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One Hundred Volumes of Neutrosophic Sets and Systems: a Bibliometric Retrospective and a Neutrosophic Framework for Dispersed Citation Evidence (2013–2026)

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Abstract. Neutrosophic Sets and Systems (NSS) reaches its one-hundredth volume in 2026, thirteen years after its foundation by Smarandache in 2013. No systematic bibliometric retrospective of the journal has been published. This paper documents the complete editorial trajectory of NSS and introduces a neutrosophic framework for a problem that the journal exhibits in an acute form: its articles exist in OpenAlex dispersed across repositories and frequently duplicated with divergent citation counts, so that the citation count of an NSS article is not a crisp quantity but an indeterminate one. We compiled a reproducible corpus of 2,895 articles across 100 volumes (2013–2026) by combining OAI-PMH harvesting, archive crawling and article-level metadata retrieval, and disambiguated 5,570 raw signatures into 4,570 unique authors by union-find. The corpus shows an extraordinary editorial expansion — from 10 articles in 2013 to 1,023 in 2025 — and a methodological profile that differs markedly from that of the applied journal of the ecosystem: multi-criteria decision-making methods appear in only 10.7% of NSS articles, against more than 40% in Neutrosophic Computing and Machine Learning. We extend five classical bibliometric indicators into single-valued neutrosophic triples and add a sixth extension, specific to this corpus, in which the indeterminacy of a citation count is computed from the dispersion among duplicate records of the same article. Beyond documentation, the study is designed as an editorial instrument: its explicit objectives include informing the indexing strategy of NSS, identifying the structural weaknesses that an external review would surface, and returning to the neutrosophic community a reproducible empirical baseline about itself.

Keywords: bibliometrics; neutrosophic logic; single-valued neutrosophic numbers; SVNWA aggregation; Lotka's law; author disambiguation; citation indeterminacy; open-access journals; editorial policy; Neutrosophic Sets and Systems.

1 Introduction

Neutrosophic Sets and Systems is the doyen journal of the editorial ecosystem articulated around neutrosophy, the trivalent extension of fuzzy set theory formalized by Smarandache in 1998 [1, 2]. Founded in 2013, it reaches in 2026 its one-hundredth volume, an anniversary that justifies a systematic look at what the journal has actually published, who has published in it, and what evidence exists about the reach of that production.

Bibliometric analyses of scientific journals fulfil a triple function in an editorial community: they document the historical evolution of a publication, they expose its collaborative structure, and they surface both strengths and systemic biases for the adjustment of editorial policy. When the signatories are the editors themselves, the exercise acquires the additional character of an internal audit, with the advantage of privileged access to the data and the disadvantage of a manifest conflict of interest, which we declare in Section 8.

A companion study recently applied this approach to Neutrosophic Computing and Machine Learning (NCML), the applied-methods journal of the same ecosystem, over 762 articles and 42 volumes [3]. The present paper extends that programme to the central case of the field, whose corpus is almost four times larger, and takes advantage of the comparison between the two journals to test whether the diagnoses formulated for one of them hold for the other.

2 Materials and Methods

2.1 Corpus and data pipeline

The empirical corpus consists of the 2,895 articles published by NSS in 100 volumes between 2013 and 2026. Metadata were obtained by combining three independent routes over the journal's OJS installation: OAI-PMH harvesting in date slices, crawling of the issue archive to enumerate every issue and article, and retrieval of article-level metadata for the records the OAI endpoint did not deliver. The archive crawl fixes the denominator — 102 issues, 2,895 articles — so that the completeness of the metadata can be measured rather than assumed.

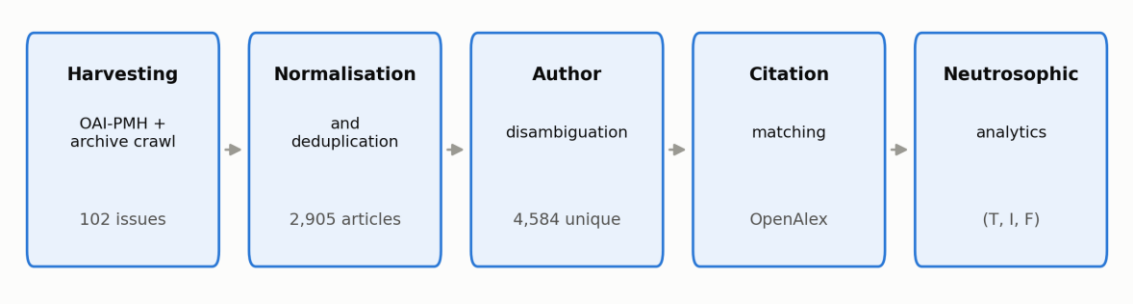

Figure 1. Data pipeline of the study, from OAI-PMH harvesting to the neutrosophic analytics layer.

The 8,646 author–article pairs were disambiguated into 4,570 unique authors by a union-find algorithm with two hierarchical rules: a strong rule based on a canonical key (NFKD normalization, removal of particles and titles, alphabetical ordering of tokens), which resolves inverted forms such as 'Smith, John' and 'John Smith'; and a weak rule based on initial-plus-surname, applied only when the group does not mix two mutually incompatible complete forms. Disambiguation reduced the 5,570 raw signatures by 18.0%.

