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Agricultural Co-operatives in the Western World: A Bibliometric Analysis

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Abstract:	<p>Since the establishment of one of the early co-operatives in Western Europe in the 1800s, co-operatives in the Western world have developed exponentially and played essential roles in improving agricultural sustainability. Much research has been carried out on this topic; however, to date, there is no systematic review of this body of the literature. To fill this gap, this paper is designed to identify the main research themes regarding agricultural co-operatives in western countries, and subsequently shed light on avenues for future research in this field. Based on a systematic literature review with bibliometric techniques including citation and co-citation analyses, this study identifies six predominant themes (the social and environmental performance of co-operatives, the governance structures and performance of co-operatives, trust and commitment in co-operatives, comparisons between co-operatives and investor-owned firms (IOFs), financing problems in co-operatives, and women co-operatives) of debates on western co-operatives. Recommendations for future research are finally provided.</p>

Agricultural Cooperatives in Western Countries: A Bibliometric Analysis

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Declaration of conflict of interest statement

The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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Title: Agricultural Co-operatives in the Western World: A Bibliometric Analysis

Dear Jeff,

Thank you for considering Journal of Cleaner Production.

Please see the comments of the reviewers on the article Agricultural Co-operatives in the Western World: A Bibliometric Analysis. I suggest you consider these comments, suggestions and questions and revise your article accordingly. The revised version of your submission is due by Jun 21, 2020.

For your guidance, reviewers' comments are appended below.

If you decide to revise the work, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript.

Dr. Prof Jiri Jaromir Klemeš, DSc

Co-Editor-in-Chief

Journal of Cleaner Production

Re: Thanks for the editor's comments. We have now fully addressed the comments provided by the reviewers.

Reviewers' comments:

Reviewer #1: Thank you for the improvement of the manuscript "Agricultural Cooperatives in the Western World".

The main issues have been addressed by the authors, so we recommend publication after minor issues setting.

-We should expect a caption for the figure 2 (blue and red?).

Re: Thanks for pointing this out. A caption (blue line for "number of citations" and yellow line for "number of publication) has been added in Figure 2.

-page 12, lines 49/50, there is no $d(u,v)$ in the equation, but $d(c_i, c_j)$ can be misleading for readers

Re: We agree. In page 12, lines 49/50, we have unified the function use $\delta(c_i, c_j)$ which is Kronecker delta function.

- page 16, line 28, please to recall the meaning of the acronym IOF -page 23, line 56, is written "seven themes" despite they are only six.

Re: Many thanks for the reviewer's serious comments here. We have put IOF in full as investor-owned firms as indicated by the reviewer. IOF is spelled in full when it first appears in the paper. We have corrected this and replaced seven with six (themes) here.

Please to make a general reading of the text.

Re: We have now carefully proofread the paper between the co-authors. The paper was professionally proofread by a company before the first submission.

Thank you for your contribution to this field of knowledge.

Re: Thank you for your meticulous efforts to help improve the paper.

Reviewer #2: I found this article to be on an interesting topic. The authors have done good efforts in the present article. I would like the authors to include some suggestions mentioned herewith:

Re: We thank the reviewers for the insightful and valuable overall comments provided here. We have now carefully considered all the comments and addressed them to your satisfaction.

1. Please highlight the novelty of your present study by comparing the previous reviews in this field.

Re: We have highlighted the novelty of our study in the last paragraph of page 2 in the introduction section.

2. Please express the unique contribution of the present study in Introduction section.

Re: We have added the contributions in page 3 in the introduction section as suggested by the reviewer.

3. Please compare your outcomes with the previous studies to distinguish your results.

Re: Thanks for this valuable comment. We have now highlighted the novelty of our study by comparing it to the previous literature reviews of similar topic in the last paragraph of page 2. Consequently, the contribution of the bibliometric analysis is clearly distinctive from previous studies.

Agricultural Co-operatives in the Western World: A Bibliometric Analysis

Abstract

Since the establishment of one of the early co-operatives in Western Europe in the 1800s, co-operatives in the Western world have developed exponentially and played essential roles in improving agricultural sustainability. Much research has been carried out on this topic; however, to date, there is no systematic review of this body of the literature. To fill this gap, this paper is designed to identify the main research themes regarding agricultural co-operatives in western countries, and subsequently shed light on avenues for future research in this field. Based on a systematic literature review with bibliometric techniques including citation and co-citation analyses, this study identifies six predominant themes (the social and environmental performance of co-operatives, the governance structures and performance of co-operatives, trust and commitment in co-operatives, comparisons between co-operatives and investor-owned firms (IOFs), financing problems in co-operatives, and women co-operatives) of debates on western co-operatives. Recommendations for future research are finally provided.

Keywords: Agricultural co-operatives; Sustainability; Citation analysis; Co-citation analysis; Western countries

1 Introduction

A co-operative is an autonomous association of people united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled enterprise (ICA 1995). As social enterprises, agricultural co-operatives (ACs) play a pivotal role to reduce poverty, promote social harmony, stimulate equitable economic development, and eventually contribute to sustainability (Bijman, Iliopoulos et al. 2012, Kumar, Wankhede et al. 2015). First, ACs are committed to supporting sustainable and accountable business practices with “strong sustainability” in their genes (Cato 2009). They commit to food safety and security and to environmental sustainability in agricultural production through technological innovation (Ajates Gonzalez 2017, Luo, Guo et al. 2017). Second, ACs are engaged in sustainable production. Agricultural modernisation has raised a number of social, economic, and ecological issues in the food chain, causing disconnections between farming, nature, and

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4 society, including the exhaustion of natural resources and food safety crises (Lang, 2010). **With**
5 **the adjustment of production systems, ACs could improve the resilience of agricultural supply**
6 **chain, and strengthen resource integration of economic and environmental systems** (Norton, 1984;
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8 Ploeg, 1997). ACs produce both conventional and ecologically certified food, which is perceived
9 as more valuable than “food full of chemistry” (Bilewicz and Śpiewak 2019). Third, ACs provide
10 substantial economic benefits to farmer members and local people through the sharing and pooling
11 of resources, improved access to higher value-added markets, higher returns for their products,
12 strengthened bargaining positioning, and supporting rural development and the viability of rural
13 communities, an essential aspect of sustainability (Song, Qi et al. 2013, Mhembwe and Dube
14 2017).

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22 The development of modern co-operatives emerged in Western Europe approximately 200
23 years ago. Since then, this type of organisation has operated and spread to other industrialised
24 countries as a self-sufficient means to manage extreme poverty (Ortmann and King 2007). The
25 Rochdale Society of Equitable Pioneers Ltd., established as a set of consumer co-operatives in
26 Rochdale, England in 1844, is a well-known pioneering effort and has made a significant
27 contribution to the determining of operating principles of ACs (Ortmann and King 2007).

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33 As described by Nilsson (Nilsson 2001), by the early 1990s, ACs in the European Union and
34 North America occupied 30% - 70% of the agricultural market. Recent research shows that the
35 business models of co-operatives have been adopted in roughly 100 countries, and ACs in Western
36 countries have significantly contributed to economic growth (ICA 1995). In addition to creating
37 economic benefits, co-operatives have been proven effective at poverty alleviation (Ortmann and
38 King 2007) and at fulfilling global demand for agricultural products (Brief 2015). For instance,
39 ACs play a major role in facilitating farming requisites, saving and crediting, educating the
40 agrarian population (i.e., providing training to farmers), and providing marketing channels for
41 agricultural commodities (Ortmann and King 2007).

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50 Due to the rapid development and spread of the co-operative movement in Western countries,
51 much research has been published on this trend. **To date, several published book chapters and**
52 **papers review the AC literature (LeVay 1983, Hendrikse 2004). Previous reviews (e.g., LeVay,**
53 **1983) are based on personal experience from the field, i.e., review methodologies/strategies used**
54 **are less rigorous; keywords used are not comprehensive; there is no review adopting bibliometric**
55 **analysis. We believe that this is the first work that conducts a systematic literature reviews with**
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4 **bibliometric analyses on Western ACs.** It is helpful to differentiate Western co-operatives from
5 those in emerging economies, as it has been observed that the co-operative movement in other
6 parts of the world has noticeably diverged from its Western origins due to specific cultural, social
7 and institutional differences in their host countries (Trescott 1993, Clegg and Cook 2009, Bernardi
8 and Miani 2014). Western co-operatives epitomise the origins of the co-operative movement (Gide
9 1982, Birchall 2010, Williams 2012) and thus deserve separate attention from academics.

