

# Bibliometric Analysis of the Common Agricultural Policy: Intersections of Agriculture, Economy, and Environment

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**Abstract.** *This study explores the trends and limitations of research on the Common Agricultural Policy (CAP) in relation to agriculture, economy, and the environment, using a bibliometric analysis based on Web of science data. Employing co-citation maps and collaborative networks among authors and institutions, the study highlights a fragmented literature characterized by high thematic specialization and a low level of interconnectedness among researchers, hindering the development of a coherent and integrated framework. A detailed analysis of author collaborations and co-citation networks provides a clear view of the intellectual structure of the field and the ways ideas and research have been interconnected and developed over time. Additionally, the examination of highly cited articles and works has revealed not only the current gaps in research but also opportunities for future investigations. For instance, most studies have focused on the effects of Common Agricultural Policy (CAP) funding on the environment, biodiversity, farmer behaviour, and the economic outcomes of the agricultural sector. However, they have largely overlooked a comprehensive understanding of how these interactions simultaneously influence all three dimensions: economic, environmental, and agricultural. This highlights a significant opportunity for research to explore more complex and integrated connections between CAP funding and its impact on these three pillars, considering the recent evolution and changes in the global economic landscape.*

**Keywords:** CAP, economy, environment, bibliometric analysis

**JEL Classification:** Q14, Q18, Q5

## 1. Introduction

The Common Agricultural Policy (CAP) is one of the European Union's most influential and enduring policies, designed to support the agricultural sector and promote rural development. Since its establishment in 1962, the CAP has played a key role in shaping the EU's agricultural landscape, undergoing multiple reforms to address evolving economic, environmental, and social challenges. Initially focused on ensuring food security and stabilizing markets, the CAP has progressively expanded its objectives to include environmental sustainability, climate action, and rural economic development, becoming a cornerstone of EU policy (European Commission).

Historically, European agricultural policy prioritized food security and farmers' income, with the CAP developed on these foundations to stimulate production growth and intensify agricultural activities, sometimes leading to regional overburdening (Coleman, W.D., et al., 1996). Over time, the emphasis on economic productivity and producer interests hindered an integrated approach to environmental goals in EU agricultural policy. Starting in the 1990s, agri-environmental schemes were introduced under the CAP, increasing the prominence of environmental and animal welfare objectives. Over the past decade, policy changes have been adopted to meet evolving

socio-economic demands, including financial compensation for farmers providing public goods such as ecosystem services (Daugbjerg and Swinbank, 2016; Henke, 2018).

However, "greening" policies remain controversial and are often compromised in favor of competitiveness and productivity (Alons, 2019; Grohmann and Feind, 2024). Reforms have introduced mandatory eco-schemes previously absent, heightened environmental obligations for farmers through enhanced cross-compliance, and significantly increased investments in rural development resources (De Castro et al., 2020). Agricultural support policies shape production methods, farming practices, and resource use, resulting in significant environmental consequences. Well-designed agricultural policies are likely to achieve both economic and environmental objectives more cost-effectively than approaches requiring additional measures to correct negative environmental impacts (Lankoski and Thiem, 2020). By committing at least 20% of direct payments to eco-schemes, the reform fundamentally transforms the environmental aspects of direct payments.

This initiative, coupled with stricter environmental requirements for farmers, strengthens the EU's environmental goals, with approximately 90% of these payments now classified as green (de Sadeleer, 2023). Moreover, under the rural development program, at least 30% of funding should be directed towards climate and environmental initiatives, while a minimum of 40% should be allocated for expenses related to specific natural and territorial constraints (Hart and Bas-Defosse, 2018).

The importance of studying the effects of the CAP lies in its far-reaching impact on various sectors. Economically, the CAP has played an essential role in stabilizing farmers' incomes, maintaining agricultural productivity, and promoting rural development. Environmentally, it has both supported and hindered sustainability, with some measures promoting green practices, while others have been criticized for encouraging intensive farming. Agriculturally, the CAP shapes how food is produced, distributed, and consumed across the EU, affecting both market competitiveness and the resilience of the food supply chain.

Despite extensive research on the CAP, ongoing analysis is needed due to its continuous reforms and changing EU priorities, especially in the context of the European Green Deal and increasing pressure to meet environmental and biodiversity targets. The novelty of this article lies in its comprehensive evaluation of the current impact of the CAP and its approach to linking economic, environmental, and agricultural outcomes within an integrated framework. By examining the policy from these interconnected perspectives, this study aims to provide new insights into how the CAP affects not only the agricultural sector but also broader socio-economic and environmental dynamics within the EU.

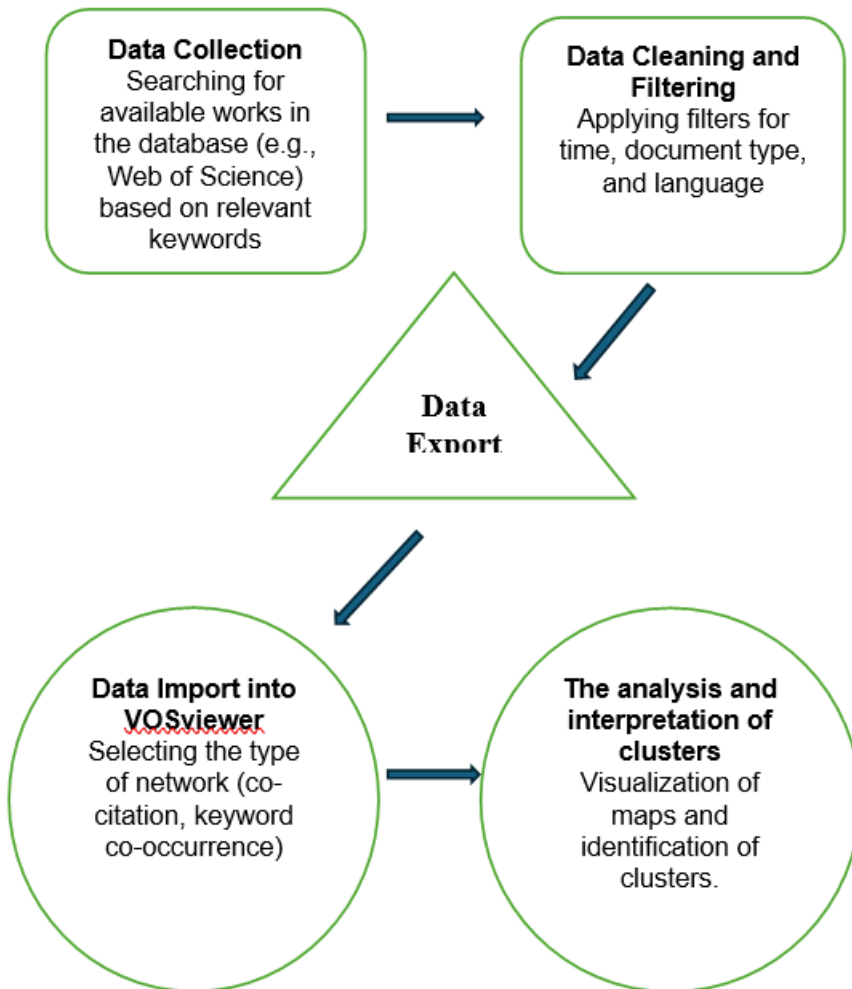
The aim of this paper is to analyze how the Common Agricultural Policy (CAP) addresses the interplay between agriculture, the economy, and the environment using a bibliometric approach. The study seeks to uncover emerging trends in CAP-related research and identify gaps in the literature, such as the limited exploration of practical applications and regional comparative analyses. The importance of this research is rooted in the critical role of CAP in fostering sustainable agricultural practices, driving economic development, and addressing environmental challenges. Through bibliometric analysis, the paper sheds light on how CAP influences agricultural strategies and policies, contributing to economic stability, environmental sustainability, and the achievement of broader sustainability goals.