2.2 Neutrosophic extensions of classical indicators

Five extensions follow the framework introduced for NCML [3]: neutrosophic h-index by inter-source agreement, neutrosophic Lotka exponent by bootstrap over the exponent and the Kolmogorov–Smirnov statistic, graded Bradford nucleus membership, neutrosophic topic membership from distances to cluster centroids, and neutrosophic co-authorship edge weight. In each case the classical indicator is recovered by collapsing the indeterminacy component, so the framework is strictly richer than the classical baseline.

A sixth extension is specific to this corpus. For an article with k bibliographic records $r_1,\ldots, r_k$, retrieved from a citation source and citation counts $c_1,\ldots, c_k$, define the neutrosophic citation profile (T, I, F) where T grows with the agreement among records, I grows with their relative dispersion

$(c_{max} - c_{min})/ c_{max}$, and F captures the absence of citation evidence. When k = 1 the profile collapses to the classical count. This extension is not a formal ornament: as Section 3.4 shows, 37% of the matched articles of NSS appear in more than one record with divergent counts, so the crisp citation count of an NSS article is a choice made by the analyst, not a datum.

Aggregation of the per-indicator triples uses the Single-Valued Neutrosophic Weighted Arithmetic operator of Ye and the score function of Smarandache, as in the companion study.

3 Results

3.1 Editorial growth (RQ1)

Between 2013 and 2026 NSS published 2,895 articles across 100 volumes. The trajectory has three regimes: a founding stage of 10 to 57 articles per year (2013–2017); a first expansion that doubles the volume in 2019 and quadruples it in 2020, coinciding with the migration to OJS; and an acceleration in 2025 without precedent in the ecosystem, with 1,023 articles and 21,215 pages in a single year — more than the first eleven years of the journal combined. The mean article length grew from 6.8 pages in 2013 to over 20 pages from 2020 onward.

Table 1: Editorial growth of NSS. *2026 is partial (cutoff August 2026).

Year	Articles	Pages	Active authors	New authors
2013	10	68	13	13
2014	48	406	23	14
2015	47	345	53	33
2016	57	469	54	34
2017	46	372	117	95
2018	67	783	119	99
2019	132	1591	360	323
2020	247	5101	611	521
2021	239	3448	701	532
2022	213	3109	501	375
2023	327	4905	691	585
2024	298	4288	813	687
2025	1023	21215	2168	1916
2026*	138	2406	327	219

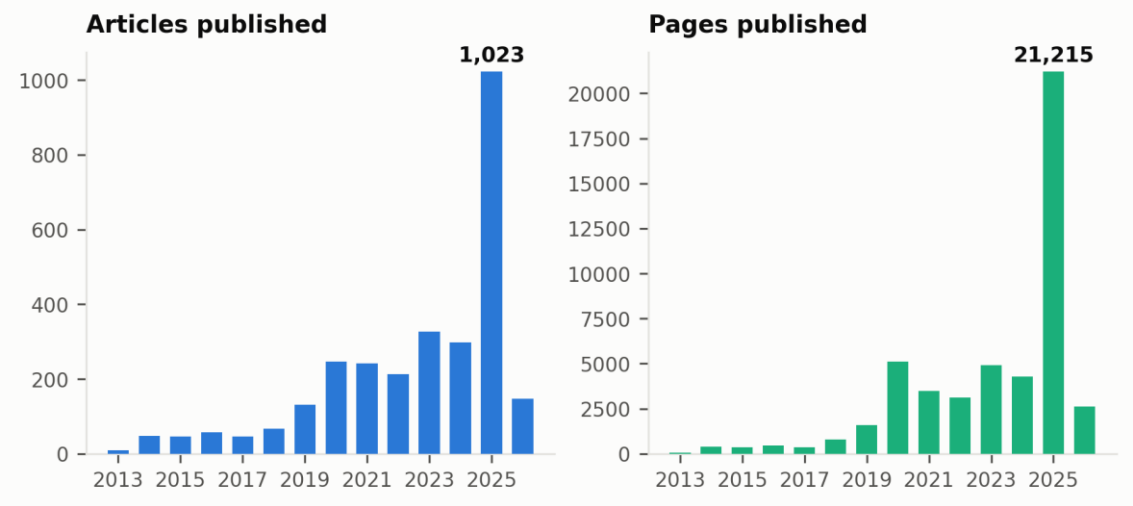

Figure 2. Annual output of NSS, 2013–2026. Articles and pages are shown on separate panels because they are measured on different scales. The 2026 bar is partial (cutoff August 2026).

3.2 Author community and productivity (RQ2)

The corpus comprises 8,646 authorships distributed among 4,570 disambiguated authors, with a mean of 2.99 authors per article and 18.1% of single-authored articles. Productivity is extremely skewed: 70.8% of authors sign a single article, above the 61.7% predicted by Lotka's law. NSS therefore operates in part as an entry platform to the field and not only as the journal of a stable community — a finding that is favorable when read as capacity building and unfavorable when read as author retention, and that the editorial board should read in both directions.