15 Taking the world's second-largest and most populated country as an example, although it is
16 believed that Chinese ACs have emerged as a response to the spread of the co-operative movement
17 from the UK and other European pioneers (Mallory 1931, Trescott 1993), they have in practice
18 followed a quite different path of development. Even legal requirements for ACs' registration
19 introduced in China in 2007 are significantly different from the widely known International Co-
20 operative Alliance (ICA) principles generally followed in the Western world (Hu 2006, ICA 2010).
21 A systematic literature review on Western ACs is therefore needed to understand the development
22 and current state of this body of literature. This paper aims to offer a systematic review with the
23 use of bibliometric and visualisation tools (which is seldom seen in the agricultural economics
24 discipline) to map out the knowledge structure of Western ACs. The specific aims of this study
25 are to:
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- 35 1) Identify and illustrate major themes in English language research on modern Western co-
36 operatives; and
- 37 2) Outline/propose a set of future research focuses based on this review.

40 To achieve these aims, a systematic literature review combined with mathematical and
41 statistical analyses and bibliometric techniques is used to identify commonalities among Western
42 ACs and to assess movements and interactions within and between fields (White and Griffith 1981,
43 Zitt and Bassecouard 1996, Sugimoto and Pratt 2008).

44 **The primary contributions of this study include the following:**

45 1) Compared to narrative reviews, this study presents a systematic review which employs a
46 transparent and replicable structured process to enhance rigor and thoroughness while reducing
47 bias.

48 2) Rigorous bibliometrics and co-citation analysis are used to explore new clusters for topics
49 classification and emergent research gaps of western ACs literature.

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4 The remaining of the paper is organised as follows. Section 2 introduces systematic literature
5 review method and bibliometric techniques used. A detailed account of the research methodology
6 adopted is provided in Section 3. The data analysis and findings are presented in Section 4, and
7 the final section concludes.
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10 11 12 13 **2 Literature and Bibliometric Review**

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15 This literature review is conducted following a systematic literature review approach. This
16 approach was initially designed to use abundant data sets to compare statistical results from
17 observational science, and has later been introduced and used in management research as an
18 evidence-based review model (Tranfield, Denyer et al. 2003, Denyer, Cassell et al. 2006).
19 Compared to narrative means of reviewing the literature, The approach of paper selection
20 employed by systematic review tends to be transparent and this could improve rigour and
21 thoroughness and reduce the negative impacts of author bias (Tranfield, Denyer et al. 2003). In
22 this particular paper, ACs in Western countries are reviewed.
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30 This review study employs bibliometric tools to identify the intellectual structure of knowledge
31 on ACs. There are three main bibliometric techniques: citation analysis, co-citation analysis, and
32 bibliographic coupling (Pilkington and Meredith 2009, Sánchez-Riofrío, Guerras-Martín et al.
33 2014). Since bibliographic coupling shows weaknesses in clustering older publications, this paper
34 adopts citation and co-citation analysis approaches. Through citation analysis, one can determine
35 that highly cited papers have more considerable impacts on a subject than those are less frequently
36 referenced, and the method can be used to examine growth in citations over a time period of
37 interest, measure impacts of scientific publications, and finally identify the roles of highly cited
38 papers (Pilkington and Meredith 2009). A citation analysis may also illustrate how a paper's
39 popularity may decline over time and if an paper is still useful to current researchers. Moreover,
40 citation rates can identify major shifts in the direction of a field (Pilkington and Meredith 2009).
41 The co-citation method involves counting the number of times that two documents or authors
42 appear jointly cited. This approach differs from and supports citation analysis, as the latter only
43 provides general insights into papers' levels of popularity and into significant changes in research
44 directions based on the citation rates of cited references. Co-citation analysis on the other hand
45 illustrates the major themes of a knowledge field based on links between the texts of cited
46 references (Leydesdorff and Vaughan 2006).
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3 Research Methodology

This review adopts the Scopus database, which is regarded as the largest database of peer-reviewed literature and international publishers. The study focuses on ACs located in Western countries. “Western countries” in this paper refer to parts of Europe (Western and a part of Central Europe), North America, and Oceania. The list of Western countries considered (Table 1) is based on those suggested by Huntington (Huntington 1997), Waite and Hawker (Waite and Hawker 2009), and the U.N. (Nation 2015). To access relevant sources, the systematic literature review involved identifying keywords, selecting inclusion and exclusion criteria, assessing quality, and processing data (Tranfield, Denyer et al. 2003).

First, keywords and search terms were identified by reviewing relevant literature and from the empirical experience of the co-authors. Two search strings were selected: “agricultural” and “co-operatives.” The co-operative string adopted the following keywords: co-operative* OR cooperative* OR coop* OR co-op*. Keywords related to agriculture for the second string included: agri* OR agro OR rural OR farm* OR food. The search was then performed by connecting the two strings and linking them with ‘AND’. This approach yielded 3,498 papers. The researchers then filtered these papers by manually limiting publications to those focused on the Western world and by setting English as the publication language. The number of papers was as a result reduced to 2,601 hits, representing a significant decrease from the preliminary search of 74.36%. The next round of review involved reading the paper titles and abstracts. A set of inclusion and exclusion criteria (Tables 1 and 2) were applied, and obtained 257 relevant papers. Finally, the full text of the remaining 257 papers was read and screened using the inclusion and exclusion criteria. The final search for papers was carried out in December 2019.

To achieve a comprehensive understanding, no time limit was imposed so that all contributions on Western ACs in the modern era, including those focused on general co-operative development, could be considered. Papers focusing on non-agricultural co-operatives and co-operatives in non-Western regions and those discussing technical issues of agricultural co-operatives were eliminated from the review. Papers using the term “co-operative” as an adjective (e.g., co-operative behaviour/cooperation between different entities) rather than as an organisational form (e.g., ACs) were also removed.

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4 **Table 1 Inclusion Criteria**
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Inclusion Criteria	Rationale for Inclusion
Papers directly or indirectly discussing agricultural co-operatives (e.g., AC development and future trends)	To conduct a systematic review, it was essential to review not only papers focused on ACs (i.e., marketing co-operatives, farm supply co-operatives, and service co-operatives) but also those focused on co-operatives involved in agricultural production based on business-management perspectives (e.g., supply chains and firm strategies), policies, and co-operative movement/evolution. It was also necessary to consider the publications of other types of academic institutions and government agencies that influence agricultural co-ops.
Restricted to the Western world	This research focuses on Western countries: Australia, Austria, Belgium, Canada, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Lithuania, Luxembourg, Monaco, New Zealand, Norway, Poland, Portugal, San Marino, Spain, Sweden, Switzerland, the Netherlands, the United Kingdom, and the United States.

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24 **Table 2. Exclusion Criteria**
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Exclusion Criteria	Rationale for Exclusion
Papers not related to ACs	Only ACs and other institutions directly impacting or relating to ACs are relevant to this study.
Papers focusing on ACs in non-Western Countries (e.g., Africa, South America, the Middle East, and Asia)	This systematic review focuses on Western countries, which often share similar economic, social, and cultural values.
Papers discussing specific technological issues encountered within ACs (e.g., the application of specific farming/marketing technologies).	This research examines ACs as institutions rather than in reference to the application of specific farming/marketing technologies or to the effectiveness/efficiency of such technologies.
Papers discussing cooperation between different enterprises within a supply chain	This study focuses on AC as a type of social enterprise. It is the co-operative behaviours between members and stakeholders of ACs that matter rather than interactions between non-co-operative enterprises along supply chains.

