

Review

Twenty Years of Socio-Economic Research on Organic Agriculture Across the World: Looking at the Past to Be Ready for the Future

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Abstract: The world organic sector has evolved in a rapid way over the last few decades, driven by consumer interest, producer and retailer strategies, as well as by the evolving normative context. This growth has stimulated an increase in academic research, particularly in socio-economic research. The present work aims to understand the evolution of organic socio-economic research in terms of the research themes covered within this field, their relative importance, and how this importance has changed over time. The implementation of a structural topic model on scientific abstracts from the last 20 years allowed us to identify three broad areas of interest for organic socio-economic researchers: consumers, production, and society. The relevance of these strands varies in different areas of the world, mostly aligning with the prominent aspects of local organic sectors. This signals a good integration of organic socio-economic research within local contexts, with the possible development of place-based skills to be exploited within the global debate on organic agriculture. Overall, a reasonably strong imbalance emerges, with consumer-focused studies being more prominent than production-focused ones, especially those investigating producers' economic results. The latter seems to call for renewed attention on and analysis of the organic sector, assisted by robust evidence on both ends of the organic supply chain.

Keywords: organic research; text analysis; literature review; organic farming; organic agriculture



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1. Introduction

The 2022 report on world organic agriculture published by the Research Institute for Organic Agriculture (FiBL) and the International Federation of Organic Agriculture Movements (IFOAM) provides a quite clear overview of the organic sector [1]. While the absolute numbers are still relatively small (organic land occupies 1.6% of total agricultural land worldwide and organic sales are valued at around EUR 120 billion), the growth of the sector is impressive. In 20 years, organic agricultural land expanded by five times (from 15 million hectares in 2000 to close to 75 million hectares in 2020), and the number of agricultural producers witnessed a more than tenfold increase.

Born in the early 20th century from the need to provide an answer to economic, ecological, and social crises of the traditional agricultural paradigm, organic farming and consumption initially appeared as part of an alternative lifestyle, imbued with strong ideological stances and embraced by small groups of individuals [2]. One of the distinguishing features of these individuals was a strong commitment towards the founding principles of the organic movement, such as respect for the environment, a desire to move towards more natural ways of consumption and production, and the search for safe and healthy food [3].

The scale of the organic sector that we observe today is therefore the result of a (still ongoing) process of expansion from an extremely small niche to a still small, but no more irrelevant, segment of the world population. In parallel, the scientific world increased its

contribution to the sector, and research on organic agriculture gradually turned from a narrow interest of private institutes and organizations to a matter of general relevance [4].

The growth in scientific coverage of the organic sector was inevitably accompanied by a widening of the array of subjects addressed by researchers, who opened several fronts in organic research. In this respect, some examples include analyses of environmental and ecological aspects of organic agriculture [5,6], studies on alternative farming practices in organic farms [7,8], comparisons of organic and conventional productivity [9–12], and investigations into the nutritional and quality aspects of organic food [13,14].

In addition, as a sector expands, mutated scenarios take shape, and novel challenges appear both for the actors directly involved and for scholars who dedicate their efforts to studying the sector itself. In this regard, organic agriculture was already confronted with relevant changes, while some of them are still ongoing. For example, the growth in demand requires to find ways to increase organic supply, either by spreading organic farming throughout the world or making it more productive [15]. At the same time, as organic production and consumption increase, expanding beyond the groups of ideologically committed initiators, processes of conventionalization may emerge [16,17], and the original principles of organic agriculture might be slightly revised and adapted [18].

In this paper, we aim to understand how the study of organic agriculture evolved, restricting our attention to a broad research area: socio-economic research. The objective is therefore to identify the relative importance of different themes within organic socio-economic research and to understand whether and how this importance changes over time or space. In this way, our work might shed light on potential ‘imbalances’ in organic socio-economic research and highlight research avenues that might require deeper investigation. This seems particularly important given that socio-economic research in the organic sector, despite being relatively young compared to other research areas, experienced decisive growth from the turn of the millennium. This growth produced a considerable and heterogeneous amount of material, which justifies the effort to build, for the first time, a map of the discipline.

From a methodological point of view, such a task is accomplished by exploiting structural topic modeling, a quantitative text analysis technique that allows us to extrapolate relevant content structures from a large number of documents.

However, mapping a discipline should not be considered merely a technical exercise. Rather, understanding which themes scholars have addressed so far allows us to identify which thematic areas have received larger coverage and which ones lag behind. This is valid both at a global scale and when looking at specific geographical regions of the world.

Geography is in fact a crucial dimension for the organic sector in several respects. Organic consumption is prevalent in the richest areas of the world. The lower reliance of organic production on external inputs and technology makes it more connected to local conditions than conventional agriculture. The normative tools used to regulate the organic sector are inevitably framed in local legislative environments. In this geography-dependent context, we deem it relevant to also explore how socio-economic research is articulated in different areas of the world.

Such an analysis would stimulate questions (and hopefully provide some insights for finding the answers) about the reasons why socio-economic research has paid more or less attention to different aspects of organic agriculture. In addition, this kind of work, offering an overall picture of the discipline, should be considered not a substitute but rather a complement to the numerous reviews conducted within individual subfields, aimed at summarizing their results (e.g., [19–21]). The joint consideration of these types of studies will hopefully help researchers identify valuable research strands for the future in the fast-changing world of organic agriculture.

In what follows, we first detail the methodology adopted for retrieving and analyzing the literary material of interest for the study. Next, in Section 3, we report the results of the analysis, accompanied by some critical discussion. In the last section we add some conclusive remarks to summarize the findings and their implications.

2. Materials and Methods

2.1. Bibliographical Material

According to the objective of investigating the literature that addresses the economic aspects of organic farming, we used the following search string to retrieve the initial list of studies from the Scopus database:

TITLE-ABS-KEY(("organic farm" OR "organic agriculture" OR "organic system" OR "organic food" OR "organic product") AND (policy OR business OR demand OR supply OR cost* OR management OR market* OR consumer OR produc* OR chain OR trade)).

The search was limited to documents written in English and to the subject areas 'Social sciences', 'Business, Management and Accounting', and 'Economics, Econometrics and Finance'. A screening of the titles was performed to eliminate possible documents not related to the investigated topic. Similarly, review articles were dropped. In addition, we discarded documents published before 2000, as their number was very small. The final corpus consisted of 2431 article abstracts, which were used to perform the text analysis. Figure 1 and Table 1 report, respectively, the yearly and cumulative numbers of documents published in each year, and the number of documents pertaining to the three investigated subject categories.

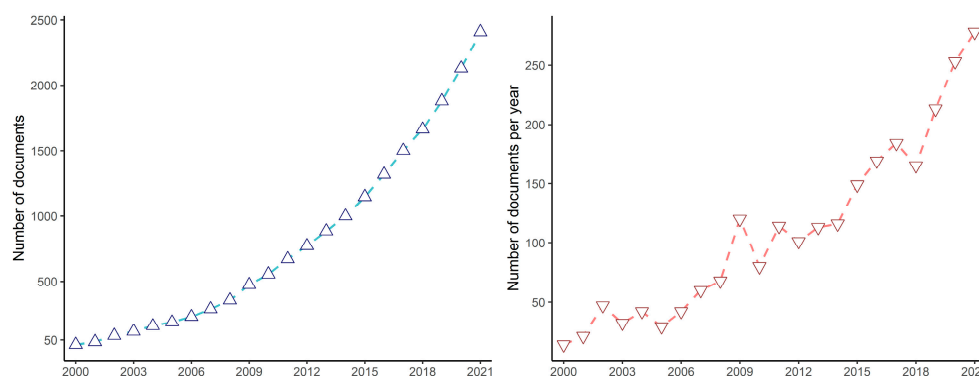


Figure 1. Cumulative (left) and yearly (right) numbers of studies published in the considered period.

