Bibliometric Analysis of Organizational Ecology Theory (OET): To Review Past for Directing the Future of the Field

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ABSTRACT

In this study, 399 articles of the extant literature published in the Web of Science database between 1975 and 2020 were examined using bibliometric analysis to determine the extent of Organizational Ecology Theory (OET) literature and current research priorities. Bibliometric techniques such as performance analysis, citation analysis, co-word and co-citation analysis are used for this purpose. We extracted several thematically clusters from bibliometric networks using co-citation and co-word analysis, describing related but distinct subfields of inquiry within the OET literature. "Organizational change", "organizational forms and identity", and "organizational founding and mortality" are overlapping clusters. Topics such as new organizational type, organizational failure, first-mover advantage, organizational founding, and coevolution may be examined in future research. Therefore, the expected contribution of this study is to provide a helpful inventory of past research to advance OET literature.

Key Words: : Organizational Ecology Theory, Systematic Literature Review, Bibliometric Analysis, Organizational Theory, Science Mapping, VOSviewer.

JEL Classification Codes: D23, L2, M1.

1. INTRODUCTION

In the field of organizational theories, environmental change and organizations' responses to this change are some of the main problems in understanding the behavior of organizations (Aldrich 1979; Aldrich and Pfeffer 1976). There are two different perspectives in organizational theories that deal with the responses of organizations to environmental change. On the one hand, there is the perspective of surviving by adapting to environmental changes, and on the other, extinction by selection in the face of environmental changes (Thompson 1967; Hrebiniak and Joyce 1985; Hannan and Freeman 1977, 1984). Organizational ecology theory seeks to answer the question of "*why organizations are so diverse*" based on selection mechanism as an alternative perspective instead of adaptation to environmental changes (Hannan and Freeman 1977; Carroll 1984). The diversity of organizations refers that the mortality of existing organizations and the birth of new organizations (Hannan and Freeman 1987, 1988; Hannan and Carroll 1992).The OET discusses the issue through concepts based on different levels of analysis: demographic characteristics such as age and size for organization-level studies (Freeman et al. 1983; Barron et al. 1994), concepts such as structural

inertia (Hannan and Freeman 1984), density dependence (Carroll and Hannan 1989), resource partitioning (Carroll and Swaminathan 2000), niche width (Freeman and Hannan 1983; Carroll 1985) for population-level research, and finally, community-level research which seeks dramatic changes in social, political and economic conditions (Astley 1985).

There are studies in the field of organization theory and organizational studies using bibliometric analysis (Ferreira et al. 2014; Zupic and Čater 2015; Kücher and Feldbauer-Durstmüller 2019; Zhai and Su 2019; Öztürk 2021a, Diez-Martin et al. 2021). However, we have not encountered bibliometric research regarding the overall organizational ecology theory literature. For this reason, this study will reveal the holistic picture of the literature of organizational ecology theory using bibliometric analysis. In this way, the link between past and future research will be established by stating the clear analytical focus of the research themes and indicating clear directions for future research.

This study aims to present a general overview of the OET literature. In this study, bibliometric analysis is used for describing the performance and science maps of the

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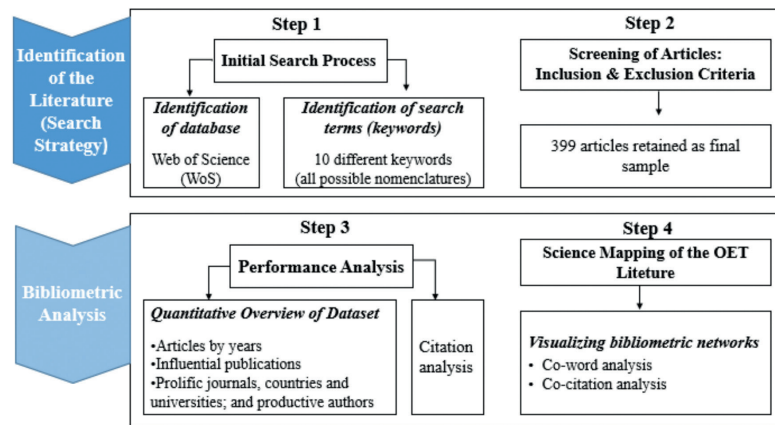² Sakarya University, Business School, International Trade and Finance, Sakarya, Turkey, esradil@sakarya.edu.tr

Figure 1 Steps of the research

OET literature. Here the performance refers to the general classification and measurement of the publications in our data set of the research field, while science maps refer to intellectual and conceptual structures. Based on such a goal that motivates this study, the research question (RQ) is: *What is the general overview of the OET literature?*

Being able to answer this question requires a holistic view of the field. Bibliometric analysis is one of the tools widely used by researchers in recent years to reveal any field's development and historical evolution. Bibliometric analysis is a particular type of systematic literature review (Block & Fisch, 2020). When considering the entire field, this tool, which ensure the analysis of large data sets in this way, provide significant benefits for researchers (Cobo et al. 2011).

2. Method

The method of bibliometric analysis is to map the intellectual structure of any research area, topic, or journal using specific indicators (Cobo et al. 2011; Gutiérrez-Salcedo et al. 2018). The bibliometric analysis can be instrumental when someone wants to learn about the evolution of a research area (Zupic and Cater 2015). The bibliometric analysis aims to visualize the structure of a research field by grouping items (articles, writers, journals, citations, keywords, or sub-topics) together (Ariaa and Cuccurullo 2017).

There are two stages in the method parts of bibliometric research: i) identifying the data set, ii) bibliometric analysis of the data set. Firstly in bibliometric studies, data is gathered from a specific database through search terms that directly reflect the relevant field called the *initial search process*. After, the initial search results are filtered depending on the research question, and the data set is made ready for analysis which is called *screening of articles* (Öztürk, 2021b). We used a systematic search method (Block & Fish 2020: 310) to find relevant litera-

ture about the OET. In bibliometric studies, it should be adopted a replicable and transparent process (Trandfield et al. 2003) to evaluate existing evidence to minimize bias that results from the random inclusion or exclusion of studies in the literature review process (Linnenluecke et al. 2020: 178).

Secondly, there are two main procedures used to analyze a research field: *performance analysis* and *science mapping* (Cobo et al. 2011; Gutierrez-Salcedo et al. 2018). In this analysis, we follow the steps shown in Figure 1 (Cobo et al. 2011; van Eck and Waltman 2014; Zupic & Cater 2015; Gutierrez-Salcedo et al. 2018; Block & Fisch 2020; Linnenluecke et al. 2020; Öztürk, 2021b).

