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## Generational renewal in agriculture: Bibliometric analysis

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# GENERATIONAL RENEWAL IN AGRICULTURE - BIBLIOMETRIC ANALYSIS

BĂDAN (VOICILĂ) DANIELA NICOLETA<sup>1</sup>

**Abstract:** *In recent decades, the number of young farmers has declined in most developed countries. This issue has been debated and recognized by scientists and policy makers. Despite all the support measures implemented at European level and abroad, young farmers continue to face barriers that prevent both the establishment and consolidation of the agricultural holdings taken over. All these existing policy support measures for young farmers are seen as triggers and determinants in the process of renewing generations of farmers. The main purpose of this study is to examine the existing situation of research conducted at European level and outside its borders on the generational renewal of farmers. During the paper, a bibliometric analysis of the research papers registered in the Web of Science database was performed, starting from the previously proposed topic. The analysis software used was VOSviewer, thus creating a descriptive part of the stored information, presenting an overview of the proposed research topic by viewing the connections created. This study reveals that this topic has been comprehensively studied in recent years in various fields.*

**Keywords:** *generational renewal, young farmers, bibliometric analysis*

**Jel Classification:** *Q01, Q18*

## INTRODUCTION

Generational renewal in agriculture is a continuing concern for decision-makers in the European Union, with research increasing over the last decade but not leading to an efficient and satisfactory outcome for all Member States. This concern for "generational renewal" means the successive retirement of older farmers and their replacement with young farmers who have a vision for the future and the development of farms, this action being considered necessary and essential for the progress of the agricultural sector. (Rovny, 2016).

The need for a non-flow of young farmers in European agriculture was also discussed by Zagata and Sutherland (2015) 2, in agriculture if production efficiency has increased, it will lead to economic development. A number of studies agree with this statement that shows that there is a link between young farmers and higher productivity (efficiency) (Howley et al., 2012). It was found that there is a link between young farmers and the increase of environmental measures on the farm (farm). Siebert et al. (2006) state that young farmers are better educated and tend to apply agro-ecological conditions at farm level. Analyzing the European reports, within the European Union it can be seen that the number of older farmers is higher than that of young farmers, this fact can be attributed to general societal trends. Hennessy and Rehman, (2007), argue that entry into the agricultural sector is often the result of the transfer of land by a relative, leading to the generational transfer of the farm. Loblely et al. (2010) state that without generational renewal "the risk is that the cornerstone of agriculture, businesses in these countries will not be able to meet national expectations and global expectations" (p. 60) with serious implications for the sector as a whole.

Family farms have a high percentage in European Union agriculture, and intra-family succession is the most common type of generational renewal. Generational renewal is a broader concept that is being debated both at European and global level.

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## MATERIAL AND METHOD

In order to examine the current situation of research carried out at European level and outside its borders, regarding the generational renewal of farmers, a bibliometric analysis of the research papers recorded on this topic was performed.

Bibliometrics is the statistical analysis of written publications (books or articles). It is used to obtain quantitative analyzes of the academic literature [3]. It is a commonly used method to identify development in a particular field [4, 13].

The data from the literature used in this study were downloaded from the Web of Science with the theme of the proposed topic, the renewal of generations of farmers. To define the search, some expressions / words have been established that characterize the proposed topic such as: farm succession, young farmers, renewal generation, which are found in the topic (title, abstract, author keywords and Plus keywords) in the time interval 2000- 2020 (November). A total of 288 works met the selection criteria.

An essential procedure in bibliometrics is data mapping. This map can represent the situation and the state of development [1]. There is a lot of software for bibliometric analysis. The software used for the analysis is VOSviewer. Eck and Waltman are the ones who started the development of this free software, which has a very function strong analysis of co-occurrence and of co-citations [10].

The paper presents annual trends, top journals, keyword distribution, highly cited articles, co-author status and the most influential magazines and authors.

## RESULTS AND DISCUSSIONS

Taking into account the database generated after meeting the selection criteria imposed on the Web of Science, it was found that analyzing by type of document, the most common type of document is the article (215), representing 74.65% of all publications. In second place is the revised works (68), with a proportion of 23.31%. There are also other types of documents, including Reviews (8), Early Access Papers (3), Book Review (2), Editorial Material (2). In table no.1 you can see the number of records and the proportions of different types of documents.

