

Consumer awareness and search trends for agrifood products certified with European Quality Schemes: PDO, PGI, and TSG - An analysis through Google Trends

Alexandra-Ioana GLOGOVEȚAN¹, Dan-Cristian DABIJA², Cristina Bianca POCOL^{3*}

^{1,3} University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania

² Babeş-Bolyai University Cluj-Napoca, Romania

* Corresponding author: C. B. Pocol e-mail: cristina.pocol@usamvcluj.ro

RESEARCH ARTICLE

Abstract

This groundbreaking study leverages Google Trends to probe into consumer awareness of Romanian food products certified under European quality schemes, Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), and Traditional Specialty Guaranteed (TSG), delivering prompt insights and addressing an existing research void. By adopting an innovative methodology through big data analytics - Google Trends and analyzing 12 sets of search terms, this study brings fresh insights to academic discourse and provides valuable information for marketers and policymakers. Prominent search interest was detected for 'Salam de Sibiu', 'Plăcintă dobrogeană', and 'Magiun de prune Topoloveni', pointing to significant consumer familiarity. The study also unveiled regional search patterns, signifying location-based preferences, and potential marketing prospects. However, a marked contrast was found between the high interest in the products and the relatively low awareness of their European quality labels, highlighting a need for enhanced communication initiatives around these certifications. The study could be limited by its focus on Romanian certified food products, which may not be applicable to other geographical contexts. Future research endeavours may also seek to integrate data from Google Trends data with additional indicators of consumer behaviour.

Keywords: big data analysis, Google Trends, Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), Traditional Specialty Guaranteed (TSG).

INTRODUCTION

Europe's rich heritage has been shaped by centuries of agricultural, historical, and cultural influences (Cerquetti and Romagnoli, 2022). This diversity has also led to the development of a vast array of distinctive food products, which are deeply rooted in their specific geographical regions and traditional production methods (Pe'er et al., 2020; De Canio and Martinelli, 2021; Scalvedi and Rossi, 2021). Recognizing the importance of protecting and promoting these products, the European Union (EU) has implemented a series of quality schemes aimed at safeguarding their authenticity and ensuring their long-term viability (European Commission, 2023a). The three primary designations are Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), and Traditional Speciality Guaranteed (TSG), having as a goal to protect the producers, as well as to maintain traditional knowledge and practices (Sgroi and Modica, 2022). The European quality schemes play a crucial role in preserving the continent's heritage by maintaining traditional production methods and preserving regional products from imitation or adulteration (European Commission, 2023a). By promoting these products, the EU ensures the continuation of local food cultures, as well as the knowledge and skills associated with them. European quality

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schemes serve to enhance consumer awareness and confidence in the authenticity and quality of food products (De Canio and Martinelli, 2021; Selvaggi et al., 2023). These designations provide transparent information on the origin and production methods of products, helping consumers make informed choices and fostering trust in the European food market (Sadílek, 2019; Glogoveţan et al., 2022).

The PDO designation is reserved for products whose production, processing, and preparation occur entirely within a specific geographical region, with quality and characteristics intrinsically linked to those factors of the natural and human environment. The application of traditional knowledge further reinforces the connection between the product and its place of origin (European Commission, 2023b). The PGI designation is attributed to products with a strong link to a specific geographical region, in which at least one stage of production, processing, or preparation takes place (European Commission, 2023b). PGI products have a reputation, specific quality, or other characteristics that can be attributed to their geographical origin. The TSG designation is unique in that it focusses on the traditional composition or production method of a product, rather than its geographical origin. TSG products must be made using traditional ingredients or methods that have been consistently applied for a minimum of 30 years (European Commission, 2023b).

Romania has a tradition with several food products that have been recognised with the EU's quality schemes. The following are Romanian food products that have been granted PDO, PGI or TSG status (Table 1; in extenso in Table 2). The European quality schemes play a vital role in fortifying and promoting traditional Romanian products, benefiting local communities, and ensuring the continuation of patrimony for future generations (Ministry of Agriculture and Rural Development, 2022).

Table 1. Romanian agrifood products certified

Protected Designation of Origin	Protected Geographical Indication	Traditional Specialty Guaranteed
		
'Telemea de Ibăneşti'	'Salam de Sibiu' 'Magiun de prune Topoloveni' 'Novac afumat din Țara Bârsei' 'Scrumbie de Dunăre afumată' 'Cârnaţi de Pleşcoi' 'Telemea de Sibiu' 'Caşcaval de Săveni' 'Salată cu icre de ştiucă de Tulcea' 'Plăcintă dobrogeană'	'Salată tradiţională cu icre de crap' 'Sardeluţa marinată'

Note: Source: Food Farming, 2023a; Food Farming, 2023b.