2.1. Initial Search Process

Data for the bibliometric analysis were gathered from a variety of sources. Many databases, such as WoS, Scopus, Google Scholar, and PubMed, provide datasets for bibliometric studies (Cobo et al. 2011). WoS is the most widely used database, especially among management and organization researchers (Zupic and Cater 2015; Mas-Tur et al. 2020).

In this study, we used the WoS database for the literature search. The reasons of using this database are; (I) WoS contains numerous social science journals. In this regard, it has sufficient data for bibliometric research. (II) datasets can be accessed in a suitable file type. (III) It is easy to access due to university membership. These benefits include significant convenience in accessing the

Table 1 Keywords used to identify relevant articles

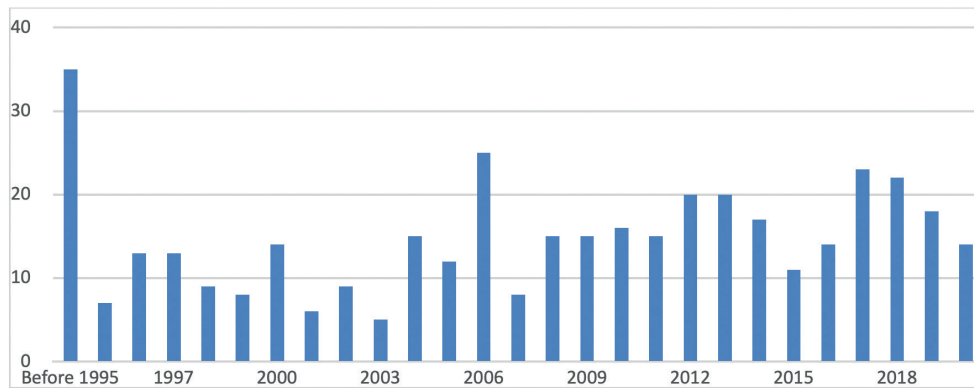| Keywords |
| --- |
| "population ecology of organization*" OR "organization* ecolog*" OR "population* ecolog*" OR "ecolog* theor*" OR "population-ecolog*" OR "organization* population*" OR "ecolog* perspective" OR "ecolog* approach" OR "ecolog* model" OR "ecolog* of organization*" |

Figure 2 Articles per year. Notes: Evolution of the number of articles over the years since 1975. Notably, the dataset includes only articles published by December 2020. The figure is based on a sample of N = 399 articles.

Table 2 Inclusion and exclusion criteria

Inclusion criteria
Article in business and management fields
Article published in a peer-reviewed journal
Research or review article
Article in the English language
Keywords (in Table 1) included in the article's title, abstract, or keywords
Exclusion criteria
Book, book chapter, book review, proceedings paper, and the editorial material
Article not covering the OET

dataset, moving it to the software, and conducting the bibliometric analysis techniques. Many of the journals in WoS, on the other hand, have a high impact factor which are leading publications in their fields.

Following the selection of the suitable database, we identified keywords representing the OET to be used in the initial search. To ensure that all publications correctly and thoroughly reflect the OET, we performed a "topical query" that included all possible naming forms (nomenclatures) relevant to the theory. Table 1 shows the search terms we use in the initial search.

Between 1975 and 2020, 17204 studies were found by searching for related keywords in the title, abstract, or keywords.

2.2. Screening of Articles

In this phase, we conducted screening processes for the 17204 studies because databases often find publications that are not relevant to our research purpose. Table 2 shows the inclusion and exclusion criteria we applied.

We include only the publications (research or review articles) published in journals in the fields of "business" and "management" as well as English as the research language. Since "population ecology" is a common term in scientific fields such as genetics, biology, ecology, zoology, and entomology, the initial quest yields many academic publications. When the filtration is narrowed down to the fields of business and management, however, the search results decrease in number. Furthermore, we exclude proceedings papers because of their structural limits. We also omitted books, book chapters, and book reviews because they are often a replication of descriptive and prior experience in books written on general organizational theories and are not focused on empirical results. We also didn't include papers that didn't have the keywords (in table 1) in the title, abstract, or keywords (Block et al. 2020).

Following the application of all these filtering criteria, we found 527 articles. Finally, we manually read and checked the names, abstracts, and keywords of each of the 527 publications to ensure that they were indeed within reach of OET, and we removed those that were not. As a result, we selected 399 papers as a final sample.

Table 3 Sub-research questions of the study

The quantitative overview of the dataset	
What is the number of articles per year?	Performance analysis
What are the most influential publications?	
Which journals have the highest number of publications?	
Who are the most productive authors?	
Which countries have the highest publication?	
Which universities have the highest publication?	
Citation analysis	
What are the most-cited studies in OET literature?	
What are the most-cited journals in OET literature?	
Does the distribution of citations comply with the Bradford Law?	
Co-word analysis	
Which terms are mentioned frequently in the OET literature? (density visualization)	Science mapping
Which do co-word clusters occur? How do these clusters relate to each other? (network visualization)	
How do the mentioned terms in the OET literature change over time? (overlay visualization)	
Co-citation analysis	
Among most-cited studies, which do co-citation clusters occur? How do these clusters relate to each other? (network visualization)	

2. 3. Bibliometric Analysis

In this stage of the analysis, we applied performance analysis and science mapping as two different procedures. Analyses were matched with sub-research questions to operationalize the research question (see Table 3).

Performance analysis will be performed in two ways. Firstly, a summary of quantitative results (such as the number of publications per year, most influential publications, most influential journals, most productive authors, and so on) of the dataset will be presented. Then, we applied a citation analysis to show the most influential studies in the OET field. In the science mapping procedure, we extracted bibliometric networks by applying co-word and co-citation analysis.

3. Results of the Performance Analysis

The performance analysis aims to categorize scientific/bibliometric items (journals, authors, countries, and universities), as well as to assess and quantify their scientific output (Cobo et al. 2011). Also, this procedure focus on assess scientific production using specific quality and quantity indicators (Gutierrez-Salcedo et al. 2018). Information about the development and effect of a particular research area is collected via this method. Several metrics, such as the number of publications, citations, frequently cited publications, number of non-cited publications, re-

search field classification, and normalized citations, may be derived from the publication core (Moral-Munoz et al. 2020). We applied performance analysis into two levels as a quantitative overview of the dataset and citation analysis.

3.1. Quantitative overview of the dataset

This section, centered on basic bibliometric metrics, offers a detailed overview of the 399 articles downloaded dataset about OET.

What is the number of articles per year?

Based on the annual number of publications, Figure 2 depicts the evolution of the OET literature in the WoS database. There are 374 articles out of the 399 publications, while reviews account for 18 and editorial materials for the remaining seven. It is clear from these figures that empirical articles have been conducted more within the framework of the OET than reviews.