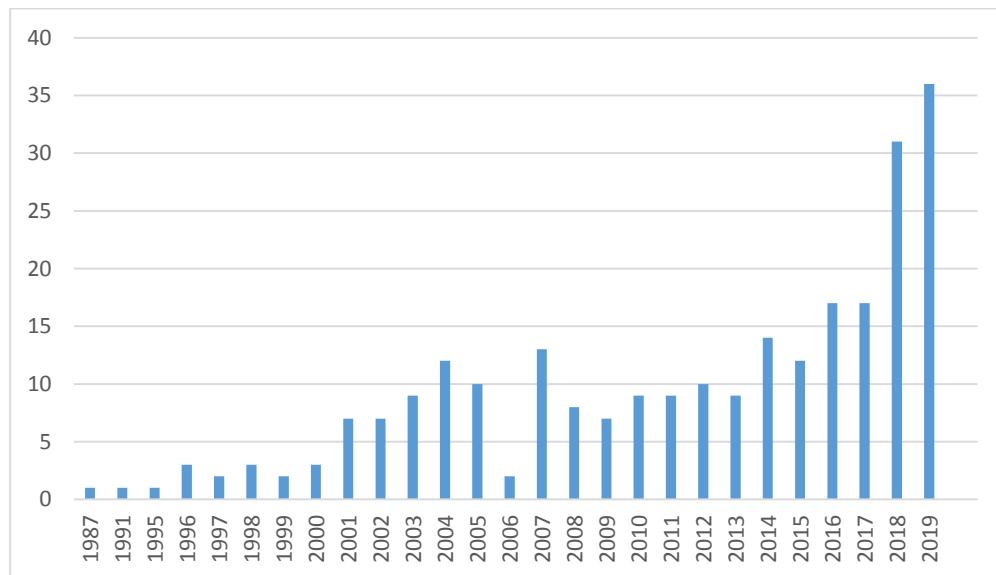
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53 This research applies knowledge domain software program BibExcel and visualisation software
54 programs Gephi and Pajek. BibExcel is mainly used to analyse bibliographic data or any data
55 textually formatted into the similar fashion. Data files would be generated in the process to
56 subsequently exported to and employed by Microsoft Excel or similar software for further analysis.
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58 (Persson, Danell et al. 2009). Gephi is a computer program for creating maps based on network
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4 data and for visualising and exploring these maps. Gephi can be used to analyse various types of
5 bibliometric network data. Although Gephi is primarily intended for analysing bibliometric
6 networks, the program can be used to create, visualise, and explore maps based on any type of
7 network data (van Eck and Waltman 2010). Pajek is a program for the analysis of large networks
8 and is freely accessible to non-commercial users. In addition to ordinary networks, Pajek also
9 supports 2-mode and temporal networks (Batagelj and Mrvar 2008).
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17 **4 Data Analysis and Findings**

18 **4.1 Descriptive analysis**

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20 The 257 selected papers published between 1987 and 2019. As shown in Figure 1, the number
21 of publications changes over time with an overall steady trend observed from 1987 to roughly
22 2004, after which the number stabilises at approximately 10-36 contributions per year except in
23 2006 (2).
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48 **Figure 1 Number of Publications (N=257)**

49 Figure 2 demonstrates that the number of citations increased from 1987-2019. In total, the 257
50 papers include 2699 citations. The number of citations increased each year (especially after 2004)
51 and peaked in 2018 and 2019. This rapid growth of citations in the past decade indicates that
52 research interest in co-operatives in Western countries has increased. The number of citations
53 should continue to rise since the number of new publications focused on ACs keeps increasing.
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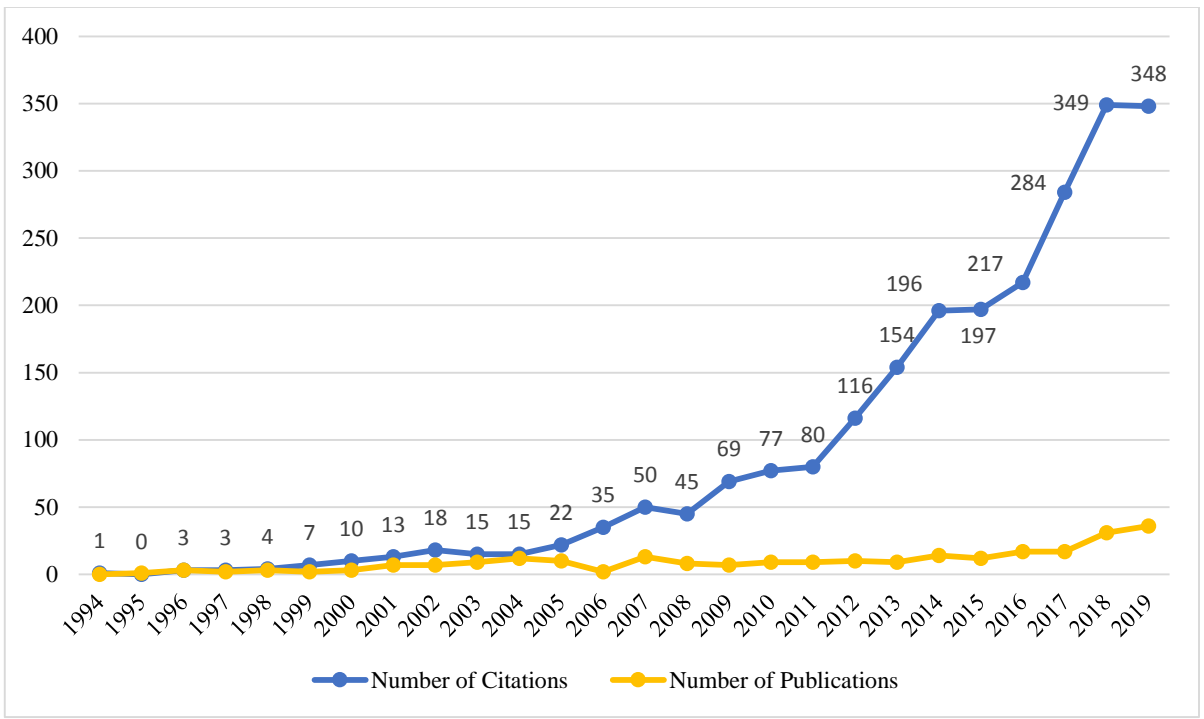


Figure 2 Paper citation Overview (N=2906)

The five most productive authors on ACs are Cook, M.L. (8 papers), Bijman, J. (7 papers), Nilsson, J. (7 papers), and Hendrikse, G. (6 papers), and the top 10 authors altogether contributed 18.79% of all 298 papers considered in this review (Figure 3).

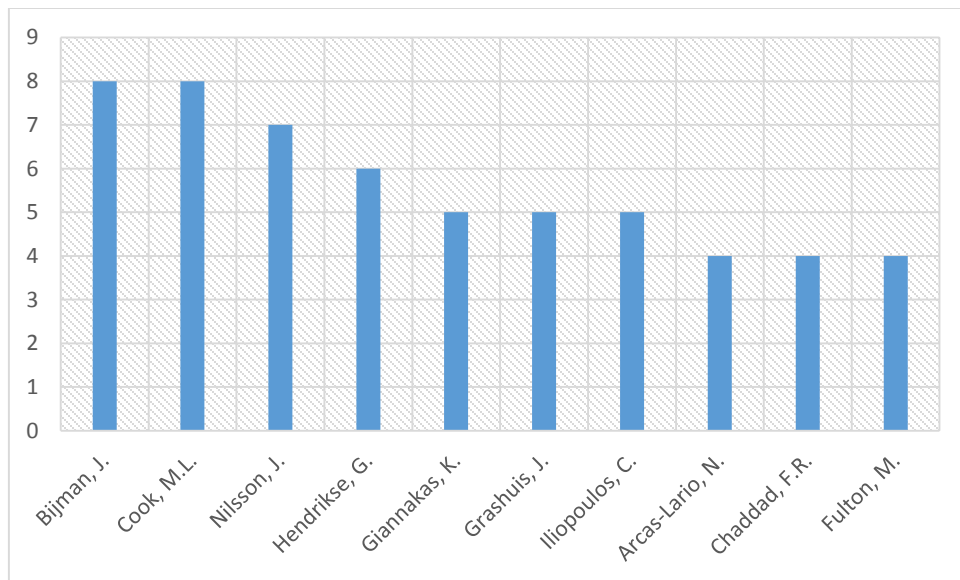


Figure 3 Key Authors

Ten journals with five or more publications are identified from the review, representing the primary sources of papers on Western co-operatives (Table 3). In terms of the journal quality for the top 10 journals, impact factors range from 0.545 to 2.475. Five of the journals have no impact factor. Journals with impact factors of above one can be considered useful journals in social science (OSA 2015). All of the top 10 journals focus on agricultural economics or agribusiness management.

