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Evolution of Research on Inverse Continuous Probability Distributions: A Bibliometric Study

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ABSTRACT

Inverse continuous probability distributions have become increasingly important in statistical modelling because of their ability to represent lifetime, reliability and survival data with greater flexibility than many classical distributions. As research in this area has expanded over the past five decades, the literature has become widely dispersed, making it difficult to identify major research trends and influential contributions. This study provides a comprehensive bibliometric analysis of 476 publications indexed in the Scopus database between 1968 and 2026. Using the Bibliometrix package in R together with science-mapping techniques, the study examines publication trends, citation patterns, leading authors, journals, institutions, countries and research collaborations. The analysis reveals a steady increase in scientific output, growing international collaboration and an expanding range of applications in reliability engineering, survival analysis, Bayesian statistics, finance and environmental modelling. It also highlights the evolution of the field from the development of classical inverse continuous probability distributions to more flexible generalized models and computational approaches. By mapping the intellectual structure and emerging research themes, this study provides a clear overview of the field's development and identifies promising directions for future research on inverse continuous probability distributions.

Keywords: Inverse continuous probability distributions, Bibliometric analysis, Science mapping, Scopus, Bibliometrix, Research trends.

1. Introduction

Probability distributions play a fundamental role in statistical modelling by describing uncertainty and random variation in diverse scientific phenomena. Among these, inverse continuous probability distributions have attracted increasing attention due to their flexibility in modelling lifetime, reliability and survival data exhibiting complex hazard rate behaviours. Derived through reciprocal transformations of random variables, these distributions effectively capture heavy-tailed characteristics and varying failure patterns, making them valuable in both theoretical and applied statistics [1]. Inverse continuous distributions have been widely applied in reliability engineering, survival analysis, Bayesian statistics, actuarial science, hydrology, environmental modelling, finance and quality control. Their ability to model complex lifetime behaviour has led to their extensive use in reliability assessment, risk analysis, medical research, insurance modelling and engineering applications [5], [8]. To improve modelling flexibility, numerous generalized inverse continuous probability distributions have been proposed, including the Inverse Weibull, Inverse Lindley, Inverse Rayleigh, Inverse Lomax, Inverse Exponential, Inverse Burr, Inverse Gamma and Inverse Gaussian distributions, together with several generated families developed through transformation and compounding techniques [11]. These developments have considerably expanded the scope of inverse continuous probability distributions for analysing diverse real-world data.

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Despite the rapid growth of this research area, studies on inverse continuous distributions remain dispersed across numerous journals and application domains, making it difficult to identify major contributors, influential publications, collaboration patterns and emerging research themes. Although several review articles discuss individual inverse continuous probability distributions, no comprehensive bibliometric study has systematically examined the evolution and intellectual structure of this research field [3], [6]. Bibliometric analysis offers a quantitative framework for evaluating scientific productivity, citation impact, collaboration networks and thematic evolution within a research domain. Using bibliometric indicators and science-mapping techniques such as co-citation analysis, bibliographic coupling, co-authorship networks, keyword co-occurrence analysis, thematic mapping and historiographic analysis, it is possible to reveal the knowledge structure and emerging directions of a discipline [7], [15], [16].

Motivated by this research gap, the present study provides a comprehensive bibliometric analysis of inverse continuous probability distributions using publications indexed in the Scopus database from 1968 to 2026. The study examines publication trends, influential authors, journals, institutions, countries and collaboration networks, while mapping the conceptual and intellectual structure of the field through advanced science-mapping techniques. The findings provide a systematic overview of the evolution of inverse continuous distribution research and identify promising directions for future theoretical and applied investigations. To the best of our knowledge, this is the first comprehensive bibliometric study devoted exclusively to inverse continuous probability distributions. Unlike previous review articles that primarily examine individual inverse continuous probability distribution families or specific methodological developments, the present study integrates descriptive bibliometric indicators with advanced science-mapping techniques to reveal the intellectual, conceptual and collaborative evolution of the field. By identifying influential publications, leading contributors, emerging research themes and future research directions, this study provides a comprehensive reference for researchers and offers a foundation for future theoretical and applied investigations.

