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Bibliographic Characteristics of the Top-Cited Articles in the Field of Agricultural Economics and Policy (1956 -2023)

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This paper analyses the bibliometric attributes of the top-cited articles in the field of agricultural economics and policy from 1956 to 2023. The data was collected from the Science Citation Index Expanded. A total of 727 articles were found to have e" 100 citations in 2023. Over 71% of these articles were published in the 2000s and the 2010s. Forty eight percent of the top-cited articles were produced by the USA-based authors, and the top 10 institutes where most of the contributions were from the USA too. Out of the 11 most inexhaustible authors, three were from the USA-based institutes. Cornell University produced the highest number of top-cited articles. The *American Journal of Agricultural Economics* produced 38% of all top-cited articles. Around 5% of the top-cited articles were related to the analysis of demand for food products, including organic food. The other most common areas of interest were Ethiopia, food policy, consumer attitude towards organic food and willingness to pay for it, and global food security in the context of climate change. The present work would be helpful to scientists and researchers in knowing the characteristics of top-cited articles in agricultural economics and its policy.

Keywords: *Agricultural Economics, Agriculture Policy, Bibliometric Study, Scientometric Study, Citation Analysis.*

0 INTRODUCTION

Agricultural economics is a typical branch of general economics in which

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the ideologies of choice are applied to use scarce resources such as land, labour, capital and management in farming and allied activities.[1] "Agricultural economics arose in the late 19th century. It combined the theory of the firm with the marketing and organization theory and developed throughout the 20th century, mainly as an empirical branch of general economics".[2] During that period, "the economic significance of agriculture and the considerable proportion of the population working in the sector increased the worth of research on farm management and the economics of agriculture, leading to the establishment of the farm management profession".[3] The first Department of Agricultural Economics was established in 1909 at the College of Agriculture, University of Wisconsin-Madison, with Henry C. Taylor as its chairman.[4]

The pioneers who made remarkable contributions to the growth and development of agricultural economics as a distinctive subject were H. C. Taylor, Dan Otis, Charles J. Galpin, B. H. Hibbard, Theodore Macklin, George Wehrwein, Preston E. McNall, John Kolb, T.W. Schultz, Nicholas Georgescu-Roegen, and Earl O. Heady.[5]

The top-cited articles are exceptional and diverse from the ordinary cited articles.[6] Over the years, bibliometric methods have been widely applied to identify the characteristics of top-cited articles in different subject categories such as horticulture[7] emergency medicine[8], education and educational research[9], materials science[10], social work[11], and chemical engineering.[12]

However, no study has been conducted to establish the characteristics of top-cited articles in the agricultural economics and policy subject category. Therefore, an attempt has been made in this study to explore the characteristics of the top-cited articles in agricultural economics and policy in terms of year-wise distribution, contributions of major publishing journals, authors, countries, and institutions, and terms used most frequently in the titles of the articles.

In the field of horticulture, the journals with the most contributions were Theoretical and Applied Genetic, the American Journal of Enology and Viticulture, and the Journal of the American Society for Horticultural Science. In the case of education and educational research, the American Educational Research Journal, Review of Educational Research, and Computers & Education contributed the most top-cited articles. In the case of emergency medicine, Annals of Emergency Medicine, Resuscitation, and Academic Emergency Medicine were significant contributors of top-cited articles.

1 LITERATURE REVIEW

Various research papers from the international research study on allied agricultural economics and policy subjects were analyzed and reviewed for this research study.

According to Sinha and Nag[13], economic development in developing

countries coincides with the growth in the agricultural sector owing to aspects, such as, income and employment. Hence, agricultural extension programmes sustain rural development. By linking farmers to research systems, agricultural extension improves profitability in farm production. The bibliometric study done by Sinha and Nag is primarily the first of its kind, concentrating on Indian scientific literature on agricultural extension to understand the research and development status of the field. Research approaches on extension systems have shifted from single-disciplined to inter-disciplinary. The study provides a national perspective on agricultural extension research in India and accentuates the role of ICAR in promoting such type of research.

Fusco[14] conducted a bibliometric analysis of the Common Agricultural Policy in Europe. Policymakers' attention was drawn towards the agricultural domain which has been on the increase recently. Meanwhile, Europe's Common Agricultural Policy represents the European Commission's primary initiatives to enhance the agricultural sector. The Academia has witnessed active debates regarding the strengths and weaknesses of public policies and investments. The study by Fusco contributes to the scientific debate on Common Agricultural Policy by conducting a bibliometric analysis of twenty years of literature, with results revealing corresponding research clusters related to the policy field. Chen et al.[15] performed a bibliometric analysis of research papers focused on the Chinese agricultural economics, fishing out distributional characteristics and evolutionary patterns in agricultural, industrial, and technological transformation in rural lands to comprehend in a far better manner the developmental tendency of the respective field of study. For the study, highly cited research papers from 2006 to 2015 were extracted from the China National Knowledge Infrastructure (CNKI) and Social Sciences Citation Index (SSCI) databases. The study identifies a rapid development in agricultural economic research over the past decade, the reasons behind which are an improvement in research funding, techniques and collaborations, and further research can promote changes at both micro and macro levels.

