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PUBLIC ATTENTION TOWARDS SUSTAINABILITY IN THE EU: AN EXPLORATION OF GOOGLE TRENDS DATA

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Introduction

Sustainability is a multi-dimensional concept (Biggeri et al., 2024; Rockström et al., 2023) and its definition has evolved over time (Hajian and Kashani, 2021). Public attention to sustainability has generally increased in Europe over the past three decades, as indicated by trends in public engagement (Fisher and Nasrin, 2020; Moor et al., 2020; Revez et al., 2022) and media coverage (Holt and Barkemeyer 2012; Hase et al. 2021). However, given the difficulty of measuring public attention towards a topic directly, most large-scale analyses of public attention to sustainability rely on media coverage as a proxy (e.g. Baumgartner & Jones, 1991; Downs, 1998; Wollin, 1999). Thus, we suggest using Google Trends data to analyze public attention towards sustainability.

Whereas Google Trends has found prevalent application in studying health-related phenomena (Brunori et al., 2022; Carniero and Mylonakis, 2009; Ginsberg et al., 2009), distant-reading of a large corpus of academic articles, Ballerini et al. (2024) suggests that Google Trends data have already found application in the study of sustainability (Boss et al., 2023; Dancy and Farris, 2024; Portugal-Nunes et al, 2023). Considering the variability of definitions associated with the term, instead of applying existing assumptions on what sustainability means, we reconstruct what topics, as defined by Google knowledge definitions, received the most public attention, based on users' search practices.

We focus on some of the analytical directions that emerged from the exploration of data collected through Google's private Trends API between 2013-2023. Our research

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questions are: How does the public attention towards sustainability evolve over time and across EU countries? What topics associated with sustainability are the most prominent within EU publics?

Methods

Whereas Google provides APIs for many of its services, to date it does not offer a public API for Google Trends. In March 2024, we were granted access to Google's private Trends API. Although in beta version, minimally documented, and likely not maintained, the API proved functional and delivered reliable results when compared to Google's public interface. Two classes of data, linked to specific elements in the interface, proved particularly promising for our goals: *InterestOverTime* and *TopTopics*. *InterestOverTime* is a score related to the overall popularity of a search term in a specific region over time, while *TopTopics* provide lists of the most popular topics and the most trending topics associated with a specific search term. We opted to collect our data based on the semantic entity "Sustainability" (ID in the Knowledge Representation graph: "/m/0hkst").

The standard *InterestOverTime* measurement, as accessible through the interface or through the Trends API, is a timeseries of scores normalized between 0 and 100. The fact that the score is normalized within each query affects the possibility of aggregation and comparison across countries. To circumvent this obstacle, we conducted a series of comparisons between the standard *InterestOverTime*, as retrieved through the interface, and *getTimelinesForHealth*, a different version of the score originally developed to provide a more advanced level of access to health researchers, accessible through the Trends API. These tests suggest that Health data are, despite minor divergences, the non-normalized version of the standard data obtainable through the interface or through the API. Consequently, for each of the 27 EU countries, we retrieved the non-normalized *InterestOverTime* for the semantic entity "Sustainability" for each week since 2004. This dataset allows us to analyze the temporal evolution and the geographical distribution of the public attention towards the issue of sustainability, as manifested by the (relative) volume of Google searches. Furthermore, we retrieved the *TopTopics* related to the semantic entity "Sustainability" for each month since 2004. After consolidation, the datasets consisted of 751 unique *TopTopics*. These datasets allow us to analyze the spontaneous, bottom-up associations that users make in relation to sustainability over time.

Findings

Using *InterestOverTime* data, we analyzed the longitudinal and cross-country distribution of public attention towards sustainability. We observe a steady growth of public attention towards sustainability since 2018. While most countries demonstrate a consistent increase in the attention given to the issue, France and Finland exhibit notable shifts. Furthermore, regional differences in overall attention towards sustainability are evident, with a clear divide between Western and Eastern European countries. Western countries, particularly the Netherlands and Denmark, devote significantly more attention to the topic of sustainability as compared to other search queries, while Eastern European countries show markedly lower search frequencies. This ranking is mostly stable across the year, signaling a systematic unbalance.

Nevertheless, the fact that all researched countries show their highest *InterestOverTime* in either 2022 or 2023 suggests an increased attention to the topic of sustainability over time, despite a East/West divide.

With *TopTopics* data, we further identified the topics most prominently associated with the concept of sustainability from the bottom-up and we examined patterns of connections between countries and topics. This analysis reveals the prominence of a few general themes that are frequently associated with sustainability across both countries and time, such as Energy, Sustainable Development, and Environment. However, the prominence of economic and corporate-related topics such as Report and Management also suggests that sustainability is often framed through an organizational and economic lens.

The distribution of topics across countries reveals how the most recurrent themes are generally well spread out, while a few topics reflect more specific associations (such as Architecture in Cyprus, Education in France and Greece, and Investment in Luxembourg). Countries are also not clustered in recognizable patterns based on shared associations to sustainability. While many countries are closely linked among each other, signaling that they often share the same topics, a few countries manifest more country-specific patterns of associations. This duality suggests varying levels of integration among countries in terms of emerging associations towards sustainability.

Limitations and Expansions

Interpreting Google Trends data as a proxy for public attention draws a direct parallel between people's Google search practices and public opinion dynamics. Not only the people using Google on a daily basis are not equivalent to the general population; importantly, a search engine is used for specific purposes, while search data lack information about intentions and context. Because of this limitation, triangulation with other data sources becomes an important form of methodological validation.

Our Topic Analysis largely relied on Google's semantic parsing and knowledge representation strategies. As a workaround to this issue, and as a further research direction in its own, we could apply content analysis to existing topics, in order to classify them into higher-level categories (e.g., Economy and Business; Governance and Politics; Technological Innovation;...). Re-running the analysis with a more abstract classification scheme could allow us to observe higher-level patterns from the more specific observations detailed in this paper.

Another meaningful extension of the Trend Analysis would be that of identifying which real-world events are the likely causes of the spikes of interest observed. Introducing Top/RisingQueries is also a way to potentially answer this curiosity. A complementary approach would be that of selecting a number of events topical for the issue of sustainability (e.g., the sign of the Paris Agreement; rise of Friday For Future; Covid outbreak) and evaluate their impact on InterestOverTime and on the composition of Top/RisingTopics.

The analytical directions presented in the findings and those suggested for further research are largely driven by our “generalistic” research goal. However, the datasets shared with this research can also be approached with a more specific research interest. For example, one can focus on the evolution of a specific dimension of sustainability, on the role of specific institutional actors, on the effects of specific events.

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