Figure 2 shows how the number of publications published in the OET literature has fluctuated over time. In addition, over the last four years, the number of articles has steadily declined.

However, the number of publications in the literature of other theories, such as Institutional and Resource Dependence Theories, has consistently increased over time. Moreover, the percentage of papers

Table 4 Most-cited publications in dataset

Publication	Publication Name	Journal	No. of Cit.	Links
Baum & Oliver (1991)	Institutional Linkages and Organizational Mortality	*Administrative Science Quarterly*	760	32
O'reilly & Tushman (2008)	Ambidexterity as a dynamic capability: Resolving the innovator's dilemma	*Research in Organizational Behavior*	756	3
Haveman (1993)	Follow the Leader: Mimetic Isomorphism and Entry into New Markets	*Administrative Science Quarterly*	672	31
Shane & Stuart (2002)	Organizational Endowments and the Performance of University Start-Ups	*Management Science*	650	1
Geroski (2000)	Models of technology diffusion	*Research Policy*	633	1
Burgelman (1991)	Intraorganizational Ecology of Strategy Making and Organizational Adaptation: Theory and Field Research	*Organization Science*	614	15
Zaheer & Mosakowski (1997)	The Dynamics of the Liability of Foreignness: A Global Study of Survival in Financial Services	*Strategic Management Journal*	537	5
Baum & Mezias (1992)	Localized Competition and Organizational Failure in the Manhattan Hotel Industry, 1898-1990	*Administrative Science Quarterly*	433	58
Pennings, Lee & van Witteloostuijn (1998)	Human Capital, Social Capital, and Firm Dissolution	*Academy of Management Journal*	391	9
Baum & Ingram (1998)	Survival-Enhancing Learning in the Manhattan Hotel Industry, 1898-1980	*Management Science*	379	13

We obtained citation counts of the publications from VOSviewer software. As of December 2020, citations are derived from the Web of Science database.

Table 5 Most prolific journals

Journal	No. of articles	Impact factor (IF)	Total citations
Administrative Science Quarterly	30	8.30	5455
Organization Science	29	2.79	2559
Organization Studies	28	3.92	948
Strategic Management Journal	20	5.46	2439
Industrial and Corporate Change	19	1.98	436
Academy of Management Journal	17	7.57	1835
Advances in Strategic Management-A Research Annual	16	0.75	-
Journal of Business Venturing	9	7.59	359
Journal of Organizational Change Management	9	0.96	53
Academy of Management Review	8	8.41	421
Management Science	8	3.93	1295
Technological Forecasting and Social Change	8	5.84	136
Journal of Management Studies	7	4.88	306
Research Policy	6	5.35	1183
Journal of Management	5	8.85	146
Small Business Economics	5	4.80	210

We obtained citation counts of the publications from VOSviewer software. As of December 2020, citations are derived from the Web of Science database. We acquired Journals' impact factor from their website and Clarivate Analytics in December 2020.

Table 6 Most productive authors in the OET field

Author	No. of articles	Total citations
Carroll, GR	14	1256
Van Witteloostuijn, A	13	586
Barnett, WP	12	1064
Boone, C	10	286
Dobrev, SD	10	506
Lomi, A	10	282
Wezel, FC	9	118
Baum, JAC	7	1992
Hannan, MT	6	741
Larsen, ER	6	126
Greve HR	5	547

We only include authors contributing to the field with five or more articles. As of December 2020, citations are derived from the Web of Science database. Also, we obtained citation counts of the publications from VOSviewer software.

published before 2000 within the total number of articles (% 21,3) is quite remarkable. This ratio shows the theory's historical legacy. Also, with 25 articles, 2006 was the year with the most articles written.

What are the most influential publications?

Table 4 shows the most-cited publications in the data set. This numerical data is essential in terms of delivering the most influential studies in the data set. In addition to the ten most-cited articles, we present in the table the direct citation relationship information of these articles with each other.

Which journals have the highest number of publications?

Table 5 shows the journals in which five or more articles about the OET are published in our dataset. There are 399 papers in the final survey, which were written in 153 separate journals. The 17 journals mentioned in Table 5 published about 57 percent of the 399 papers. The 2019 impact factors and total citations of the listed journals are also shown in Table 5.

The most productive journal is *Administrative Science Quarterly*, which has 30 articles published, respectively followed by *Organization Science* with 29 articles, *Organization Studies* with 28 articles, and *Strategic Management Journal* with 20 articles. Table 5 shows the journals with reasonably high impact factor value. Furthermore, we can assume that journals that publish OET-related articles are of relatively high quality. With very high impact factor values, Journal of Management (IF: 8.85), Academy of Management Review (IF: 8.41), and Administrative Science Quarterly (IF: 8.30) are the highest-ranked journals in the "Management" and "Business" fields according to WoS Journal Categorization.

Who are the most productive authors?

The 399 papers in our sample included a total of 721 authors. The authors who contributed to five or more publications are mentioned in Table 6. Carroll is the most prolific author in terms of article output, having authored 14 articles with 1256 citations. Table 6 reveals an unexpected result: Hannan, as one of the theory's founders, joined the list with minimal articles, while Freeman did not even list. Another interesting finding is that Witteloostuijn and Boone have a relatively large number of articles. They were also the forerunners of theory creation in Europe.

According to the Table 6, 629 of the 721 authors (or more than 80%) contributed to the field with one paper. In addition, when we look at whether a single author or multi-authorship wrote the papers, we find that 109 articles were single-authored. This finding demonstrates that there is no sign to mention a well-structured epistemic community who publish together regularly. In this context, almost three-quarters of the articles were written by more than one author. This ratio can be interpreted as the presence of community and the authors' tendency to collaborate. However, compared to other organizational theories' literature, the number of publications with a single author in the OET literature is considerably higher.

Which countries have the highest publication?

Researchers from 41 different countries wrote a total of 399 articles. Table 7 shows the prominent countries in the OET literature, based on the number of publications and overall citation counts. Table 7 shows the top countries that contributed five or more publications.

We only include countries contributing to the field with five or more articles. As of December 2020, citations are derived from the Web of Science database. Also, we obtained citation counts of the publications from VOSviewer software.