In addition to impact factors, Table 3 provides lists of SJR and SNIP indicators¹ of the ten most influential journals. SJR and SNIP are both widely used to represent the impacts of a journal. The SJR (SCImago Journal Rank) demonstrates the scientific prestige of scholarly sources, while the SNIP (Source-Normalised Impact per Paper) shows a source's contextual citation impact. For indexes, the higher the value, the better a journal's quality. For the SNIP, a value of $n \geq 1$ indicates that a journal is of or exceeds the average quality of journals in its field, while a value of lower than one means that it is below average (OSA 2015). The IPP is a measure based on a citation window of three years, which is considered to be the optimal time period for measuring accurately citations. According to these journal quality indicators, it seems that AJAE is the most impactful journal on ACs in Western countries. On the other hand, JRC is the most productive source since it has published the most papers in this field.

Table 3 Journal Quality

Rank	Source Title	Impact Factor	SJR	SNIP	CiteScore	No. of papers
1	Journal of Rural Cooperation	N/A	0.141	0.369	1	28
2	Annals of Public and Cooperative Economics	N/A	0.503	0.777	1.33	21
3	International Food and Agribusiness Management Review	0.545	0.325	0.742	0.88	14
4	American Journal of Agricultural Economics	2.457	2.113	1.704	2.67	12
5	Agribusiness	1.147	0.487	0.897	1.27	10
6	Journal of Rural Studies	N/A	1.113	1.71	3.14	9
7	European Review of Agricultural Economics	1.667	1.172	1.621	2.28	5
8	Journal of Agricultural Economics	2	1.16	1.581	2.26	5
9	Journal of Co-operative Organization And Management	N/A	0.311	0.922	0.85	5
10	Journal on Chain and Network Science	N/A	0.193	1.164	1.09	5

¹ Find more information at <http://www.journalmetrics.com/fag.php>; <https://www.osapublishing.org/submit/style/journalmetrics.cfm>

4.2 Citation analysis

Citation analysis is employed to identify significant publications focused on Western ACs. The majority of popular citations refer to agricultural economics journals. Table 4 displays the ten most highly cited papers of the 257 papers identified with the number of citations for each. Chaddad and Cook (2004), the most cited publication, adopts a neo-institutional perspective to examine co-operatives.

The noticeable gap between local and global citation values shown in Table 5 indicates that Western ACs have also attracted the attention of researchers of other disciplines (Local citations: number of citations included in the 2,699 papers; Global citations: actual number of Scopus citations).

Table 4 Ten Most Cited Papers

Rank	Authors	Title	Source title	Citations per year	Global citations	Local citations
1	Chaddad F.R., Cook M.L.	Understanding new cooperative models: An ownership-control rights typology	Review of Agricultural Economics	13.13	197	127
2	Jepsen M.R., Kuemmerle T., etc.	Transitions in European land-management regimes between 1800 and 2010	Land Use Policy	32	128	47
3	Guinnane T.W.	Cooperatives as information machines: German rural credit cooperatives, 1883-1914	Journal of Economic History	5.94	107	68
4	Sykuta M.E., Cook M.L.	A new institutional economics approach to contracts and cooperatives	American Journal of Agricultural Economics	5.78	104	72
5	Hansen M.H., Morrow Jr. J.L., Batista J.C.	The impact of trust on cooperative membership retention, performance, and satisfaction: An exploratory study	International Food and Agribusiness Management Review	5.71	97	54
6	Österberg P., Nilsson J.	Members' perception of their participation in the governance of cooperatives: The key to trust and commitment in agricultural cooperatives	Agribusiness	8.50	85	47
7	Fulton M., Giannakas K.	Organizational commitment in a mixed oligopoly: Agricultural cooperatives and investor-owned firms	American Journal of Agricultural Economics	4.50	81	43

8	Hendrikse G., Bijman J.	Ownership structure in agrifood chains: The marketing cooperative	American Journal of Agricultural Economics	4.35	74	58
9	Chaddad F., Iliopoulos C.	Control Rights, Governance, and the Costs of Ownership in Agricultural Cooperatives	Agribusiness	11.83	71	63
10	Nilsson J., Svendsen G.L., Svendsen G.T.	Are Large and Complex Agricultural Cooperatives Losing Their Social Capital?	Agribusiness	9.71	68	49

Furthermore, all publications have experienced a rise in popularity over the years. The observed changes in citation popularity offer some insights into the changing research themes on western ACs (see Figure 4 for statistics from Scopus data. The X-axis indicates changes in citation popularity for 1994-2019; coloured bars on the Y-axis indicate different publications). It is evident that Chaddad and Cook (2004) has increased in popularity most among others in the field followed by Fulton and Giannakas (2001). These papers discuss co-operatives' governance structures, which can be regarded as a trendy topic of the past 35 years. An paper might become less popular when more recent research discusses a similar topic provides new (and better) insights. For instance, while Cook and Iliopoulos (2000) generally describe property right and land ownership issues among co-operatives, Chaddad and Cook (2004) work has become more prominent in going beyond descriptions and developing a land ownership typology for co-operatives, rendering it an influential paper on this topic.

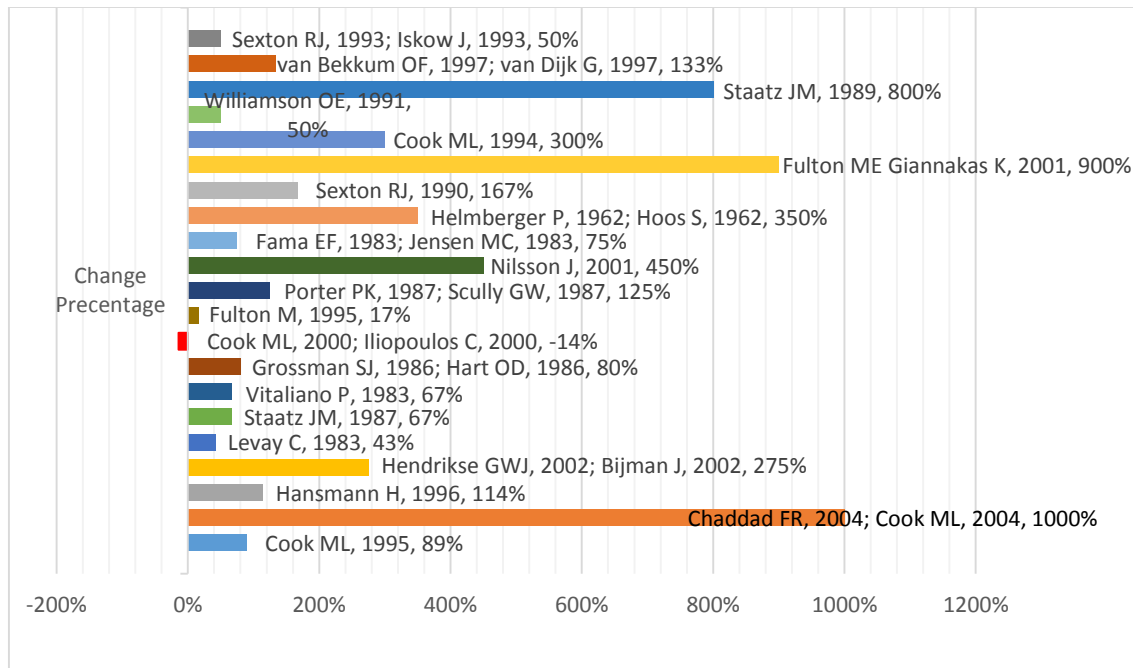


Figure 4 Changes in Percentages of Citation

4.3 Co-citation analysis

Co-citation analysis enables a researcher to identify and illustrate major research clusters/themes and how themes have evolved over time.

