Agri-Food Contexts in Mediterranean Regions

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The agri-food frameworks have specific characteristics (production units with small dimensions and in great number with implications in the respective markets) that call for adjusted approaches, even more so when they are considered in Mediterranean contexts (where global warming will have relevant impacts). In fact, the Mediterranean regions and countries have particular specificities (due to their climate conditions) that distinguish them from their neighbours. This is particularly true in Europe, for example, where the southern countries present socioeconomic dynamics (associated with the respective public debt) that are different from those identified in the northern regions.

Keywords: food production ; food consumption ; agri-chains ; sustainability ; bibliometric analysis ; PRISMA approach

1. Introduction

The several dimensions (economic, social, and environmental) of agri-food systems are interrelated with other domains, such as those associated with chains and territory, where, for example, the heritage, socioeconomic dynamics, and natural assets have their importance [1].

On the other hand, agri-food contexts, due to their specificities, are often subject to several public interventions, namely through agricultural policies. This is particularly relevant in European Union (EU) countries, due to the different processes of enlargement and the consequent diversity of realities amongst member-states and regions [2].

In association with agricultural policies, institutions appear. Amongst the agri-food organisations, cooperatives appear with a determinant contribution to support in overcoming the particularities of the sector [3]. The cooperatives are crucial to technically support the agri-food stakeholders and help them to concentrate and add value to farm production.

Other approaches to dealing with the characteristics of the sector are the alternative agri-food networks that have appeared over the last decades, across several countries, as an interesting substitute for the traditional normalised systems towards more sustainable and healthy food markets [4].

In addition to its internal particularities, the agri-food sector always deserves special attention because of its environmental externalities and contributions to global warming [5]. In fact, the impacts on the environment from farming activities are having a real influence on the air, soil, and water quality. Achieving a sustainable and healthy agri-food sector seems to be a concern for several stakeholders [6], as well as the interrelationships of this sustainability with rural development [7].

2. Material and Methods

For this purpose, 100 and 117 articles (excluding conference papers, book chapters, and books) were obtained from the Web of Science Core Collection [8] and Scopus [9], respectively, in a search carried out on 26 December 2020, without any restriction for the publication year. This expression allows for the consideration of documents for the several forms considered by the researchers to express the agricultural and food systems, such as agri-food, agro-food, etc. This expression appears, in general, more frequently than agro-food in WoS and Scopus; nonetheless, specifically for the Mediterranean topic, there are no great differences. To aid in the organisation of the literature review in subsections, a previous bibliometric analysis was carried out with the VOSviewer software [10][11], considering keywords and terms as items.

The bibliometric analysis is a relevant support to better structure the literature review [12] and provide interesting findings to better understand the scientific trends [13]. In turn, systematic literature reviews are adjusted approaches to assess the state-of-art of the research associated with the topics addressed [14]. In addition, the agri-chains need to deal with new challenges [15] in the coming future [16].

This research follows the approach described before; nonetheless, there are other methodologies followed by other studies, such as, for instance, Sharma et al. In this study, an MB2MBA2 (Methodology Based on Benchmarking of Metadata, from scientific databases, and Bibliometric Assessment and Analysis) approach with the following phases is suggested (following, for example, Martinho [12] and Kent Baker et al. [17]):-Selection of the more adjusted scientific databases to work upon, considering the topics to be addressed;-Removing the duplicated documents and the not relevant ones;-Assessment of the information obtained from the database(s) selected to identify better methods to be considered in the bibliometric analysis;-Survey, through a literature review of the total documents or, in case of a great number of studies, the most representative ones as a sample of the total results obtained in the search.

3. Bibliometric Analysis

Figure 1 and **Table 1**, obtained through the VOSviewer software [11] with bibliographic data, consider co-occurrence as links and keywords as items. In the co-occurrence links, the relatedness of the keywords is based on the number of documents in which they appear together [10]. To obtain this figure and this table, 1 was considered the minimum number of occurrences (number of documents in which a keyword appears) of a keyword [10]. In this figure, the size of each circle associated with each keyword represents the number of occurrences, and the distance between each item (keyword) is related to the level of relatedness.