## **2. Materials and methods**

To summarize and highlight the main theoretical directions and research trends associated with this current topic, we conducted a bibliometric analysis of recent

studies on the Common Agricultural Policy and its economic, agricultural, and environmental aspects. A sample of 358 scientific articles published between 1992 and 2024, indexed in Web of Science, was selected using several keywords derived from a systematic literature review in line with our research objective. A large dataset was extracted from Web of Science and processed in VOSviewer to capture the co-occurrences of all keywords related to the Common Agricultural Policy, the environment, the economy, and agricultural aspects.

In Figure 1, we presented the main methodological steps undertaken in conducting the bibliometric analysis. These steps resulted in a detailed and comprehensive bibliometric evaluation of the state of knowledge in our research field.



**Figure 1. Diagram of the stages of bibliometric analysis in VOSviewer**

*Source: author's processing*

We conducted a comprehensive review of the existing literature, focusing on the most frequently cited, as well as the top journals that have published the most relevant articles in our field of study. Additionally, I included essential articles obtained through a systematic review and significant works by recognized authors addressing the theme of our research. This analysis guided us to relevant sources in the existing literature regarding the connection between the CAP (Common Agricultural Policy) and the economic, environmental, and agricultural sectors. Given the breadth and complexity of the existing literature, I aimed to identify the current state of knowledge and carry out a detailed analysis that would provide complex perspectives and serve as a foundation for future research. Thus, this subchapter focuses on evaluating the impact of the CAP on indicators measuring economic, environmental, and agricultural performance, emphasizing both the significance of the relationship and the evaluation methods used.

To achieve this objective, I adopted a specific method, which included a detailed bibliometric analysis of the literature in the field. This approach allowed us to assess trends, prominent authors, and the most influential papers, thus providing a solid framework for subsequent research and the development of new innovative perspectives in this crucial area. At the same time, the adopted quantitative method facilitates a more objective evaluation of relevant documents, as expressed in various previous studies (Borgman & Furner, 2002; Moed, 2005). Significant productivity is highlighted by a large number of publications, while impact is reflected in a considerable number of citations for these works (Bornmann & Daniel, 2008; Waltman et al., 2012; Leydesdorff & Opthof, 2010). This analysis also contributes to identifying the most prolific authors and the seminal documents in the field (Small, 1973; van Raan, 2019). Within the bibliometric analysis, I investigated author co-citation networks, the most cited papers, journals with the highest output, and mapped relevant keywords.

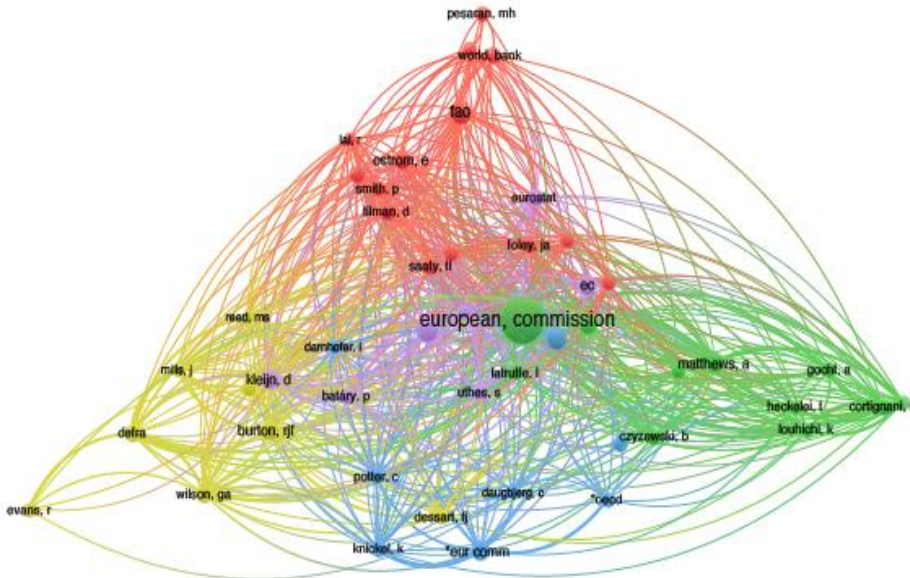
### **3. Results**

#### *3.1. Identification of the Author Co-Citation Network*

Co-citation analysis is one of the most effective methods for mapping knowledge in a given field. This technique focuses on the co-citation of authors, having a qualitative nature, and serves as an initial approach that helps us identify the most frequently cited authors in research. Co-citation refers to the situation in which two authors are mentioned together in the same publication, appearing on the reference list of an article (Small, 1973). This method has been used to assess the intellectual structure of various scientific disciplines. Additionally, co-citation analysis provides a unique way to study the cognitive structure of science (Zhao & Dangzhi, 2006; Zhao & Strotmann, 2007; Trujillo & Long, 2018).

Through this analysis, we can observe the evolution of top authors in a specific field, referring to the frequency with which two works are cited together within a third article (Bronk et al., 2023). This technique is based on the premise that co-citation represents a measure of perceived similarity, suggesting a conceptual link or cognitive relationship between two co-cited elements, whether these are authors or works. Furthermore, co-citation studies applied to different fields and specialties allow for an accurate mapping of the intellectual structure of a research field (Small, 1973).

Author co-citation analysis is based on a dual assumption, which includes the network of the most relevant and frequently cited authors. Thus, the aim of this analysis is to identify the most cited authors, present the formed clusters, and provide a graphical representation of the results. Figure 2 illustrates the author co-citation network, highlighting the co-citation analysis based on the cited authors, according to the data from the Web of Science database. This evaluation was performed using the VOSviewer application, which facilitates the identification of the most cited authors in the field, providing a solid foundation for documenting our study.