Understanding consumer perception of certified food products, such as those bearing PDO, PGI and TSG labels, is crucial to gauging market preferences, formulating marketing strategies, and assessing the economic viability of these products (Barska and Wojciechowska-Solis, 2020). Traditional methods of studying consumer perception, such as surveys or focus groups, can be resource-intensive and time-consuming (Queirós et al., 2017). Google Trends is a powerful tool that has profoundly impacted various sectors, including the business world, academic research, public policy, and more. At its core, it is a real-time search data analyser that provides insights into the popularity of specific search terms and topics (Jun, 2018; Cebrián and Domenech, 2022). This dynamic tool allows users to track the ebb and flow of public interest over time and across geographical regions. This information can be essential to understand trends, predict market movements, and inform strategic decisions (Cebrián and Domenech, 2022).

In the context of the food industry, Google Trends has become a significant resource. It can offer real-time insights into what consumers are interested in, such as trending dietary preferences, popular recipes, or in-demand products (Cebrián and Domenech, 2022). This can help food companies stay ahead of the curve, allowing them to adjust their offerings or marketing efforts in response to emerging trends (Cebrián and Domenech, 2022). Additionally, it can provide valuable insights into the effectiveness of advertising campaigns or new product launches, by tracking search interest before and after these events (Demirel, 2020).

The importance of Google Trends becomes apparent when analysing consumer awareness of Romanian agrifood products certified with European quality schemes such as PDO, PGI, and TSG. These labels serve to differentiate products based on their geographical origin or traditional production methods, factors that can significantly

influence consumer preferences and purchasing behaviour. Using Google Trends, researchers and industry professionals can gain insight into the levels of consumer interest and awareness of these certified products.

There is a gap in the existing body of literature when it comes to the analysis of consumer interest in food products certified with European quality schemes, particularly through the use of big data tools such as Google Trends. Existing research primarily employs traditional methodologies such as surveys or focus groups, which, although valuable, may not capture the real-time dynamic nature of consumer interests and behaviour in the digital age.

Table 2. Certified Romanian agrifood products

Product certified name	Quality scheme	Certification date	Status	Class	Location of production
‘Telemea de Ibănești’	PDO	15/03/2016	Registered	Class 1.3. Cheeses	Romania
‘Salam de Sibiu’	PGI	19/02/2016	Registered	Class 1.2. Meat products (cooked, salted, smoked etc.)	Romania
‘Magiun de prune Topoloveni’	PGI	08/04/2011	Registered	Class 1.6. Fruit, vegetables, and cereals fresh or processed	Romania
‘Novac afumat din Țara Bârsei’	PGI	06/04/2017	Registered	Class 1.7. Fresh fish, molluscs, and crustaceans and products derived therefrom	Romania
‘Scrumbie de Dunăre afumată’	PGI	03/12/2018	Registered	Class 1.7. Fresh fish, molluscs, and crustaceans and products derived therefrom	Romania
‘Cârnați de Pleșcoi’	PGI	04/10/2019	Registered	Class 1.2. Meat products (cooked, salted, smoked etc.)	Romania
‘Telemea de Sibiu’	PGI	16/10/2019	Registered	Class 1.3. Cheeses	Romania
‘Cașcaval de Săveni’	PGI	22/04/2021	Registered	Class 1.3. Cheeses	Romania
‘Salată cu icre de știucă de Tulcea’	PGI	04/06/2021	Registered	Class 1.7. Fresh fish, molluscs, and crustaceans and products derived therefrom	Romania
‘Plăcintă dobrogeană’	PGI	30/03/2023	Registered	Class 2.3. Bread, pastry, cakes, confectionery, biscuits, and other baker's wares	Romania
‘Salată tradițională cu icre de crap’	TSG	29/09/2021	Registered	Class 1.7. Fresh fish, molluscs, and crustaceans and products derived therefrom	Romania
‘Sardeluță marinată’	TSG	21/12/2022	Applied	Class 1.7. Fresh fish, molluscs, and crustaceans and products derived therefrom	Romania

Note: Source: Food Farming, 2023a; Food Farming, 2023b.