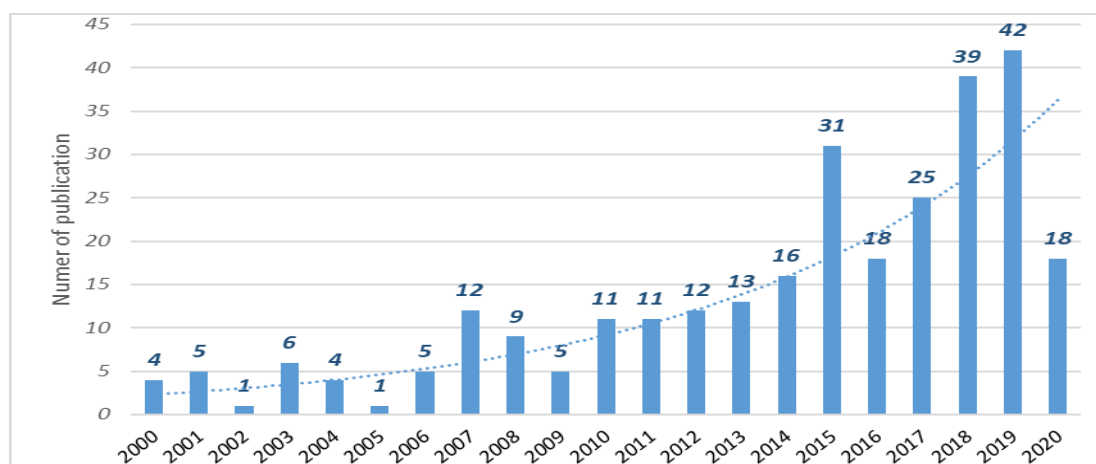
Table 1. Number of document records by type

Type of documents	Record	% from total
Article	215	74,65%
Proceedings paper	68	23,61%
Review	8	2,78%
Early access	3	1,04%
Book review	2	0,69%
Editorial material	2	0,69%
Correction	1	0,35%
Meeting abstract	1	0,35%
Retractes publication	1	0,35%
Total	288	100,00%

Source: data processed from the Web of Science database

Figure no. 1 shows the annual trend of publications related to the subject studied, the renewal of generations of farmers, in the period 2000-2020 (November). In the first 6 years after 2000, the number of publications was less than 6, the growth trend being registered since 2007, when the interest and concern towards this subject increased, namely the decreasing tendency of the rural population, the migration of young people to its urban environment is accentuated but also the shortage of workers in the agricultural sector. After 2010, more and more researchers started researching in this field. This has led to a jump in the number of publications, to a maximum of 42 in 2019.

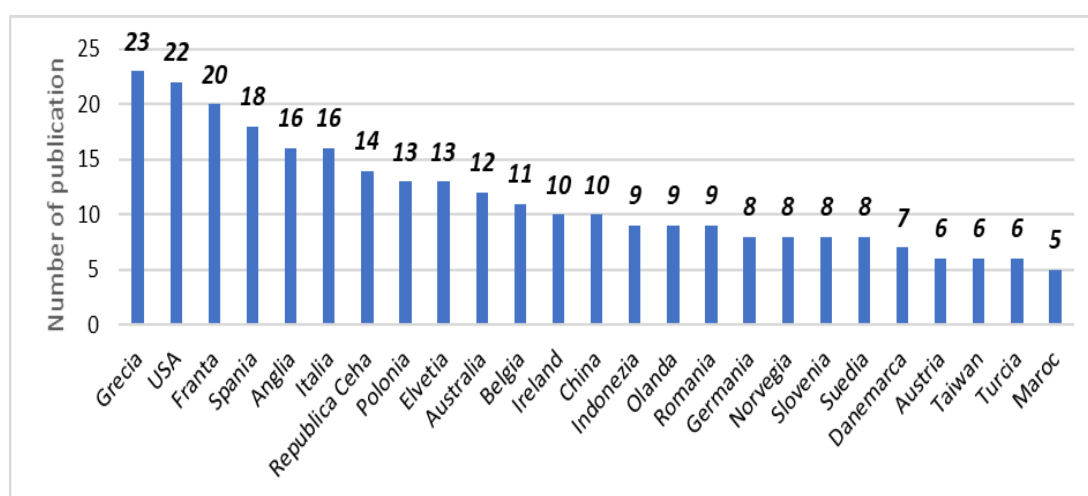
Figure 1. The annual trends related publications.