Table 7 Prominent countries

Country	No. of articles	Ratio (%)	Total citations
USA	221	55.38	12852
CANADA	38	9.52	2251
ENGLAND	37	9.27	1514
NETHERLANDS	36	9.02	949
ITALY	21	5.26	253
CHINA	19	4.76	294
AUSTRALIA	18	4.51	166
GERMANY	17	4.26	291
FRANCE	16	4.01	379
BELGIUM	14	3.50	337
SWITZERLAND	9	2.25	148
SOUTH KOREA	8	2.00	582
SPAIN	8	2.00	200
ISRAEL	6	1.50	168
SWEDEN	6	1.50	192
FINLAND	5	1.25	189
TAIWAN	5	1.25	15

We only include universities contributing to the field with six or more articles. As of December 2020, citations are derived from the Web of Science database. Also, we obtained citation counts of the publications from VOSviewer software.

Table 8 Most Productive universities

University	No. of articles	Total citations
STANFORD UNIV	30	3205
UNIV CHICAGO	16	1557
UNIV CALIF BERKELEY	14	1103
UNIV TORONTO	13	981
TILBURG UNIV	10	151
UNIV ANTWERP	10	198
UNIV BOLOGNA	10	114
EMORY UNIV	9	306
CORNELL UNIV	8	596
UNIV ILLINOIS	8	297
UNIV GRONINGEN	7	72
UNIV PENN	7	672
DUKE UNIV	6	387
UNIV MICHIGAN	6	550
UNIV MINNESOTA	6	146
UNIV UTRECHT	6	71
YORK UNIV	6	956

The USA is the most productive country with 221 articles, followed by Canada with 38, England with 37, and the Netherlands with 36. As a result, the United States dominates the OET literature, contributing approximately 55% of all fields' publications.

Which universities have the highest publication?

Researchers from 403 different universities wrote a total of 399 articles. Researchers in 290 of the 403 universities contributed to one paper. Table 8 displays the most
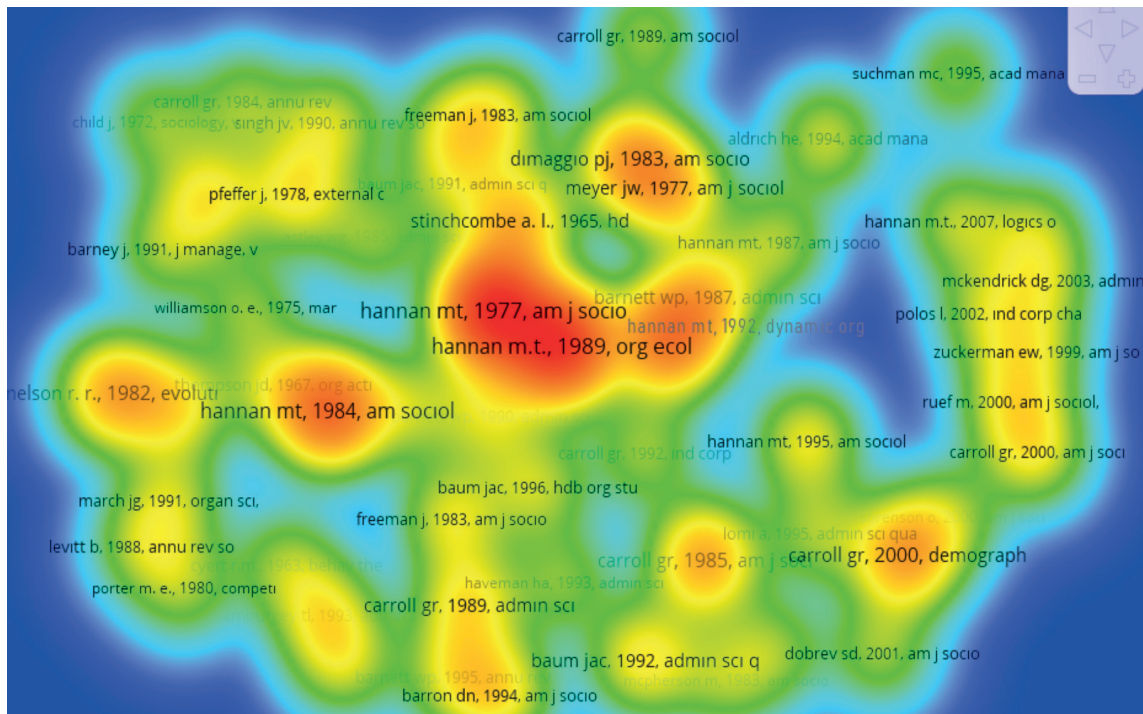
Figure 3 Most influential studies in the OET field. *Notes:* Created with VOSviewer based on a sample of N=399 articles (included in Web of Science). As of December 2020, citations are derived from the Web of Science database (online color figure).

prolific universities in the OET literature, as measured by the number of published articles. Table 8 lists the top universities that contributed six or more publications to the OET literature.

With 30 papers receiving 3205 citations, Stanford University is the most active contributor to the topic. The University of Chicago, the University of California Berkeley, and the University of Toronto follow the rankings.

3.2. Citation Analysis

Performance analysis aims to assess different scientific actors' scientific output on citation impact. Hence, a citation analysis was also carried out as part of the performance analysis. It is possible to classify the most cited (or influential) studies, authors, or journals in a research field using citation analysis (Zupic and Cater 2015). Therefore, citation analysis offers details on the relative importance of studies in a particular research area (Usdiken and Pasadeos 1995). As a result, highly cited studies are likely to be essential or contain more significant contributions than studies that earn little to no citations. The results of the citation analysis are summarized below.

What are the most-cited studies in OET literature?

Here, we conducted a publication-level citation analysis to identify the most influential studies in the OET literature. In total, 17235 studies were cited by the 399 articles in our sample. However, we set the minimum threshold at 30 citations (requiring research to be cited at least 30 times) by the 399 publications to be included in our analysis results. In total, 57 studies met the crite-

ria. Figure 3 depicts the most prominent (cited) studies in terms of Web of Science citations.

The figure's red areas represent the most frequently cited studies, while yellow areas represent the less frequent ones. Also, green and blue areas represent the least cited studies. The font size indicates the citation numbers of the cited studies. Since it is the field's masterpiece, Hannan and Freeman (1977) is the most cited study with 192 citations (11737 in Google Scholar). Hannan and Freeman's book (1989) got the second-highest citations (186 citations, but 7432 citations in Google Scholar). This book covers the theory in general and the fundamental approaches and principles that underpin it. The third most cited study is Hannan and Freeman's (1984) article published in American Sociological Review earned 129 citations (9803 in Google Scholar). It is a descriptive conceptual study that addresses structural inertia, which is one of the fundamental issues of the theory. On the other hand, Hannan and Carroll (1992) received 112 citations (1946 citations in Google Scholar). This work is about organizational population dynamics (density, validity, and competition), which are the theory's key concerns.