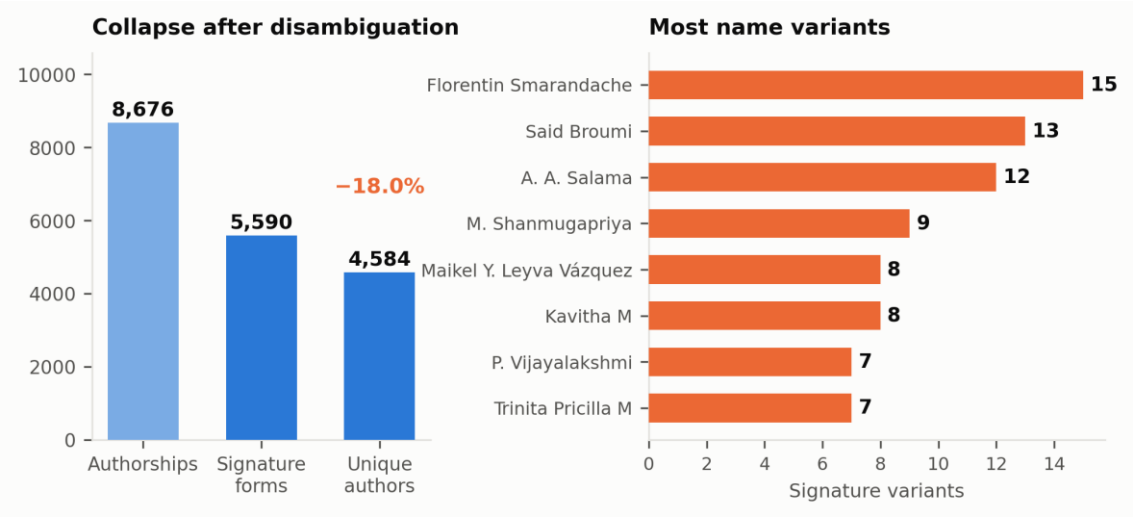

Figure 3. Effect of author-name disambiguation. Left: 8,646 authorships collapse into 5,570 distinct signature forms and then into 4,570 unique authors (−18.0%). Right: authors with the largest number of signature variants.

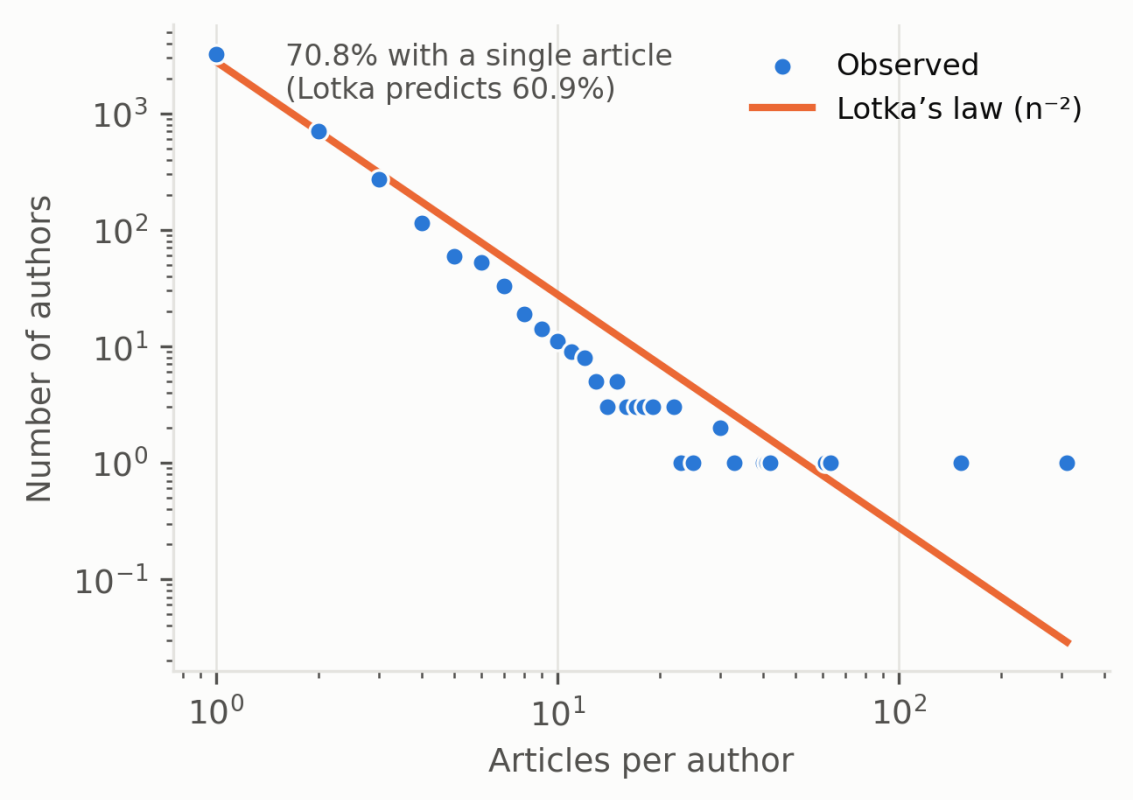

Figure 4. Productivity distribution against Lotka's inverse-square law (log–log). The observed share of single-article authors (70.8%) exceeds the theoretical prediction (61.7%).