Source: data processed from the Web of Science database

Analyzing the research works in terms of publications belonging to a country, it was observed that during the period 200-2020 (November) the country with the largest number of publications was Greece, with 23 publications, followed by the USA with 22 publications, France and Spain with 20 publications and 18 publications, respectively. The countries with the most publications are those in Europe, this topic on generational exchange but also the concern for the future of agriculture being two of the main concerns of European researchers, but also of the U.E. On the last place is Morocco with 5 publications and Turkey with 6 publications.

Figure 2. Evolution of publications by country



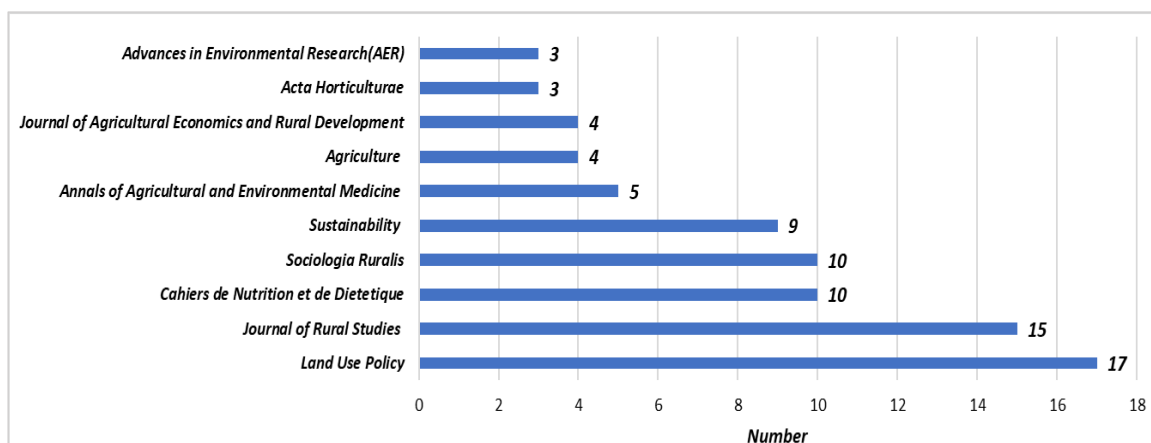
Source: data processed from the Web of Science database

Analyzing the distribution of works according to the journals in which they are published, the 288 publications were published in 153 specialized journals.

No more than 2 papers were published in over 137 journals, representing over 87.58% of the total journals. In the first top 10 journals were published 80 research papers, representing a share of 27.7% of the total.

The Journal of Land Use Policy recorded the largest number of publications, a total of 17 papers, followed by the Journal of Rural Studies with 15 papers. In the figure below (fig no.3) are found the top 10 Journals that recorded a greater number of 3 published works.