**Figure 2. Author Co-Citation Network**  
 Source: Author's processing in VOSviewer

For this analysis, a minimum threshold of 20 citations per author was set, which allowed us to select only those authors who received at least 20 citations during the study period. Following the scientific mapping, a total of 19,897 cited authors were identified in the first phase of the research, of which only 48 authors exceeded the threshold of 20 citations per author. As illustrated in the scientific map, these 48 authors were organized into five clusters: Cluster 1 (red) contains 14 authors; Cluster 2 (green) includes 11 authors; Cluster 3 (blue) consists of 8 authors; Cluster 4 (yellow) also has 8 authors; and Cluster 5 (purple) groups 7 authors. The authors were grouped based on their connections, which reflect the intensity of collaborations or interactions, as well as based on the total links, indicating the number of relationships an author has with other cited authors and their co-citations. Information about these clusters is presented in Table 1, providing a clear and comprehensive overview of them.

**Table 1. Clusters of most cited authors**

Cluster 1 (red) Author/Citations	Cluster 2 (green) Author/Citations	Cluster 3 (blue) Author/Citations	Cluster 4 (yellow) Author/Citations	Cluster 5 (purple) Author/Citations
Constanza, R./ 28	Caian, P./24	*CEC./29	Burton, R.J.F../48	Batary, P./23
FAO/64	Cortignani, R./28	*OECD./21	DEFRA/36	EC/ 47

Foley, J.A./26	Czyzewski, B./30	Darnhofer, I./20	Dessart, F.J./22	EUROSTAT/36
IPCC./ 27	European Comossion/ 269	Daugbjerg, C./20	Evans, R../22	Kleijn, D./41
LAL, R/20	Gocht, A../24	Knickel, K./24	Mills, J../20	Pe'er, G./71
Lambin, E.F./24	Gomez-Limon, J.A../41	Potter, C./26	Prager, K./29	Tscharntke, T./23
Ostrom, E../41	Heckelei, T./21	OECD/57	Reed, M.S../20	Uthes, S./25
Persan, M.H./24	Latruffe, L./24	*Eur Comm/ 45	Wilson, G.A./33	
Pretty, J../35	Louhichi, K./26			
Saaty, T.L../36	Matthews, A/42			
Smith, P../26	Solazzo, R./23			
Tilman, D./36				
Verburg, P.H../24				
World bank./28				

Source: Author's processing in VOSviewer

By analysing Figure 2 and Table 1 which present the co-citations of authors, we observe that the largest cluster is Cluster 1 (marked in red). Among the most cited authors in this group are the Food and Agriculture Organization of the United Nations (FAO) with the highest number of citations, 64, and the World Bank with 28 citations—two organizations whose studies on agriculture and the Common Agricultural Policy (CAP) provide essential perspectives for understanding the challenges and opportunities in the agricultural sector at both global and European levels. FAO particularly focuses on issues related to food security, agricultural sustainability, and the impact of climate change on agriculture. Its studies highlight the importance of natural resource management and the implementation of sustainable farming practices. FAO also emphasizes the need for agricultural policy reforms to support small farmers and vulnerable rural populations, promoting farming practices that contribute to carbon emission reductions and biodiversity protection.

The World Bank, on the other hand, emphasizes the role of agriculture in economic development and poverty reduction, especially in developing economies. Its studies show how investments in agriculture and rural infrastructure can stimulate economic growth and improve living conditions in disadvantaged regions. The World Bank also analyses the impact of globalization and market integration on the agricultural sector and recommends policies that support access to international markets for small and medium producers. Both FAO and the World Bank highlight some challenges, such as the effect of subsidies on global markets and their impact on the competitiveness of farmers in developing countries. Both organizations suggest that CAP should include more ecological and social measures to become more sustainable and equitable from a global perspective.

Cluster 2 (green) is dominated by an institution, the European Commission, with 269 citations and 957 strong connections. The European Commission plays a crucial role in the development and evaluation of the Common Agricultural Policy (CAP) and is one of the most active promoters of research regarding the economic, environmental, and agricultural implications of this policy. Through its studies and reports, the Commission contributes to a deeper understanding of CAP's impact on European

agriculture, the general economy, and the environment. The next author in this cluster is Matthews, A., with 42 citations, who has made significant contributions in this field. His most cited paper, "Greening agricultural payments in the EU's Common Agricultural Policy," suggests that the apparent failure to adapt CAP significantly to address environmental issues is partly due to the competition between eco-conditionality and voluntary agri-environmental measures. Instead of complementing each other, these two approaches seem to be in competition. Thus, supporters of a greener CAP must choose between these two methods to achieve environmental objectives. This cluster also includes Gomez-Limon, J.A., with 41 citations, whose work focuses on assessing the economic, social, and environmental impact of agricultural policies, particularly in Spain and its regions.

Cluster 3 (blue) is led by the OECD, with 57 citations, which has published numerous studies and reports on the European Union's Common Agricultural Policy (CAP), analysing its impact from economic, social, and environmental perspectives. OECD studies provide a detailed assessment of how CAP influences European agriculture and its broader effects within the EU and globally. The OECD thus contributes to discussions on the future of CAP, offering valuable perspectives that combine economic, environmental, and social analysis to improve the impact of this policy on farmers, the environment, and rural communities in the European Union.

Also in this cluster is Potter Clive, with 26 citations, known for his contributions to analysing the impact of agricultural policies on the environment and rural communities, as well as evaluating the "greening" process of CAP.

At the top of the fourth research group is Burton, R.J.F, with a total of 48 citations and 373 significant connections. This author has distinguished himself through his research on how farmers interact with their communities and how these interactions contribute to building their professional identities, as well as discussions about sustainable agriculture, identity, and community, emphasizing the importance of understanding the cultural dimensions of agriculture in addressing current issues in this sector. The second most cited in this group is DEFRA (Department for Environment, Food, and Rural Affairs), with 36 references, a UK government department responsible for environmental, agricultural, food, and rural issues.

In the last cluster (purple), we find Pe'er, G., with 71 citations, whose works address critical issues related to the impact of agricultural policies on biodiversity, highlighting current deficiencies and suggesting measures for improvement. Another author is Kleijn, D., with 41 citations, whose most cited work, "How effective are European agri-environment schemes in conserving and promoting biodiversity?" analyzes articles written on this topic and concludes that there is an urgent need for studies evaluating the effects of agri-environment schemes in extensive farming areas. Another notable researcher in this field is Boyd J.H., with 14 citations.

This analysis allowed us to identify the most influential authors in the field, and the top five are: European Commission (269 citations), FAO (64 citations), Pe'er, G. (71 citations), Matthews, A. (42 citations), and Burton, R.J.F (48 citations). This ranking facilitates access to their works, thus contributing to a deeper understanding of the perspectives and contributions made in the field. It provides a valuable opportunity to conduct detailed documentation on the subject of interest.

### *3.2. Scientific Mapping of the Most Cited Works*

To identify gaps and future research directions in the relationship between the Common Agricultural Policy and the economy, environment, and agriculture, we conducted a synthesis of the most relevant works published on this topic. For this purpose, we used the same article database previously employed in the bibliometric analysis, covering the period from 1992 to 2024. The selection process included a filter of at least 15 citations per paper, resulting in an initial selection of 250 articles.