2. Methodology

This study employs a bibliometric and science-mapping approach to examine the development and intellectual structure of research on inverse continuous probability distributions. Bibliographic data were retrieved from the Scopus database, selected for its broad coverage of high-quality peer-reviewed literature. A systematic search was conducted using keywords related to inverse continuous probability distributions and their major families in the title, abstract and keyword fields. Only English-language journal articles, review papers, conference papers, books and book chapters directly related to inverse continuous probability distributions were included. Duplicate records, publications with incomplete bibliographic information and studies unrelated to inverse probability distributions were excluded. Following data cleaning, 476 publications were retained for analysis.

The bibliometric analysis was performed using the Bibliometrix package in R, while Biblioshiny was used for data processing, visualization, and descriptive analysis. Author names, affiliations, keywords and source titles were standardized to ensure consistency across the dataset. To investigate the intellectual and conceptual structure of the field, VOS viewer was employed to construct bibliometric networks based on co-authorship, co-citation, bibliographic coupling and keyword co-occurrence analyses. Collaboration analysis was

conducted to examine research partnerships among authors and countries, while thematic mapping was used to identify major research themes and emerging topics. In addition, Bradford's Law was applied to identify the core publication sources and the Three-Field Plot was employed to visualize the relationships among countries, authors and research keywords. Together, these techniques provide a comprehensive assessment of publication trends, research impact, collaboration patterns and the evolution of inverse continuous probability distribution research.

3. Descriptive Bibliometric Analysis

Descriptive bibliometric analysis provides a quantitative overview of the research landscape by examining publication output, citation performance, authorship patterns, publication sources and geographical distribution. These indicators offer insights into the growth, maturity and scholarly impact of research on inverse continuous probability distributions before exploring its intellectual and conceptual structure through science-mapping techniques.

3.1 Overview of the Data

The overview of the bibliographic dataset provides a general understanding of the scope and characteristics of research on inverse continuous probability distributions. The dataset comprises 476 publications published between 1968 and 2026 across 333 publication sources, indicating the broad dissemination of research within probability, statistics and related disciplines. The predominance of journal articles, together with the high level of multi-authorship and citation impact, reflects the collaborative and mature nature of the research field. These findings demonstrate that inverse continuous probability distributions have evolved into an active area of research with sustained scholarly interest and expanding interdisciplinary applications.

Table 1: Overview of the Data

Description	**Result**
Time span	1968:2025
Sources (Journals, books)	333
Documents	476
Document average age	12.8
Average citations per doc	33.43
References	4001
Keyword plus (ID)	3664
Author’s Keywords (DE)	1518
Authors	1519
Authors of single-authored docs	72
Single-authored docs	76
Co-authors per doc	3.55
International co-authorships	23.74
Article	387

3.2 Annual Scientific Production

Figure 1 presents the annual scientific production on inverse continuous probability distributions from 1968 to 2026. Research output remained limited during the early years, followed by steady growth after 2000 and a sharp increase from 2015 onwards. The highest publication output was recorded in 2022, with approximately 34 publications, reflecting the growing interest in developing inverse continuous distributions and their applications. The apparent decline in 2025 is due to incomplete database indexing for the current year. Overall, the publication trend indicates that inverse continuous probability distributions have become an active and expanding research area with increasing scientific and interdisciplinary relevance.

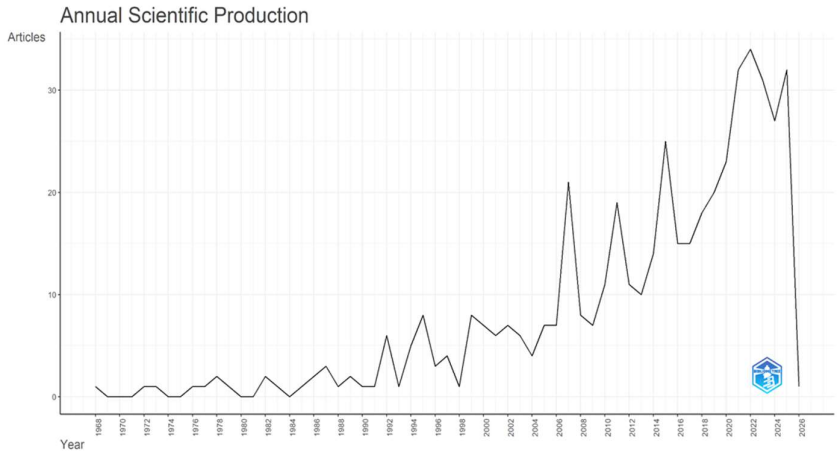


Figure 1: Annual Scientific Production

3.3 Average Citations per Year

Figure 2 presents the average citations received per publication across the study period. Citation impact fluctuates considerably over time, with prominent peaks observed in 1992 and 2015, indicating the publication of highly influential studies during these years. Earlier publications generally received higher average citations due to their longer citation windows and foundational contributions to the field. Although recent publications exhibit lower average citation counts, this is largely attributable to their shorter time available for citation accumulation. Overall, the citation trend demonstrates the sustained scholarly impact of inverse continuous probability distribution research and highlights the lasting influence of key methodological contributions.