The most cited studies mentioned above are that they are conceptual studies written on the theory's general assumption sets or fundamental concepts. Researchers who want to learn more about a subject, literature, or research field should start with those conceptual studies. In this respect, these are generally frequently cited.

Table 9 Most-cited journals

Top 20 Journal	No. of citations
Administrative Science Quarterly	2074
American Journal of Sociology	1380
Strategic Management Journal	1189
American Sociological Review	943
Academy of Management Journal	942
Organization Science	742
Academy of Management Review	733
Industrial and Corporate Change	415
Organization Studies	349
Annual Review of Sociology	309
Management Science	303
Journal of Business Venturing	272
Journal of Management	237
Journal of International Business Studies	235
Research Policy	221
Research in Organizational Behavior	209
Organizational Ecology and Institutional Change in Global Governance	193
Journal of Management Studies	187
Entrepreneurship Theory and Practice	173
American Economic Review	146

What are the most-cited journals in OET literature?

Here, we conducted the journal-level citation analysis. A total of 7129 journals were cited in the 399 papers in the sample. We set the minimum threshold at 30 citations. To be included in our analysis results, a journal had to be cited at least 30 times. 92 journals met this criterion in total. The results are shown in Table 9.

Created with VOSviewer based on a sample of N=399 articles (included in Web of Science).

With a total of 2074 citations, *Administrative Science Quarterly* is the most cited publication. *American Journal of Sociology* (1380 citations), *Strategic Management Journal* (1189 citations), *American Sociological Review* (943 citations), and *Academy of Management Journal* (942 citations) are among the most frequently cited journals.

Does the distribution of citations comply with the Bradford Law?

The distribution of the most-cited articles was tested to see whether they adhered to Bradford's Law. According to the law, "*there is always a small group of core journals that cover a significant percentage (1/3) of articles in a subject, field, literature, research area, or discipline. A second larger number of journals cover the other third of these articles, and a much larger number*

of journals cover the last third" (Garfield 1980). A total of 17235 references (and 7129 journals) were cited in the 399 articles. The top 5 journals in Table 9 received more than a third of (6528 citations in total) overall citations cited by the 399 papers. In this respect, the distribution of citations appears to follow Bradford's Law. Therefore, it's possible to suggest that a core group of journals directing the field.

4. Results of Science Mapping

Science mapping represents how disciplines, areas, specialties, and individual papers or authors are connected by their physical proximity and relative locations (Small 1999; Gutierrez-Salcedo et al. 2018: 1276). Since the performance analysis procedure results can be obtained about the performance of scientific actors, no details can be acquired about the relationship and interaction between these actors. In other words, by conducting performance analysis, adequate knowledge cannot be attained about the intellectual, conceptual, and social structures (Aria and Cuccurullo 2017) and dynamics of a research field (Cobo et al. 2011).

Visualizing bibliometric networks often referred to as science mapping. Visualization has proven to be a powerful tool for analysing a wide range of bibliometric networks; including networks of citation relationships between publications or journals (co-citation and bibliographic coupling), networks of co-author-
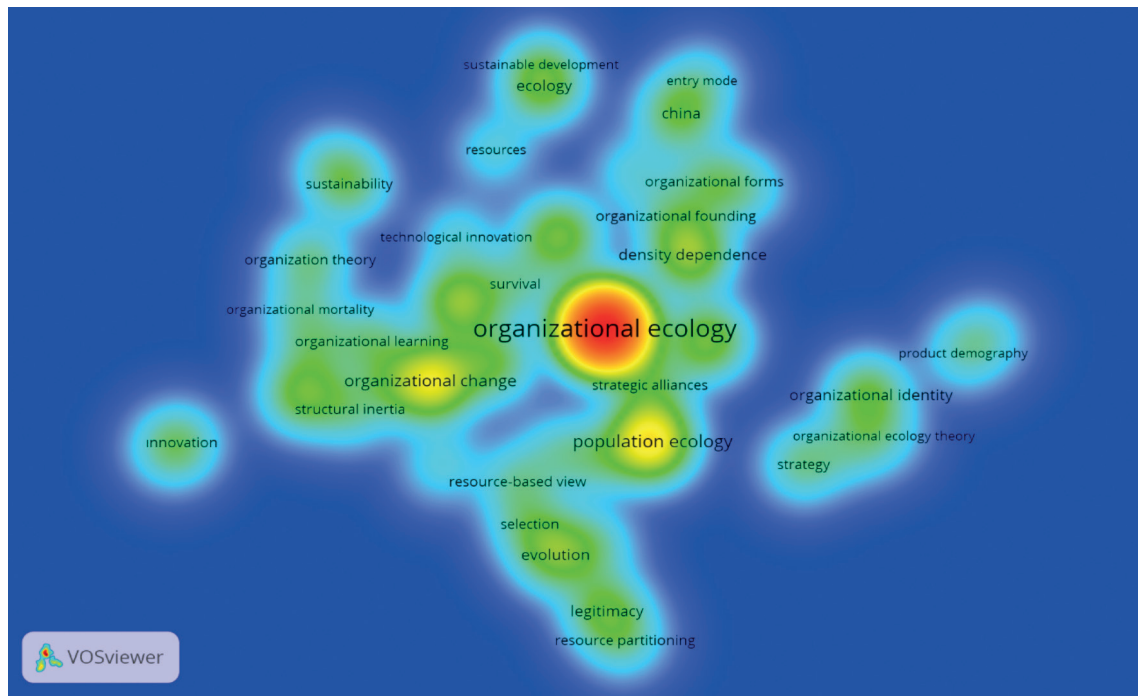
Figure 4 Frequently mentioned keywords in the OET field. Notes: Created with VOSviewer based on a sample of N=399 articles (included in Web of Science, color figure online).

ship relationships between scholars, and networks of keyword co-occurrence relationships (van Eck and Waltman 2014).

We applied co-word and co-citation analysis within the scope of science mapping to attain a thematic overview of the field.

4.1. Co-word Analysis

Co-word analysis, also known as the co-occurrence of keywords (van Eck and Waltman 2014), is a type of content analysis that uses the terms in documents to create relationships and extract a research field's conceptual structure (Callon et al. 1983).

Titles, keywords, or abstracts of documents are the analysis units of the co-word analysis (Block et al. 2020). Co-word analysis assumes that a collection of aggregated keywords can reveal underlying themes and that keyword co-occurrences can reveal associations with those themes (Hu and Zhang 2015). We conducted this analysis based on keywords rather than titles and abstracts. Due to being widely agreed that keywords accurately represent the content of a study, we prefer this.