Table 2: Ten most prolific authors after disambiguation.

Author	Articles	Signature forms

Florentin Smarandache	196	15
Said Broumi	152	13
A. A. Salama	63	12
Surapati Pramanik	61	4
Huda E. Khalid	42	5
Saeid Jafari	41	6
Yaser Ahmad Alhasan	40	3
Muhammad Saeed	32	4
Jun Ye	30	2
Suman Das	30	2

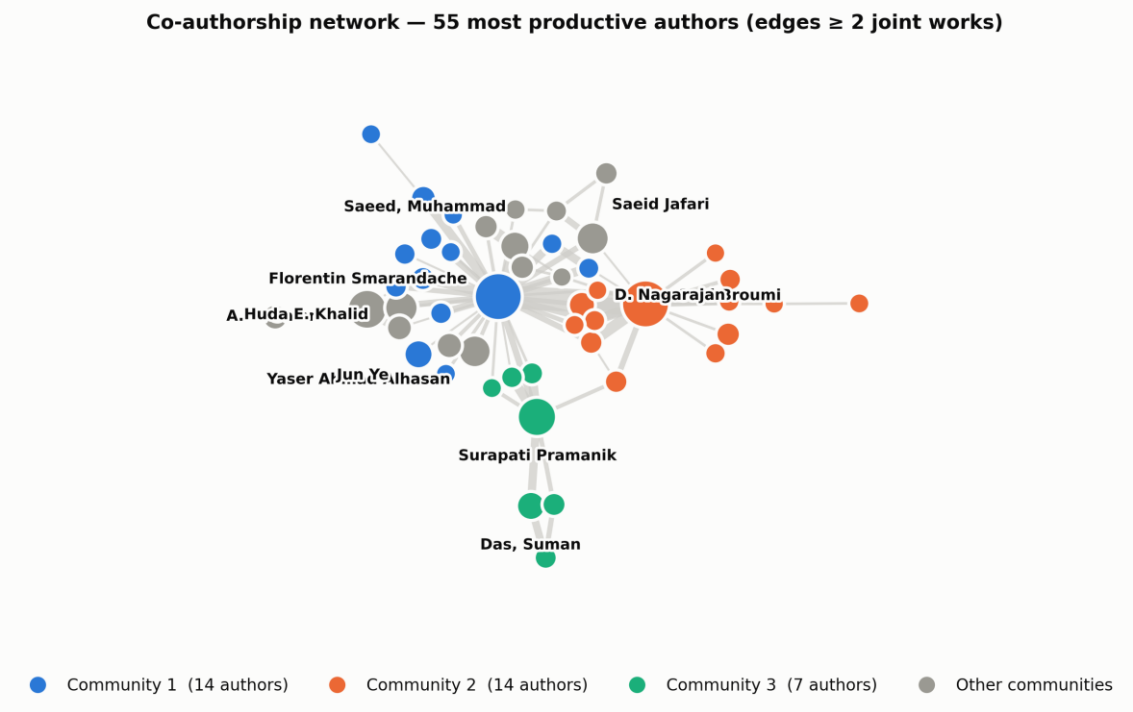

Figure 5. Co-authorship network of the most productive authors after disambiguation. Edges denote at least two joint articles; node area is proportional to output; colour marks the largest Louvain communities.

3.3 Methodological profile (RQ3)

The methodological concentration attributed to the neutrosophic field does not describe NSS. Multi-criteria decision-making methods — the family that dominates the applied journal of the ecosystem — appear in only 10.7% of NSS articles, against more than 40% in NCML. What dominates in NSS is decision theory in the broad sense (33.5%), extensions of set structures such as soft, rough, hypersoft and plithogenic sets (27.8%), algebra (13.9%) and topology (9.2%). TOPSIS, the emblematic method of the critique, appears in 4.2% of the corpus and AHP in 2.4%.

Table 3: Methodological profile of the corpus (non-exclusive categories).

Method family	Articles	% of corpus
Decision theory (broad)	971	33.5
Set extensions	804	27.8
Algebra	403	13.9
Topology	267	9.2
Optimization	182	6.3
TOPSIS	121	4.2
Neutrosophic statistics	118	4.1
Graphs	104	3.6
Machine learning	97	3.4
Cognitive maps	78	2.7
AHP	70	2.4
Any MCDM method	310	10.7