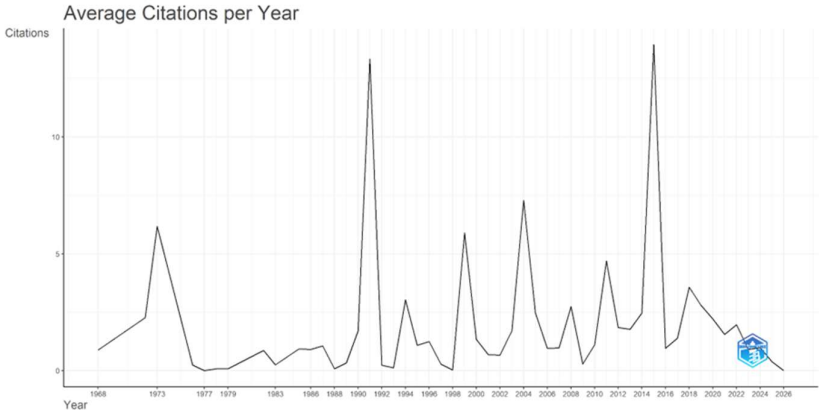


Figure 2: Average Citations per Year

3.4 Life Cycle of Research

The life cycle of research on inverse continuous probability distributions is illustrated through the Cumulative Growth Curve and the Annual Publication Life Cycle. Figure 3 exhibits a typical logistic growth pattern, with slow research development during the initial decades, followed by a rapid increase in cumulative publications after the early 2000s. The curve indicates that more than half of the total publications were produced during the last two decades, highlighting the accelerated expansion of the field. Figure 4 further confirms this trend by showing a continuous rise in annual publications, with the fitted life cycle model predicting a peak around 2023.4 ($R^2 = 0.731$). Although the model projects a decline after the peak, this represents the theoretical life cycle of publication growth rather than an actual decrease in research activity. Overall, the results indicate that inverse continuous probability distribution research has evolved into a mature and rapidly growing field with strong potential for future advancements.