The nodes of a network can be divided into ‘clusters’ or ‘modules’ where connections (density of edges) are stronger between nodes of the same cluster than between those of different clusters (Clauset, Newman et al. 2004, Radicchi, Castellano et al. 2004, Leydesdorff and Bornmann 2011). In a co-citation network, a cluster can be defined as a group of well-connected publications in a research area with limited connections to publications of other clusters or research areas. Data clustering (also termed modularity) has been used as a classification tool for grouping of a set of publications (Radicchi, Castellano et al. 2004). Data files would be generated in the process to subsequently exported to and employed by Microsoft Excel or similar software for further analysis (Blondel, Guillaume et al. 2008).

The default clustering tool available through Gephi is based on the Louvain algorithm, which is an iterative optimisation model that aims to determine the optimal number of partitions that maximise the modularity index (Blondel, Guillaume et al. 2008). The modularity index of a partition is a scalar value of between -1 and $+1$ that measures the density of links within communities versus links between communities. According to Blondel, Guillaume et al. (2008),

for a weighted network (i.e., networks with weighted links, such as the number of co-occurrences of two papers in a reference list), the modularity index Q can be calculated as:

$$Q = \frac{1}{2m} \sum_{ij} [A_{ij} - \frac{k_i k_j}{2m}] \delta(c_i, c_j)$$

where A_{ij} represents the weight of the edge between nodes i and j , k_i is the sum of weights of edges attached to node i ($k_i = \sum_j A_{ij}$), c_i is the community to which node i is assigned, $\delta(c_i, c_j)$ is Kronecker delta function ($\delta(c_i, c_j) = 1$ if $c_i = c_j$ and equals 0 otherwise), and finally $m = \frac{1}{2} \sum_{ij} A_{ij}$.

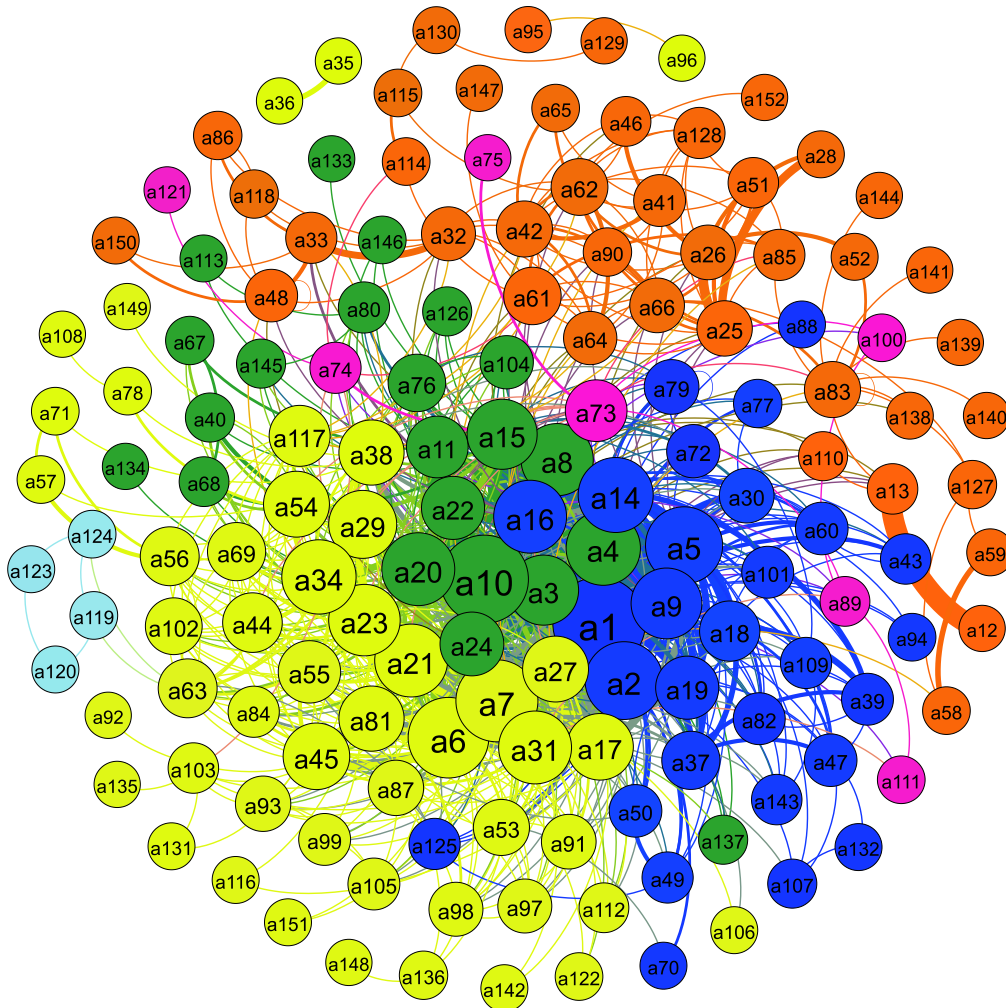


Figure 5 The Layered Configuration of the Six Clusters

Applying this algorithm to the filtered 151-node papers in Gephi produced 6 major clusters. The number of papers included in each cluster varies from 4 papers for cluster 6 to 46 papers for

cluster 2. Figure 5 shows a layered configuration of the 6 clusters where the papers of each cluster are included in one separate orbit/circle.

Table 5 The Number of Published Papers of Each Cluster (1991–2019)

Year	No. of published papers (N=151)					
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
1991		1				
1996	3					
1997			1			
1998	2	1				
1999			1			
2000	1		1			
2001	2			3		
2002	1		2	2		1
2003		1	2		1	2
2004	1	2		7		
2005		3	1	3	1	
2006		1		1		
2007	5	2	1	2		1
2008	1	2	2	2		
2009		1	2	3		
2010	5			2		
2011	3	2	1	1		
2012	5	1	2	1		
2013	1	4	1		1	
2014						
2015			1			
2016	3	3		1		
2017	4	2	1	1	1	
2018		16	4		3	
2019	2	4	2			
Total	40	46	25	29	7	4

Cluster 1 (Orange): Social and environmental performance of co-operatives

This cluster is the second largest within the Western AC literature and focuses on the social and environmental performance of co-operatives. This cluster includes 40 papers with the first published in 1996 (Table 5). In Western countries, co-operatives have always emphasised social and environmental performance, and this is still considered a promising focus of research on ACs, as sustainability among ACs has received more attention. ACs offer new integrative solutions to

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4 the current environmental, social and economic crisis affecting the food supply chain by opening
5 themselves to closer collaboration with alternative food networks and new social movements
6 (Fonte and Cucco 2017, Bilewicz and Śpiewak 2019). ACs have contributed more to social and
7 environmental performance than to economic performance comparing to investor-owned firms
8 (Balnave and Patmore 2012, Wynne-Jones 2017). Western ACs are assumed to stimulate local
9 economic growth, local employment, local infrastructure, geographic consumption patterns,
10 service delivery, local democracy, quality of life and environmental sustainability (Lorendahl
11 1996, Ekberg 2012, Kasabov 2016). For example, co-operatives can develop local agri-food
12 networks by integrating new members with non-agricultural profiles to promote sustainable
13 agricultural production (Ortiz-Miranda, Moreno-Pérez et al. 2010).

14
15 Some Western ACs focusing on the agri-environmental program (so-called "environmental co-
16 operatives" or ECs) have been seen as successful attempts to achieve sustainability (Franks and
17 McGloin 2007). ECs can form the basis of a more widely used sustainability-led governance unit
18 (Franks and Mc Gloin 2007, Franks 2010) and can enhance farmers' intentions to participate by
19 facilitating the application of agri-environmental schemes (van Dijk, Lokhorst et al. 2015).
20 Moreover, ECs can serve as a pivotal additional factor that helps delivering overarching
21 environmental, regional and rural policy objectives; coordinate joint submissions; manage scheme
22 payments; monitor progress towards achieving environmental objectives; and solve problems
23 associated with joint submission and payments by output (Franks and Mc Gloin 2007).