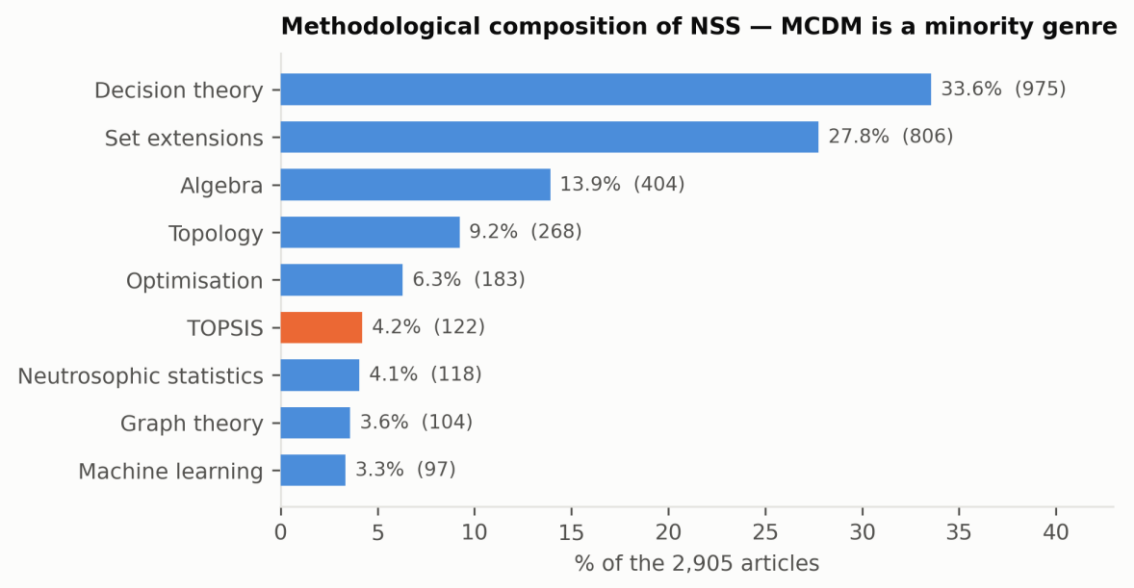

Figure 6. Methodological composition of the corpus, as detected from titles, abstracts and keywords. Multi-criteria decision-making categories are highlighted.

3.4 Citation evidence and its indeterminacy (RQ5)

OpenAlex recognises Neutrosophic Sets and Systems as a source with 27 works and 180 citations. The real corpus is 2,895 articles. The journal is therefore two orders of magnitude larger than its indexed footprint, and any impact assessment based on that source alone is meaningless.

Title-level matching against OpenAlex on a sample of 50 articles recovers 46 of them (92%), which confirms that the articles do exist in the database but are attached to repositories — chiefly the UNM Digital Repository and Zenodo — rather than to the journal. Of the matched articles, 37% appear in more than one record with divergent citation counts: the same article may report 21 citations under one record and 0 under another. The ten most cited articles of the sample accumulate 640 citations, with a maximum of 139 for a single article; the sample as a whole accumulates 1,211 citations against the 180 that the journal-level source reports for the entire journal.

Table 4: Ten most cited articles in the matched sample (OpenAlex, maximum over duplicate records).

Article	Citations
Several Similarity Measures of Neutrosophic Sets	139
An Extended TOPSIS Method for the Multiple Attribute Decision Making Problem	134

Rough Neutrosophic Sets	100
A New Methodology for Neutrosophic Multi-attribute Decision-making	93
Neutrosophic Crisp Set Theory	62
Single Valued Neutrosophic Similarity Measures for MADM	49
Another Form of Correlation Coefficient between SVN Sets	44
Filters via Neutrosophic Crisp Sets	43
A Novel Method for SVN Multi-criteria Decision Making	39
Cosine Similarity Measure of Interval Valued Neutrosophic Sets	37

Table 5: The same journal as recorded by four independent bibliographic sources.

Source	What it holds of NSS	Note
Scopus	1,943 articles (2018–2025)	CiteScore 3.4; #4/43 in Mathematics: Logic, 91st percentile
DOAJ	2,830 article records	97% of the corpus; almost all DOIs are Zenodo deposits
Crossref	no record for the ISSN	the journal is not a registered member
OpenAlex	27 works, 180 citations	source record built largely on Crossref deposits