Moreover, most studies (SgROI et al., 2022; Särkkä and Autio, 2022; Török et., 2022; Likudis and Dafni, 2023) focus on a narrow range of products or geographic areas, leaving a vast array of certified products across the EU underexplored. Therefore, comprehensive information on the consumer awareness of these certified food products at the continental level remains relatively unexplored territory. Therefore, this study investigates consumer awareness of Romanian agrifood products certified with PDO, PGI, and TSG labels through the lens of Google Trends data. It not only leverages an innovative big data tool to gain real-time insights into consumer behaviour, but it also focusses on a unique range of certified products.

This novel approach offers a promising start to bridge the existing research gap. It has the potential to deepen the understanding of consumer interest in certified food products, enriching the existing body of literature with fresh insights and perspectives. Additionally, it sets a precedent for future studies to employ similar methodologies, enabling a more comprehensive examination of consumer awareness of European quality schemes and certified products across all the EU. By doing so, the research can begin to form a holistic picture of consumer behaviour in

this sphere, paving the way for better informed strategies in the food industry, more effective marketing approaches, and more supportive public policies that recognise and promote the value of European quality schemes.

Thus, the article seeks to provide an understanding of consumer awareness about Romanian certified PDO, PGI and TSG agrifoods, by examining each certified agrifood product through big data analytics. By analysing examples of well-known Romanian PDO, PGI, and TSG food products, this study aims to analyze the importance of these quality schemes in the broader context of Romanian food culture.

The next sections of this article provide the material and methods applied, describing how Google Trends was used to investigate consumer awareness of Romanian agrifood products certified with European quality schemes. Following this, the results and discussion section provides a comprehensive presentation of the data collected during the study. It details the patterns and trends that have emerged from the analysis of Google Trends data related to Romanian certified food products. The last section emphasizes the conclusion of the study.

MATERIALS AND METHODS

The research explores the use of Google Trends as an innovative tool for analysing consumer interest in Romanian certified food products with European quality schemes, offering a dynamic approach to understanding market trends. So, a detailed and methodical approach was adopted to collect and analyse data – using this powerful tool (Cavallo et al., 2020; Kamiński et al., 2020; Laguna et al., 2020; Mayasari et al., 2020; Portugal-Nunes et al., 2023). Google Trends represents a primary data tool due to its ability to provide real-time insights into the popularity of specific search terms and topics. With its vast database of search data, Google Trends was used to analyse consumer interest in Romanian agrifood products certified with European quality schemes.

The data used in this study spanned a five-year period, from January 1, 2018, to March 15th, 2023, providing a comprehensive view of trends and changes in consumer interest over time. This longitudinal approach allowed the identification of patterns and drawn meaningful conclusions about consumer awareness.

To gather the necessary data, 12 sets of search terms were used, all in Romanian to reflect local consumer behaviour. These terms included names of specific Romanian certified products such as ‘Salam de Sibiu’, ‘Telemea de Ibănești’, ‘Magiun de prune Topoloveni’, ‘Novac afumat din Țara Bârsei’, ‘Cârnați de Pleșcoi’, ‘Telemea de Sibiu’, ‘Cașcaval de Săveni’, ‘Plăcintă dobrogeană’, ‘Salată cu icre de știucă de Tulcea’, ‘Salată tradițională cu icre de crap’, ‘Scrumbie de Dunăre afumată’ and ‘Sardeluță marinată’. Each of these terms represents a product with a PDO, PGI, or TSG certification, allowing the study to focus on awareness of certified food products.

It should be mentioned that were attempts to gather data for other Romanian agrifood products certified with European quality schemes, such as ‘Salată cu icre de știucă de Tulcea’, ‘Salată tradițională cu icre de crap’, ‘Scrumbie de Dunăre afumată’ and ‘Sardeluță marinată’. However, data for these search terms were not found, suggesting that these products may not be widely recognized or sought after by consumers, at least within the scope of online searches. The methodology of this study, leveraging Google Trends and focusing on search terms specific to certified Romanian agrifood products, provides a robust and innovative approach to understanding Romanian consumer awareness in the digital age.

RESULTS AND DISCUSSIONS

By interpreting the Google Trends data, significant insights can be derived into the public's interest and engagement with the Romanian certified agrifood products. The primary type of data that Google Trends releases is search interest. This is measured on a scale from 0 to 100, where 100 is the peak popularity of a term, and 50 is half as popular. A score of 0 means that there was not enough data for this term (Google Trends Data, 2023).