In this section, firstly, we determined the most used keywords in the OET field by performing density visualization. Secondly, we conducted network visualization to show the relationships between those keywords used together. Finally, by using overlay visualization, it has been shown how the keywords and the topics studied in the OET field have changed over time.

In these visualization maps, the distance between two terms can be interpreted as an indication of their relatedness. It is accepted that the closer the words are to each other, the stronger the relationship between them (van Eck and Waltman 2017).

Which terms are mentioned frequently in the OET literature?

The co-word analysis was carried out in the following stages: (1) we downloaded the 399-article data set from the Web of Science as plain text (*.txt file) and uploaded it VOSviewer software. (2) We conduct a keyword co-occurrence analysis by using the author keyword unit. (3) We found that in the 399 articles, 884 separate keywords were used in total. (4) We set a threshold for three appearances as a minimum requirement, which meant that a keyword had to be used at least three times to be included in our analysis. (5) A total of 48 out of 884 keywords meet the criteria.

The colors represent the density of words, ranging from red with the highest density to blue with the lowest density. In addition, the font size reflects how often the words are used. As shown in Figure 4, prominent OET terms include organizational ecology (center), population ecology (lower right), and organizational change (lower left), competition (upper left), and density dependence (upper right).

Which do co-word clusters occur? How do these clusters relate to each other?

Co-word analysis produces a network of themes and their relationships, which represents a field's conceptual structure (Börner et al. 2003). By conducting co-word analysis, VOSviewer provides network visualizations showing the relationship between the most used words
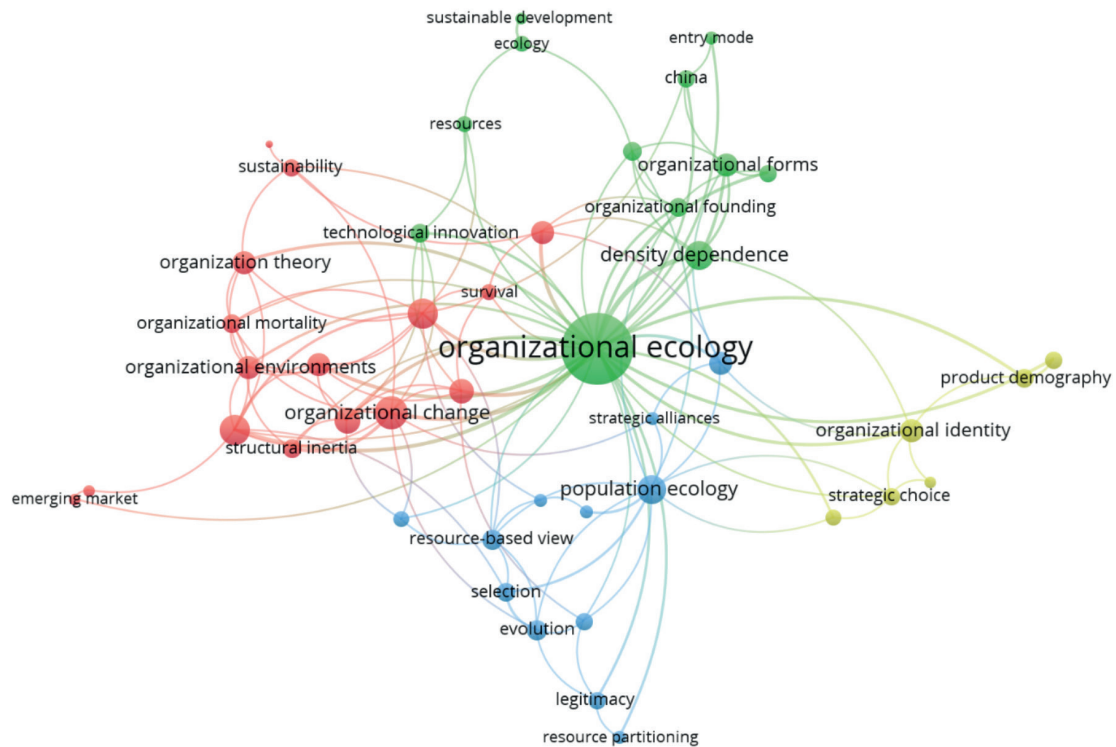
Figure 5 Network visualization of co-word analysis for clustering Notes: Created with VOSviewer based on a sample of N=399 articles (included in Web of Science, color figure online).
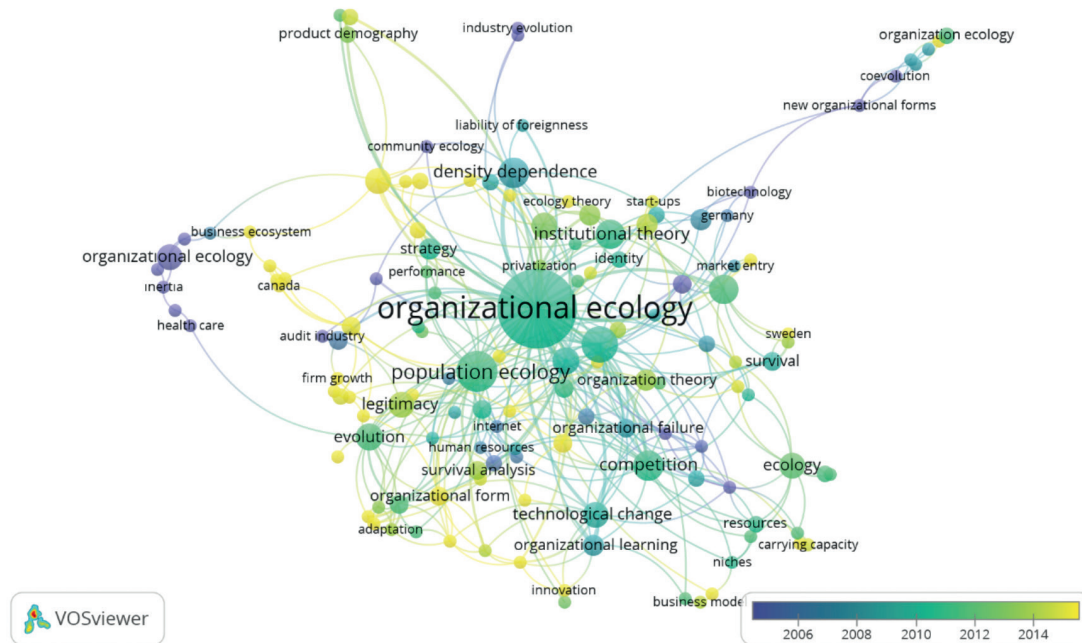

Figure 6 Overlay visualization of co-word analysis Notes: Created with VOSviewer based on a sample of N=399 articles (included in Web of Science, color figure online).