Table 1. Number of studies of the corpus pertaining to the different subject areas.

Subject Area	Number of Studies	Share
Social Sciences	1265	52.0%
Business, Management and Accounting	1110	45.7%
Economics, Econometrics and Finance	658	27.1%

For each study, we have information about the year of publication and the geographical area where the study was conducted. While the former information is directly available in Scopus, the latter was retrieved from either the title or the abstract of the papers. The number of documents in each area (continent) is reported in Table 2. For around 600 studies, the geographical area is unknown, because they either deal with general themes, or the area was not mentioned either in the title or in the abstract. An artificial continent (*Mixed*) was created for studies conducted across two or more continents.

Table 2. Number of studies of the corpus conducted in each continent.

Continent	Number of Studies	Share
Africa	55	2.3%
Asia	435	17.9%
Europe	868	35.7%

Table 2. Cont.

Continent	Number of Studies	Share
Latin America	123	5.1%
North America	231	9.5%
Oceania	39	1.6%
Mixed	74	3.0%
Unknown	606	24.9%

2.2. Structural Topic Modelling

Structural topic modeling (STM) is a technique used in text analysis to infer the content of a text corpus, i.e., a collection of text documents. Developed by [22,23], it is a Bayesian modeling technique that extends the Latent Dirichlet Allocation [24], combining different previous models.

As a generative model, it is based on a process that leads from a set of latent structures, namely, the topics, to the occurrence of words in a document, i.e., the observed elements of the text corpus. Basically, the work of the STM consists in walking this process back to retrieve, starting from the words that the researcher observes in the corpus, the topics that generated them.

The structure of this process confers the STM some interesting characteristics, as follows: (i) it is an unsupervised model, since the topics are inferred from the corpus rather than being specified in advance by the researcher; (ii) it is a mixed-membership model, i.e., each document is a mixture of topics, rather than being made of only one topic; (iii) it allows topics to be correlated (and to estimate these correlations); and (iv) it allows the use of covariates to describe the frequency with which a topic is discussed (its prevalence) as well as the words used to discuss a topic (its content), rather than assuming them to be constant across the documents. While properties (i)–(iii) are also common to other topic models, property (iv) is peculiar to STM.

The two concepts underlying STM are topical prevalence and topical content. Topical prevalence refers to the proportion that each topic represents in a document (or, equivalently, in the entire corpus when considering the whole set of documents), allowing the researcher to identify the most relevant topics. Topical content is the frequency distribution of words within each topic. This distribution allows the researcher to identify the most frequent words within a topic and therefore infer its content.

The STM generative process is sketched in Figure 2, which is a simplification of the diagram drawn by [22]. The vector of topic proportions (θ_d) is drawn from a logistic normal linear model (μ). On the one hand, this allows us to estimate the correlation between different topics, similar to the correlated topic model [25]. On the other hand, it allows us to include covariates X in the linear model, allowing the topic proportions to vary according to specific characteristics of the documents.

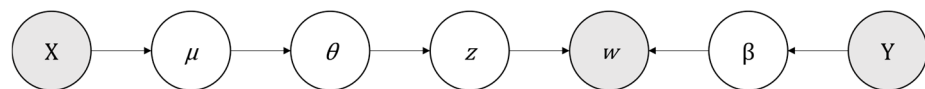


Figure 2. Generative process of the structural topic modeling (shaded elements are those observed by the researcher, blank ones are the unobserved entities; adapted from [22]).

Once the topic proportions of a document are obtained, the topic ($z_{d,n}$) of the n^{th} word is drawn from this distribution. Conditional on this topic, a word w is drawn from the multinomial logit distribution (β) that describes the topical content. Specifically, the content of topic k in document d is expressed as follows:

$$\beta_{d,k} \propto \exp\left(m + k_k^{(i)} + k_{Y_d}^{(c)} + k_{Y_d,k}^{(i)}\right) \quad (1)$$

Equation (1) shows that the topical content depends on a vector of baseline word frequencies (m) and on deviations from these frequencies due to the specific topic ($k_k^{(i)}$), to some document characteristics expressed by the vector Y ($k_{Y_d}^{(c)}$), and to their interaction ($k_{Y_d,k}^{(i)}$).

2.3. Selection of the Model

As discussed in the previous section, STM allows one to model both topical prevalence and topical content. In our model, we used two covariates in the prior distribution for topical prevalence: year of publication and geographical area. Splines were used for the former covariate to account for possible nonlinear relationships. No variable was used in modeling the topical content, under the assumption that the words used to describe a topic do not vary either in time or across geographical areas in the considered period of analysis.

The selection of the optimal model was based on the joint consideration of exclusivity and semantic coherence [26,27]. The former is an index measuring the specificity of each word to a given topic, while the latter is related to the probability that a set of words cooccur in the same document [28]. The estimation of models with up to 20 topics provided the exclusivity-semantic coherence combinations reported in Figure 3.

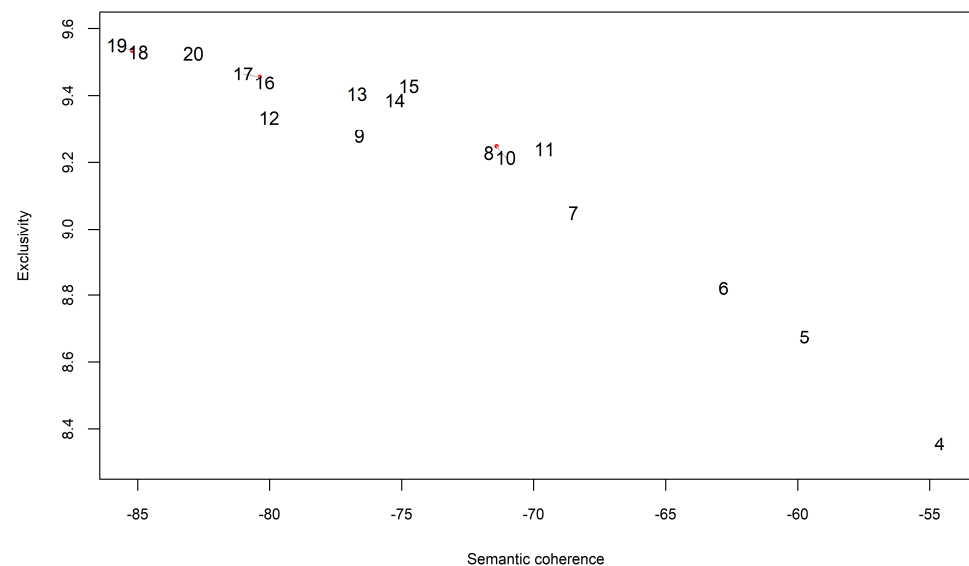


Figure 3. Average values of semantic coherence and exclusivity for models with different numbers of topics (from 4 to 20).