Search interest

The graph on ‘Salam de Sibiu’ (Figure 1) shows an average search interest ranging from 27 to 35% of the maximum daily searches, indicating a consistent level of interest in the agrifood product. This suggests a sustained awareness and potential consumer demand for this product throughout the period. A notable peak of interest is observed between March 31 and April 6, 2019, when the searches for ‘Salam de Sibiu’ reached their maximum (100%). This sudden surge in searches could be attributed to a specific event or occurrence, such as media coverage, marketing campaigns, events and festivals, public endorsements, or due to changes in consumer behavior. These types of change can significantly influence consumer behaviour and interest in specific certified more healthy food products. Another significant increase in search interest was observed in June 2020, with searches reaching 75% of the maximum. Interestingly, from this high-interest point in June 2020, the search interest remained relatively constant, averaging around 55% until the end of the observed period on March 15, 2023. This sustained interest suggests that whatever factors contributed to the surge in June 2020 may have had a lasting impact, maintaining a higher level of consumer interest in the ‘Salam de Sibiu’.

Regarding ‘Telemea de Ibănești’ (Figure 1), there seems to be a moderate level of interest, with an average search interest ranging from 25 to 30 percent of the maximum daily searches. This sustained interest may suggest a regular

and ongoing demand for this particular Romanian certified product. However, there are two notable peaks that stand out from the otherwise steady pattern. The first surge in search interest was observed in September 2019 when searches for ‘Telemea de Ibănești’ rose sharply, hitting 75% of the maximum. The second surge came in October 2021, with searches peaking at a remarkable 90%. These upswings indicate significant increased interest during these periods and could be related to specific triggers or events. Following the peak in October 2021, the average interest level remained higher than before, at approximately 35%. This could suggest that whatever factors contributed to the surge in October 2021 have had a lasting impact, leading to an increase in the interest in ‘Telemea de Ibănești’.

In the agrifood product ‘Magiun de prune Topoloveni’ (Figure 1) the average search appears to be relatively modest, ranging between 15 and 25% of the maximum daily searches. This could suggest that while ‘Magiun de prune Topoloveni’ has a consistent presence in the consumer’s mind, it may not be as widely searched as other certified products. A significant surge in interest is noticed in June 2018 when searches for ‘Magiun de prune Topoloveni’ peaked at 90% of the maximum. This could be indicative of a specific event or trigger during this period that sparked significant public interest in this product. After this increase in June 2018, the search interest seems to have normalised to lower levels, averaging around 20% for the remainder of the observed period. The spike in interest during June 2018 was tied to a specific event or circumstance and did not have a lasting impact on the baseline level of interest in the ‘Magiun de prune Topoloveni’.

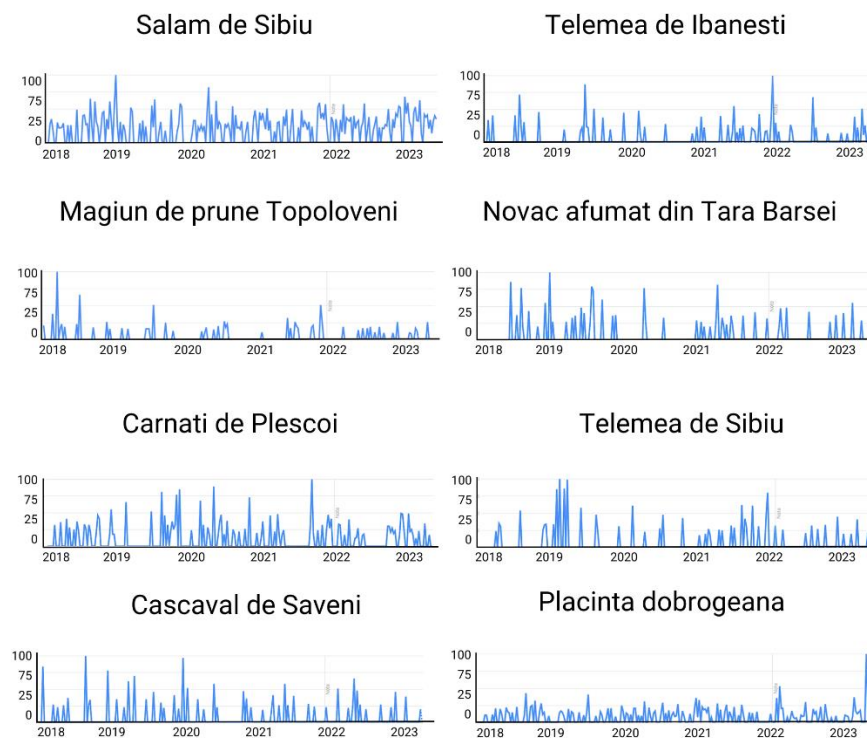


Figure 1. Search interest in Google Trends.