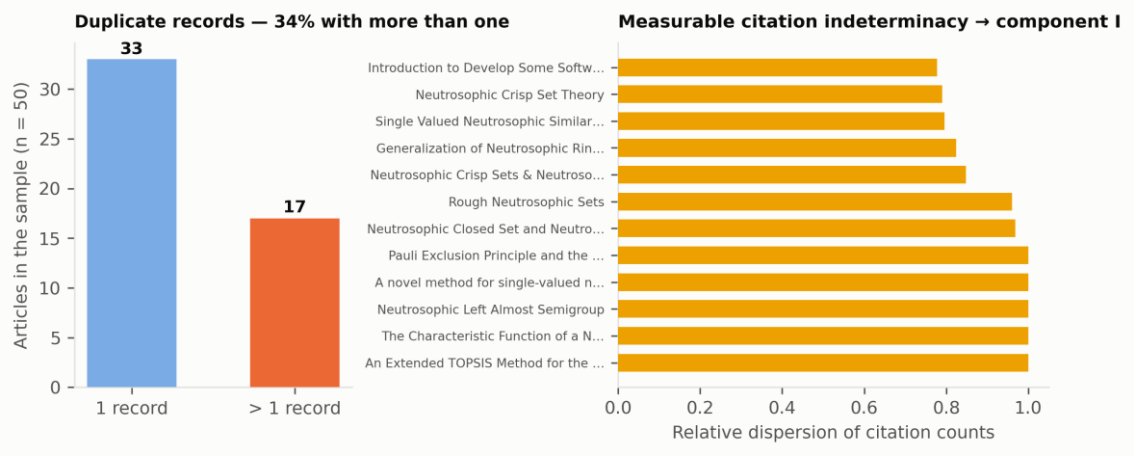

Figure 7. Citation indeterminacy in the matched sample. Left: articles with more than one bibliographic record. Right: relative dispersion of the citation count across duplicate records, which feeds the indeterminacy component I of the sixth neutrosophic extension.

3.5 Thematic agenda and internationalization (RQ4)

The application domains of the corpus are led by environment and sustainability (25.4%), business and management (17.8%), education (16.5%) and pure mathematics (15.4%), followed by health (12.1%) and social sciences (11.5%). The share of pure mathematics, dominant in the founding volumes, declines steadily in favor of applied domains. The corpus declares 6,501 distinct keywords, and five thematic special issues concentrate 212 articles, all of them devoted to Latin America, which documents the incorporation of that region as an editorial policy and not as an accident.

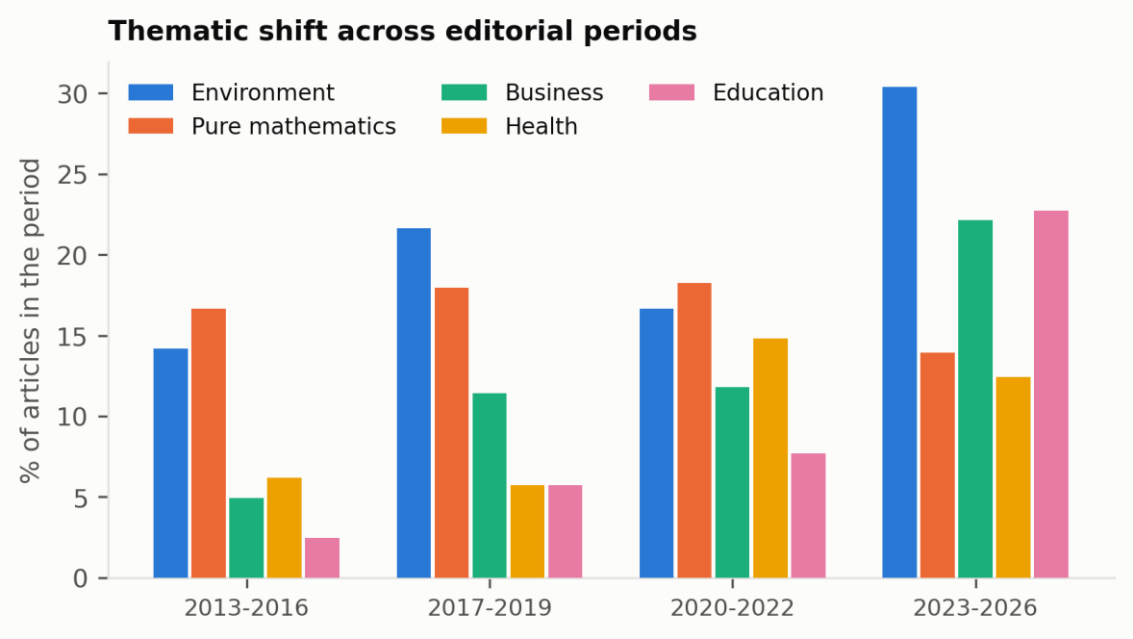

Figure 8. Shift of application domains across the editorial periods, as a percentage of the articles published in each period.