Armenta-Medina et al.[16] used bibliometric tools to analyze 25 years of literature to understand the tendencies in advanced information and communication technologies for improving agricultural productivity and to discover growth in the publication dynamics of the respective field, especially in US universities. Using the Louvain algorithm, they found that the most associated themes to the topic are precision agriculture, smart agriculture, remote sensing and climate-smart agriculture.

Zdenek and Lososova[17 i] conducted an analysis focusing on Editorial Board Members (EBMs) of ten agricultural journals to portray their publishing behaviors in their journals. Since the EBMs are experts with scholarly achievements, they play a vital role in the whole publishing process. These EBMs engage in research activities or work as scholars, resulting in publications

in scientific journals. Liu et al.[18] cite that, "Agroecosystem is both a major provider and a major beneficiary of ecosystem services (ES)". In a bibliometric analysis, they attempted to recognize the status of Agroecosystem Services Research, retrieve relevant literature, and discover key research themes. Research articles on the topic of AES, published between 2008 and 2017, were analyzed using bibliometric methods. The results show an increase in research publications and an emphasis on agrobiodiversity and land use in the current AES research, with frequent keywords being 'biodiversity', 'land use change' and 'climate change'.

Yu and Mu[19] conducted a bibliometric analysis of scientific literature between 2002 and 2022 which was related to sustainable agricultural development assessment studies. The study's results display the author-institution solid collaboration, scattered journal publications encompassing a broader spectrum of disciplines and more papers found in higher-impact journals, where the authors were primarily Asian or European. A Co-citation analysis brought out the details of more related authors and journals. An analysis of the keyword progression identified researchers emphasized on sustainable agricultural operations, which involve environmental impacts and economic efficiency. The study concludes that research on sustainable agricultural development assessment is still developing and holds room for its research and applications.

Malanski et al.[20] expose the individualities of scientific communities that "work in agriculture" through a bibliometric review. Work is a central concern regarding issues in the agricultural sector, and the work conditions bring about a shortage in rural employment. Work in Agriculture should be communicated about more, specifically compared to other diversely related topics, which get more policy and economic motivation. Their main objectives of the study aims to review the research output associated with work in agriculture. The scientific literature was reviewed based on country, institution, journal, author, and keywords. The findings include six divisions within the gamut of work in agriculture, the scientific communities funding them and their publication potentials; the USA, France and China being the topmost. The bibliometric scrutiny of the characteristics of the scientific community, a relevant actor in research related to work in agriculture, provides a yardstick for future reviews on agricultural-work-related topics and encourages collaboration between scientific communities.

In another research study, Malanski et al.[21] say the ILO definition of 'decent work' in the agriculture sector involves conditions beyond farming and that a bibliometric review of related literature is essential to summarize the existing knowledge and trends in the same. The review done by Malanski on an inter-disciplinary but relevant topic like agriculture shows that low wages, long working days and physically intensive tasks are the basic reasons behind a

weaker rural workforce and that promoting decent work in agriculture is indispensable for its progress. Reflecting upon the latest trends in agricultural research using metric analysis is essential for future endeavors in related research.

Many other research studies on various aspects of agricultural sciences were conducted worldwide. Kryszak et.al[22] conducted a bibliometric analysis to identify research streams and future research agendas in agriculture, focusing on a prominent concept in agriculture economics called the Total Factor Productivity (TFP). Citation, content, and collaboration structure analyses were carried out to identify authors, their collaboration and research options in TFP. "Food factory design research (FFD) affects production costs, production safety and food quality" Liu et al.[23]. They did a bibliometric analysis of scientific literature related to FFD published in the Web of Science from 2012 to 2022. The study's conclusions include a clear account of the publication count, identifying institutions and countries influential for FFD research, and suggesting intelligent manufacturing and optimization of production systems and processes.

Papadopoulou et al.[24] explains in detail the knowledge-based agricultural economy by conducting a bibliometric network analysis of scientific literature from the last ten years, where the last five years show substantial growth in publications. The keyword analysis reveals 'biomass' and 'sustainability' as similar concepts. A growth in publications of the respective field of study predicts a broader interest in related research, which will further help the transition into a bio-economic model of agriculture that can increase business and employment opportunities in rural areas.

Droste et al.[25] conducted a large-scale bibliometric analysis around the hot topics of emergent research trends in agricultural and environmental economics to identify the convergence of the two fields. Both agricultural and environmental economics domains use land and resources as common grounds but evolve separately in the long run. Agricultural and environmental policymakers can draw insights from integrating these two domains to benefit global sustainable development policies. The study recommends that economic research and evidence-based policy design will help in the improvement of agricultural progress.