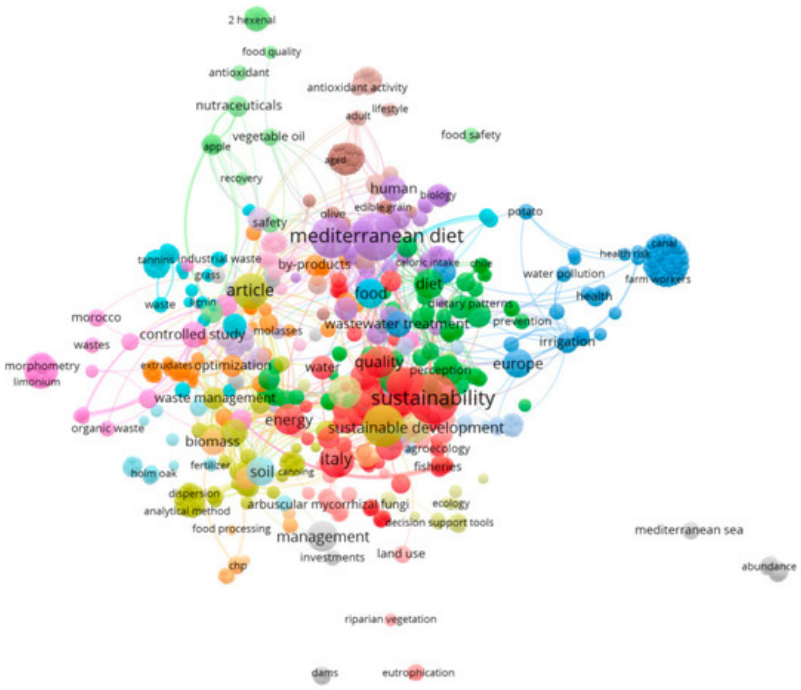

Figure 1. Network visualisation map for bibliographic data, co-occurrence link, and keyword items.

Table 1. Top 50 most relevant (more occurrences) keywords for bibliographic data and co-occurrence links.

Keywords	Cluster	Occurrences	Avg. Pub. Year
sustainability	**1**	**40**	**2017.13**
italy	**1**	**19**	**2016.16**
spain	**1**	**19**	**2016.95**
quality	**1**	**16**	**2017.19**
energy	**1**	**15**	**2016.60**
trade	**1**	**13**	**2015.15**
impacts	**1**	**12**	**2015.83**
life cycle assessment	**1**	**11**	**2016.73**
performance	**1**	**11**	**2018.09**
environmental impact	**1**	**10**	**2014.20**
life-cycle assessment	**1**	**10**	**2014.50**

Keywords	Cluster	Occurrences	Avg. Pub. Year
lca	1	9	2015.78
mediterranean basin	1	9	2015.11
water	1	9	2017.22
agri-food industry	1	8	2016.75
carbon	1	8	2013.50
competitiveness	1	8	2013.13
environment	1	8	2008.75
diet	2	14	2018.57
consumption	2	12	2018.83
adherence	2	10	2019.00
model	2	10	2012.90
mediterranean	2	9	2006.22
biogas production	2	8	2016.75
europe	3	13	2012.54
wastewater treatment	3	11	2015.82
wastewater	3	9	2013.44
agriculture	4	28	2015.11
article	4	20	2015.85
anaerobic digestion	4	11	2017.45
degradation	4	8	2017.13
mediterranean diet	5	37	2016.62
olive oil	5	28	2015.57
human	5	10	2016.30
traceability	5	10	2018.30
fruits	5	9	2017.00
food	6	14	2011.71
mediterranean countries	6	9	2013.22
controlled study	9	11	2017.73
aquaculture	9	8	2014.00
impact	10	11	2016.82
agri-food trade	10	8	2012.13
food waste	11	8	2017.88
costs	12	11	2015.64
mediterranean region	13	18	2010.50
sustainable development	13	14	2015.64
polyphenols	14	9	2016.44
soil	15	13	2015.77
biomass	16	11	2015.82
management	21	15	2017.20

Specifically, in **Table 1**, it is possible to identify five great clusters, in terms of diversity of keywords, among the top 50 documents having more occurrences. Cluster 1 displays keywords related to sustainability, where Italy and Spain appear with high occurrences and a recent average publication year, showing that they are current topics. Cluster 2 appears with keywords associated with diet and consumption, Cluster 3 with items such as Europe and waste, Cluster 4 with agriculture, and Cluster 5 with Mediterranean productions, such as olives and fruit.

Considering text data and terms such as items, **Figure 2** and **Table 2** were found. In this case, binary counting was considered, and the occurrences represent the number of documents in which a term appears at least once [10]. One was considered the minimum number of occurrences of a term. The size of the circles is related to the number of occurrences and the distance between items is associated with the relatedness.