24
25 ACs promote sustainable agriculture and thus enhance not only the environmental but also
26 social sustainability of local communities (Winter 2003). As "People's Businesses," ACs have
27 played a significant role in their local communities and in society (Birchall 2010, Little, Maye et
28 al. 2010). ACs have greatly helped sustain food supply chains by not only improving the
29 production and trade of agriculture but by also promoting development aid in rural regions and
30 across the food system (Ilbery and Maye 2005, Ajates Gonzalez 2017). For example, co-operatives
31 are engaged in the cultivation and sale of organic produce (ecologically certified food), in
32 environmental conservation, and in sustainable social or local development (Fazzi 2011, Bilewicz
33 and Śpiewak 2019). Moreover, co-operatives also strengthen women's rights by offering more
34 employment opportunities and stable income (Gidarakou, Xenou et al. 2000).

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36 In conclusion, ACs enable their members to restore connections between their production
37 activities and environmental and social goals. ACs can be linked to the environment and to public
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4 policies (and thus extrinsic product quality), to the market (and thus intrinsic product quality), or
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6 to a combination of both (Swagemakers, Domínguez García et al. 2019). Therefore, governments
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8 should provide continual financial support and incentives for ACs in achieving stronger social and
9
10 environmental performance (Franks and Mc Gloin 2007).

11 12 13 ***Cluster 2 (Yellow): Governance structures of co-operatives***

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15 This cluster is the largest, including 16 papers published in 2018. Papers of this cluster focus on
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17 co-operatives' governance structures. Co-operatives are structured through a form of democratic
18
19 and collective governance based on three principles: user-ownership, user-control, and user-
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21 benefit (Filippi 2014, Benos, Kalogeras et al. 2016, Figueiredo and Franco 2018). The different
22
23 governance structures of co-operatives can affect their performance and sustainability (Elliott,
24
25 Elliott et al. 2018, Kontogeorgos, Sergaki et al. 2018). The governance structures of co-operatives
26
27 are perceived to efficiently increase farmers' incomes by increasing their bargaining power
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29 (Chlebicka and Pietrzak 2018).

30
31 As co-operatives become increasingly globalised and exposed to global competition, some co-
32
33 operatives have been inclined toward the corporatisation of internal governance structures to lower
34
35 costs or risks (Stanford and Hogeland 2004). Governance issues have emerged through product
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37 differentiation (Borgen 2011) and membership heterogeneity (Elliott, Elliott et al. 2018). Some
38
39 co-operatives have transformed their traditional governance structures from traditional,
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41 collectively organised, equality-based models to restructured models (e.g., **investor-owned firm**)
42
43 (Kalogeras, Pennings et al. 2013, Benos, Kalogeras et al. 2016). Traditional co-operatives employ
44
45 exclusive member ownership, democratic control, and a uniform pricing policy (Filippi 2014). In
46
47 contrast, the restructured co-operative model entails individualised equity, proportional decision-
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49 making control, and the allocation of benefits through personal shares and price differentiation
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51 (Chaddad and Cook 2004).

52
53 Chaddad and Cook (2004) compared the governance structures of traditional co-operatives, new
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55 generation co-operatives, limited co-operative associations, and limited liability companies and
56
57 found great differences in governance characteristics of open membership, farmer ownership and
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59 control, investor ownership and control, share approximability and transferability, equity
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61 redeemability, boards of directors and supply commitment. Chaddad and Iliopoulos (2013) created
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63 a typology of fundamental governance models used in relation to the allocation of decision-making
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4 functions: namely, producer-owners delegate formal authority to boards of directors, producers-
5 owners depute substantial control to co-operative experts (Bijman, Hendrikse et al. 2013), and
6 members delegate authority and decision rights to a small group of member-patrons (Chaddad and
7
8 Cook 2004).
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11 Some co-operatives have complex governance structures involving dozens of joint ventures and
12 subsidiaries in various different industries (Grashuis 2018). The governance structures of co-
13 operatives are not always a decisive factor for their financial success (Kalogeras, Pennings et al.
14 2013). The mission of a co-operative is more complex, as board of director members must both
15 supervise management and protect their democratic rights (Berge, Caldwell et al. 2016).
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19 The governance structures of the new generation of co-operatives support long-term brand
20 positioning and brand value (Cook and Iliopoulos, 1999). However, with increased heterogeneity
21 in member attitudes and objectives, many of the larger ACs have assumed a corporate appearance
22 (Forney and Häberli 2017). The development and transformation of agricultural co-operatives
23 have been described in a pessimistic way in identifying a trend of 'corporatisation' (Forney and
24 Häberli 2017).
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33 ***Cluster 3 (Green): Trust and commitment in co-operatives***

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35 Cluster 3 includes 25 papers published in 1997 with 0, 1, or 2 papers published per year except
36 in 2018, when four papers were published. The cluster is primarily concerned trust and
37 commitment in co-operatives. An important focus of co-operatives is to develop of membership
38 policies that foster involvement, commitment, and trust between farmers and co-operative
39 enterprises (Peng, Hendrikse et al. 2018). Trust is linked to members' loyalty toward their co-
40 operatives. Trust constitutes a determining factor in members' decisions to sell their crop to a co-
41 operative rather than to a private entity (Sykuta, 2006). Farmers who trust their co-operatives are
42 willing to accept the superiority of such cooperative (Nilsson, Svendsen et al. 2012). In co-
43 operatives, trust between members and co-operative management are important predictors of
44 group cohesion, which is a measure of the strength of members' desires to remain in a group (a co-
45 operative) and their level of commitment to this group (Hansen, Morrow Jr et al. 2002). Most co-
46 operatives invest resources to build trust between their members and management teams (Hansen,
47 Morrow Jr et al. 2002). Organisational commitment plays a mediating role in the relationship
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4 between trust and members' involvement in co-operative governance (Barraud-Didier, Henninger
5 et al. 2012).

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8 Trust and commitment synergistically influence governance and performance among other
9 features. On one hand, trust affects co-operative members' performance, satisfaction, and
10 commitment to remaining with co-operatives. Cognitive and affective trust have complementary
11 and different effects on members' performance and satisfaction depending on the given context
12 (Hansen, Morrow Jr et al. 2002). Members may trust their co-operatives because they are
13 competent, reliable and conscientious in making the best decisions and also because they show
14 goodwill and positive intent toward members (Ibid). On the other hand, co-operative members'
15 levels of commitment are impacted by levels of capitalisation, which improve co-operatives'
16 innovation and performance (Marcos-Matas, Ruggeri et al. 2018). Members' affective
17 commitment positively mediates the relationship between affective and cognitive trust in their
18 cooperation and participation in governance (Barraud-Didier, Henninger et al. 2012).

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21 However, trust and commitment do not always increase farmers' willingness to cooperate in
22 co-operatives, as this may only matter under certain conditions (Österberg and Nilsson 2009,
23 Stallman and James 2017). There are great differences in levels of members' commitment and trust
24 based on their satisfaction with the profitability of farm operations, their age, and their experience
25 with board work, but these differences can to a large extent be attributed to members' perceptions
26 of their participation in co-operative governance (Österberg and Nilsson 2009).

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29 Moreover, traditional co-operatives, when they grow larger and adopt more complex business
30 operations, may have difficulties in managing their members. Lessened levels of member control
31 in large co-operatives result in less trust in membership (Nilsson, Kihlén et al. 2009). Large and
32 complex agricultural co-operatives, through vertical and horizontal integration, have shown less
33 mutual trust and fewer face-to-face interactions between rank-and-file members and between
34 members and leaders, implying less involvement among members, less pride in co-operatives, and
35 weakened democratic governance (Nilsson, Svendsen et al. 2012).