Sarkar et al.[26] used a bibliometric method for mapping the whole field of Sustainable Agriculture literature to examine and define the crucial literary works on this subject, based on which the emerging trends will be predicted. The primary objectives of the research study are to investigate the progress, trends, and themes to provide a comprehensive mapping of sustainable agriculture. The results show a steady growth in publications. As per the study, food security, irrigation, and sustainability are the most dominant themes related to Sustainable Agriculture publications, with the USA and China being

the top producers. The study provides a theoretical basis for sustainable agriculture research and is accommodating for potential studies.

Hence, there has not been any research on what sets apart the most widely cited articles in the subject of agricultural economics and policy. This study has been taken up to filling the gap by examining key aspects, such as, the distribution of these top-cited articles over the years, the role of major journals in publishing them, the notable authors involved, the countries and institutions associated with them, and the frequent use of specific terms in their titles.

2 RESEARCH OBJECTIVES

The objective of the research study directs to provide a wide-ranging analysis of the bibliometric characteristics of highly cited articles in the field of agricultural economics and policy. These are the following objectives framed to find the insights from the top cited research papers:

- To identify and analyse the bibliometric characteristics of articles in the field of agricultural economics and policy that have received significant citation counts.
- To investigate the geographic distribution of top-cited articles, with a particular focus on the countries of origin of the authors.
- To recognize and analyse productive authors in agricultural economics and policy, and the contribution of various institutions to the production of top-cited articles in the field.
- To identify and analyse keywords associated with top-cited articles, providing perceptions into recurring themes and topics.

3 RESEARCH METHODOLOGY

The data for the present study was derived from the SCI-EXPANDED database of the Web of Science Core Collection of Thomson Reuters (updated on 2023-09-27). A subject search was implemented by means of using an advanced search option to identify the top-cited articles in the theme category of agricultural economics and policy. A total of 44,171 documents were found for the period from 1956 to 2023. Next, a filter was applied to select only "Article" under the option "Document type." This showed data for 29,549 articles. There were 436 (251 articles) documents in the year 1956 and 1283 documents (1189 articles) in 2022. The publication of articles in this subject category accelerated after 2007.

Another filter was applied to identify articles with at least 100 citations. This search yielded a list of 727 articles that had received at least 100 citations as of 2023-09-27. The data pertaining to these 727 top-cited articles was exported to Microsoft Excel with the full record option. Figure-1 depicts the process of identifying the top-cited articles in the subject category of agricultural

economics and policy.

Microsoft Excel was employed for further analysis wherever necessary. To identify the characteristics of the top-cited articles, the following parameters were considered: total citations, number of references, number of authors, number of journals, number of pages, decade-wise distribution of top-cited articles, average citations per article, and average authors per article. The other features that were identified were: top contributing journals and their citations per article; institutes and countries that contributed the most number of top-cited articles, along with their number of single-country articles and multi-country articles; and the most creative authors, together with their number of first- and corresponding- author articles. The life cycles of the top 10 most cited articles were also analysed.

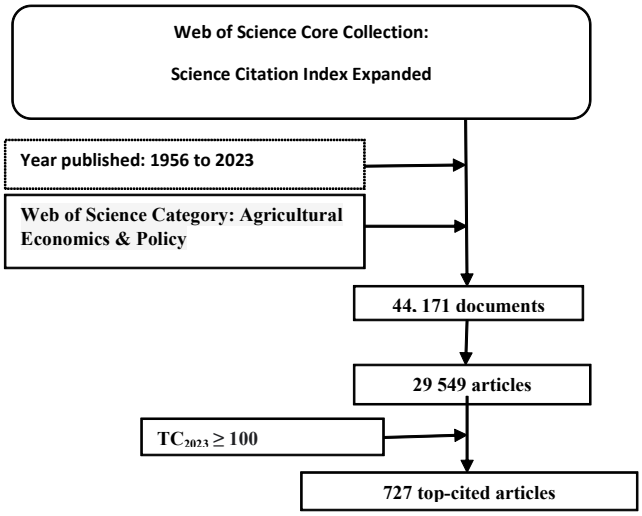


Fig.1 Schematic for Searching the Top-cited Articles

4 RESULT AND DISCUSSION

BIBLIOMETRIC CHARACTERISTICS OF TOP-CITED ARTICLES

The 727 top-cited articles in the agricultural economics and policy subject category were published between 1969 and 2021, with an annual growth of 3.81%. The average age of the articles was 18.9 years, and they were published across a total of 24 journals. As many as 19% (137) of all top-cited articles were written by single authors, while 27.79% had international co-authorship.

The Figure-2 displays the year-wise publication of the top-cited articles in the agricultural economics and policy subject category along with the number of average citations per article. It is clear from the figure, that the number of top-cited articles started increasing from 1990 onwards year by year. The

articles published in 1984 received the highest average citations (more than 600 citations per article). One particular article received as many as 1448 citations.[27] A linear increase in the number of top-cited articles can be observed from the figure.