Figure 3. The top 10 journals -related publications

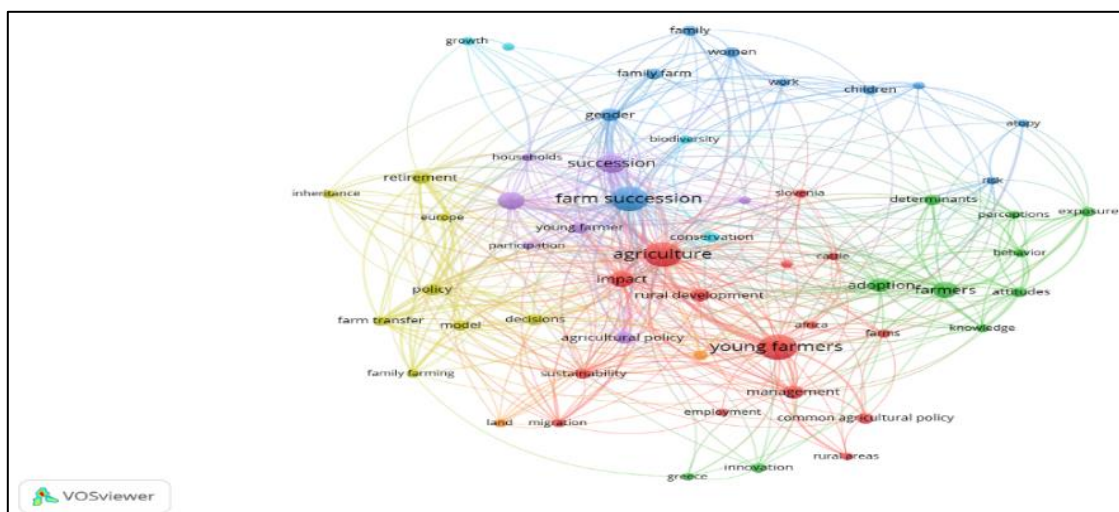


Source: data processed from the Web of Science database

Next, the content of the papers was studied by analyzing the distribution of keywords. The keywords on the coincidence network map, using the VosViewer software, were generated in numbers of 10. The view map shows the keyword density and the keyword history view. The co-emergence of keywords can effectively reflect research hotspots in the disciplines, providing ancillary support for scientific research.

Taking into account all the 288 publications belonging to the studied topic (renewal of generations of farmers), we obtained 1358 keywords. Of these, 56 keywords appeared at least 5 times. In figure no. 4 you can see the size of the nodes and the words, they represent the weights of the nodes. The larger the size of the node and the word, the more important it is. The distance between two nodes reflects the connection between the two nodes. If the distance is shorter, then the relationship is stronger. The line between two keywords is that they appeared together. Nodes of the same color belong to a cluster.

Figure 4. Keywords co-occurrence network -related publications



Source: data processing using VosViewer software

The analysis software, VOSviewer, divided the keywords of the research publications into 7 clusters. The most common keyword is "young farmers" (49). Other high frequency keywords they include 'farm succession' (46), 'agriculture' (46) and 'succession' (27).

The power of the connection between two nodes refers to the frequency of co-occurrence. It can be used as a quantitative index to describe the relationship between two nodes [7].

The total link strength of a node is the sum of the strengths of that node over all other nodes. The node, "young farmers", has a strong link to the following keywords such as "agriculture", "common agricultural policy", "rural development", "sustainability" and "management". In table no. 2 shows the top 10 keywords, with their frequencies and link strengths.

Table 2. The top 10 keywords -related publications.

Rank	Keywords	Frequency	Total Link Strength
1	Agriculture	46	117
2	Farm succession	46	96
3	Succession	27	86
4	Young farmers	49	79
5	Impact	19	75
6	Family farms	23	70
7	Policy	11	48
8	Retirement	12	46
9	Adoption	15	43
10	Farmers	21	43

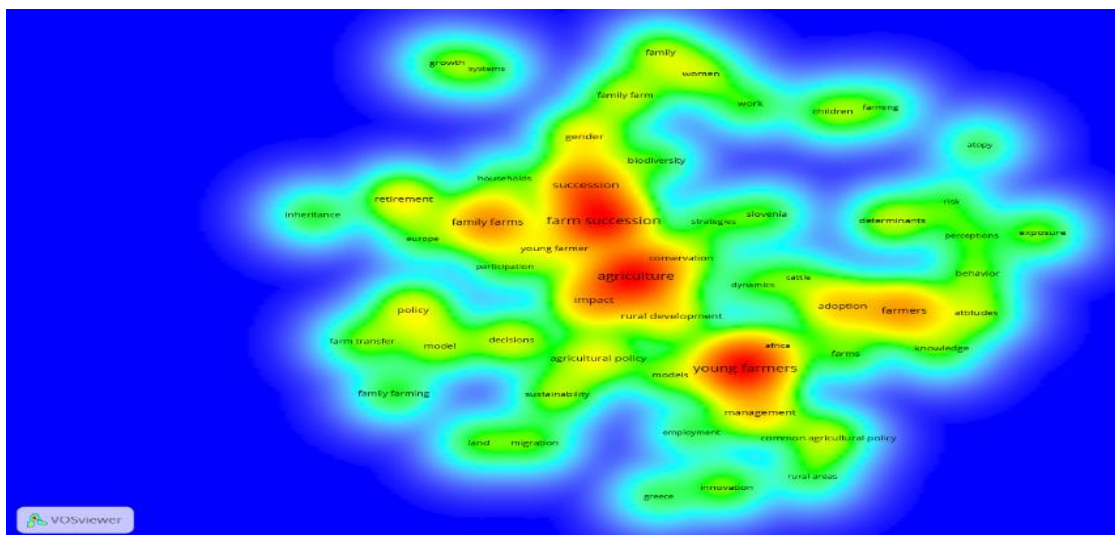
Source: data processed from the Web of Science database