The main findings of the analysis are presented in Table 2, where the articles are arranged in descending order based on the number of citations. The paper with the highest number of citations (62 citations) is “Inflation and financial development: Evidence from Brazil” by M. Bittencourt, published in 2011. It examines the effects of inflation on financial development in Brazil and shows that inflation had a negative impact on financial development during the analysed period. The main implication of this result is that poor macroeconomic performance can negatively affect financial development.

**Table 2. Analysis of the Top 10 Most Cited Works**

Authors	No. citations	Research sample	Methodology	Journal/Year
MacDonald, D., Crabtree, J. R., Wiesinger, G., Dax, T., Stamou, N., Fleury, P., ... & Gibon, A.	1510	24 studies conducted in European mountain regions:	A review of the literature on land abandonment and a comparative analysis of case studies from European mountain regions.	<i>Journal of Environmental Management, 2000</i>
Dessart, F. J., Barreiro-Hurlé, J., & van Bavel, R.	468	Studies from the past 20 years in economics, psychology, and sociology conducted with farmers or landowners:	A presentation of the literature on behavioural factors influencing the adoption of environmentally sustainable agricultural practices.	<i>European Review of Agricultural Economics. 2019</i>
Pe'er, G., Bonn, A., Bruelheide, H., Dieker, P., Eisenhauer, N., Feindt, P.H., Hagedorn, G., Hansjürgens, B., Herzon, I., Lomba, A. and Marquard, E., 2020.	283	Developed European countries and emerging markets, 2006–2010	A critical analysis of previous CAP reforms to radically improve this policy	<i>People and Nature, 2020</i>
Brown, C., Kovács, E., Herzon, I., Villamayor-Tomas, S., Albizua, A., Galanaki, A., ... & Zinngrebe, Y..	85	7 European countries: Czech Republic, Finland, Germany, Greece, Hungary, Spain, and Sweden, literature from the last 10 years:	A review of the literature on farmers' adoption of agricultural and environmental management practices and focused interviews on Ecological Focus Areas with decision-makers,	<i>Land Use Policy, 2021</i>



			consultants, and farmers.	
Pe'er, G., Zingrebe, Y., Hauck, J., Schindler, S., Dittrich, A., Zingg, S., Tscharncke, T., Oppermann, R., Sutcliffe, L.M., Sirami, C. and Schmidt, J., 2017.	141	Europe and Switzerland	-A European-scale survey among ecologists -Collected data on farmers' adoption to examine the implementation of EFAs at the local level -A synthesis of expert opinions and an analysis of the factors influencing farmers' decisions.	<i>Conservation Letters, 2017</i>
Gocht, A., Ciaian, P., Bielza, M., Terres, J. M., Röder, N., Himics, M., & Salputra, G.	71	4 sources of information: 1) the Aglink-Cosimo baseline scenario; 2) historical trend analysis; 3) expert-provided information; and 4) other complementary sources (e.g., supply and use accounts, trade matrices, and projections from FAO, FSS and FADN data).	The CAPRI method.	<i>Journal of Agricultural Economics 2017</i>
Cortignani, R., & Dono, G.	98	Botswana, 1974–2009	bio-economic model	<i>Environmental Science &amp; Policy, 2018</i>
Picazo-Tadeo, A. J., Gómez-Limón, J. A., & Reig-Martínez, E.	295	3960 farms, 171 questionnaires	DEA, regression techniques, and bootstrap	<i>Journal of Environmental Management, 2011</i>
Toma, P., Miglietta, P. P., Zurlini, G., Valente, D., & Petrosillo, I.	31	1993-2003 UE	DEA, bootstrap	<i>Ecological indicator, 2017</i>
Olesen, J. E., & Bindi, M.	997	EU – divided into 8 regions, 1995-1999	Scenarios on climate change	<i>European Journal of Agronomy, 2002</i>
Stoate, C., Boatman, N. D.,	920	UE-15, 1993-1997	Comparative analyses	<i>Journal of Environmental</i>

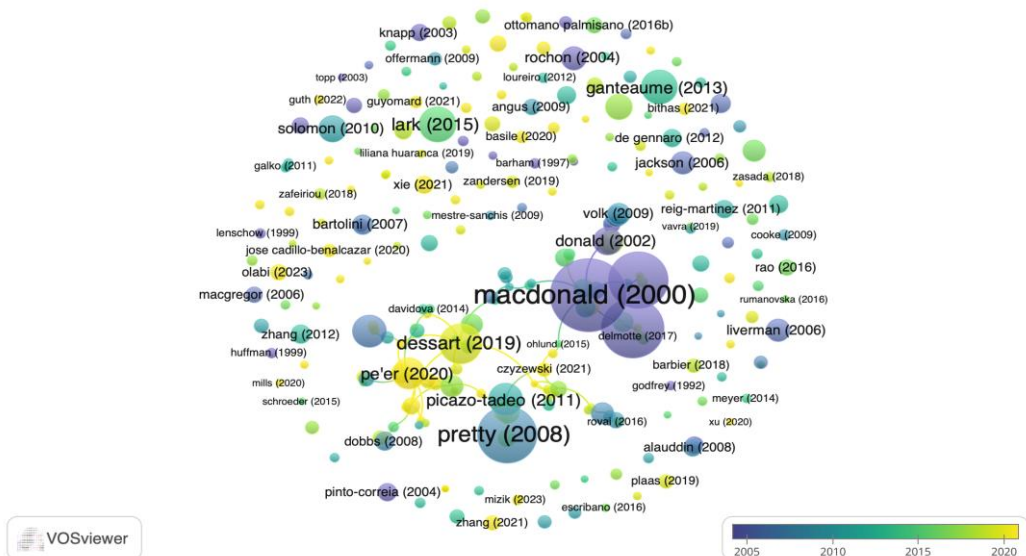
Borralho, R. J., Carvalho, C. R., De Snoo, G. R., & Eden, P.			<i>Management, 2001</i>
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Source: Author's processing, using data provided by VOSviewer

Analysing the data from Table 2 and the ordering of the papers, a clear trend is observed among the research, with the majority focusing on agriculture, environment, and agri-environmental policies, highlighting the interaction between agricultural practices and their environmental impact. This emphasizes the need to reduce negative environmental impacts and promote policies that support both food production and biodiversity conservation. The research sample varies from regional studies in Europe to national or European-level analyses. It also includes case studies involving diverse European countries. These articles form a comprehensive framework for understanding the challenges and opportunities in sustainable agriculture and agri-environmental policies, offering valuable perspectives on how farmers can be encouraged to adopt more ecological practices. It is crucial that research continues to address these topics, considering climate change and the need to ensure food security. This aspect underscores the importance and necessity of the proposed doctoral research topic, which aims to address the relationship between the Common Agricultural Policy and the economic, environmental, and agricultural aspects in an integrated and comprehensive manner.