According to [26], the optimal model should score high on the two metrics, but neither of them should dominate the other. In our case, based on Figure 3, models with 11 and 15 topics are the most promising. Thus, we computed the overall semantic coherence and exclusivity averages across the two pre-selected models, finally selecting the one with 11 topics, i.e., the one with the highest share of topics above the exclusivity and coherence means (36.4% vs. 20.0%) calculated only on the models with 11 and 15 topics.

3. Results and Discussion

For clarity purposes, we organized the results part into two subsections. The first subsection reports the topics identified by the topic modeling analysis, describes them, and critically explores their content. The second subsection is devoted to the analysis of the temporal and spatial heterogeneity in the discussion of these topics in the literature on the socio-economic aspects of organic agriculture. All the analyses were performed using the `stm` package [26] in the R software version 4.3.2.

3.1. Topics from the Economic Literature

The names assigned to the 11 topics identified by STM analysis are based on the most frequent and most exclusive word stems (see Table A1 in the Appendix A). In addition, to validate the chosen names, we ranked the documents by estimated prevalence of each topic, and read, for each topic, the title and abstract of the first 10 documents. This procedure, which corresponds to the analysis of ‘exemplar’ documents suggested by [23], also allows us to better investigate the content of each topic. The 11 topics are shown in Figures 4 and 5. Figure 4 reports the estimated prevalence of the topics in the entire corpus of abstracts, while Figure 5 shows the pattern of correlation between topics.

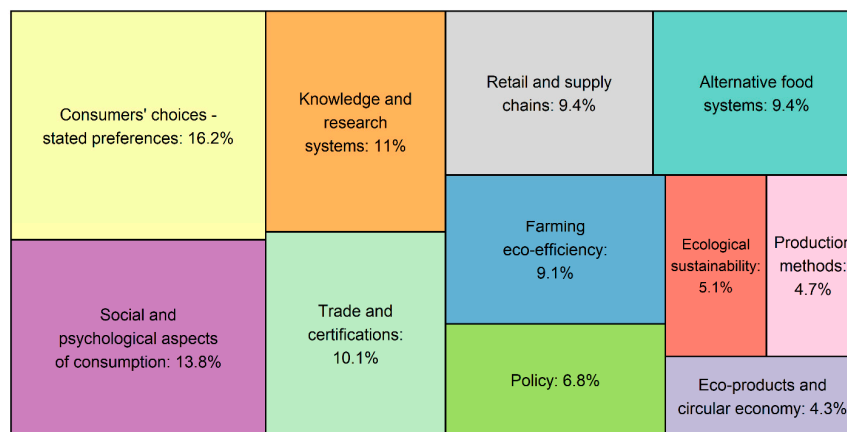


Figure 4. Estimated prevalence of topics in the overall corpus of abstracts.

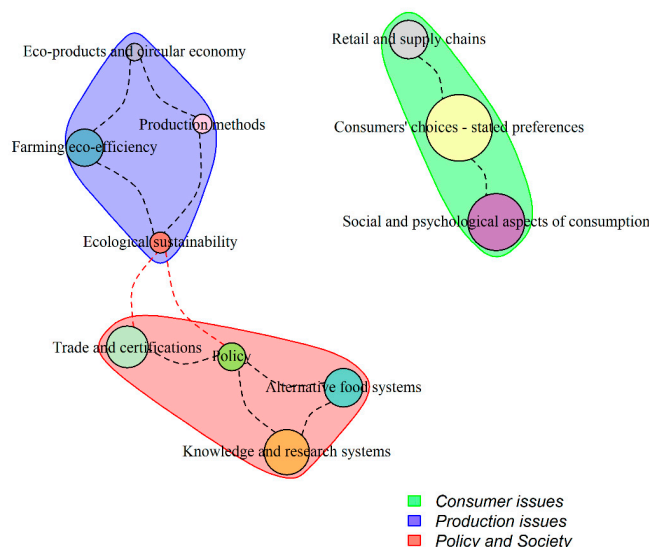


Figure 5. Significant correlations between topics and correlation clusters (a dashed line is drawn when the correlation between two topics is greater than 0.05).

Based on estimated correlations, three broad clusters of topics can be identified. The largest one, *Consumer issues*, representing 39.4% of the corpus in terms of prevalence, gathers the topics related to the demand side. Specifically, within this cluster, research related to *Social and psychological aspects of consumption* deals with the psychological and behavioral processes that shape consumers’ attitudes toward organic products. On the other hand, studies within *Consumers’ choices—stated preferences* analyze the very purchase decisions of consumers, paying attention to the external factors that affect them. The last topic of the cluster, *Retail and supply chains*, is more related to the dynamics that distribution agents develop to meet the demand and consumer needs.

Supply-related topics, forming the cluster *Production issues*, appear to have an overall lower importance (23.2% of the corpus). Within this cluster, the economic and environmental effects of specific production decisions and techniques are studied in the *Production methods* and *Ecological sustainability* topics. Their translation in efficiency-based analyses takes place within the *Farming eco-efficiency* topic, while studies related to *Eco-products and circular economy* tend to provide a better integration of individual production practices into broader sustainability systems and supply chains.

Finally, a relevant space is devoted to several aspects concerning the social and policy frameworks in which organic agriculture operates (*Policy and Society*, 37.4% of the corpus). The distinguishing feature of this cluster is the consideration of themes that are not specific to a few categories of people (e.g., consumers or producers), but affect the societal/political/legislative system at large. In this respect, research involved in *Knowledge and research systems* investigates the processes of knowledge creation and development in organic systems, including the role of researchers in stimulating and facilitating these processes. Research on *Alternative food systems* engages in the study of alternative movements related to organic farming and consumption, while research within the *Policy* topic mainly investigates local institutional arrangements and societal and political issues related to sustainability transitions. Finally, *Trade and certifications* contains studies dealing with the international trade of organic products, as well as the development of organic standards, mostly connected to trade.

While details about the content of each topic and a critical analysis of each cluster are provided in the following subsections, Figure 5 provides interesting insights on the connections between the three clusters. Specifically, *Consumer issues* appears as a stand-alone cluster, suggesting that scientific literature focusing on demand aspects is relatively disconnected from literature strands addressing supply-side or societal and policy issues. The other two clusters show instead some degree of connection, as the *Ecological sustainability* topic (within the *Production issues* cluster) is correlated to the *Trade and certifications* and *Policy* topics, both belonging to the *Policy and Society* cluster.

3.1.1. Consumer Issues

“Each time a new food technology is developed, a new brand advertised, or a food policy debated, there is an associated spike in research eliciting consumer preferences for the particular product or attribute in question.”

In line with this observation by [29], the spread of organic products and the large and steady growth of organic markets that have been in process since the turn of the century [1] prompted high interest among scholars in the study of the dynamics of organic consumption. The result of this attention is that, as confirmed by the estimates of our model, the topics related to the sphere of consumption are by far the most discussed ones in the organic socio-economic literature (Figures 4 and 5).