With the help of VOSviewer, the density visualization was also made (Figure no. 5). Each node in your keyword density has a color that is based on the density of the elements in that node. The color of a node depends on the number of items in the vicinity of the node. In the red area are represented the words that appear most frequently, and in the green area are represented the least common words.

Density views are useful for understanding the overall structure of a map and for drawing attention to the most important areas on the map.

In figure no.5, you can see the focus of the study research. "Young farmers", "farm succession" and "agriculture" are the basic keywords in this study.

Figure 5. Keywords density visualization map -related publications



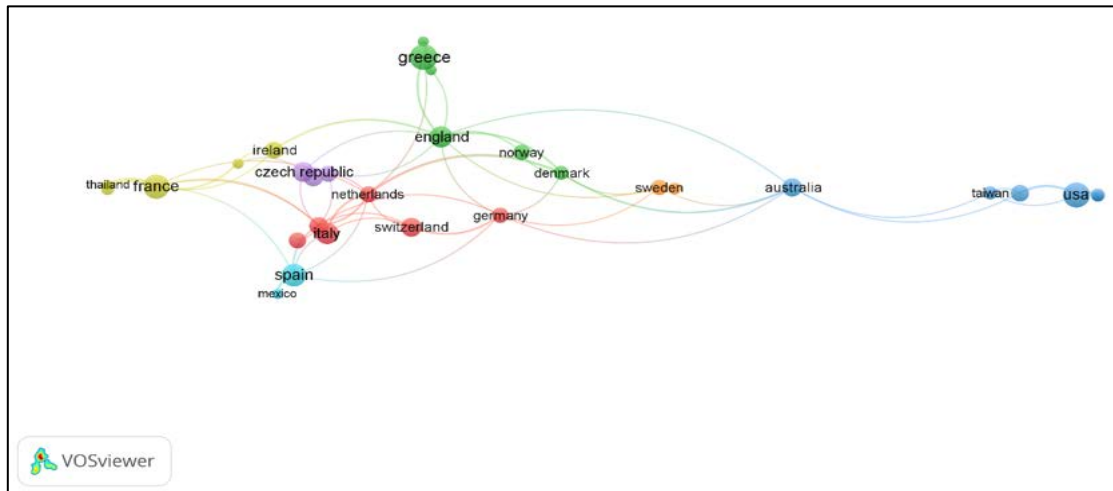
Source: data processing using VosViewer software

Analyzing the frequency of co-authors depending on the country, we can see the degree of relationship between countries and countries with the greatest interest in studying this issue such as the renewal of the generation of farmers.

Figure no. 6 shows that the map shows different colors that indicate the diversification of research directions. Large nodes represent the countries that have a special interest in the topic we studied, and the connections between nodes represent the cooperative relations between institutes.

In the figure below (fig no.6) it can be seen that the nodes showing the red connection line indicate that the studies conducted in Europe are multiple, the relations between employees being close, but the geographical advantage is not the main factor that can influence the cooperation relationship.

Figure 6 The country co-authorship network -related publications



Source: data processing using VosViewer software

In the case of the most influential papers published on the studied topic (renewal of the generation of farmers) were identified the first 10 scientific papers that recorded the most citations. In table no. 3 are presented the works with the most citations.