Instead of analysing the effects of the Common Agricultural Policy on various aspects separately and at the level of different regions or countries, this thesis aims to investigate the impact of the CAP on economic, environmental, and agricultural aspects, using a diverse set of indicators and macroeconomic variables.

In terms of methodologies used, many studies employ comparative analyses and literature reviews, highlighting a diversified methodological approach, including case studies, surveys, critical analyses, and economic models. Additionally, statistical techniques such as DEA (Data Envelopment Analysis) and regression techniques are used.

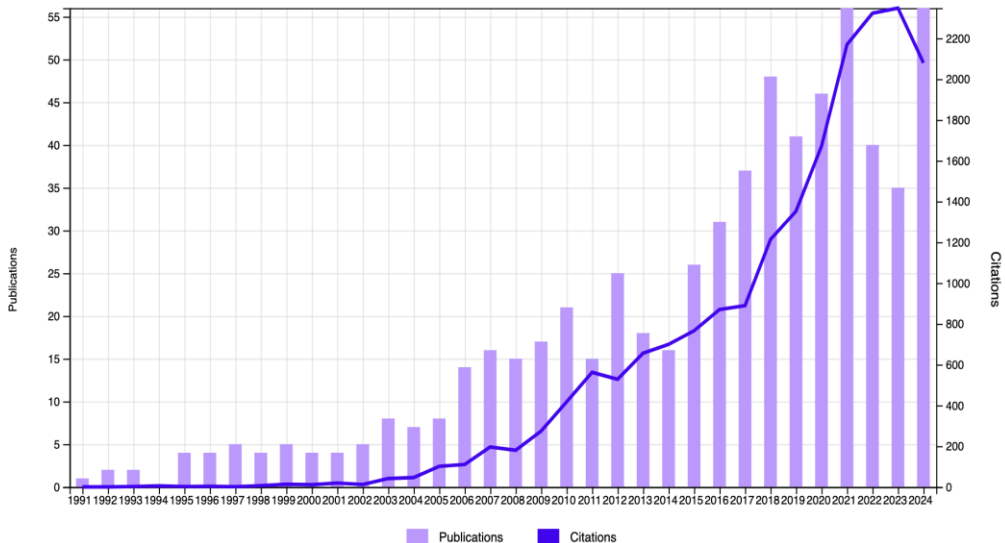


**Figure 3. Co-occurrence of the most cited papers**  
Source: Author's processing in VOSviewer

Figure 3 presents the map of the most frequently cited papers, which also includes information about their publication year. After applying a minimum criterion of 15 citations per article, out of the 601 papers analysed, only 250 managed to exceed this threshold. Additionally, it is observed that there are connections between only 87 of these papers.

The majority of the most cited papers on the researched topic were published between 2010 and 2014. There are also highly cited works from the 2000-2008 period, but studies from the last two years have had lower visibility, suggesting a stagnation in innovations and relevant discoveries in this research area.

This trend can be explained from several perspectives. One possible reason could be the heightened relevance of the Common Agricultural Policy (CAP) and its effects during the 2010-2014 period, when researchers were motivated to explore ways to reform this policy. The increased interest was also driven by the reforms made in the CAP (2008) to address challenges such as climate change, sustainable resource management, and biodiversity conservation, which resulted in changes to the direct payment system and the establishment of additional environmental protection measures. During this time, the 2013 reform also took place, which aimed to increase the sustainability of European agriculture and support farmers in protecting biodiversity, introducing the concept of "greening" (ecological obligations) for a portion of direct payments.



**Figure 4. Annual Publications and Citations**

*Source: Web of Science, 2024*

The analysis above included only publications with a considerable number of citations, leaving aside papers with fewer than five citations. Therefore, a general overview of all works published over time that have studied the relationship between the Common Agricultural Policy (CAP) and economy, environment, and agriculture, as well as the number of citations for each year, was deemed useful. This analysis is essential for gaining an overall view of publication activity in this field, not just significant papers. According to data from the Web of Science database, the first paper published online was in 1991, titled "An Empirical Approach to Crop Modelling and the Assessment of Land Productivity," authored by A.J. Thomasson and R.J.A. Jones, with the first citation recorded in 1993. Until 2002, publications generally numbered fewer

than 10 per year, but after the first CAP reform in 2003, this number increased significantly. For instance, in 2010, 25 papers were published on this topic. A similar increasing trend is observed in the number of citations, indicating a positive signal in the dynamics and relevance of research in this field, offering valuable insights into trends and progress made.

The 2013 CAP reform generated increased interest in investigating the effects of the CAP, particularly on the environment and biodiversity, making research in this sector more relevant in the post-reform period. It is remarkable how the interest in this field has continuously grown over the years, reflected in the increasing number of publications and annual citations. Technological advances have facilitated access to information and enhanced analytical capacities, leading to a rise in published studies on this topic. Online databases like Web of Science have enabled the identification and examination of relevant literature, contributing to a deeper understanding of the relationship between CAP and economy, environment, and agriculture. The CAP plays a fundamental role in shaping agricultural practices and natural resource use in the European Union, and research in this area is crucial for identifying strategies that can support sustainable economic development while protecting ecosystems and contributing to carbon emission reduction.

Between 2018 and 2021, this field saw a peak in interest, with a record number of publications in 2020 (56 papers). This field of study is interdisciplinary, attracting researchers from economics, environmental sciences, agriculture, and public policy. Collaboration between experts from various fields allows for a more comprehensive and integrated approach to the issue, which has contributed to the increase in publications and citations in this field. Moreover, the CAP is analysed from multiple perspectives and is continuously evaluated to address current global challenges such as climate change, biodiversity loss, and food security.

In the two years following 2021, although the number of publications declined considerably, we observe a rebound in 2024 to the 2021 level. Citations continued to rise, reaching 2,348 in 2023. Thus, of the 636 available documents, half were published between 2015 and 2024, a period that generated 8,030 citations, representing over 41% of the total.

In conclusion, the increase in the number of publications and citations in the field of the relationship between CAP, the environment, economy, and agriculture demonstrates its importance in the current context. Future research could focus on interdisciplinary collaborations and the use of advanced technologies to analyze the impact of CAP on the environment and the economy. Studying this field is crucial for optimizing agricultural policies to ensure the long-term sustainability of natural resources and economic development in rural areas. In this way, the relationship between CAP, the environment, and the economy will remain a key topic for European policy and academic research, contributing to the formulation of informed policies that support greener agriculture and a more sustainable economy in the European Union.