Source: Google Trends*

*Concerned period from January 1, 2018, to March 15th, 2023

In terms of ‘Novac afumat din Țara Bârsei’ (Figure 1), an average search interest ranging between 50 and 55% of the maximum daily searches shows a steady and robust level of interest in this specific product. Unlike the trends observed for some other products, there do not seem to be any significant peaks or drops in search interest over the period in question. This constant trend suggests a strong and enduring awareness of ‘Novac afumat din Țara Bârsei’. This could be reflective of steady demand patterns for this specific product in the Romanian market.

On an average day, searches for ‘Cârnați de Pleșcoi’ (Figure 1) account for 45-50% of the maximum search interest, indicating a consistent level of consumer interest in this food product. However, a significant boost in interest is observed in July 2021 when searches for ‘Cârnați de Pleșcoi’ soared to 95% of the maximum search interest. This sharp increase suggests that a particular event or trigger may have drawn heightened public attention to ‘Cârnați de Pleșcoi’ during this time. Following this spike, the search interest appears to have decreased to levels lower than the average seen before July 2021. The interest has averaged around 25% for the remainder of the observed period. This drop could indicate that the heightened interest during July 2021 was due to a specific,

temporary event and did not result in a sustained increase in the overall level of interest.

Regarding the topic ‘Telemea de Sibiu’ (Figure 1), the searches account for 20-25% of the maximum daily searches, suggesting a relatively consistent level of interest in this product. However, a notable spike in interest was observed in September 2019. During this period, searches for ‘Telemea de Sibiu’ increased to 90-95% of the maximum search interest. This dramatic increase indicates that a specific event during this period sparked a significant increase in public interest in ‘Telemea de Sibiu’. Outside of this period of increased interest, the search trend remains fairly constant, with interest levels averaging around 40-45%. This suggests that despite the peak in September 2019, the general interest in ‘Telemea de Sibiu’ remained consistent, indicating that the spike was likely tied to specific temporary factors and did not result in a long-lasting shift in overall consumer interest.

The searches for ‘Cașcaval de Săveni’ (Figure 1) range between 50 and 60 percent of the maximum daily searches, indicating a substantial level of steady interest in this product. However, there are three notable spikes in search interest at distinct times: April 2018, September 2018, and February 2021. During these periods, searches for ‘Cașcaval de Săveni’ increased significantly, reaching approximately 95% of the maximum search interest. Excluding these specific periods, the search interest appears to be lower, averaging around 35%. This decrease might suggest that the heightened interest during the specific months was tied to temporary events and did not result in a long-lasting impact on the overall level of interest in ‘Cașcaval de Săveni’.

As to ‘Plăcintă dobrogeană’ (Figure 1), the searches represent about 30-50% of the maximum daily searches, indicating a consistent and moderate level of interest in this product throughout the observed period. However, there is a notable peak in interest in November and December of 2022, where searches for ‘Plăcintă dobrogeană’ reached their maximum, at 100% of the daily searches. This sharp increase in interest may be tied to specific events or factors that occur during this period. This could include a variety of possibilities, such as a targeted marketing campaign, a seasonal increase due to holidays or festivals, or perhaps the product being featured in the media. Excluding this surge in interest, the search trend remains relatively stable, with the interest level averaging around 45%. This stability suggests that despite the peak at the end of 2022, the overall interest in ‘Plăcintă dobrogeană’ maintained a fairly consistent level, implying that the jump may be linked to transient factors, rather than a long-term shift in consumer interest.

In the course of the research, it is important to note that for the remaining four agrifood products certified with European quality schemes ‘Salată cu icre de știucă de Tulcea’, ‘Salată tradițională cu icre de crap’, ‘Scrumbie de Dunăre afumată’, and ‘Sardeluță marinată’, there was insufficient data available to yield any significant insights. These products, despite their certified status, did not garner enough search interest over the past five years to generate reliable data through Google Trends. This may suggest that consumer awareness or interest in these particular products may be lower compared to the previously discussed food products. It is also possible that these products are being searched under different terms or phrases not included in this analysis. However, this lack of data does not necessarily reflect the quality or potential success of these products on the market.

