Amankwah-Amoah, 2016; Blazquez, 2017; Preis et al., 2013). Recently, the search engine Google Trends (2017) 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 with historic searches available since January 2004. This recent non-traditional source of social and economic data GT provides up-to-date reports on the volume of search queries on a specific keyword or text, with historic searches from 2004 and was used to nowcast and to forecast social and economic variables with application in various empirical fields (Blazquez, 2017).

Despite GT captures how the demand of information under certain topics varies over time, providing useful data to detect emerging trends and underlying interests and concerns of society, namely, using GT data to nowcast social and economic variables (Blazquez, 2017), the use of GT in agricultural field still remain restricted in and with just only one contribution from Troumbis (2017) who analyzes the GT and cycles of public interest in biodiversity, and remains without any contribution in nowcast aquaponics what is recognized as a sustainable food production technology.

So, the present paper tries to fill this gap on the literature and

E-mail address: mjpls@iscte-iul.pt.

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