The Table-1 provides the bibliometric characteristics of the top-cited articles. The first top-cited article was published in 1969 and was produced by a single author. More than 70% of all top-cited articles were published in the 2000s and the 2010s. In the case of education and educational research, more than 50% of the top-cited articles were published in the 1990s and the 2000s. Regarding horticulture, 30% of the top-cited articles were published in the 1990s and the 2000s.

However, the articles published in the 1960s and the 1970s had a higher number of average citations than those published later. This is because the articles published earlier had been around for a longer period of time to be cited. The number of references used to write the top-cited articles was 19 in the 1970s and increased to 42 in the 2020s. The average number of authors per article was one in the 1960s and increased to 2.53 in the 2020s. The average length of the articles increased from 8.63 pages in the 1970s to 13.87 pages in the 2020s.

On the whole, the 727 top-cited articles received an average of 176 citations per article. Each article used an average of 41 references and had an average of 2.74 contributing authors. The average length of the 727 top-cited articles was 14.62 pages. Initially, the top-cited articles came from only three journals, but by the 2010s, the number went up to 15 journals. This confirms that these 15 journals have significantly contributed to the growth and development of the subject of agricultural economics and policy.

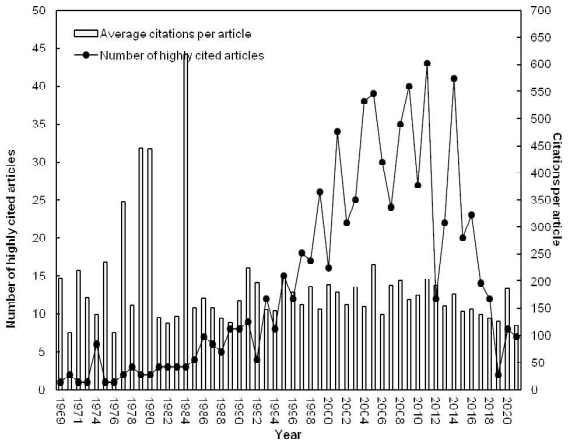


Fig. 2 Number of top-cited articles and average citations per article

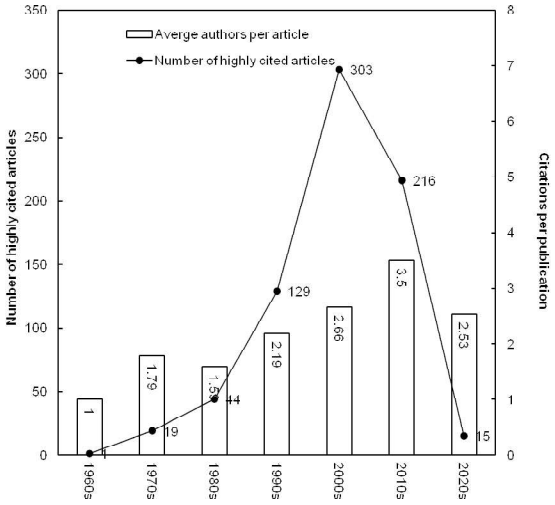


Fig. 3 Decade-wise Distribution of Top-cited articles with Average Citations per Article

TABLE-1

41 Bibliometric Characteristics of Top-cited Articles in the Subject Category of Agricultural Economics and Policy (1956-2023)

Year	TP	TC	NR	AU	J	NP	TC/TP	NR/TP	AU/TP	NP/TP
1960s	1	206	37	1	1	12	206.00	37.00	1.00	12.00
1970s	19	3833	365	34	3	164	201.74	19.21	1.79	8.63
1980s	44	8282	1205	70	3	510	188.23	27.39	1.59	11.59
1990s	129	22237	3560	283	9	1574	172.38	27.60	2.19	12.20
2000s	303	54643	11271	807	14	4752	180.34	37.20	2.66	15.68
2010s	216	36511	13273	756	15	3407	169.03	61.45	3.50	15.77
2020s	15	2316	630	38	5	208	154.40	42.00	2.53	13.87
Total	**727**	**128028**	**30341**	**1989**	**50**	**10627**	**176.10**	**41.73**	**2.74**	**14.62**

Note: TP = Total articles, TC = Total citations, NR = Number of references, AU = Number of authors, J = Journals, NP = Number of pages, TC/TP = Average citations per article, NR/TP= Average references for each article, AU/TP= Average references for each article, NP/TP = Average pages per article.

5 JOURNALS

The top publishing journals that have published at least 13 or more top-cited articles in agricultural economics and policy are listed in Table-2. The journal with the most contributions and which ranked first was *the American Journal of Agricultural Economics.* It contributed to almost 38% of the top-cited articles on the subject. The journal that ranked second was *Food Policy,* with 22% of the top-cited articles. These two journals together contributed

almost 50% of the top-cited articles in the agricultural economics and policy subject category from 1956 to 2023.

Regarding the average number of citations recorded for the articles, the articles published in *Food Policy* received the highest number of average citations, followed by the *British Food Journal. Food Policy* had the highest impact factor (JCR_IF=6.5) and journal citation indicator among all the top contributing journals (JCI=1.85).