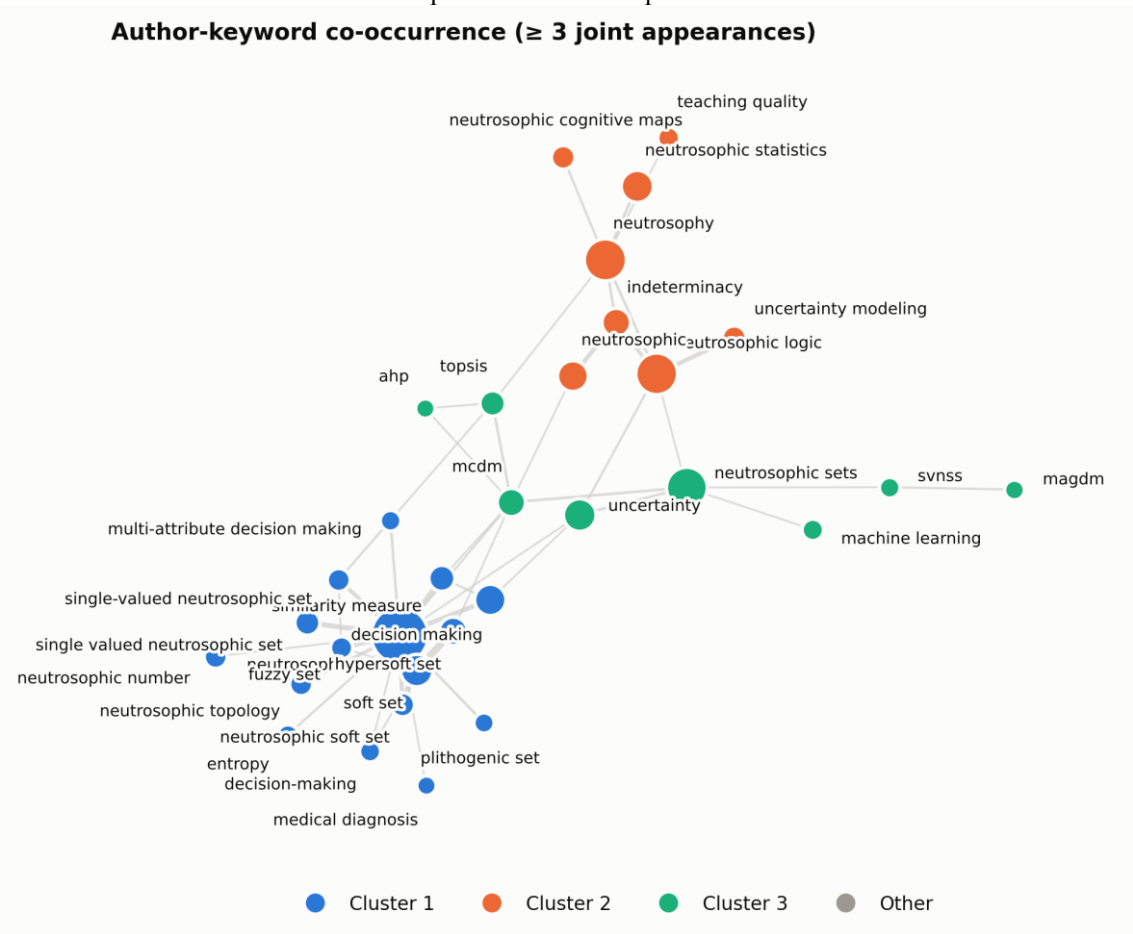

Figure 9. Co-occurrence network of author keywords (at least three joint appearances), coloured by Louvain cluster. Node area is proportional to keyword frequency.

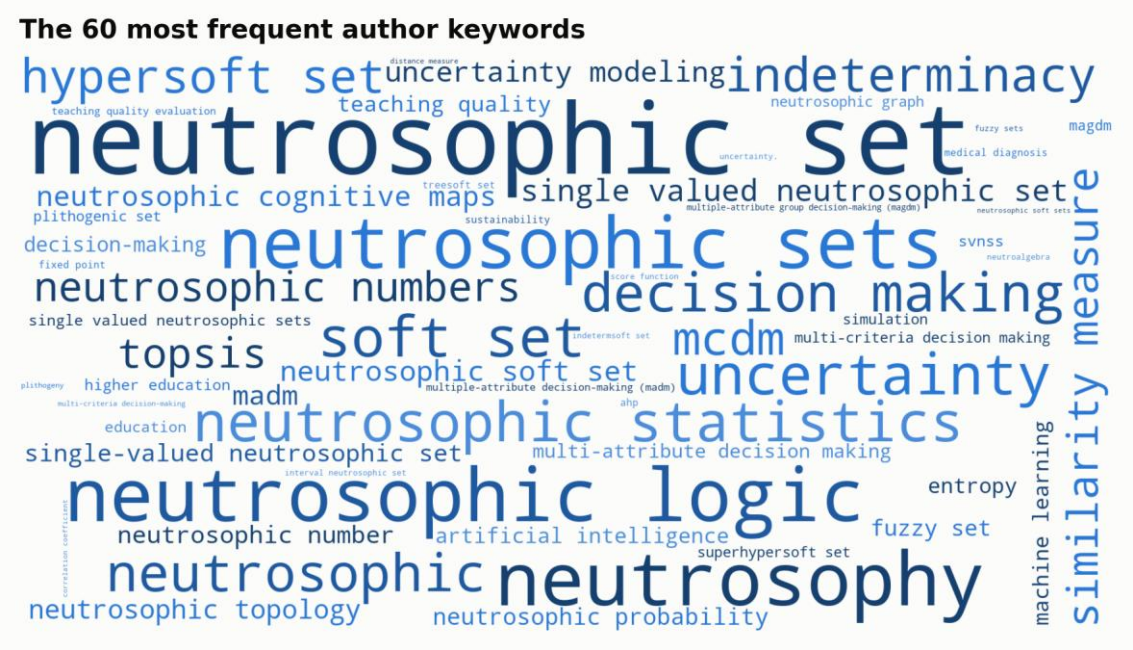

Figure 10. The sixty most frequent author keywords in the corpus.

Table 6: The five classical bibliometric indicators extended into single-valued neutrosophic triples (T, I, F), and their SVNWA aggregate.