The first place with 131 citations is occupied by the work written by Styger, E et al. (2007). The paper written by Portengen L et al (2002) occupies the second position with 118 citations.

Table 3. The top 10 papers with the most citations

Nr. crt.	Authors	Article Title	Publication Year	Journal Abbreviation	Citari all data base
1	Styger, E; Rakotondramasy, HM; Pfeffer, MJ; Fernandes, ECM; Bates, DM	Influence of slash-and-burn farming practices on fallow succession and land degradation in the rainforest region of Madagascar	2007	AGR ECOSYST ENVIRON	131
2	Portengen, L; Sigsgaard, T; Omland, O; Hjort, C; Heederik, D; Doekes, G	Low prevalence of atopy in young Danish farmers and farming students born and raised on a farm	2002	CLIN EXP ALLERGY	118
3	Negri, V	Landraces in central Italy: where and why they are conserved and perspectives for their on-farm conservation	2003	GENET RESOUR CROP EV	76
4	Smit, LAM; Bongers, SIM; Ruven, HJT; Rijkers, GT; Wouters, IM; Heederik, D; Omland, O; Sigsgaard, T	Atopy and new-onset asthma in young Danish farmers and CD14, TLR2, and TLR4 genetic polymorphisms: a nested case-control study	2007	CLIN EXP ALLERGY	73
5	Zagata, L; Sutherland, LA	Deconstructing the 'young farmer problem in Europe': Towards a research agenda	2015	J RURAL STUD	72
6	Calus, M; Van Huylenbroeck, G; Van Lierde, D	The relationship between farm succession and farm assets on Belgian farms	2008	SOCIOL RURALIS	64
7	Sanchez-Zamora, P; Gallardo-Cobos, R; Cena-Delgado, F	Rural areas face the economic crisis: Analyzing the determinants of successful territorial dynamics	2014	J RURAL STUD	64



8	Panagos, P; Imeson, A; Meusbürger, K; Borrelli, P; Poesen, J; Alewell, C	Soil Conservation in Europe: Wish or Reality?	2016	LAND DEGRAD DEV	57
9	Fischer, H; Burton, RJF	Understanding Farm Succession as Socially Constructed Endogenous Cycles	2014	SOCIOL RURALIS	53
10	Zimmermann, A; Heckelei, T; Dominguez, IP	Modelling farm structural change for integrated ex-ante assessment: review of methods and determinants	2009	ENVIRON SCI POLICY	53

Source: Web of Science database

In fifth place is the work written by Azgatal and Sutheland (2015); this referring to the first and second pillars of the CAP (EU), support for generational exchange in agriculture but also the presentation of endogenous factors that have a connection with the economic potential of farms.

The economic size and the surface of the farm, as well as the characteristics of the managers, (especially the level of education) proved to be more important in taking over and developing the farms.

The paper “The relationship between farm succession and farm assets on Belgian farm”, written by CalusM et al (2015) ranks 6th with 64 citations. This paper highlights the fact that the lower assets of the farm can influence its future trajectory, implicitly of the generational exchange. Farmers anticipate the possibilities of transfer to their younger predecessors, by adapting farm management.

## CONCLUSIONS

The study presents a bibliometric analysis of publications related to the generational renewal of farmers, in the period 2000-2020. Some interesting results were observed regarding the publications related to this topic. First of all, their number showed an increasing trend during the period under study, and their number accentuated after 2007, reaching a maximum of 49 publications in 2019. European countries are those that predominate in published research catch the generational exchange, being a broad and interesting topic. Regarding the main journals in which the papers are published, it was observed that the Journal with the largest number of publications is Land Use Policy, with a total of 17 papers, followed by the Journal of Rural Studies with 15 papers.

Through the analysis of the keywords, we found that "young farmers", "succession farm", but also agriculture are central points that have strong links with different factors that can determine or influence their evolution "management", "gender". ,, impact ,, ,, policy ,, etc.

By studying these characteristics it can be revealed that this topic has been studied comprehensively in recent years in various fields.

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