in the field. VOSviewer displays the position of the words in the link (total relationship) network and the total link strength. We can derive our clusters from these links. When words frequently co-occur in documents, it indicates that the concepts they represent are closely related (van Eck and Waltman 2017). The various colors and the positioning of the circles in network are used to cluster the keywords. The network visualization for clustering is shown in Figure 5.
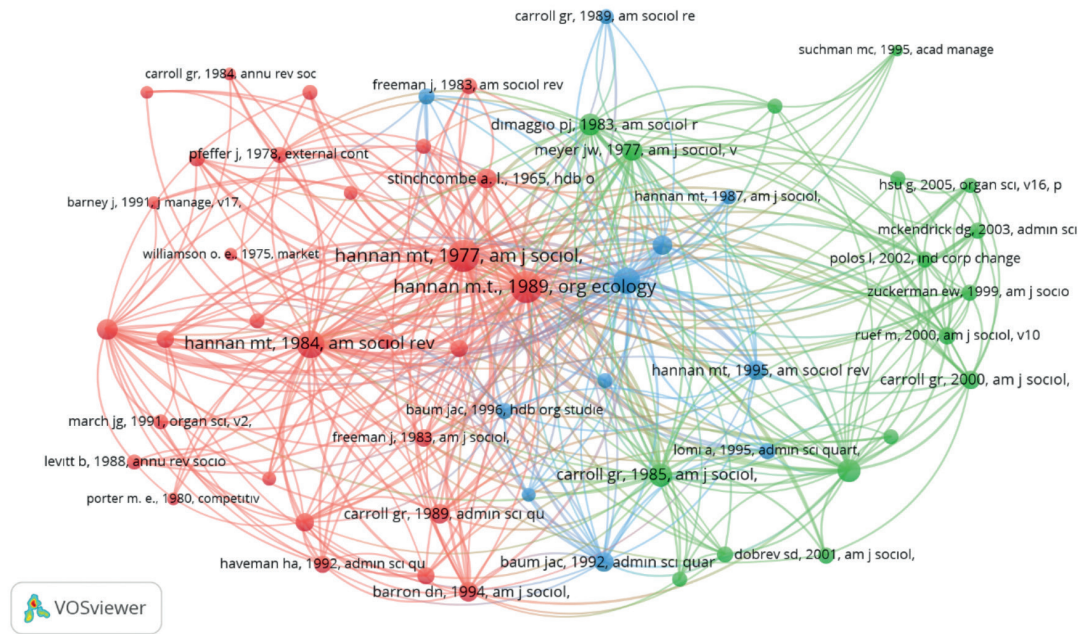
Figure 7 Network visualization of co-citation analysis for clustering Notes: Created with VOSviewer based on a sample of N=399 articles (included in Web of Science, color figure online).

Figure 5 displays the clusters through the relationship networks and the total link strength of the keywords of the articles. Each color in the figure represents a separate cluster. Four clusters have emerged based on the relatedness of the keywords. The red cluster contains keywords related to environmental change issues in general. The green cluster includes the emergence of new organizational types and the entry of new organizations into the existing population within the density dependency logic. The blue cluster focuses on selection mechanisms within the population. Finally, the yellow cluster focuses on the strategic choice issue in organizations' identity constructions.

How do the mentioned terms in the OET literature change over time?

The evolution of the main topics in the field over time can be evaluated using co-word analysis (Liu et al. 2012). VOSviewer offers overlay visualization for this evaluation. With overlay visualization, researchers can track changes in conceptual space created for various periods (Coulter et al. 1998).

We set a threshold for two appearances as a minimum requirement. A total of 147 out of 884 keywords meet threshold. Figure 6 shows the overlay visualization of co-word analysis.

Figure 6 displays the evolution of the keywords used in the period. The early 2000s to the late 2010s are shown with different colors. On the timetable, the color range of visualization begins with purple and progresses to yellow. In the 2010s, the terms with green color are dense on the visualization map. Figure shows that the studies in the field of organizational ecology and the use of terms related to this field became widespread between 2008-2012. It is seen

that the number of studies in the field has a decreasing trend after 2014. Relatively old studies of the field use keywords such as new organizational form, organizational failure, first-mover advantage, organizational founding, co-evolution. Organizational ecology, organizational change, population ecology, competition, technological change keywords stand out between the years 2008-2012. Organizational identity, organizational environment, organizational form, strategic choice, innovation are prominent topics after 2014.

4.2. Co-Citation Analysis

One of the citation-based science mapping methods is co-citation analysis (Schröder et al. 2021). Co-citation is an analysis technique that gives images of the most cited works together. Two documents are co-cited when they are both cited by at least one paper in particular (Small 1973). Although it is a citation-based analysis technique, co-citation analysis can determine the thematic similarity between articles in the data set (Kessler 1963).

When two articles earn more co-citations, their citation link strength increases, and they are more likely to be semantically relevant. In other words, the co-citation analysis has been identified as a more accurate measure of thematic similarity (Small 1973). Therefore, when clusters are found through co-citation analysis, thematic clusters are reached as in co-word analysis.

Among most-cited studies, which do co-citation clusters occur? How do these clusters relate to each other?

The citation analysis identifies the most cited studies in the field, and a density visualization was reached on the citation frequencies. This section provides network

Table 10 Summary of the contents of the three co-citation clusters

Clusters Description	No. of pub.	Important publications	Characteristic Terms and Themes	Color
Environmental Change: Adaptation vs. Selection	29	Hannan and Freeman (1977) Hannan and Freeman (1989) Hannan and Freeman (1984) Nelson and Winter (1982) Stinchcombe (1965)	organizational change, technological change, structural inertia, selection, niche width, density dependence, demographic characteristics of organizations (age, size, complexity), organizational evolution, failure, organizational mortality, isomorphism, growth	**red**
Organizational Forms and Identity in Populations	17	Carroll and Hannan (2000) Carroll (1985) DiMaggio and Powell (1983) Meyer and Rowan (1977) Carroll and Swaminathan (2000)	organizational forms, identity, density, species, resource partition, niche width (specialists and generalists), organizational affiliation, isomorphism, legitimacy	**green**
Rising and Falling of the Organization Species	11	Hannan and Carroll (1992) Barnett and Carroll (1987) Baum and Mezias (1992) Hannan et al. (1995) Delacroix and Carroll (1983)	organizational founding, new-entrance/venture, start-up, organizational decline, organizational failure, organizational mortality, density dependence (competition vs. legitimacy/mutualism), community ecology, population ecology, resource partition, and dependence	**blue**

Notes: We obtained citation counts of the publications from VOSviewer software. As of December 2020, citations are derived from the Web of Science database. In the second column, the five authors with the highest number of citations in a cluster are important authors. In the third column, the given characteristic terms were extracted from the titles, abstract, and introduction section of each publication belonging to a cluster using the methodology described by Waltman and van Eck (2012).

visualization, which depicts the relationships between the most co-cited studies in the OET literature.