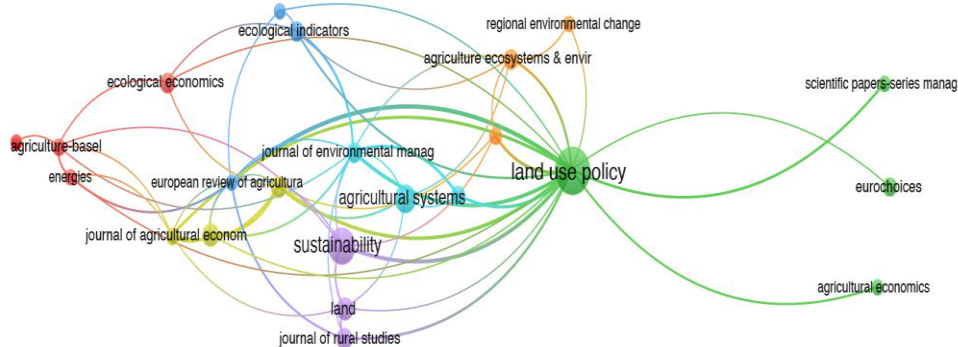
### *3.3. The Topography of Journals in the Study of the Relationship Between the CAP and Economy, Environment, and Agriculture*

Analysing the journals where the most papers in our field of interest have been published can provide valuable insight into how research is disseminated and valued within the academic community. This can help identify potential collaborations or networks of researchers for future projects and, more importantly, assist in discovering the main sources of specialized literature needed for comprehensive documentation. In total, 636 papers have been published or presented in 200 journals and conferences, with 315 articles appearing in 70 journals. Figure 4.5 displays these journals, setting the minimum threshold at least five articles published per journal. The number of publications varies, and based on the diagram, we can rank the journals that have

published works exploring the relationship between the CAP and the environment, economy, and agriculture.

According to the map generated with the VOSviewer application, it can be observed that of 295 journals, only 26 meet the threshold of 5 articles published, and of these, only 23 are connected. In the context of bibliometric analysis, this suggests that the articles come from a diverse range of publications, with a strong association regarding referenced articles. In general, identifying journals with connections on the VOSviewer map provides an overview of the publication diversity in this research field, highlighting its complexity and breadth.

We observe that the highest number of articles (47) were published in the journal *Land Use Policy*, which has an impact factor of 6 in 2023 and is ranked in Q1. The second journal by the number of articles published is *Sustainability*, with 29 articles published, an impact factor of 3.3 in 2023, and ranked in Q2, followed by *Agricultural Systems*, with an impact factor of 6.1 in 2023 and classified in Q1. Both *Environmental Science & Policy* (ranked in Q1) and *Ecological Economics* (also ranked in Q1) stand out with 11 publications each in our area of interest, with impact factors of 4.9 and 6.6 respectively for 2023.



**Figure 5. Citation of the source (journals)**

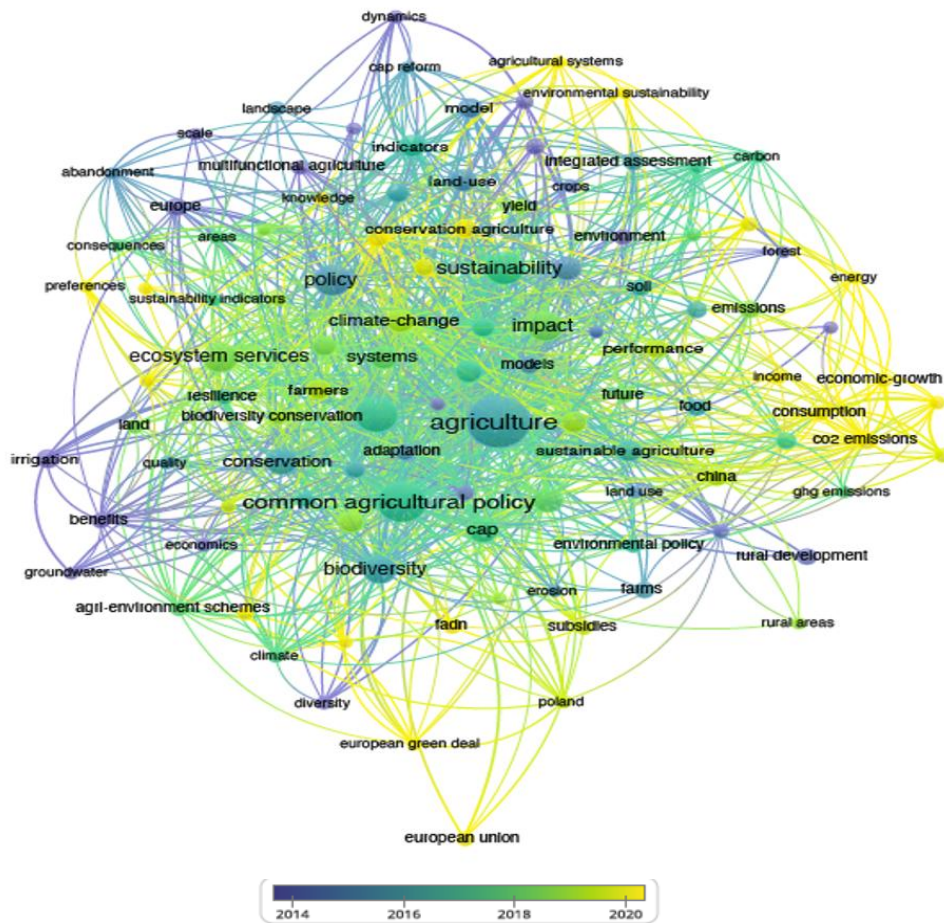
Source: Author's processing in VOSviewer

Following an analysis of the distribution of articles across quartiles (Q1–Q4) in the Web of Science database, we observe that the majority of articles were published in journals classified as Q1. This suggests the high quality and relevance of the research in the field analysed in the thesis.

By correlating the information from Table 2, which presents the journals in which the most cited papers appear, with the distribution of publications across journals (Figure 5), we can conclude that the most frequently cited articles come from journals with the highest volume of published articles. This highlights the interaction between the quality of research, its visibility, and the access provided within the academic community. The researchers' choice to publish in these journals may be motivated by the potential impact on their recognition and influence in the field.