TABLE-2

51 Top publishing Journals of Top-cited Articles in Agricultural Economics and Policy (1956-2023)

Journal	TP	TC	TC/TP	JCR_IF$_{2022}$	JCI$_{2022}$	Rank
American Journal of Agricultural Economics	276	49335	179	4.2	1.59	1
Food Policy	160	29543	185	6.5	1.85	2
Agricultural Economics	79	13344	169	4.1	1.06	3
British Food Journal	40	7298	182	3.3	0.91	4
Journal of Agricultural Economics	37	6559	177	3.4	1.18	5
European Review of Agricultural Economics	31	5483	177	3.4	1.27	6
Applied Economic Perspectives and Policy	19	2649	139	5.8	1.82	7
Journal of Agricultural and Resource Economics	15	2159	144	1.19	0.52	8
Australian Journal of Agricultural and Resource Economics	13	2241	172	3.2	0.98	9
Review of Agricultural Economics	13	2008	154	N/A	N/A	9

Note: TP = Total articles, TC = Total citations, TC/TP = Average citations per article, JCR_IF$_{2022}$ = JCR impact factor 2022, JCI$_{2022}$ = Journal citation indicator 2022

6 INSTITUTE AND COUNTRY CONTRIBUTIONS

The details of the top-contributing institutes towards the publication of the top-cited articles in the subject category of agricultural economics and policy are provided in Table-3. Cornell University contributed the highest number of articles and ranked first (44 top-cited articles). It was followed by the International Food Policy Research Institute (35 top-cited articles), the University of Illinois (31 top-cited articles), and the University of California (24 top-cited articles). A total of 10 institutes contributed almost 257 top-cited articles, amounting to 33% of the top-cited articles, and were all from the United States of America.

This confirms that Cornell University, the International Food Policy Research Institute, and the University of California have played a leadership role in agricultural economics and policy research. In the case of horticulture, the University of California, Davis, USA, was the top contributing institute of top-cited articles, followed by Cornell University. In the field of education and

educational research, the University of Michigan, USA, was the top contributing institute, followed by the University of Illinois, USA. In the case of social work, Washington University was the top contributing institute, followed by the University of Wisconsin.[28] In the case of emergency medicine, Harvard University, USA, was the most contributing institute, followed by the University of Penn., US.

The country-wise contribution of the top-cited articles is given in Table 4. The highest number of top-cited articles were contributed by the USA (353), followed by the United Kingdom (53) and Australia (31). In the fields of emergency medicine, education and educational research, and horticulture, the USA was the highest contributor to the top cited articles, followed by the United Kingdom.

TABLE-3

61 Top Contributing Institutes for the Top-cited Articles in Agricultural Economics and Policy (1956-2023)

Institute	TP	FA	CA	Country	Rank
Cornell University	44	13	20	USA	1
The International Food Policy Research Institute	35	13	16	USA	2
University of Illinois	31	7	16	USA	3
The University of California	24	3	13	USA	4
Michigan State University	23	3	13	USA	5
Purdue University	23	5	16	USA	5
World Bank	22	7	18	USA	7
Ohio State University	19	5	18	USA	8
University of Wisconsin	19	1	12	USA	8
Economic Research Services	17	2	10	USA	10

TABLE-4

62 Top contributing countries for the top-cited articles in agricultural economics and policy (1956-2023)

Country	TP	SCP	MCP	% of MCP	Rank
USA	353	301	52	14.7	1
United Kingdom	53	32	21	39.6	2
Australia	31	24	7	22.6	3
Germany	30	18	12	40	4
Canada	21	11	10	47.6	5
Netherlands	19	13	6	31.6	6
China	17	7	10	58.8	7
France	17	10	7	41.2	7
Italy	17	8	9	52.9	7

Note: TP = Total articles, SCP = Single-country articles, MCP = Multi-country articles, % of MCP = Percentage of multi-country articles

7 PROFILIC AUTHORS

The 11 most prolific authors who contributed six or more top-cited articles in the subject category of agricultural economics and policy are mentioned in Table-5. Barrett, Christopher B. from Cornell University, USA, contributed the highest number of top-cited articles, followed by Lusk, JL (Purdue University, USA), Goodwin, BK (North Carolina State University, USA), and Verbeke, W (Ghent University, Belgium). Five of the most prolific authors were from the USA, two were from Germany, and one each was from Belgium, China, New Zealand, and Norway. Lusk, J L contributed the highest number of first author and corresponding author top-cited articles in the field, followed by Goodwin, BK (9 articles). These two authors played a leadership role in publishing top-cited articles. On the other hand, articles contributed by Reardon, T. received the highest average citations per article (261 citations per article). One of his articles received 652 citations.[29]