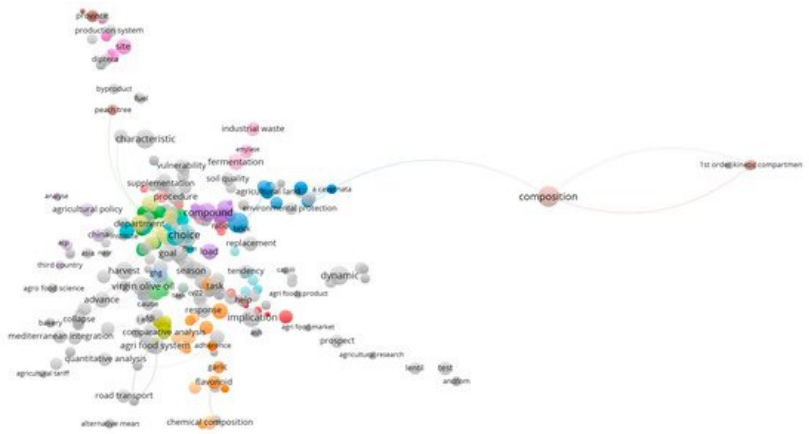

Figure 2. Network visualisation map for text data, co-occurrence links, and terms items.

Table 2. Top 50 most relevant (more occurrences) terms for text data and co-occurrence links.

Terms	Cluster	Occurrences	Avg. Pub. Year
certification	**1**	**6**	**2018.00**
food production	**3**	**13**	**2014.54**
agricultural land	**3**	**6**	**2015.50**
arbuscular mycorrhizal fungi	**3**	**6**	**2013.50**
compound	**5**	**11**	**2015.18**
generation	**5**	**9**	**2015.56**
amendment	**5**	**8**	**2016.63**
load	**5**	**8**	**2016.50**
olive pomace	**5**	**8**	**2016.38**
anaerobic co digestion	**5**	**6**	**2013.50**
biodegradability	**5**	**6**	**2013.50**
chloride	**5**	**6**	**2013.50**
damage	**6**	**10**	**2011.40**
characterisation	**6**	**6**	**2008.50**
component	**7**	**8**	**2015.13**
site	**9**	**8**	**2014.88**
decrease	**10**	**7**	**2019.71**
space	**11**	**9**	**2017.56**
hotspot	**12**	**9**	**2017.00**
department	**13**	**10**	**2014.00**
weight	**13**	**9**	**2016.78**

Terms	Cluster	Occurrences	Avg. Pub. Year
agricultural	13	7	2015.29
selection	13	7	2014.43
university	13	7	2015.29
agricultural policy	14	6	2017.33
china	14	6	2006.50
behaviour	16	7	2015.43
chemical composition	16	6	2019.00
composition	17	14	2012.29
fermentation	18	9	2015.00
replacement	19	7	2007.71
choice	22	18	2017.61
goal	23	10	2018.50
right	23	8	2017.13
function	25	7	2011.43
dynamic	26	12	2013.50
negative effect	32	7	2009.29
response	32	7	2012.71
question	37	10	2015.30
season	42	8	2014.25
stage	43	7	2015.86
task	44	8	2017.88
virgin olive oil	46	12	2016.75
advance	46	8	2015.50
cultural heritage	46	8	2018.88
agri food system	47	10	2018.90
procedure	49	10	2016.70
implication	50	12	2014.50
characteristic	55	12	2012.25
harvest	56	10	2017.60

In this case, **Figure 2** and **Table 2** also show the importance of sustainability and agriculture in the agri-food systems; nonetheless, they further highlight the relevance of the agri-chains' behaviours, namely in terms of food choice and consumption, food production and composition, and the associated dynamics. After exploring **Table 2** in greater depth, it is evident that there are some larger clusters that deserve further analysis. For example, Cluster 3 highlights the importance of food production and agriculture, Cluster 5 shows the interrelationships between food production and biodegradability, Cluster 13 shows the role of the University and research for agri-food systems, and Cluster 46 reveals the interrelationships between food production and heritage.

Considering the information highlighted here and following, for example, Martinho [12][18][19], who carried out an organised literature review based on previous bibliometric analysis, the literature review will be carried out for the following subtopics: agri-food dynamics and sustainability; agriculture and agri-food systems; agri-chains and food consumption; food production and composition impact on agri-chains.