A characteristic of these studies is that the scope of many of them, especially those investigating consumers' preferences (which are mainly included in the topic *Consumers' choices—stated preferences*), is usually limited to narrow geographical areas, certain groups of consumers, specific sales channels, or a few selected products. This suggests a view of each study as a single piece of a larger picture, a sort of 'large collection of case studies'. In this spirit, several meta-analytical papers tried to condense and summarize more than 20 years of geographically narrow and product-specific results [30–32]. The more stable evidence that comes from this wealth of literature is the positive image that consumers have, on average, of organic products. This image translates, for some groups of consumers, into a willingness to pay a price premium for having the products they buy labeled 'organic'. It is interesting to note that, despite the fact that researchers often argued, guided by contrasting results, about the virtues and flaws of organic agriculture, few cast doubts about the positive attitudes that organic products arouse in consumers. In this sense, the following passage by [32] is illustrative:

“Although there is little evidence supporting many of the claims for organic foods, many consumers still believe in these benefits for organic foods.”

While the estimation of the willingness to pay for the organic attribute is the main research interest within the topic *Consumers’ choices—stated preferences*, this interest is rarely addressed alone, but is often discussed jointly with a variety of different aspects. Thus, scholars observed that the importance attached to the organic attribute hinges on the type of product (e.g., ref. [33] distinguishes between virtue and vice foods) as well as on the product category [34,35]. Most often, the research questions revolve around the relation between organic and other product attributes, such as the place of origin [36,37], taste [38], health and nutritional claims [39], information about animal welfare [40], or labels guaranteeing the naturalness of products [41], among others.

While all of these factors are directly relate to the product, the study of consumers’ preferences for organic food has also repeatedly been used to examine the traits of consumers themselves. The evaluation of the role played by socio-demographic characteristics led, after years and a wide range of research, to the conclusion that their role is mixed and inconclusive [30]. This evidence seems to confirm the prediction given by a survey from [42], which anticipated that the expansion of organic supply chains would lead to a widening of the consumer segment in terms of socio-economic characteristics.

Whatever the reason for the failure of socio-demographic characteristics to consistently explain consumers’ preferences toward organic food, scholars interested in this type of research question have turned their attention, for some time, to investigating consumers’ inner motivations. The level of interest expressed by scholars in these issues is made clear by the importance that this dedicated topic, namely, *Social and psychological aspects of consumption*, has in our model.

Compared to its close relative, *Consumers’ choices—stated preferences*, the topic on socio-psychological aspects is less heterogeneous in terms of content, as its main issue is understanding the psychological processes that lead to the formation of certain attitudes and behaviors toward organic food. A characterizing element is therefore the extensive use of behavioral models, among which the Theory of Planned Behavior [43] is by far the most common, although a variety of other conceptual frameworks can be found as well, such as the Control Theory [44,45], the Theory of Reasoned Action [46], or the Value Theory [47].

Based on these models, the most representative papers of this topic strive to link individual values and norms to attitudes towards organic products and actual purchasing behavior [48,49]. Although the authors focus on a variety of different factors, the two elements that dominate the scene are the attitudes and beliefs about health and the environment [50–52]. The first is related to the perception of consumers that organic food is healthier, due to the absence of chemical inputs in the production process and the use of more ‘natural’ production methods. The latter aspect, that is, environmental concerns, causes organic consumption to flow directly into the field of ethical consumerism, which, according to [53], is defined as “the conscious and deliberate choice to make certain consumption choices due to personal and moral beliefs” (p. 290).

While both health and environmental attitudes are behind the purchase and consumption of organic products, health often appears to be the main force guiding consumers to choose organic. In this sense, paying attention to health motives means caring for yourself, an expression of egoistic values, which are usually stronger than altruistic values that stimulate the decision to buy organic to avoid harming the environment [19,54].

Closely connected to the issues of consumption are those concerning distribution, which our model captures in the topic *Retail and supply chain*. In fact, as organic consumption has grown and evolved over time, so has the number of actors responsible for their sales. As noted by [55],

“... the major marketing outlets for organic foods have shifted over time. Health and natural products stores and direct markets (such as farmers markets) were the major outlets for organic food from 1990 to 1996. By 2000 conventional supermarkets represented the primary purchasing outlet for organic food products.”

This structural change in the organic retail sector opened up new possibilities for organic farmers, widening the spectrum of selling strategies, among which they can choose the ones that best suit their needs [56,57].

Also, conventional retailers started to build their own strategies, taking into account organic products and pondering the role these products might play within such strategies. Organic products are still subject to the same traditional marketing considerations and decisions that are relevant to other products, such as those concerning pricing or product placement on the shelves [58,59]. However, because of the quality image that consumers (or at least some of them) attach to them, the offering of organic products is usually also considered a part of broader retail strategies. For example, retailers should consider that the introduction of an organic version in a category of products might significantly affect the perception (and sales) of conventional product versions [60,61].

However, organic products are also a means of shaping the image of the retailer. While the already mentioned phenomenon of ethical consumerism has been expanding, several retailers have tried, also through the inclusion of ethical products, to develop a conscientious image [62]. From this perspective, the decision to sell organic products might also bespeak an aim to create in the consumer an 'organic image' of the retailer, which could be exploited in future as a source of competitive advantage [63]. A similar strategy is pursued through the development of organic private labels [64]. These labels, which have emerged as a specific type of premium private labels, provide retailers with the opportunity not only to increase customer loyalty and obtain higher margins, but also to improve their image as premium retailers [65].

3.1.2. Production Issues

Organic agriculture was originally born as a response to the green revolution, with its founding concepts being deeply anchored in the search for holistic production methods, whereby sustainable techniques are exploited to ensure the conservation of natural as well as farm resources [66]. Howard, one of the founders of the organic movement, clearly expressed the need for a balance between naturalness, freshness, and fertility, characterizing organic agriculture and economic returns as typical of a conventional view of farming [67]:

"The war in the soil is the result of a conflict between the birthright of humanity—fresh food from fertile soil—and the profits of a section of Big Business in the shape of the manufacturers of artificial fertilizers and their satellite companies who produce poison sprays to protect crops from pests and who prepare the various remedies for the diseases of live stock and mankind,"

In line with this environmental-oriented pursuit, economic research has not ignored the aspects directly related to agricultural activity and its externalities, despite the fact that relatively less attention has been paid to these issues compared to other broad research areas.

The production/environment double track on which the production cluster is articulated is particularly evident in the *Production methods* and *Ecological sustainability* topics. Both topics are mainly centered on farm management issues, but, while in the former a production-oriented approach is evident, studies related to the latter usually screen farm management practices through an ecological lens. It is therefore common to find in the *Production methods* topic studies trying to untangle the effects of specific agricultural practices on crop yields or on food quality [67–70], such as fertilization [71], irrigation [72], cover cropping, or soil management [73]. On the other hand, some recurrent themes in the *Ecological sustainability* topic are the general provision of ecosystem services [74,75], the study of insect biodiversity and control [76–78], the use of cover crops and their effects on the agroecosystem [79,80], and the use of certain permaculture practices [81].

While production and environmental aspects of farm management are discussed in two different topics, in the *Farming eco-efficiency* topic the production/environment dichotomy is analyzed with respect to efficiency and risk. Specifically, production efficiency is based on the concept of technical efficiency, while environmental efficiency refers to the

analyses of unitary environmental impacts, usually estimated through life cycle assessment (LCA) techniques.

Interestingly, the most representative papers of this topic highlight the importance of one of the most debated issues in comparing organic and conventional agriculture: yields. Yield differences between organic and conventional systems have been analyzed by a wealth of the literature with mixed results, but a good synthesis is provided in [11], who reported an average 20% lower productivity for organic agriculture in developed countries, clearly acknowledging that “yield differences between organic and conventional agriculture [...] are highly contextual” (p. 231). Furthermore, organic yields tend to be more variable compared to conventional ones [82], with a direct effect on the riskiness of the organic business [83,84].