TABLE-5

71 Top Contributing Authors of Top-cited Articles in Agricultural Economics and Policy (1956-2023)

Author	TP	TC/TP	FA	CA	Institute
Barrett, Christopher B.	17	197	5	5	Cornell University, USA
Lusk, Jl	16	214	12	12	Purdue University, USA
Goodwin, BK	12	139	9	9	North Carolina State University, USA
Verbeke, W	10	107	3	4	Ghent University, Belgium
Rozelle, S	9	136	0	1	University of California, USA
Huang, JK	9	124	6	5	Chinese Academy of Sciences, China
Scarpa, Riccardo	7	219	5	5	University of Waikato, New Zealand
Qaim, Matin	7	134	2	4	University of Göttingen, Germany
Abdulai, Awudu	7	154	2	5	Kiel University, Germany
Shiferaw, B	7	210	2	2	Norwegian University Of Life Sciences, Norway
Reardon, T	6	261	3	3	Michigan State University, USA

Note: TP = Total articles, TC/TP = Average citations per article, FA = First author articles, CA = Corresponding author articles

8 BIBLIOMETRIC ANALYSIS OF TOP 10 MOST CITED ARTICLES

The Table-6 lists the top 10 most cited articles with 652 or more citations.

Out of 10, four articles were contributed by USA-based authors, whereas two were published in a collaboration between authors from the USA, England, and Switzerland and between the USA and Chile. One article each was published in a collaboration between authors from Denmark and Australia; Canada and Australia; and Denmark and Belgium. This confirms that most of the top-cited were contributed by the top economic countries. Four of the 10 articles received an average of more than 50 citations per year. Out of the 10 top-cited articles, five were published in the *American Journal of Agricultural Economics* and two in *Food Policy.* One top-cited article was published in the *European Review of Agricultural Economics* and *Agriculture Economics-Blackwell.*

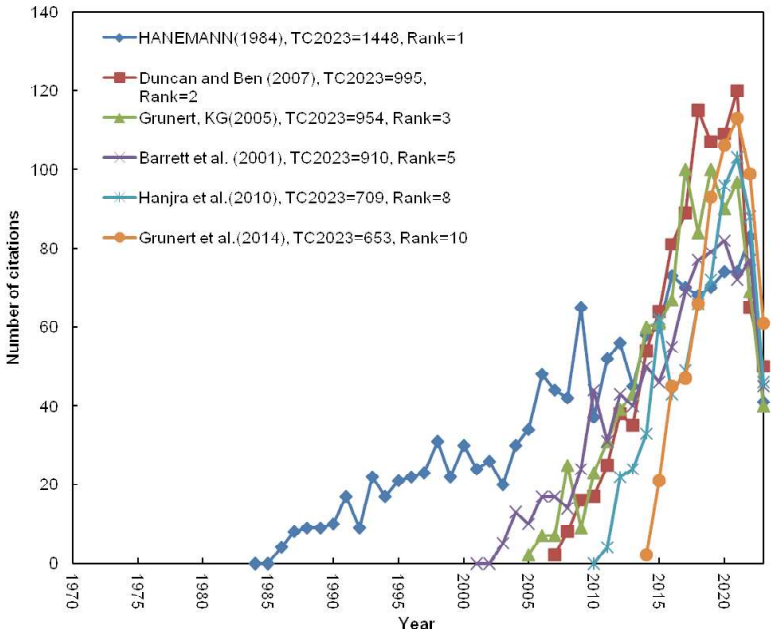
The citation life cycle of the top-cited seven articles is displayed in Figure-4. One of the significant observations is that the top-cited articles started attracting more citations two to three years after their publication and got a spike in citations especially after 2015.

TABLE-6

81 Top 10 Most Cited Articles in Agricultural Economics and Policy (1956-2023)

Article	TC	TCPY	Country	Rank
Hanemann WM, 1984, Am J Agr Econ	1448	36.2	USA	1
Grunert KG, 2005, Eur Rev Agric Econ	954	50.21	Denmark	2
Hanemann M, 1991, Am J Agr Econ	929	28.15	USA	3
Adamowicz W, 1998, Am J Agr Econ	786	30.23	Canada and Australia	4
Binswanger HP, 1980, Am J Agr Econ	735	16.7	USA	5
Hanjra Ma, 2010, Food Policy	709	50.64	Australia	6
Anselin L, 2002, Agr Econ-Blackwell	702	31.91	USA	7
Grunert KG, 2014, Food Policy	653	65.3	Denmark and Belgium	8
Di Falco S, 2011, Am J Agr Econ	653	50.23	England, Switzerland, and the USA	8
Reardon T, 2003, Am J Agr Econ	652	31.05	USA and Chile	10

Note: TC = Total Citations, TCPY= Average Citations Per Year



(TC_{2023} ³ 36)

Fig.-4 Citation Life-cycle of the Top Seven Articles with Average Citations Per Year

9 ANALYSES OF TERMS IN THE TITLES OF THE TOP CITED ARTICLES

An article's title indicates its content in a precise manner. We performed an analysis of the terms used in the titles of the top-cited articles to gain an insight into their content. The top 20 terms are provided in Table-7. The term that occurred most frequently was demand (35 times), followed by Ethiopia (24 times), policy (21 times), application (19 times), attitude (19 times), choice (18 times), and consumer (16 times). The most important terms were Africa, food security, consumer willingness, and organic food.