4. Main Insights from the Literature Review and Discussions

The main insights are presented in **Table 3** and reveal the importance of an adjusted management of the by-products as a way to reduce the environmental impacts and find innovative and alternative uses from the perspective of circular economy. Innovative approaches to deal with the increased carbon footprint and that allow improvements in sustainability are determinants for a more balanced development.

Table 3. Public policies and production assets as main axes.

Documents	Main Insights
[20]	**By-products bring about serious challenges to management**
[21]	**Bilateral cooperation is fundamental and may bring relevant contributions for the several dimensions of the sustainability**
[22]	**A sustainable agriculture includes land preservation**
[23]	**The agricultural policies are important drivers of the agri-food contexts**
[24]	**The combination of agricultural and forestry activities may bring about interesting contributions**
[25]	**A more integrated rural development is a concern for several countries and institutions**
[26]	**The realities, in the EU, differ among Central, New Eastern, and Mediterranean countries**
[27]	**Urban agriculture also has social and ecological functions**
[28]	**The agri-food sector is one of the most important worldwide**
[29]	**There is antagonism between indicators related to the health and environment dimensions**
[30]	**The Mediterranean diet (MD), classified as Intangible Cultural Heritage by UNESCO in 2013**
[31]	**There is a historical agri-food trade between the EU Mediterranean countries and their neighbours**
[32]	**The Euro-Mediterranean (EUROMED) integration has had its implication in the respective countries**
[33]	**The requirement of energy may be provided by alternatives and renewable sources largely available in Mediterranean countries**

In these contexts, the agricultural policies and institutions may bring relevant contributions and play a relevant role, namely to promote interrelationships between the agricultural and forestry sectors in a more integrated rural development. This is a great task considering the diversity of realities in the Mediterranean framework.

The Mediterranean Diet as food label and lifestyle and Euro-Mediterranean integration are good signs for a deeper cooperation between the Mediterranean countries with advantages for the respective agri-food sectors and contexts.

References

1. Arfini, F.; Cozzi, E.; Mancini, M.C.; Ferrer-Perez, H.; Maria Gil, J. Are Geographical Indication Products Fostering Public Goods? Some Evidence from Europe. Sustainability 2019, 11, 272.
2. Blumberg, R.; Mincyte, D. Beyond Europeanization: The politics of scale and positionality in Lithuania's alternative food networks. Eur. Urban Reg. Stud. 2020, 27, 189–205.
3. Colom Gorgues, A.; Cos Sanchez, P.; Florensa Guiu, R.M. Agri-food cooperatives in Europe. Dimension, governance and BCG analysis of cooperative societies TOP25 of the EU-28 and TOP10 in Spain. REVESCO Rev. Estud. Coop. 2019, 73–98.
4. Higgins, V.; Dibden, J.; Cocklin, C. Building alternative agri-food networks: Certification, embeddedness and agri-environmental governance. J. Rural Stud. 2008, 24, 15–27.
5. Perrot, N.; De Vries, H.; Lutton, E.; van Mil, H.G.J.; Donner, M.; Tonda, A.; Martin, S.; Alvarez, I.; Bourgine, P.; van der Linden, E.; et al. Some remarks on computational approaches towards sustainable complex agri-food systems. Trends Food Sci. Technol. 2016, 48, 88–101.
6. Ruggeri, A.; Samoggia, A. Twitter communication of agri-food chain actors on palm oil environmental, socio-economic, and health sustainability. J. Consum. Behav. 2018, 17, 75–93.