The level and variability of the yields have impacts on technical and environmental efficiency, largely explaining the heterogeneous results observed in different studies. For technical efficiency, lower organic yields can determine the lower efficiency levels often observed in organic farms [85,86], while when performing LCA analysis, the yield differential is the factor that makes the choice of the functional units decisive for the consistency of these studies [87]. As recalled by [87] in the following passage, functional units are in fact one of the most critical elements to be considered:

“Outcome of [carbon footprint (CF)] studies have potential to supply information that supports effective decision-making to mitigate [greenhouse gases (GHG)] and climate change, but currently there is poor consistency in the methods of CF calculation for agricultural systems. Consistency is particularly lacking in the choice of functional units, definition of system boundaries, and specificity of emission factors (EFs),”

Specifically, when LCA studies use an area-based functional unit (i.e., environmental effects are referred to a unit of land area), a quite wide agreement is found in the statement that organic farming has lower impacts than conventional farming [88]. However, when a production-based unit is used (i.e., the environmental effects are referred to a unit of production), the results are more heterogeneous, with organic farming having estimated impacts that might be lower than [89], not different from [90], or even higher than [91] conventional farming.

To conclude with the analysis of the topics from the *Production issues*, the topic *Eco-products and circular economy* incorporates papers that address different themes, mainly related to the sustainability of production systems or to the use of resources. In this sense, we can find papers about public procurement [92,93], waste and recycling [94,95], or the use of reclaimed water and water footprint [96,97]. What distinguishes the representative papers of this topic from those of other topics is the broader perspective adopted, which is not limited to production, but extends also to other stages of the product life. This is especially evident in studies that focus on specific products [98,99], which, instead of conducting farm-level analyses, adopt supply chain approaches.

3.1.3. Policy and Society

Overall, the *Policy and Society* cluster (*Knowledge and research systems, Alternative food systems, Trade and certifications and Policy*) has a prevalence of almost 37% across the corpus. Within the cluster, the topic *Knowledge and research systems* accounts for about one third (11% of topical content across the corpus) of the content. This is not surprising as knowledge is a key ingredient in sustainable and organic agriculture.

According to [100],

“As a more sustainable agriculture seeks to make the best use of nature’s goods and services, technologies and practices must be locally adapted and fitted to place,”

This peculiar aspect of sustainable farming implies a larger role for place-based knowledge systems in organic rather than in conventional agriculture. In fact, the latter is more based on national innovation systems, as techniques are standardized rather than adapted to local ecological and social conditions [101]. Similarly, the role of locally adapted practices

suggests a larger role for local practitioners in the knowledge production process. This leads to the involvement of local actors through participatory research and the engagement of researchers in action research and social innovation practices, which are typical aspects of a strong concept of agroecology [102]. Not surprisingly, the papers addressing this topic cover the areas of knowledge coproduction and social learning [103–106], as well as aspects of local knowledge systems [107,108], including the related institutional aspect of local development processes. The need to resort to participatory research and knowledge co-creation to foster organic farming is well illustrated by the following [103]:

“For further development of organic agriculture, it will become increasingly essential to integrate experienced innovative practitioners in research projects. The characteristics of this process of co-learning have been transformed into a research approach, theoretically conceptualized as “experiential science,”

As the role of social innovation in organic agriculture is underlined, the *Knowledge and research systems* topic is linked (see Figure 5) to the *Alternative food systems*, which stresses the agency of actors (especially farmers and consumers) along the food chain. This topic accounts for slightly less than 10% of the contents across the corpus. It covers a mainly sociological body of literature focused on new social movements resisting neo-liberal capitalism in the food system, a notable example being the World-Wide Opportunity on Organic Farms (WWOOF) movement at the intersection of alternative tourism and organic agriculture [109–111]. Other issues range from the analysis of the ethics of these movements in modern and post-modern society [112] to the analysis of the lifestyles and life narratives of farmers and activists [113,114]. Referring to Japan, a country that has witnessed in the Takei movement one of the first forms of community supported agriculture [115], the paper by [116] exemplifies the content of this topic:

“With goals of living in harmony with nature, intimate others, and community, [young farmers] create lifestyles in marginal rural localities by which they can make selves that are alternative to the neoliberal narrative, yet act as entrepreneurial subjects that risk bringing their version of morality to the market, via delicious, organic food sold to self-creating consumers.”

The topic is characterized also by papers that offer a critical reflection on the alternative food movement, acknowledging for example that WWOOFs “may be less motivated by farming and more by a cheaper form of holiday” [109], pointing out that some alternative food practices like hired gardens characterize a white middle class phenomenon [116], or highlighting that support for local organic food “fosters a romantic vision of local organic food and a utopian politics that naturalizes one set of socio-natural relations as right and legitimate rather than a more open discussion of what kinds of agroecological landscapes should be preserved and why” [117].

Related to both the *Knowledge and research systems* and the *Alternative food systems* topics is the relatively small *Policy* topic, which accounts for less than 7% of the corpus content. Notably, this topic is also linked to the *Trade and certifications* within the *Policy and Society* cluster and with the *Ecological sustainability* topic within the *Production issues* cluster.

Far from being exclusively focused on traditional economic analysis of policies, the literature ascribed to this topic covers a number of issues and approaches from comparative politics to social and political issues of transitions toward sustainable agriculture, often adopting political science, juridical, or sociological points of view. For example, the comparison of the financial support to EU organic regulations across new and old Member States is performed, taking into account the country-specific conflicts between mainstream and organic agriculture [118], while the implementation delay and transposition deficit are related to the level of domestic institutional change [119].

A further issue deals with political aspects within a broader sustainability transition framework [120]. Examples are seen in two papers by [21,121]. The former focuses on how changes in the political sphere impact on societal, practical, and personal spheres, eventually affecting the conversion of individual farmers to organic agriculture, while the

latter analyzes how organic agriculture, viewed as an alternative technical transformation, performs better than biotechnologies with respect to appropriateness and conviviality criteria in pursuing a degrowth transition path.

Finally, a group of papers dealing with the design and the implementation of organic regulations is well represented by [122]

“The regulatory regime for organic products is different from other non-state-market driven (NSMD) regimes because it is the only one that evolved from a purely private into a regime where the establishment of minimum standards has become the monopoly of public powers.”

Within the same domain of regulation, the institutional arrangement of organic regulation in the USA is investigated, focusing on the role and characteristics of third-party regulatory administrators across their differentiated organizational forms. The inclusion of non-profit and private third-party regulatory administrators may improve the service offered to regulatees in addition to the strict regulatory program functions [123].

Ideally linked to regulatory issues, the *Trade and certifications* topic accounts for about 10% of the corpus content, and it is slightly less popular in Europe than in other areas. This topic mainly covers the issue of trade barriers to entering foreign organic food markets. More specifically, the opportunities offered by an expanding organic market in developed countries are explored with reference to the need for a certification system.

The point of view of exporter countries is exemplified by [124], who discuss the trade barriers that developing countries face when accessing the UK organic market, while ref. [125] analyzes the increased transaction costs borne by Chilean exporters from the EU due to lack of a national certification system.