The popularity of certain search terms (Table 3), as revealed by Google Trends, indicates a high degree of consumer interest in specific Romanian agrifood products certified with European quality schemes. In particular, ‘Salam de Sibiu’, ‘Magiun de prune Topoloveni’, and ‘Plăcintă dobrogeană’ emerged as the three most popular search terms in Romania. The associations of search terms provide additional insight into consumer behaviour and interests related to these products. For instance, if ‘Salam de Sibiu’ is frequently associated with terms related to preparation methods or specific recipes, it may suggest that consumers are interested not just in the product itself but also in how to use it in their cooking. Similarly, associations with events, holidays, or specific cultural practises can indicate deeper cultural or contextual factors influencing consumer interest.

Table 3. Top 7 associations of search terms

‘Salam de Sibiu’	‘Magiun de prune Topoloveni’	‘Plăcintă dobrogeană’
<i>Salam de Sibiu</i>	<i>Magiun de Topoloveni</i>	<i>Placinta dobrogeana</i>
<i>origine Salam de Sibiu</i>	<i>Magiun de prune Topoloveni beneficii</i>	<i>Placinta dobrogeana reteta originala</i>
<i>Salam de Sibiu calorii</i>	<i>Magiun de prune Topoloveni pret</i>	<i>Placinta dobrogeana reteta</i>
<i>Salam de Sibiu ingrediente</i>	<i>gem de prune Topoloveni</i>	<i>Placinta dobrogeana cu branza sarata</i>
<i>Salam de Sibiu online</i>	<i>Magiun de prune Topoloveni calorii</i>	<i>Placinta dobrogeana ca la patiserie</i>
<i>Salam de Sibiu eticheta</i>	<i>Magiun de prune Topoloveni fara zahar</i>	<i>Placinta dobrogeana Constanta</i>
<i>Salam de Sibiu reteta</i>	<i>Magiun de prune Topoloveni contraindicatii</i>	<i>Placinta dobrogeana cu iaurt</i>

Note: Source: Google Keyword Planner

To enhance their communication and marketing strategies, producers of these agrifood products should consider these associations and trends. They can use this information to provide more targeted and relevant information campaigns to consumers. For example, if consumers are often searching for recipes involving ‘Salam de Sibiu,’ producers could include recipe suggestions on their packaging or websites. Moreover, by understanding the

times of year when interest peaks (like observed in 'Plăcintă dobrogeană' during November and December), producers can synchronise their marketing efforts to coincide with these periods of heightened consumer interest. Finally, if search terms indicate confusion or misinformation about the product - for instance, misconceptions about the geographical origin or production methods - producers can provide clear, educational content to inform consumers and dispel misconceptions.

Geographic variations

Google Trends also shows how search interest is distributed across various regions. This can be useful to understand the geographic variations in search trends. Thus, an additional aspect of the data derived from Google Trends pertains to the geographical distribution of search interest for the three most popular Romanian agrifood products certified with European quality schemes 'Salam de Sibiu', 'Plăcintă dobrogeană', and 'Magiun de prune Topoloveni'. In the context of this study, it offered a spatial dimension to understanding of consumer awareness, revealing the distribution of search interest for these three products in various counties in Romania. These geographical data could suggest regional preferences, cultural influences, or potential market opportunities for these products. It also emphasises the fact that consumer interest in agrifood products is not homogeneous throughout the country and can be influenced by a variety of regional factors.

Therefore, Figure 2 shows the search interest for the above mentioned three agrifood products mentioned above, distributed throughout Romanian counties (NUTS 3, 2010). The data from Google Trends show that the search interest for 'Salam de Sibiu' is spread across nine counties in Romania. This suggests that this product has significant appeal in these specific regions. On the other hand, 'Plăcintă dobrogeană' shows a broader geographical interest, extending across fourteen counties. This implies a wider regional attraction for this particular food product, hinting at potential cultural or regional influences that could contribute to its popularity. Interestingly, 'Magiun de prune Topoloveni' stands out with its search interest distributed widely across a substantial number of counties, thirty-three. This extensive geographical spread demonstrates a broad-based interest and potential consumer market for this product in a large part of the country.



Figure 2. Search interest distributed geographically.