36 37 38 39 ***Cluster 4 (Blue): Comparisons between co-operatives and IOFs***

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42 Cluster 4 consists of only 29 papers focused on comparing co-operatives to investor-owned
43 firms (IOFs). As shown in Table 8, Cluster 4 emerged in 2001 and gained much attention from
44 ASC scholars in 2004 (with seven papers). However, one or no papers of this cluster have been
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4 published annually since 2011. Co-operatives and IOFs are considered two distinct governance
5 structures. What distinguishes co-operatives is their membership control by input suppliers, i.e.,
6 farmers (Hendrikse and Veerman 2001). Profit-maximising IOFs on the other hand include
7 members who are both owners and users of their services (USDA, 1995; Hansmann, 1996). Co-
8 operatives are typically assumed to focus on maximising member welfare, while IOFs focus on
9 maximising total profits. Therefore, co-operatives are typically assumed to perform a different
10 objective function than their IOF counterparts (Fulton and Giannakas 2001). Additionally, co-
11 operatives enjoy certain advantages over IOFs in being exempted from anti-trust laws, following
12 different taxation rules and having access to a specialised source of debt capital from co-operative
13 financial capital (Giannakas and Fulton 2005).
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22 In terms of innovation activity, farmers' net returns associated with selling products to co-
23 operatives are higher than those of IOFs. As a co-operative's objective is to maximise member
24 welfare, a co-operative can provide more lucrative price to farmers, enjoy higher market shares in
25 pre- and post-innovation stages, and carry out more innovation effort than IOFs (Drivas and
26 Giannakas 2008). Compared to profit-maximising IOFs, member welfare-maximising co-
27 operatives can increase the success rate of innovations while reducing the prices of agricultural
28 inputs. Co-operative involvement in innovation activity can enhance total social welfare with its
29 effectiveness determined by the degree of producer heterogeneity and the value of innovation costs
30 (Giannakas and Fulton 2005).
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39 Regarding governance structures, great differences in organisational (internal control systems
40 and democratic decision making), financial governance (retained earnings and outside equity) are
41 observed with co-operatives seeming to adopt governance structures with better functioning
42 internal control systems than those of IOFs (Hendrikse and Veerman 2001).
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46 In terms of contract design, co-operatives differ from IOFs in several ways, e.g., contracts may
47 be structured based on different property right structures, information asymmetries, and trust levels
48 (Sykuta and Cook 2001).
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53 ***Cluster 5 (Pink): Financing in co-operatives***

54 Cluster 5 consists of seven papers published between 2003 and 2018 on financing problems in
55 co-operatives. Agricultural co-operatives are owned by the patrons they serve, and they return their
56 earnings to patrons primarily based on patronage rather than stock ownership, which leaves little
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4 incentive for direct investment; therefore, co-operatives must generally rely on patronage-based
5 methods to accumulate equity capital (Royer 2017).
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8 Equity capitalisation programs based on retained earnings from patronage sources, as financing
9 method widely used in the EU, provide great advantages to co-operatives and their patrons relative
10 to traditional equity financing methods (Royer 2017). However, from a financial perspective, the
11 characteristics inherent to co-operative share capital and reserve funds create three problems:
12 difficulties with accumulating share capital returned to members when they leave co-operatives;
13 difficulties for co-operatives to access capital markets and strict legal company regulations on self-
14 funding mandatory reserve fund endowments, which are also un-distributable (Mateos-Ronco and
15 Guzmán-Asunción 2018). Therefore, agricultural co-operatives, as social entrepreneurs, need
16 financial advice and support (Mazzarol, Limnios et al. 2013, Figueiredo and Franco 2018).
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26 ***Cluster 6 (Light Green): Women's co-operatives in Western countries***

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28 Cluster 6 represents the smallest cluster of studies on western co-operatives, including 4 papers
29 published between 2002 and 2007 and all focuses on Greece. Women's co-operatives have
30 contributed to local development (Vakoufaris, Kizos et al. 2007) and have aimed at increasing
31 family incomes and social status (Koutsou, Iakovidou et al. 2003). Driving forces behind
32 participation in women's co-operatives include intentions to increase incomes for rural women
33 and to enhance their independence, levels of control and self-esteem (Koutsou, Iakovidou et al.
34 2003).
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41 For the agricultural industry of women's co-operatives, the main fields of activity include
42 agritourism (Kazakopoulos and Gidarakou 2003), handicraft production and the trade of cultural
43 products, and the production and trade of products of alternative forms of agriculture (Koutsou,
44 Iakovidou et al. 2003).
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49 However, women's co-operatives have experienced challenges, including production problems,
50 organisational and management problems, problems with the promotion and advertisement of
51 products and services, capital raising problems (Iakovidou 2002), and interpersonal problems
52 along with rural women's difficulties with fully understanding their new roles as businesswomen
53 (Vakoufaris, Kizos et al. 2007). Consequently, some women's co-operatives have transformed into
54 family businesses (Ibid).
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4 Addressing such problems involves developing women’s leadership skills, establishing
5 authorities that encourage and support women's ventures, and the use of bottom-up approaches
6 (Iakovidou 2002). To develop women’s co-operatives, it is essential for active members to work
7 on a full-time basis and to make sufficient incomes where an interest in entrepreneurship and a
8 willingness to invest exist (Vakoufaris, Kizos et al. 2007).
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15 **4.4 Evolution of research on Western ACs**

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17 HistCite™ was used to generate and visualise the most relevant papers of the 257 papers
18 identified (from Figure 1). Historical reconstructions of Western AC developments are
19 chronologically represented in the networks of citation relations (Figure 6). Following Lucio-Arias
20 and Leydesdorff (2008), our analysis was limited to 30 core papers (with the highest LCS values).
21 In Figure 6, the vertical axis represents each year and shows that research on ACs increased over
22 the study period. For the 30 entries, some isolated nodes/papers are disregarded (Numbers 3, 16,
23 47, 71, and 119). From our chronological citation graph reflecting the economic and historical
24 background (e.g., economic liberalism and the subprime mortgage crisis) of Western ACs, we
25 contend that Western AC research has evolved through three stages: an incubation stage (1977-
26 1998), exploration stage (1999-2012), and burgeoning stage (2007-2019). These stages are shown
27 Figure 1, which presents two spikes in the total number of publications occurring from 1997 to
28 1998 and from 2013 to 2014, suggesting that Western AC research entered new stages in 1999 and
29 2013.
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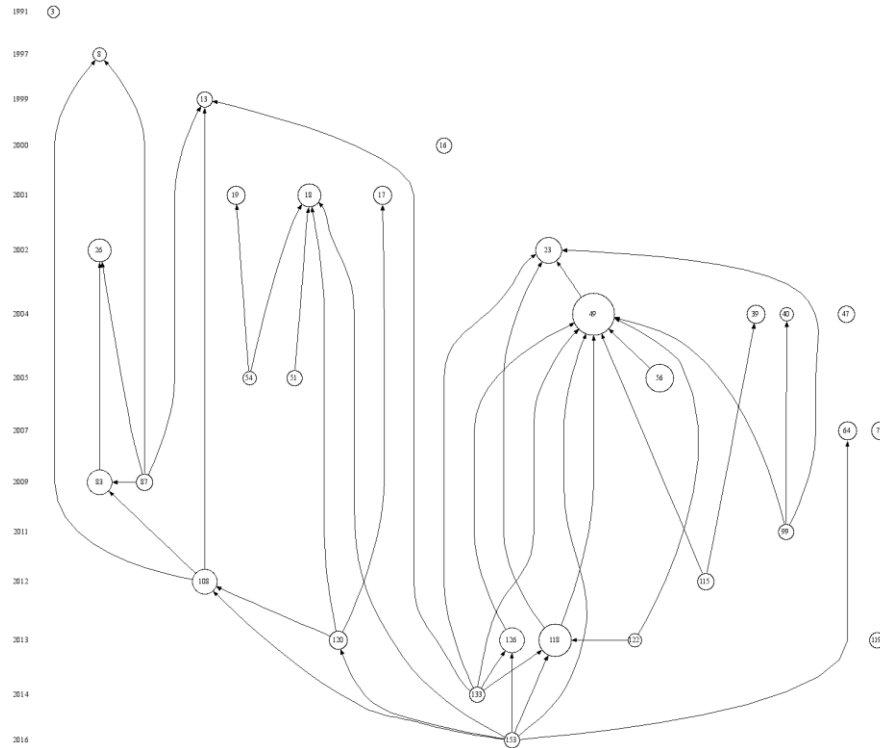


Figure 6 Chronological Citation Graph for the 257 Papers

Incubation stage: (1977-1998): This stage includes 12 papers of the 257 considered, among which Lerman and Parliament (1991) (LCS=15) and Hind (1997) (LCS=11) are two important papers counted among the 30 core papers. Research of this phase mostly focuses on the development, roles and performance for farmers; on scale effects of ACs relative to those of small farming operations (Lerman and Parliament 1991); and on the history of AC development (Rayner and Ennew 1987).