Conversely, ref. [126] illustrates the point of view of importer countries describing the inadequacy of the current US regulatory and certification framework in ensuring the integrity of organic food imports, using the case of China as an example. The topic also hosts papers more focused on domestic regulatory issues, such as the positive impact on consumers (as well as importers) of New Zealand’s organic food of a mandatory domestic organic standard, at the time in approval, which is replacing a number of voluntary standards and private certifiers [127]. Conversely, ref. [128] explores the positive role of private certification of organic agriculture in revitalizing local communities and promoting an environment-friendly agriculture. Finally, the positive effects of the access to European organic markets in promoting an agroecological transition and triggering the farmers to act in an organized manner to cope with the many challenges and lockups are analyzed by [129] for the case of Turkey and by [130] for the Moldovan one.

3.2. Topics Coverage Across Time and Space

The inclusion of the covariates in the prior distribution of topical prevalence was meant to enable us to explore the variation of topic proportions over time and between different geographical areas. As we detailed in Table A2 in the Appendix A, time does not appear, for most of the topics, to have a significant effect on topical prevalence. This indicates that the relative importance of the different topics did not undergo significant variations over the 20 years considered in the analysis. The importance of this evidence is apparent when considering the rising popularity of organic agriculture within the agricultural socio-economic literature. The stability of the relative importance attributed by researchers to the different aspects must be, in fact, contrasted with the impressive growth of the published material, which grew from the 41 papers listed in the Scopus database in 2000 to the 2410 papers at the beginning of 2023.

Only two topics deviate from this static scenario, actually showing some temporal trends: *Trade and certifications* and *Social and psychological aspects of consumption*. As reported in Figure 6, *Trade and certifications* lost some importance over time, this category’s prevalence declining from close to 20% of the corpus at the dawn of the millennium to less than 10% in the most recent years. Conversely, researchers are consistently paying more attention to the investigation of consumer behavior, whose importance has risen by nearly 20 percentage

points in the last 20 years. These patterns might be related to specific dynamics within the organic sector, like the growth of organic consumption (especially in Asia), but they are also in line with some general trends observed in the agricultural economics literature. Indeed, ref. [131] noted that the decline in the importance of traditional market issues and the growing attention to consumer behavior are trends that characterize the entire field of agricultural economics, especially from 2000.

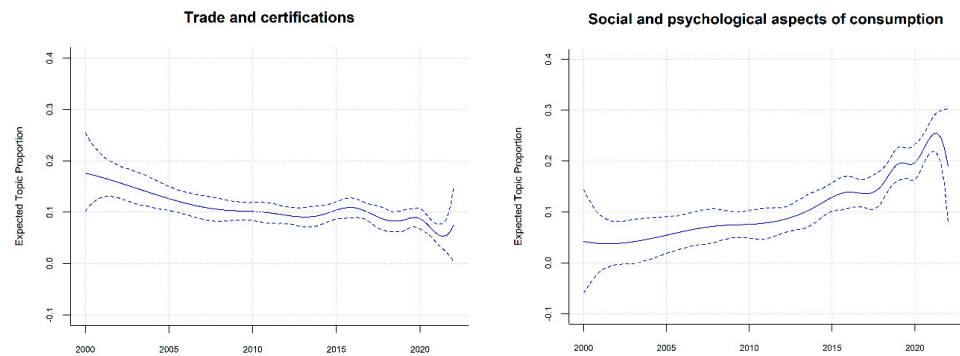


Figure 6. Time trends of the estimated prevalence of *Trade and certifications* and *Social and psychological aspects of consumption* (95% confidence intervals represented by dashed lines).

Turning to the geographical analysis, Tables 3 and 4 report the average estimated prevalence of each cluster in each continent, arranged in ways to facilitate within-continent (Table 3) and between-continent (Table 4) comparisons. Similarly, the estimated topic prevalences are reported in Figures 7 and 8.

Table 3. Average estimated cluster prevalence (within-continent comparisons).

Cluster	Africa	Asia	Europe	Latin America	North America	Oceania
Consumer issues	0.34 ^a	0.50 ^a	0.37 ^a	0.26 ^b	0.33 ^{ab}	0.32 ^{ab}
Production issues	0.29 ^a	0.17 ^c	0.25 ^b	0.25 ^b	0.26 ^b	0.17 ^b
Policy and society	0.37 ^a	0.33 ^b	0.38 ^a	0.49 ^a	0.41 ^a	0.51 ^a
Total	1.00	1.00	1.00	1.00	1.00	1.00

Superscript letters identify statistically different estimates (within-continent) based on 95% confidence intervals.

Table 4. Average estimated cluster prevalence (between-continent comparisons).

Cluster	Consumer Issues	Production Issues	Policy and Society	Total
Africa	0.34 ^{bc}	0.29 ^a	0.37 ^{bc}	1.00
Asia	0.50 ^a	0.17 ^b	0.25 ^c	1.00
Europe	0.37 ^b	0.25 ^a	0.38 ^{bc}	1.00
Latin America	0.26 ^c	0.25 ^a	0.49 ^a	1.00
North America	0.33 ^{bc}	0.26 ^a	0.41 ^{ab}	1.00
Oceania	0.32 ^{bc}	0.17 ^{ab}	0.51 ^a	1.00

Superscript letters identify statistically different estimates (within-continent) based on 95% confidence intervals.

The first salient aspect is the importance of *Consumer issues* in Asia, where it covers half of the continental corpus, a share far larger than in any other continent. The importance of this cluster is essentially due to the attention paid in Asia to studies involving consumers, especially the *Social and psychological aspects of consumption*. The importance of investigating consumer-related issues may be linked to the development of organic consumption in this area of the world. Asia, traditionally associated with the production of organic products for export, in fact witnessed a considerable and steady growth in the consumption and sale values of organic products in recent years [132,133].

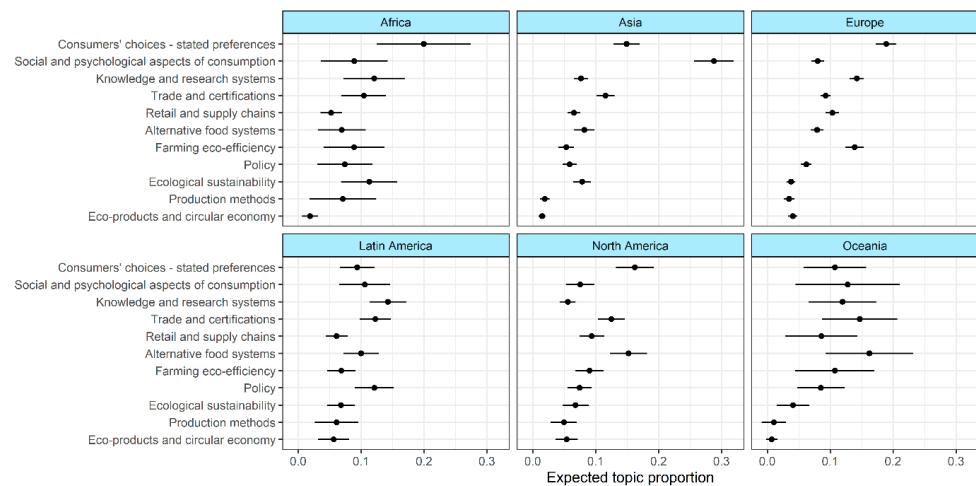


Figure 7. Average topic prevalence by continent (within-continent comparisons) with 95% confidence intervals.