Source: Google Trends*

*Concerned period from January 1, 2018, to March 15th, 2023

Discussing the results collected, the Google Trends data demonstrate a disparity between consumer searches for agrifood products certified under the European PDO, PGI and TSG quality schemes, and the schemes themselves. While significant search volumes are recorded for the certified products, there is a notable lack of search interest specifically about these certification schemes. This discrepancy implies that consumers may have a certain level of familiarity with these traditional agrifood products, yet they seem to lack awareness of the certification designations these products carry. Specifically, consumers might not fully understand that these products have been recognised and awarded geographical indications by the EU, as an honour to their nutritional merits and traditional recipes.

In line with the acquired results, Kamiński et al. (2020) also illustrates the power of Google Trends in providing insights into consumer behavior and dietary trends. The study found that veganism, vegetarianism, and gluten-free diets attract significant global public interest, with search interest averaging between 11-20 of the daily searches. Other authors (Hamulka et al., 2020) bring to light an interesting dimension of consumer behavior changes during exceptional global events such as the COVID-19 pandemic, using Google Trends as a data collection tool. The research shows a marked increase in the interest and usage of immune-related nutrients and foods - such as vitamins C and D, zinc, garlic, ginger, and turmeric. This is reflective of a surge in public health consciousness, as people seek ways to bolster their immunity in the face of a global health crisis. A similar pattern of results was obtained by Mayasari et al. (2020), which emphasizes the importance of maintaining healthy dietary and lifestyle behaviors during the COVID-19 pandemic. Google Trends allowed the observation of shifts in public interest in real-time, reflecting the changes in collective consciousness towards more healthy food.

Portugal-Nunes et al. (2023) provide another dimension to understanding the shifting in consumer awareness and interests, by employing Google Trends. They tried to evaluate consumer interest in food sustainability from

2010 to 2021. From the study, it seems that there has been a sustained and growing interest in sustainable food production over the past decade. This aligns with broader societal shifts towards environmental consciousness and sustainable practices, illustrating how consumer preferences are deeply intertwined with wider cultural, societal, and environmental trends. The study conducted by Masih (2021) goes beyond and explores global search interest about organic foods by using Google Trends that offers valuable insights into the geographical distribution of consumer interest in organic food products. Notably, it identified the United Arab Emirates, Singapore, Australia, Canada, and Namibia as the top countries where people have the highest search interest about organic foods. This suggests a high degree of awareness and interest in organic foods in these regions, pointing towards consumer preferences that lean towards health-conscious and potentially environmentally friendly food choices. When compared to the present study on Romanian certified agri-food products, there is an interesting contrast. Both studies highlight the power of Google Trends in revealing regional nuances in food-related search interests. For instance, while the global organic food trend might not directly reflect Romanian consumers' preferences for PDO, PGI, and TSG certified agrifood products, it shows how consumers in different parts of the world prioritize various aspects of food quality.

Notably, another study (Liu et al., 2019) leveraging Google Trends pinpointed organic milk, organic chicken, and organic apples as the primary organic foods that piqued consumer awareness in certain internationally countries. While our findings present some patterns in terms of the heightened interest in specific certified Romanian agrifood products, this results also illuminate with the help of big data nuanced differences in the consumer awareness landscape. Casting light on the evolving landscape of food preferences through the comprehensive Google Trends analysis, another study (DuPuis et al., 2022) identified a notable surge in consumer awareness regarding local food. Such transient yet pronounced increases in search patterns offer invaluable insights into the dynamic nature of consumer awareness and behaviour.

In relation to the assessment of consumer interest in agrifood products certified with European quality schemes, specifically utilizing extensive data tools such as Google Trends, the literature appears to have a gap. Most existing research relies on conventional methods such as interviews or focus groups (Arfini et al., 2019; Mancini et al., 2019; Chalupová et al., 2020; Toma et al., 2023; Valverde et al., 2023), which, while significant, could not fully depict the evolving and real-time nature of consumer interests and behaviours in the digital era. Furthermore, many studies primarily concentrate on a limited selection of products or geographical regions (Sgroi et al., 2022; Särkkä and Autio, 2022; Török et., 2022; Likudis and Dafni, 2023), leading to a substantial portion of certified products throughout the EU being under-investigated. As a result, a holistic understanding of consumer awareness surrounding these certified agrifood products on a pan-European scale is still somewhat unexplored terrain.