Taking ACs in the UK as an example, unfavourable political and economic environments in the 1920s and 1930s did not benefit the growth of ACs in these periods. The co-operative movement then began to receive formal support from the UK government and European Commission in the post-war period (Rayner and Ennew 1987). Early ACs mainly pursued local development with a focus on local employment and infrastructure and geographic buying patterns (Lorendahl 1996). In this stage, challenges and the development (Lorendahl 1996) of ACs were not explicitly discussed.

Exploration stage (1999-2012): In total, 108 of the 257 papers were published in this stage. With the emergence of new general ACs and the subprime mortgage crisis in the US, scholars began to explore the development of ACs to solve their challenges. From 1999-2006, ACs became

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4 important organisations in rural areas and were compared to investor-owned firms (Fulton and
5 Giannakas 2001). However, the economic liberalism and corporatisation of ACs in Western
6 countries challenged the identity of ACs (Stanford and Hogeland 2004, Wolz, Kopsidis et al.
7 2009), resulting in a decline in the number of papers published from 2004-2006. The 2008 financial
8 crisis spurred a rise in unemployment and a global food crisis (e.g., less demand for agricultural
9 commodities) with virtual economics becoming severely detached from developments of the real
10 economy. ACs thus emerged as effective means to address poor economic conditions in rural areas.

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12 Under this specific economic and historical context, AC scholars also explored AC
13 development. Research in this phase mostly focused on changes in ownership rights (Chaddad and
14 Cook 2004), changes in the capital structures of ACs (Russo, Weatherspoon et al. 2000),
15 comparisons between ACs and IOFs (Oustapassidis, Vlachvei et al. 1998) based on transaction
16 cost analyses of ACs (Hendrikse and Veerman 2001). For example, Chaddad and Cook (2004)
17 (LCS=127, GCS=197) argued that new co-operative organisational models differ in how
18 ownership rights are assigned to economic agents (members, patrons, and investors) contractually
19 tied to firms. Moreover, changes in the allocation of ownership structures encouraged agents to
20 make investments in ACs (Hendrikse and Bijman 2002) (LCS=58, GCS= 74). Members'
21 commitments to co-operatives and trust in their boards of directors enhanced the success of ACs
22 (Österberg and Nilsson 2009) (LCS=47, GCS= 85).

23
24 **Burgeoning stage (2013- 2019):** In total, 137 papers were published in this stage. By this
25 period, agricultural co-operatives had changed considerably and especially in residual claim rights
26 with alternative ownership-control models emerging in different regions (Chaddad and Iliopoulos
27 2013) (LCS=63, GCS=71). More studies began to examine the organisational restructuring
28 (ownership, control, and cost/benefit allocation), strategic attributes (market and brand
29 orientation), and effects of such changes on performance (Bijman, Hanisch et al. 2014, Benos,
30 Kalogeras et al. 2016). ACs by this period had developed a long-standing capacity to continually
31 modify organisational design, ownership, and governance models to adapt to the ever-changing
32 needs of their members, customers, and environments (Iliopoulos, Värnik et al. 2019).

33
34 For these ACs with different organisational models, some scholars have addressed the issue of
35 whether non-traditional agricultural co-operatives should be eligible for public policy support
36 (Iliopoulos 2013). Consequently, these studies pay close attention to the effects of these emerging
37 co-operative models on social, environmental,, and economic performance (Montefrio and
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4 Dressler 2019). Among the many types of ACs using different organisational, ownership, and
5 governance models, which co-operative model performs best? Results show that no single type of
6 co-operative model performs better than the others (Kalogeras, Pennings et al. 2013). In turn, cases
7 of AC development are individually unique and can be likened to one hundred flowers in bloom
8 or to ten thousand horses galloping ahead.
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15 **5 Conclusion**

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17 ACs have developed rapidly over the past decades, have faced numerous challenges, and have
18 experienced significant changes to their organisation models. ACs are currently quite varied in
19 terms of ownership rights, and their functions have been extended (e.g., marketing and credit co-
20 operatives).
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24 This study uses a systematic literature review and citation and co-citation analyses to explore
25 the insight into knowledge on Western ACs, the evolution of this knowledge, and the six main
26 research themes focused on Western ACs. Some contributions can be identified. *First, this is*
27 *believed to be the first paper to systematically review the literature on Western ACs and outlines*
28 *a knowledge structure from which researchers can position their research. Second, the knowledge*
29 *structure outlined identifies common themes and distinct features that have emerged over time and*
30 *illustrates the trajectory of this body of research and avenues for future development. Third, based*
31 *on this analysis, directions for future research are identified and detailed below.*
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39 A number of current research gaps can inform future research. This paper discusses these gaps
40 and future research focuses here. *First*, the cultural aspects of ACs are not well understood. The
41 changing values and principles of co-operatives threaten the existence of new co-operatives. As
42 agricultural traditions risk being abandoned by younger generations, there is a need for adapted
43 values and principles that can attract these populations back to agricultural work. Researchers may
44 focus on this area in the future.
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50 *Second*, several studies have proposed that trust has positive effects on co-operative
51 performance by helping build long-term partnerships and enhancing member commitment and
52 participation (Nilsson, Kihlén et al. 2009, Österberg and Nilsson 2009, Barraud-Didier, Henninger
53 et al. 2012). As co-operative members become heterogeneous and as property rights models
54 become more diverse, it is more critical and challenging for co-operatives to manage relationships
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4 with their members. There is a need for new mechanisms to address trust between co-operatives
5 and their members and between members themselves.
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8 *Third*, co-operatives are being increasingly integrated into agricultural value chains. Co-
9 operatives must therefore position themselves better within such chains depending on their
10 competencies and membership requirements. Co-operatives often deal with powerful stakeholders
11 (e.g., retailers and processors) in agricultural value chains. Thus, means to improve levels of
12 bargaining power is a key issue facing co-operatives today. Some papers (especially co-operatives
13 in Greece) have also shown that co-operatives tend to experience a lack of marketing expertise,
14 which can lead to the development of inefficient and underperforming co-operatives
15 (Kazakopoulos and Gidarakou 2003). Marketing co-operatives are set up to strengthen the -
16 operatives' bargaining power (Prasertsri and Kilmer 2008). Therefore, marketing co-operatives
17 may be separately established to maximise the marketing functions of agricultural co-operatives.
18 Co-operative member may also choose to set up a marketing co-operative or a marketing and sales
19 company where the latter is more efficient in terms of decision making. Research opportunities in
20 this area should be explored further.
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23 *Fourth and finally*, few studies have compared co-operative models used in different Western
24 countries. Future research may identify the pros and cons of each and especially of those used in
25 North America, Australia, and Europe, which represent different regions of Western culture and
26 which produce different agricultural products.
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29 The findings of the current study can guide researchers focusing on Western ACs. However,
30 several limitations are identified.
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33 *First*, this work presents methodological limitations in selecting publications manually and
34 given the subjective nature of our map interpretation methods (Ramos-Rodríguez and Ruíz-
35 Navarro 2004).
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38 *Second*, the sample used was limited to literature published in English-speaking, Western
39 countries. Thus, papers published in other languages were not considered, thus excluding potential
40 insights from the review. The studies reviewed represent local knowledge on co-operatives that
41 have enriched research on western co-operatives. Our focus on Western countries is established at
42 the start of this paper, but this approach limits the generalisability of our findings to Western co-
43 operatives.
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4 *Third, since any newly published papers cannot accumulate enough citations to be used in the*
5 *source documents, the co-citation method employed is flawed with a publication time lag.* Some
6 influential documents might therefore not have been included in our initial core set. For instance,
7 12 co-cited papers were identified for 2006 to 2018 despite the minimum frequency of citations
8 being 4.
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13 *Fourth, to gain additional insights into the academic foundations of the studied discipline, other*
14 citation analyses such as those focused on author co-citation and co-authorship should be
15 conducted to quantitatively and qualitatively identify key networks involved in this field.
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19 *Finally, bibliometric studies tend to be backward-looking, as they only focus on the most co-*
20 *cited references and coupled papers. While a high frequency of co-cited works and coupled*
21 *databases can be regarded as strong impacts on a given research field, these features are not*
22 *reflective of an entire knowledge field.*
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