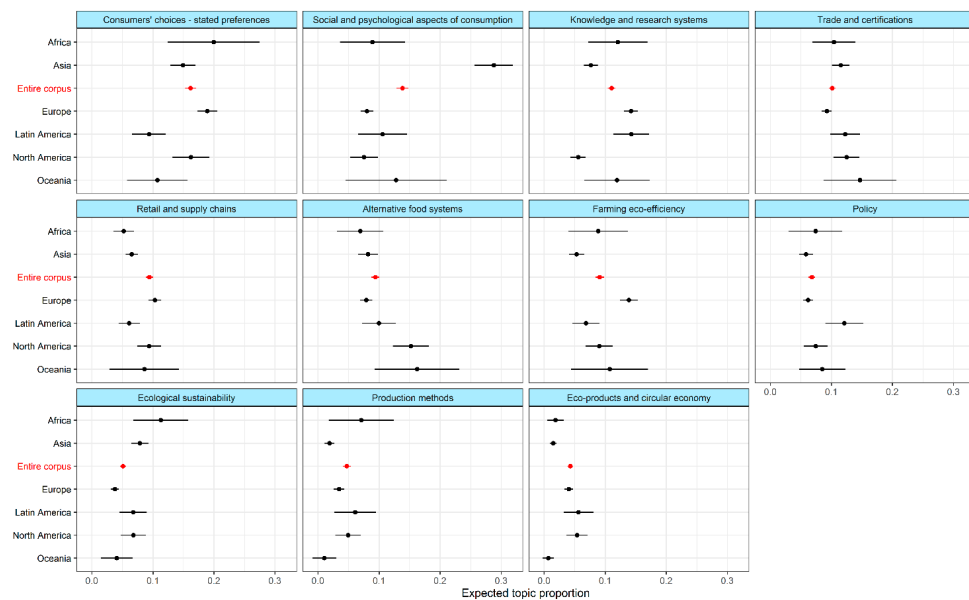


Figure 8. Average topic prevalence by continent (between-continents comparisons) with 95% confidence intervals.

In contrast, aspects concerning the *Retail and supply chains* of organic products are relatively less widely explored. However, this is not a peculiar feature of the Asian context. In general, in all study areas, within the *Consumer issues* cluster, consumers attract the major interest of research, to the detriment of retail issues. However, *Retail and supply chains* research seems to suffer particularly outside of the western world (Africa, Asia, and Latin America). In this respect, the presence of long-standing and well-established organic markets in western countries probably affects the amount of research produced in these areas. The structure itself of these markets can affect related studies. The leading role acquired by organized distribution (e.g., retail chains, supermarkets) in the commercialization of organic products in Europe, North America and Oceania [15] provides a structured market environment that makes available a large amount of data and facilitates its collection and analysis. Similar conditions can also be found in several countries in the other continents. However, in several areas in these continents, the commercialization of organic products is still characterized by informal markets, which are more difficult to study, as they pose

more relevant barriers to the acquisition of information and require researchers to spend more effort in their analysis.

Although the issues related to the consumption of organic products are largely debated in all continents, *Production issues* are consistently of the least importance. No relevant differences are observed across different areas, even if in Africa and Latin America the prevalence of production aspects is closer to that of consumption, possibly reflecting the traditional role of these areas as organic producers in the organic world supply chain [134]. Delving into the prevalence of individual topics of the production cluster adds little insight, with the exception of the *Farming eco-efficiency* topic. This topic is of relatively greater importance in the European literature. In addition, in this case, the evidence might be related to the specific characteristics and dynamics of the area of interest. In particular, the debate on the impacts of agriculture on the environment and climate has been expanding at a particularly high rate in Europe. In the EU, the subsequent reforms of the Common Agricultural Policy (CAP) have seen the paying of progressively more attention to the environmental sustainability of agriculture. Therefore, researchers might have been stimulated to measure the environmental performance of European farms and to assess potential improvements. Such a context might also explain the greater attention devoted to farm-level sustainability (expressed by the *Farming eco-efficiency* topic) rather than to the study of the environmental impacts of specific farming practices (expressed by the *Ecological sustainability* topic).

The last cluster, *Policy and Society*, shows the highest estimated prevalence in Latin America. The heterogeneity of the topics characterizing this cluster implies that in different areas, variable importance is attached to different aspects. The topic *Knowledge and research systems* is comparatively more discussed in Latin America and Europe, the two continents where the spread of the agroecology concepts is wider [102]. As detailed in Section 3.1, in fact, this topic addresses knowledge and innovation issues in the organic sector, mainly adopting a social approach, involving concepts and practices such as participatory research, place-based innovation or action research. These strategies are typical of an agroecological approach that goes beyond organic agriculture and that is tailored on the founding strategy of “exploit[ing] the complementarities and synergisms that result from various combinations of crops, trees and animals in spatial and temporal arrangements such as polycultures, agroforestry systems and crop–livestock mixtures” [135].

Although agroecology constitutes a strong basis for organic research in Europe and Latin America, the Anglo-Saxon world (namely, North America and Oceania) seems to pay more attention to *Alternative Food Systems*. These include initiatives like WWOOFs, whose participation is the highest among New Zealand, Australian, US, and Canadian farms [136], community-supported agriculture, which originated in the US drawing from concepts from Europe and Japan [137], and farmers’ markets, which particularly in the US have witnessed extensive growth [138,139]. In addition, the aspects covered within this topic, such as the local–global juxtaposition or the description of contexts alternative to the mainstream agro-food system, have been traditionally considered a hallmark of North American (and to some extent UK) research [140,141]. In this context, organic agriculture traditionally appears not only as a way of farming, but as a social movement to contrast food industrialization and consumerism [142], thus stimulating debates about its evolution and the risk of conventionalization [16].

4. Conclusions

The objective of this paper was to provide a wide and comprehensive view of the state of the art in agricultural socio-economic research dealing with organic agriculture. As such, the work can offer valuable insights into broad themes and trends of this research area, while it is not able to (and, actually, it was not meant to) investigate specific individual aspects of the organic agricultural economics literature.

The main evidence emerging from the analysis is the strong bias toward consumer studies, especially compared to research focusing on production aspects. Consumers

attracted the most attention from researchers not only in areas of the world where the consumption of organic food is widespread, but also in areas where organic consumption usually plays a less relevant role. In addition, the absence of any relevant time variation in the coverage of most of the topics suggests that this might be a structural feature of the investigated literature strand, rather than an occasional occurrence.

A possible cause of the greater attention devoted to consumer aspects could be identified in data issues. While direct data collection from consumers might be relatively easy, the availability of reliable production and farm economic data, as well as their collection, might be an important barrier, especially in certain areas of the world [143]. In this sense, facilitating the access to relevant data would improve the ability of researchers to better investigate issues related to the economic aspects of organic farms. However, to assess long-term market equilibrium, it is important to complement the well-documented evidence from the demand side (e.g., growth of organic demand, consumers' willingness to pay price premiums for organic products) with the investigation of dynamics related to organic production. An effort seems to therefore be required from researchers to direct greater attention towards the production side of the organic sector.