A significant portion of the research was concerned with a demand for analysing foods, such as, meat, beef and chicken products, and organic food; future demand for food in food markets; and more over a persistent demand for safe food. The second most important area of research was the adoption of modern technologies in agricultural practices in Ethiopia, including food security, soil conservation, land management and agricultural marketing cooperatives. The third most significant portion of the research was concerned with a policy on food systems, technology diffusion, genetically modified

food, carbon labelling of foods, nutrition, climate change, consumers, water pricing, and biofuels. One of the significant portion of the research was concerned with consumer attitudes towards buying organic food, including genetically modified food. More than 14 top-cited articles were concerned with the global food security analysis in the context of climate change, improved crop varieties, organic farming, COVID-19, and plant breeding. More than 10 top-cited articles were concerned with analysing consumer willingness to pay for food products such as traditional, locally grown, genetically modified, processed, and pesticide free products.

TABLE-7

97 Top 20 Terms that Occurred in the Titles of the 727 Top-cited Articles in Agriculture Economics and Policy

Term	Number of times it occurred	% of 727
Demand	35	4.81
Ethiopia	24	3.30
Policy	21	2.89
Application	19	2.61
Attitude	19	2.61
Choice	18	2.48
Consumer	16	2.20
Estimation	15	2.06
Value	15	2.06
Africa	14	1.93
Determinant	14	1.93
Factor	14	1.93
Food Security	14	1.93
Economic	13	1.79
Willingness	13	1.79
Consumer Willingness	12	1.65
Food Product	12	1.65
Organic Food	12	1.65
Choice Experiment	10	1.38
Comparison	10	1.38

The researchers analysed the titles of published Agricultural Economics and Policy research papers for the most recurrent keywords. These keywords provide a deep insight into the major themes and topics of top-cited articles

over the specified period. The "Unigram" list reflects a broad spectrum of issues, from food production and technology to consumer behaviour and environmental concerns. An detailed interpretation of the key terms and their frequencies is provided: "Food" has appeared most frequently, indicating a significant emphasis on food-related topics in agricultural economics and policy research. The second most frequent term is "Agricultural," accentuating the central theme of agriculture in the analysed articles. The term "Analysis" suggests a prevalence of studies involving analytical approaches in agricultural economics and policy. "Agriculture," which is similar to "Agricultural," strengthens the focus on the core subject matter. "Farm" implies a consideration of issues related to farming practices. "Consumer" indicates a focus on the explicit behaviour of the consumer in the context of agricultural economics and policy.

There are many other popular terms used in the titles of research papers, which are as follows: food (190); agricultural (72); analysis (68); agriculture (54); farm (49); consumer (48); organic (43); organic (43); adoption (43); evidence (40); land (39); demand (37); production (35); efficiency (34); farmers (32); technology (31); price (31); market (31); model (30); risk (29); impact (29); effects (29); countries (29); productivity (28); choice (28); use (26); rural (26); willingness (25); change (25); pay (24); implications (24); developing (24); case (24); markets (23); quality (22); models (21); Ethiopia (21); crop (21); consumers (21); climate (21); security (20); products (20); global (20); environmental (20); economics (20); welfare (19); information (19); economic (19); China (19); valuation (18); using (18); technical (18); policy (18); data (18); safety (17); preferences (17); meat (17); labels (17); insurance (17); income (17) etc.

Fig. 5 Word Cloud of Most Frequent Key Terms that Occurred in the Titles

The researchers have located other interesting research results, provided in Figure-6 as trendlines of top-cited articles in Agricultural Economics and Policy (1956-2023). The term, "top-cited" implies that these articles have

received a significant number of citations from other scholarly works. Figure-7 characterizes information about the publishers of the top-cited articles in the field—the visual representation of the publishers that have produced the most dominant works in agricultural economics and policy. Figure-8 appears to depict the research area categories as defined by the Web of Science (WoS).