Extension	**T**	**I**	**F**	**Classical indicator extended**
Neutrosophic h-index	0.78	0.10	0.12	h = 14–20 (sample of 50)
Lotka exponent	0.00	1.00	0.00	$\alpha = 1.99$
Author-productivity zones	0.21	0.21	0.58	core = 285 authors
Topic membership	0.55	0.17	0.29	K = 10 topics
Co-authorship edge weight	0.07	0.46	0.47	9,732 edges
SVNWA aggregate	0.408	0.280	0.000	score S = 0.709

4 Discussion: what this means for the journal and for the community

Three of the findings translate directly into editorial decisions, and we state them as such because the fourth objective of this study is to improve the journal rather than merely to describe it.

First, the indexing gap is the most actionable problem. The evidence shows that the citations of NSS exist but are attributed to repositories instead of to the journal. Registering DOIs at the article level and depositing consistent metadata would consolidate a citation record that today is fragmented across duplicate entries. This is not a cosmetic matter: it is the difference between a journal that appears to have 180 citations and one whose sampled articles alone accumulate 1,211.

Second, the profile of the author community suggests where to invest. With 70.8% of authors signing a single article, the journal is functioning as a gateway to the field. Converting part of that flow into recurrent authors — through mentoring of first-time authors, thematic calls with editorial

accompaniment, and explicit feedback on rejected submissions — would strengthen the community more than any additional increase in volume.

Finally, the growth of 2025 deserves editorial reflection rather than celebration. Multiplying the annual output by three in a single year is an achievement in reach, but it places the burden of quality control on a review system whose capacity did not grow at the same rate. An anniversary is a good moment to state publicly how that load is being managed.

5 Limitations

The corpus is complete at the article level, but the citation analysis rests, at the time of writing, on a sample of 50 articles, because the search endpoint of the citation source imposes rate limits incompatible with querying **2,895** titles individually; the full matching is being completed through bulk retrieval by repository. Google Scholar, which the companion study identified as the source that best captures neutrosophic citations, has no public API, so the journal-level figures are taken from Scholar Metrics and not from article-level data. Author disambiguation, although validated by manual inspection of the largest clusters, may retain residual errors in homonymous names of frequent surnames. Finally, the classification of methods and domains is based on regular expressions over titles, abstracts and keywords, which underestimates articles whose method is not named in those fields.

6 Conclusions

One hundred volumes and **2,895** articles later, NSS is a substantially larger and methodologically broader journal than its external image suggests. Its central problem is not concentration but visibility: a citation record dispersed across repositories, duplicated, and consequently indeterminate in the precise sense that neutrosophic logic was designed to treat. The framework proposed here does not resolve that dispersion — it measures it, and converts it into a reportable quantity for editorial decision-making.

Author Contributions

Conceptualization, S.B. and F.S.; methodology, M.L.-V. and S.B.; data curation and software, M.L.-V.; formal analysis, S.B., M.A.-B. and M.L.-V.; writing — original draft, S.B. and M.L.-V.; writing — review and editing, F.S. and M.A.-B.; supervision, F.S. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors are editors of the journals analyzed in this study. To mitigate the conflict, the complete dataset, the extraction scripts and the intermediate results are published so that any third party can reproduce or contest the findings. The editorial handling of this manuscript should be assigned to an editor with no authorship in it.

Data Availability and Supplementary Material

The complete dataset accompanies this manuscript as supplementary material (NSS100_dataset_paquete.zip, 1.4 MB) and will be deposited in a public repository upon acceptance. It contains the following items.

NSS_articulos_dataset.csv is the main table: 2,895 rows, one per article, with 25 fields — identifier, volume, year, special issue, title, number of authors, author list, first author, keywords and their count, abstract and its length in words, language, publication date, first and last page, page count, detected method families, MCDM indicator, application domains, article URL and PDF URL, and the metadata route through which each record was obtained.

The reports/ folder contains twelve derived tables: autores_desambiguados.csv, with the 4,570 unique authors and every signature form merged into each of them; evolucion_anual.csv, with articles, pages and active and new authors per year; por_volumen.csv; metodos.csv and metodos_por_periodo.csv, which document the methodological profile and its displacement across four periods; dominios.csv and dominios_por_periodo.csv for the application domains; palabras_clave.csv with the 6,501 distinct descriptors and their frequency; lotka.csv and lotka_desambiguado.csv with the productivity distribution before and after disambiguation;

citas_muestra_openalex.csv with the citation sample, including the number of duplicate records and the relative dispersion of counts per article; numeros_especiales.csv; and coautoria.csv.

The scripts/ folder contain the complete pipeline: date-sliced OAI-PMH harvesting, issue-archive crawling, parallel retrieval of article records, merging, author disambiguation by union-find, descriptive analysis, and bulk citation matching. README_DATASET.md documents the procedure, the known limitations of the automatic classification of methods and domains, and the two server-side obstacles that conditioned the collection: the HTTP 500 errors returned by the journal's OAI endpoint on specific resumption tokens, and the rate limiting that the citation source applies to title-search queries. The pipeline is idempotent and resumable end to end.

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