In discussing the consumption and production literature divide, it should be noted that the definition of the boundaries of the study might have affected the ratio between these two areas of research. The inclusion rules (only English, peer-reviewed documents) implicate the exclusion of local gray literature (which might contain additional studies assessing, for example, the economic viability of local organic farming), but were necessary to ensure the quality and homogeneity of the scientific material analyzed.

More importantly, it must be stressed that, despite not being included in the present review, a good amount of the literature is available that discusses yield differences between organic and conventional agriculture. The study of yields has traditionally been favored, and from an economic perspective, yields represent only one of the factors that affect the economic results of farms. In this sense, the present study highlights the need for researchers to go beyond (or start from) the comparison of yields and to start considering production units (i.e., farms) in a more systematic way as a whole and complex system, thus expanding the literature on organic farm business economics. This strand of research has, in fact, a relatively low importance within production studies, many of which are characterized by a more environmental economics approach. However, the possible insights that come from such investigations would be of primary importance to understanding the economics of organic production units, investigating issues such as profitability, the use of production factors, or internal organization. In this way, researchers might bring to the fore possible issues in the organic production process, as well as potential solutions or success experiences.

A further point that requires attention is the alignment of the economic literature on organic agriculture with some general or sectorial characteristics of the study areas where research is conducted. This is seen in consumer-centered research in the fast-growing Asian organic markets, which shows attention to environmental sustainability in the Green Deal European policy context, as well as the prominence of sociological research in Latin America and the focus on alternative agricultural and food paradigms in the Anglo-Saxon world. This evidence suggests that organic economic research is well integrated in local contexts. In this respect, it is important that scholars continue to keep pace with the evolution of the organic sector in the research environments where they operate.

At the same time, it seems important to also extend some topics of research that was performed in specific contexts to other areas. This would allow one to compare the state of the art of the same issue in different contexts, and to understand to what extent research findings obtained in some areas of the world can be translated and/or adapted to other areas. In this way, the current geographically scattered nature of expertise may create valuable opportunities for the overall development of the global organic sector. In this respect, the interconnection of scholars from different areas of the world plays a fundamental role, each bringing to the organic debate their own baggage of place-based

experience, knowledge, and perspectives on the sector. These collaborations will be all the more important as organic demand is progressively expanding, either spontaneously or encouraged by governments and public institutions.

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Appendix A

Table A1. Most frequent and most exclusive stems for each topic.

Topic Number	Frequent Terms	Exclusive Terms	Topic Name
1	develop; sustain; research; studi; agriculture; approach; use; natur; busi; chain	stakehold; learn; busi; rural; tool; tourism; approach; concept; collabor; enterpris	Knowledge and research systems
2	Food; local; social; altern; practice; farmer; consumpt; produc; network; movement	Host; co-op; movement; box; wwoof; network; engag; discours; space; argu	Alternative food systems
3	Polici; agriculture; technolog; system; chang; public; environment; govern; innov; adopt	Pgs; agroecology; diffuse; polici; technolog; conflict; agribusi; innov; public; govern	Policy
4	Market; product; retail; price; strategi; sale; consum; paper; custom; use	Retail; sale; wine; store; channel; custom; price; shop; brand; supermarket	Retail and supply chain
5	Product; agriculture; develop; market; country; food; produc; increase; standard; sector	Trade; country; standard; export; world; domest; certify; intern; growth; regul	Trade and certifications
6	Soil; plant; use; product; system; fertile; yield; differ; convent; crop	Acid; biomass; miner; leaf; lettuce; compost; potato; antioxid; dri; plant	Production methods
7	Product; food; sustain; wast; use; package; chain; environment; produc; suppli	Wool; fqs; textile; banana; oliv; wast; egg; package; recycle; oil	Eco-products and circular economy
8	Food; consum; product; prefer; studi; label; result; health; purchas; use	Wtp; pay; prefer; attribute; choic; respond; willing; segment; consum; label	Consumers' choices—Stated preferences
9	Farm; product; system; convent; use; impact; environment; agriculture; result; assess	Ghg; effici; dairi; energi; convers; emiss; subsidi; per; scenario; farm	Farming eco-efficiency
10	Food; consum; purchas; studi; intent; attitude; behaviour; research; influenc; model	Intent; behaviour; behaviour; attitud; mediat; perceive; purchas; conscious; equat; norm	Social and psychological aspects of consumption
11	Farmer; farm; agriculture; crop; system; use; practice; manag; rice; convent	Rice; farmer; smallhold; seed; biodiverse; crop; ecosystem; extens; revenue; conserv	Ecological sustainability

Table A2. Estimated parameters for time splines in the structural topic model ¹.

Cluster: Consumer Issues				
	Consumers' choices—Stated preferences	Social and psychological aspects of consumption		Retail and supply chains
Intercept	0.13 **		0.04	0.04 **
Time (Spline 1)	0.10		−0.02	0.12
Time (Spline 2)	−0.01		0.04	0.02
Time (Spline 3)	0.03		0.03	0.07
Time (Spline 4)	0.03		0.06	0.09 *
Time (Spline 5)	0.06		0.11 *	0.05
Time (Spline 6)	0.01		0.07	0.06
Time (Spline 7)	0.01		0.17 **	0.05
Time (Spline 8)	0.04		0.12 *	0.04
Time (Spline 9)	−0.01		0.28 **	0.06
Time (Spline 10)	0.00		0.15 *	0.01
Cluster: Production Issues				
	Farming eco-efficiency	Ecological sustainability	Production methods	Eco-products and circular economy
Intercept	0.09 *	0.11 **	0.08 **	0.08 **
Time (Spline 1)	−0.01	−0.04	−0.01	−0.04
Time (Spline 2)	−0.03	−0.07	−0.09 *	0.06
Time (Spline 3)	0.03	−0.04	0.00	−0.07 *
Time (Spline 4)	0.03	−0.04	−0.04	0.00
Time (Spline 5)	−0.02	−0.06	−0.04	−0.04
Time (Spline 6)	0.05	−0.06	−0.04	−0.03
Time (Spline 7)	0.01	−0.05	−0.01	−0.03
Time (Spline 8)	−0.03	−0.06	−0.02	−0.01
Time (Spline 9)	−0.04	−0.04	−0.04	−0.03
Time (Spline 10)	0.04	−0.03	−0.02	−0.05
Cluster: Policy and Society				
	Knowledge and research systems	Trade and certifications	Alternative food systems	Policy
Intercept	0.08 **	0.18 **	0.10 **	0.08 **
Time (Spline 1)	−0.03	−0.02	−0.03	−0.02
Time (Spline 2)	0.08 *	−0.08 *	0.04	0.03
Time (Spline 3)	0.01	−0.07	0.01	0.00
Time (Spline 4)	0.02	−0.10 **	−0.02	−0.02
Time (Spline 5)	−0.01	−0.05	0.01	−0.02
Time (Spline 6)	0.05	−0.09 **	−0.03	0.01
Time (Spline 7)	0.02	−0.10 **	−0.04	−0.03
Time (Spline 8)	0.03	−0.07	−0.02	−0.03
Time (Spline 9)	0.02	−0.15 **	−0.02	−0.03
Time (Spline 10)	0.00	−0.10 *	−0.02	0.02

Asterisks (*) and double asterisks (**) denote statistical significance at the 10% and 5% levels, respectively. ¹ The estimated parameters for the different continents were omitted for simplicity, since the effects of the geographical areas are investigated in depth in Figures 6 and 7.

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