Via this visual map, we were able to identify clusters based on the subject's similarity in the field. Co-citation analysis is carried out in three different analysis levels such as publication, journal, author. Since we want to reveal the subject similarity in the field, we performed a co-citation analysis at the publication level.

To conduct co-citation analysis at the publication level, firstly, we downloaded the 399-article data set from the Web of Science as plain text (*.txt file) and uploaded it VOSviewer software. In total, 17235 publications were cited by the 399 articles in our data set. We set the minimum threshold at 30 citations. In total, 57 studies met the threshold. Figure 7 shows the results.

Figure 7 shows the relationship networks and total link strength of the 399 articles in our dataset's most-cited publications. VOSviewer, by default, assigns the items in network visualization to clusters. A cluster is a group of closely related items that are colored differently. Each item is allocated to a single cluster in a network (van Eck and Waltman 2017).

In our analysis, VOSviewer has found three clusters. Of the three clusters, while the red one consists mainly of articles about environmental change and adaptation themes, the green one covers articles focusing on organizational forms and identity in populations. The blue one includes articles rising and falling of the organization species. Details on clusters are given in Table 10.

The red cluster is about what organizations do against environmental changes. In other words, the cluster focus

on the organization-environment relationship. Change is mentioned in cases where organizations operate in a dynamic environment. Technological change is particularly prominent in terms of change. Organizations' responses to change take two different forms: adaptation and selection. Organizations either survive or fail as a result of environmental change. Therefore, organizational change, natural selection, organizational mortality, failure, and evolution are the basic concept set of this cluster. The central concepts of other clusters such as density dependency, niche width, age dependence, size dependence are discussed to explain the organizational change.

The green cluster focuses on intra-population processes in general, particularly on forming organizational forms and identities within the population. In this respect, it consists of concepts under the heading of "organizational forms and identity" about how organizations in a population survive or fail. This cluster includes terms such as organizational species, identity, population density, size, resource partition, niche width (generalist and specialist), population width, penalties, and affiliation.

The blue cluster focuses on the emergence of new organizational species and the extinction of existing ones. It is seen that the concept of "density dependence" is used to explain this phenomenon. When the density in the population is low, the concept of legitimacy and when the density is high, the concept of competitiveness form the basis of explanations on the subject. Organizational founding, density dependence, community ecology, new entrance, organizational decline, organizational failure, organizational mortality are prominent keywords in this cluster. The community and the population are considered two different levels of analysis within the explanatory framework of the theory.

5. Conclusions

The objective of the paper is to overview OET literature. We present a comprehensive picture of the OET literature through bibliometric analysis, which examined the general overview and the evolution of OET literature between 1975 and 2020, based on articles in the WoS database. To accomplish the purpose of the study, we apply performance analysis (quantitative overview of the dataset and citation analysis), co-word analysis, and co-citation analysis. While this is not the first attempt to conduct a comprehensive and systematic review of academic OET research, it is the first strive to map an orderly conceptual and intellectual structure by applying bibliometric techniques.

Our results on the quantitative dataset indicate a fluctuating view of the number of articles over the years since OET literature dated back 1970s suggesting that the field is becoming more mature in the 1990s. The most influential papers can be traced around the 1990s. The top three influential publications in the data set are Baum and Oliver (1991), O'reilly and Tushman

(2008), and Haveman (1993). The journals *Administrative Science Quarterly*, *Organization Science*, and *Organization Studies* published the most article on the topic. We also find that authors such as Carroll, van Witteloostuijn, Barnett, Boone, Dobrev, and Lomi published ten or more articles according to our dataset. The USA is a prominent country in terms of publication numbers. 55.38 % of all publications in our dataset are from this country. Canada (9.52%), England (9.27%), and Netherland (9.02%) follow the USA. The top universities with the highest publication number are Stanford University, the University of Chicago, and the University of California Berkeley.

The citation analysis results on publications show that Hannan and Freeman (1977, 1989, 1984) and Hannan and Carroll (1992) are the most-cited ones. In addition, the most cited journals are Administrative Science Quarterly, American Journal of Sociology, and Strategic Management Journal.

While this study aims to have a general review of the OET literature, we intend to have an inventory of past research to direct future research by using bibliometric techniques such as co-citation and co-word analysis. The results of both analyses overlap in terms of thematic clusters. These overlapping **clusters** (and prominent keywords in these clusters) are **organizational change** (technological change, niche width, age, size, organizational evolution, co-evolution), **organizational forms** (new organizational form, identity, species, resource partition, organizational affiliation, isomorphism, legitimacy), and **organizational founding** (new-entrance, new venture, start-up, first-mover advantage) **and mortality** (organizational decline, organizational failure, density dependence). In the light of our research findings, we can propose some research questions to link previous research to direct future research, specifically in OET literature.

– How do technological changes affect organizations?

– How did unexpected global situations like the COVID-19 pandemic affect the pace of organizational change?

– What type of new organizational forms has been revealed in the unestimated future era?

– How the new organizational forms have been legitimized?

– What kind of new ventures have been triggered by future trends?

– What lessons can be drawn from failed organizations in the certain industries?

– Are there any cases of organizational extinction in the pandemic?

– What type of advantages do start-ups gain when they first enter an organizational population?

As with any research design, this approach is not without limitations. Some limitations are a consequence of the nature of the bibliographic databases and the bibliometric technique per se:

1. The bibliometric analysis was restricted to data retrieved from the WoS online database since it provides the information required to conduct a bibliometric analysis. In future studies, different sources of literature (e.g., Scopus) can be used simultaneously to overcome this limitation.

2. Only articles from peer-reviewed journals were included in this study, potentially restricting access to other results.

3. The weakness of the co-citation analysis results in evidence from frequently cited articles, while less frequently cited documents may have less impact on the research.

The results of the analysis via a bibliometric analysis provide some evidence that research streams have detectable characteristics. Since co-citation analysis and bibliographic coupling are citation-based techniques, it gives an idea about the chronology of evolution in the field. While co-citation analysis reveals the change historically, bibliographic coupling identifies new trends in the field. For this reason, in future research, the bibliographic coupling can be used to detect recent thematical trends in the field. It is hoped that the results presented in this paper will encourage and facilitate new OET research in the future.

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