### 3.4. Mapping of Keyword Co-occurrence

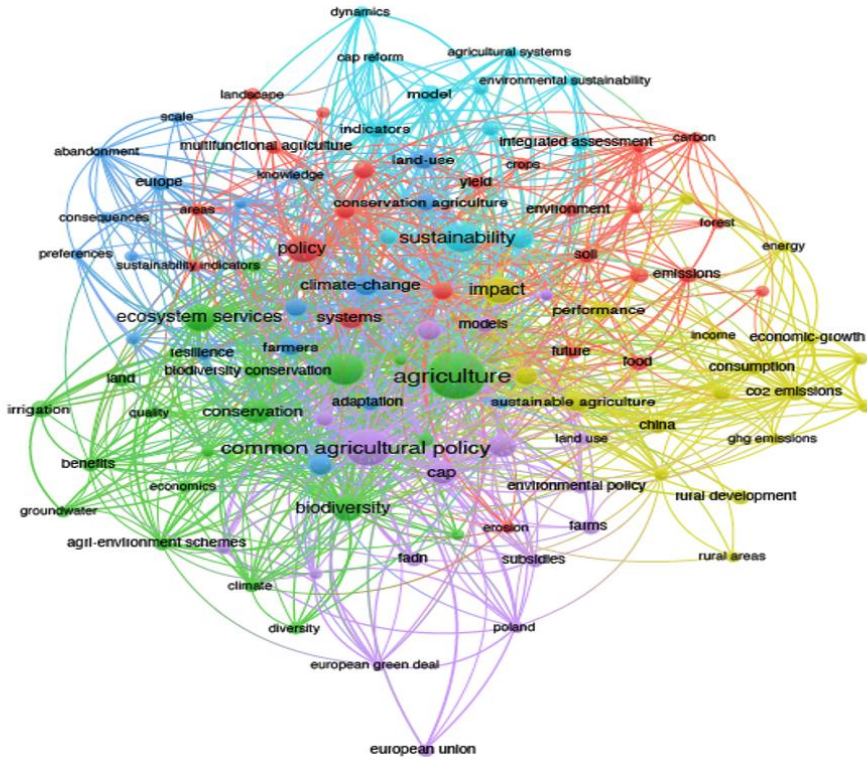
A large dataset was extracted from Web of Science and processed in VOSviewer to capture the co-occurrences of all keywords related to the Common Agricultural Policy, the environment, economy, and agricultural aspects. The graphical map of these co-occurrences is presented in Figure 6 below.



**Figure 6. Co-occurrence and connections between terms/keywords in the relevant literature on the Common Agricultural Policy and its socio-economic and environmental effects**

*Source: Author's processing in VOSviewer*

Figure 6 shows that agriculture, sustainability, biodiversity, conservation, agricultural policy, climate change, rural development, and agro-environmental schemes are central elements in similar studies on this current topic. At the same time, we can observe a temporal orientation of article topics, from themes such as agriculture, sustainability, biodiversity, and agricultural policy in the years 2014-2016, to topics focused on CO<sub>2</sub> emissions, environmental sustainability, energy, climate, agricultural system, schemes, payments, the European Green Deal, economic growth, income, and climate change in the years after 2020.



**Figure 7. Co-occurrence and clustering of terms/keywords in the relevant literature on the Common Agricultural Policy and its socio-economic and environmental effects**

*Source: Author's processing in VOSviewer*

At the same time, in Figure 7, it can be observed that out of the 2,963 keywords, 203 keywords meet the occurrence threshold of 5 and are grouped into 6 clusters, each centred around a keyword such as: agriculture, Common Agricultural Policy, policy, sustainable agriculture, sustainability, Europe.

The most frequently used keyword in the analysis is "Common Agricultural Policy," with a total of 113 occurrences and 482 connections to other terms (such as agriculture, biodiversity, sustainability, European Union, etc.), with the highest usage in 2017. The second most common term is "Management," with 70 occurrences and 376 links to associated keywords (policy, agro-environmental schemes, climate change, CAP, sustainability, etc.), predominant in 2018. Next, "Agriculture" ranks third, with 83 occurrences and 365 connections, with higher usage in 2014.

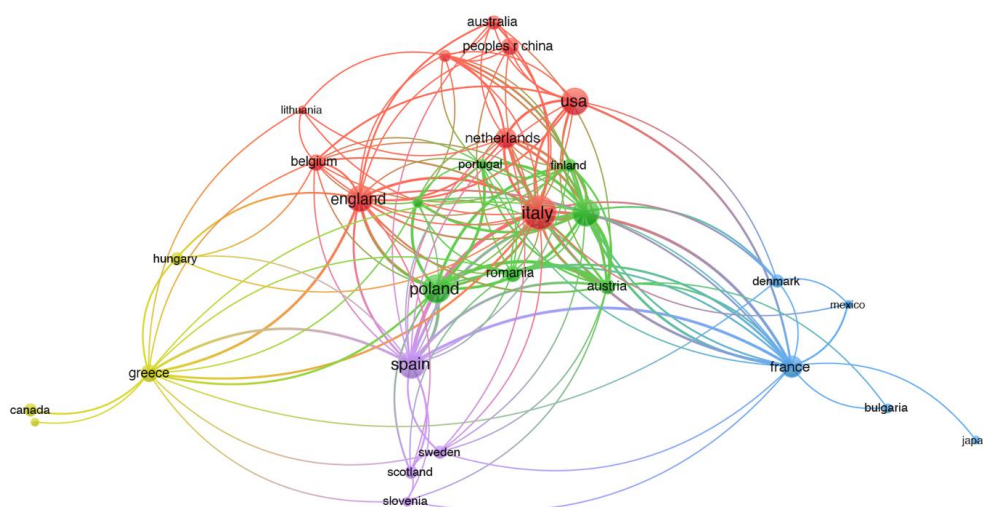
Other keywords include "policies" (56 co-occurrences), "ecosystem services" (45), "biodiversity" (45), "conservation" (44), and "sustainability" (54). Additional terms, such as "systems," "CAP," "climate change," "agricultural policies," "productivity," "land use," "farmers," "Europe," "sustainable development," "agro-environmental schemes," "CO<sub>2</sub> emissions," "food security," etc., recorded more than 15 co-occurrences.

This analysis highlights not only the most frequently used keywords but also emerging trends that suggest future directions for research. We observe that while fundamental terms such as "Common Agricultural Policy" and "sustainability" remain constant, there is an expansion toward concepts such as "ecosystem services" and "climate change," emphasizing the importance of integrated approaches in analyzing the relationship between CAP, the environment, and sustainable agricultural

development. This evolution of terminology reflects the ongoing adaptation of research to current challenges and emerging needs in the agricultural sector, highlighting the importance of a common agricultural policy that addresses both economic and environmental requirements.

### 3.5. Mapping of Main Countries of Origin

The analysis of the role and influence of various countries in VOSviewer highlights their contributions to global research. It allows for the evaluation of each country's impact based on the number of publications and citations, revealing the scientific leaders and how they influence knowledge in the studied field. Additionally, by analyzing the collaboration networks between countries, it is possible to identify cooperation relationships and the international flow of knowledge, thus showing how scientific communities worldwide connect and support each other (Beaver, 2001).



**Figure 8. Citation network analysis based on country of origin for various authors**

*Source: Author's processing in VOSviewer*

Thus, in Figure 8, the list of the most influential countries of origin has been identified in the network using VOSviewer software, where countries were ranked based on the number of documents, and the ranking of states was also based on citations from 1991 to 2024.