7. Sonnino, R. Embeddedness in action: Saffron and the making of the local in southern Tuscany. Agric. Hum. Values 2007, 24, 61–74.
8. Web of Science Web of Science (Core Collection). Available online: (accessed on 26 December 2020).
9. Scopus Scopus Database. Available online: (accessed on 26 December 2020).
10. van Eck, N.J.; Waltman, L. VOSviewer Manual; Universiteit Leiden: Leiden, The Netherlands, 2020; p. 53.
11. VOSviewer VOSviewer—Visualizing Scientific Landscapes. Available online: (accessed on 26 December 2020).
12. Martinho, V.J.P.D. Interrelationships between renewable energy and agricultural economics: An overview. Energy Strategy Rev. 2018, 22, 396–409.
13. Barbosa, M.W. Uncovering research streams on agri-food supply chain management: A bibliometric study. Global Food Secur. 2021, 28, 100517.
14. Esposito, B.; Sessa, M.R.; Sica, D.; Malandrino, O. Towards Circular Economy in the Agri-Food Sector. A Systematic Literature Review. Sustainability 2020, 12, 7401.
15. Ghadge, A.; Kara, M.E.; Mogale, D.G.; Choudhary, S.; Dani, S. Sustainability implementation challenges in food supply chains: A case of UK artisan cheese producers. Prod. Plan. Control. 2020, 1–16.
16. Mogale, D.G.; Kumar, S.K.; Tiwari, M.K. Green food supply chain design considering risk and post-harvest losses: A case study. Ann Oper Res 2020, 295, 257–284.
17. Kent Baker, H.; Pandey, N.; Kumar, S.; Haldar, A. A bibliometric analysis of board diversity: Current status, development, and future research directions. J. Bus. Res. 2020, 108, 232–246.
18. Martinho, V.J.P.D. Agricultural Entrepreneurship in the European Union: Contributions for a Sustainable Development. Appl. Sci. 2020, 10, 2080.
19. Martinho, V.J.P.D. Exploring the Topics of Soil Pollution and Agricultural Economics: Highlighting Good Practices. Agriculture 2020, 10, 24.
20. Serrano, A.; Siles, J.A.; Carmen Gutierrez, M.; Angeles Martin, M. Optimization of Anaerobic Co-digestion of Strawberry and Fish Waste. Appl. Biochem. Biotechnol. 2014, 173, 1391–1404.
21. Sánchez, M.A.A. Towards a Spanish-Moroccan cooperation in environmental issues: The implementation of the European Maritime Strategy in the city of Melilla. Rev. Estud. Reg. 2014, 17–42.
22. Vastola, A.; Zdruli, P.; D'Amico, M.; Pappalardo, G.; Viccaro, M.; Di Napoli, F.; Cozzi, M.; Romano, S. A comparative multidimensional evaluation of conservation agriculture systems: A case study from a Mediterranean area of Southern Italy. Land Use Pol. 2017, 68, 326–333.
23. Baysse-Laine, A.; Perrin, C. How can alternative farmland management styles favour local food supply? A case study in the Larzac (France). Land Use Policy 2018, 75, 746–756.
24. Panozzo, A.; Huang, H.; Bernazeau, B.; Vamerali, T.; Samson, M.F.; Desclaux, D. Morphology, Phenology, Yield, and Quality of Durum Wheat Cultivated within Organic Olive Orchards of the Mediterranean Area. Agronomy 2020, 10, 1789.
25. Bezhani, E. The result and the impact of project IPARD for the rural and agricultural development. Mediterranean J. Soc. Sci. 2015, 6, 602–604.
26. Dos Santos, M.J.P.L.; Ahmad, N. Sustainability of European agricultural holdings. J. Saudi Soc. Agric. Sci. 2020, 19, 358–364.
27. Donadieu, P. Building Urban Agricultural Commons: A Utopia or a Reality? Chall. Sustain. 2016, 4, 3–9.
28. Scuderi, A.; Foti, V.; Timpanaro, G. The Supply Chain Value of Pod and Pgi Food Products through the Application of Blockchain. Qual. Access Success 2019, 20, 580–587.
29. Seconda, L.; Baudry, J.; Alles, B.; Soler, L.-G.; Hercberg, S.; Langevin, B.; Pointereau, P.; Lairon, D.; Kesse-Guyot, E. Identification of sustainable dietary patterns by a multicriteria approach in the NutriNet-Sante cohort. J. Clean Prod. 2018, 196, 1256–1265.
30. Pias, F. Design Contributions to Adopt Mediterranean Diet. Case Study Oranges from Silves. J. Spat. Organ. Dyn. 2018, 6, 174–181.
31. Crescimanno, M.; Farruggia, D.; Galati, A.; Siggia, D. The intensity of agri-food trade between the countries of the Mediterranean basin. Econ. Agro Aliment 2013, 15, 13–35.
32. Scarpato, D.; Simeone, M.; Rotondo, G. The challenge of Euro-Mediterranean integration for Campania agribusiness sustainability. Agric. Econ. 2019, 65, 539–549.

33. Buscemi, A.; Panno, D.; Ciulla, G.; Beccali, M.; Lo Brano, V. Concrete thermal energy storage for linear Fresnel collectors: Exploiting the South Mediterranean’s solar potential for agri-food processes. Energy Conv. Manag. 2018, 166, 719–734.