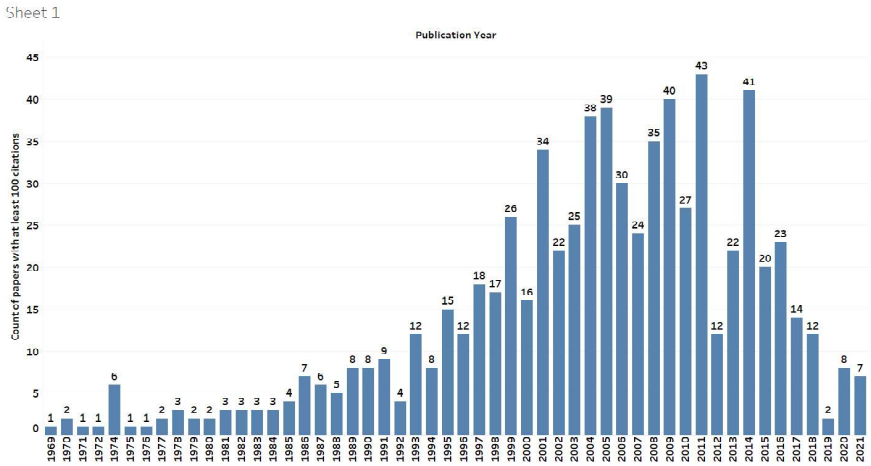


Fig. 6: 96 The Top-cited Articles in the Field of Agricultural Economics and Policy from 1956 to 2023 that had Received at least e" 100 Citations

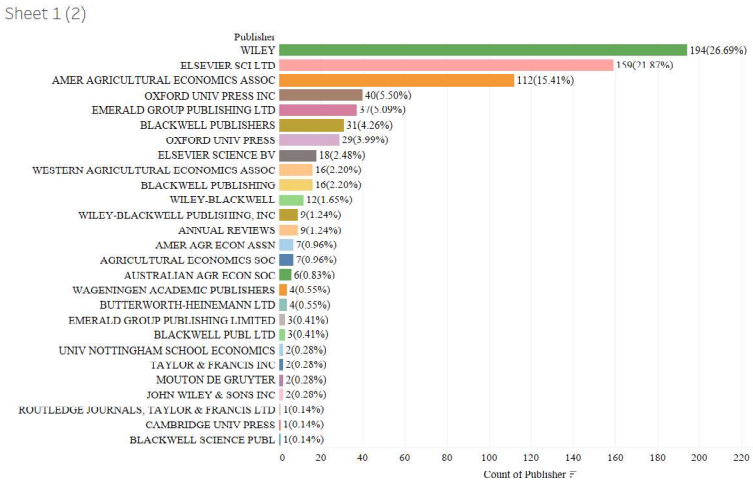


Fig. 7: The Top Publishers of Articles in the Field of Agricultural Economics and Policy

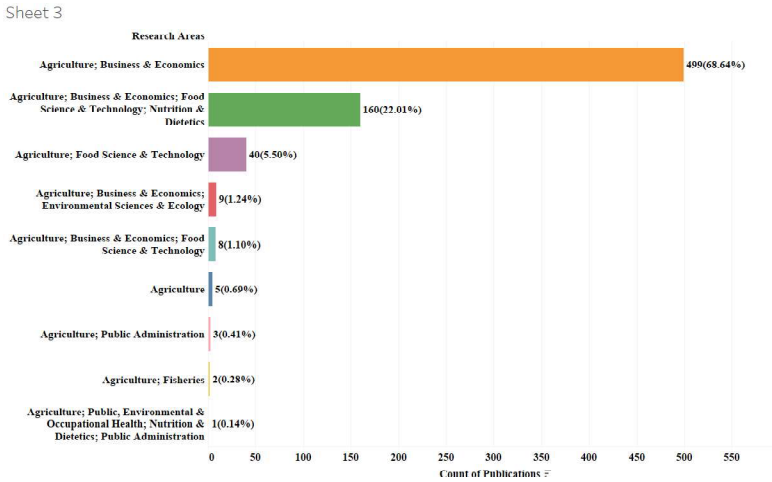


Fig. 8 The Web of Science (WoS) Research Areas Categories

10 CONCLUSION

This study analysed the physical appearances of the top-cited articles in agricultural economics and policy. Most of the top-cited articles were published between the years 2000 and 2010. Around 19% were produced by single authors and 27.79% by international collaboration. More than half of the top-cited articles were produced by individual countries and institutes. The articles were written by an average of 2.74 authors and had 41 references per article and an average length of around 14 pages. A total of 24 journals produced these 727 articles, with an average of 30 articles per journal. This confirms that only the most reputable agricultural economics and policy journals produced the top-cited articles. The average number of citations received by the top-cited articles was 176. More than 38% of all top-cited articles were published in the *American Journal of Agricultural Economic*s. This journal has made a substantial contribution to the growth and development of the field of agricultural economics and policy.

Most of the journals and institutes that contributed the top-cited articles were from the United States of America. More than half of the top-cited articles were contributed by the USA-based authors. Among the 11 most inexhaustible authors, 45% were from the USA. More than 40% of the top 10 most cited articles were also contributed by the USA-based authors alone. This may be due to the USA having the top universities and due to the availability of the necessary funds and research facilities in those universities. Around 5% of the top-cited articles were related to the analysis of demand for food. Other most common areas of research interest were an adoption of modern technologies

in agriculture in Ethiopia (3.30%), food policy (2.89%), The attitudes of consumer buying towards organic food products (2.61%), and global food security in the context of climate change (1.93%). The present work would be beneficial for researchers and scientists in discerning the characteristics of the top-cited articles in the area of agricultural economics and policy.

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