The top 10 countries in Table 3 represent highly regarded documents. Italy has the highest number of documents (58), but it is not among the countries with the most citations, suggesting that although it publishes a lot, the impact of its works is not proportional to the volume of publications. In contrast, Austria and Scotland have a relatively small number of publications but a significant number of citations, indicating that their works are highly influential and recognized in their fields. The citation-to-publication ratio varies significantly between countries. For example, Austria (191.45) and Scotland (195.89) have an extremely high ratio, suggesting that their publications are highly relevant and frequently cited within the academic community. This could indicate superior research quality or a highly sought-after area of specialization. In the context of the research, these data highlight the importance not only of the quantity of publications but also of their quality and relevance. It serves as a signal for researchers



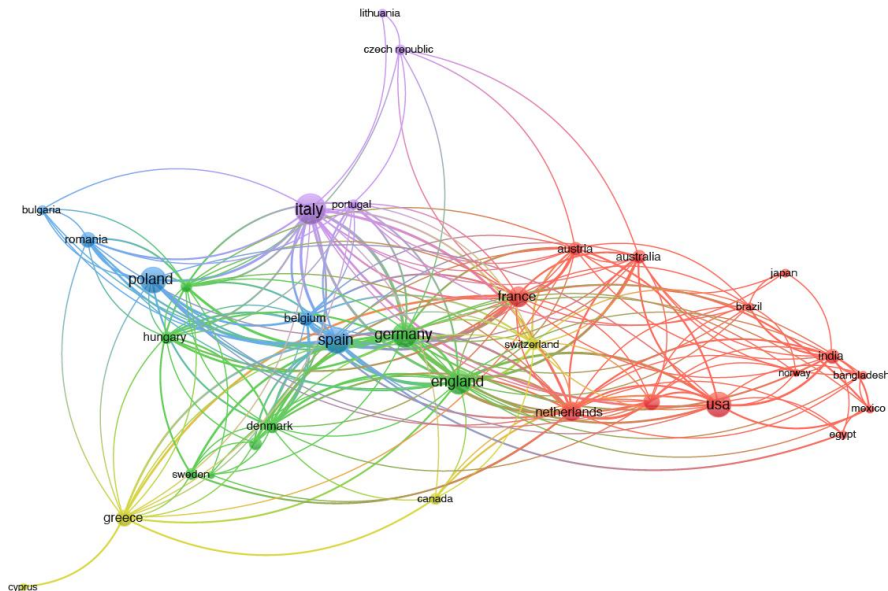
to focus not only on publishing but also on contributing to important discussions and topics. Countries with a high citation ratio could serve as a model for others, suggesting that focusing on relevant research topics and international collaborations could lead to greater recognition and citation of publications.

**Table 3. The most prolific countries**

No.	Country	Number of Documents	Number of Citations
1.	Spain	39	3215
2.	Italy	58	2753
3.	France	24	2298
4.	Austria	11	2106
5.	Scotland	9	1763
6.	Germany	38	1760
7.	Greece	16	1714
8.	England	35	1370
9.	Denmark	9	1170
10.	Belgium	13	836

*Source: Author's data processing in VOSviewer*

Using co-authorship analysis, trends in collaboration between influential countries were evaluated. Similar to the researcher analysis, we also aimed to identify opportunities for discovering new information and knowledge through collaboration.



**Figure 9. Co-authorship network analysis by country**

*Source: Author's processing in VOSviewer*

Figure 9 shows the network between 37 countries in terms of co-authorship from the perspective of the authors' countries of origin. The more important a country is, the larger its circle. The size of each circle indicates the number of papers written by authors from that country. Each link between two circles from different countries indicates a co-authorship relationship between organizations from those countries. There are three top international co-authorship relationships: USA-China, USA-

Australia, China-Canada, and China-India. Additionally, countries outside the EU are grouped in a single cluster, the red cluster, showing a greater tendency for collaboration among these countries, except for Canada. Canada is notably placed in the same cluster as Cyprus, Greece, and Switzerland. Among European countries, there are very close collaboration relationships between Spain, Germany, and the UK, as shown by the length of the connections between them.

## 7. Conclusions

Numerous studies have highlighted the importance of researching the impact of the Common Agricultural Policy (CAP) on the economy, environment, and agriculture, focusing on ways to measure and interpret this relationship in diverse global contexts. In the specialized literature, the reforms brought to agricultural funding through the Common Agricultural Policy have been intensively discussed, alongside the implications and recommendations formulated based on the findings. Bibliometric analysis has been used to provide an overview of the works examining this crucial relationship. This increasingly popular and rigorous method in scientific research has been adopted to evaluate scientific output and its impact within the academic community. Using the Web of Science database, we initially identified and analysed 636 published between 1991 and 2024, utilizing VOSviewer software to visualize and interpret bibliometric networks. Through bibliometric analysis, we mapped and evaluated scientific productivity, research impact, author and institutional collaborations, and emerging trends in the field. The bibliometric indicators used included co-citation network analysis of authors, identification of the most cited works, and the top journals where these relevant works were published. This approach contributed to shaping a clear picture of the current state of knowledge in the field and provided a robust framework for the development of future research and innovative perspectives.

Through analyses conducted with VOSviewer, we identified and mapped the most cited authors and relevant works in the researched field. The results indicate a strong focus on the need to reduce the negative environmental impact and promote policies that support both food production and biodiversity conservation, with some of the most cited works addressing these aspects with an improved perspective. We also observed a temporal evolution of interest in this subject, with the most cited works published between 2010 and 2014, and the highest number of publications between 2018 and 2021, when the field experienced a peak in interest, with a record number of publications in 2020 (56 papers). This research area is interdisciplinary, attracting researchers from economics, environmental sciences, agriculture, and public policy. Collaboration between experts from various fields allows for a more comprehensive and integrated approach to the issue, which has contributed to the increase in publications and citations in this field. By analysing the clusters of cited authors, we highlighted an uneven distribution of their relevance, with certain authors, such as Pe'er, Dessart, and MacDonald, drawing attention due to their significant contributions. These authors have been recognized for their extensive studies and their influence in defining the paradigm related to the relationship between the Common Agricultural Policy and economic, environmental, and agricultural indicators. A detailed analysis of author connections and co-citation networks provides a clear picture of the intellectual structure of the field and how ideas and research are connected and developed over time.

Additionally, the exploration of the most cited articles and papers revealed not only the current research gaps but also opportunities for future investigations. For instance, most studies have focused on the effects of CAP funding on the environment, biodiversity, farmers' behaviour, and the economic outcomes of the agricultural sector,

but have not emphasized the global understanding of how these interactions simultaneously influence all three dimensions: economic, environmental, and agricultural. This suggests a considerable space for research exploring more complex and comprehensive connections between funding and the three dimensions targeted by the CAP, considering recent developments and changes in the global economic landscape. Thus, we consider that bibliometric analysis has played a crucial role in illustrating and evaluating the existing literature regarding the relationship between the CAP and the economic, environmental, and agricultural pillars. This effort not only highlighted the significant contributions of authors and relevant works but also facilitated the identification of emerging research directions, promising to fuel the further development of knowledge in this vital field of funding through the EAFRD and EAGF.

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