Essentially, the studies discussed illustrate the potency and utility of Google Trends as a tool for understanding consumer interests and awareness in the realm of food and diet. It's noticeable that Google Trends serves as a rich data source that reflects real-time shifts and nuances in consumer interest across a range of food-related topics, from specific product searches to broader dietary trends. The unique findings of these investigations, whether it's about consumer awareness in certain Romanian certified agri-food products or globally trending diets, underscore the tool's capacity to yield invaluable insights that can influence marketing strategies, policymaking, and industry practices. Moreover, it's not just the magnitude of interest that Google Trends can reveal, but also the spatial distribution of these interests, shedding light on regional preferences and potential market segments. The comparison of these results exemplifies the diverse applications of Google Trends, highlighting its relevance across various aspects of the food industry, from local artisan products to global dietary movements.

The present study, which examines consumer awareness and search trends for Romanian agrifood products validated with PDO, PGI, and TSG certifications through Google Trends data, is a pioneering effort in this direction. This innovative approach represents a promising step towards filling the existing research gap. It is poised to enhance the comprehension of consumer interest in certified agrifood products, supplementing the existing literature with new findings and viewpoints. Moreover, it lays the groundwork for future research to adopt similar techniques, allowing for a more exhaustive exploration of consumer awareness related to European quality schemes and certified products across the entirety of the EU. By this means, a comprehensive understanding of consumer behaviour in this area can be formed, creating a foundation for more informed strategies in the food sector, more efficient marketing techniques, and more supportive public policies that acknowledge and endorse the significance of European quality schemes.

CONCLUSIONS

Main outcomes

This research, employing Google Trends to analyze consumer interest and awareness about Romanian agrifood products with PDO, PGI, and TSG certifications, represents a novel contribution to the field. The methodology provides progress in bridging existing research gaps. It seeks to enhance understanding of consumer trends regarding certified agrifood products, thus enriching the literature with fresh insights.

Agrifood products that enjoy European certifications such as PDO, PGI, and TSG represent a cornerstone of the Romanian food tradition, primarily due to their time-honoured recipes and nutritional standard. However, the extent to which consumers are cognizant of these quality certifications is a question that merits closer examination. The findings suggest that while consumers exhibit some degree of familiarity with these agrifood products, their awareness of the significance of these products' certification under the European quality schemes is notably limited. Despite evidence of consistent search volumes for these agrifood products, a peculiar trend emerged. The Google Trends data did not show substantial search interest explicitly related to the PDO, PGI, and TSG quality schemes.

This contrasted sharply with the search interest surrounding the products certified with these schemes, suggesting a disparity between the recognition of the products themselves and the certification schemes backing them. This suggests that, while consumers demonstrate a certain degree of familiarity with these traditional agrifood products, they may be largely unaware of their certifications and the associated benefits. The geographical indications granted by the EU, reflecting their nutritional qualities and traditional recipes, seem to be largely overlooked by the general consumer base.

Implications

This study may highlight a potential gap in the education and understanding of Romanian consumers about the EU's PDO, PGI and TSG quality schemes and the benefits they confer on the agrifood products certified with them. This warrants further exploration and suggests the need for increased awareness campaigns to educate consumers about these certifications, fostering a deeper appreciation of these high-quality, traditional products. The aim would be to ensure that consumers can make informed decisions that acknowledge the value of such designations when selecting food products.

Limitation and future research

The main limitation of the study might be that Google Trends data only provide insight into the behavior of internet users, which may not be fully representative of the wider population's attitudes and behaviours. Additionally, Google Trends data is influenced by the popularity of search terms and may not accurately reflect the complexity of consumer preferences. The study could also be limited by its focus on Romanian certified food products, which may not be applicable to other geographical contexts.

While Google Trends offers insights into Internet users' behaviors, it doesn't capture the full spectrum of consumer information channels or account for variations due to socio-economic factors, digital literacy, and potential biases of the online population. Beyond Google Trends, consumers often utilize channels like traditional media, word of mouth, or direct brand engagements to inform their choices. Additionally, Internet usage can indeed correlate with a consumer's socio-economic status and education level, potentially distorting the representation of the data.

Prospective studies have the potential to extend this methodological approach to different nations and a wider variety of certified agrifood products. Future research endeavours may also seek to integrate data from Google Trends data with additional indicators of consumer behaviour. These could include aspects like purchase data or feedback obtained through surveys, ultimately contributing to a broader understanding of consumer perceptions. Moreover, it would be insightful to examine how particular events, such as targeted advertising efforts or policy can impact the Google Trends data corresponding to certified food items.

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Conflicts of Interest

The authors declare that they do not have any conflict of interest.

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