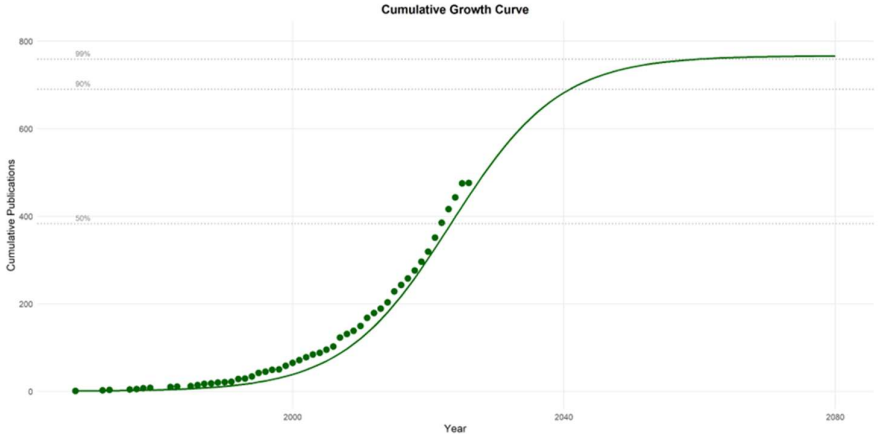


Figure 3: Cumulative Growth Curve

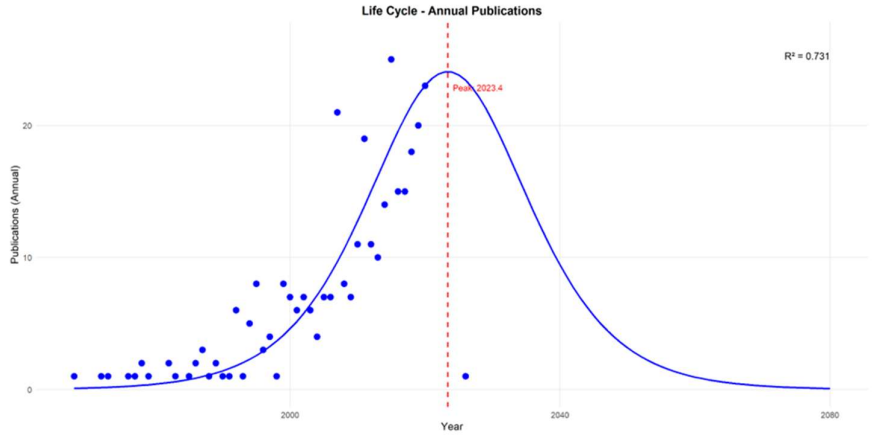


Figure 4: Annual Production

3.5 Three-Field Plot

Figure 5 presents the Three-Field Plot, illustrating the relationships among cited references (CR), authors (AU), and author keywords (KW) in inverse continuous probability distribution research. The plot shows that influential references, such as Stochastic Processes (1953) and A Course in Probability Theory (1974), form the intellectual foundation of the field and are closely associated with leading authors, including Zhu Y., Huang Y., Barát É. and Dautrémer T. These authors are strongly connected to major research themes, particularly probability distributions, probability, probability density functions, and inverse problems. The network highlights the flow of knowledge from foundational literature to active researchers and subsequently to contemporary research topics, demonstrating the central role of probability theory in the development of inverse continuous probability distributions and their expanding applications.

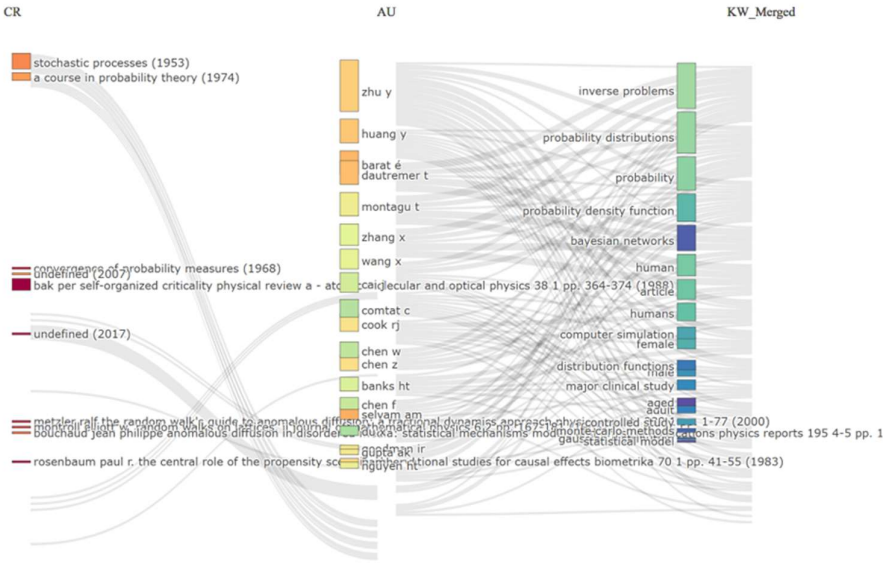


Figure 5: Three Field Plot

3.6 Most Relevant Sources

Figures 6 and 7 and Table 2 concern the leading publication sources and their production over time in inverse continuous probability distribution research. Communications in Statistics – Theory and Methods is the most productive source with 28 publications, followed by Geophysical Journal International and Lecture Notes in Computer Science with 7 publications each. AIP Conference Proceedings, Physica A: Statistical Mechanics and Its Applications, and Reliability: Theory and Applications each contributed 6 publications, while Physical Review E, Statistics in Medicine, and Biometrics also made notable contributions.

The production-over-time analysis shows that research in this field began in the late 1980s and expanded steadily, with a marked increase after 2010 and accelerated growth from 2020 onward. Communications in Statistics – Theory and Methods have consistently remained the leading publication outlet, while contributions from journals in statistics, physics, reliability engineering, computer science, geophysics, and biomedical sciences demonstrate the interdisciplinary growth and increasing scientific relevance of inverse continuous probability distribution research.

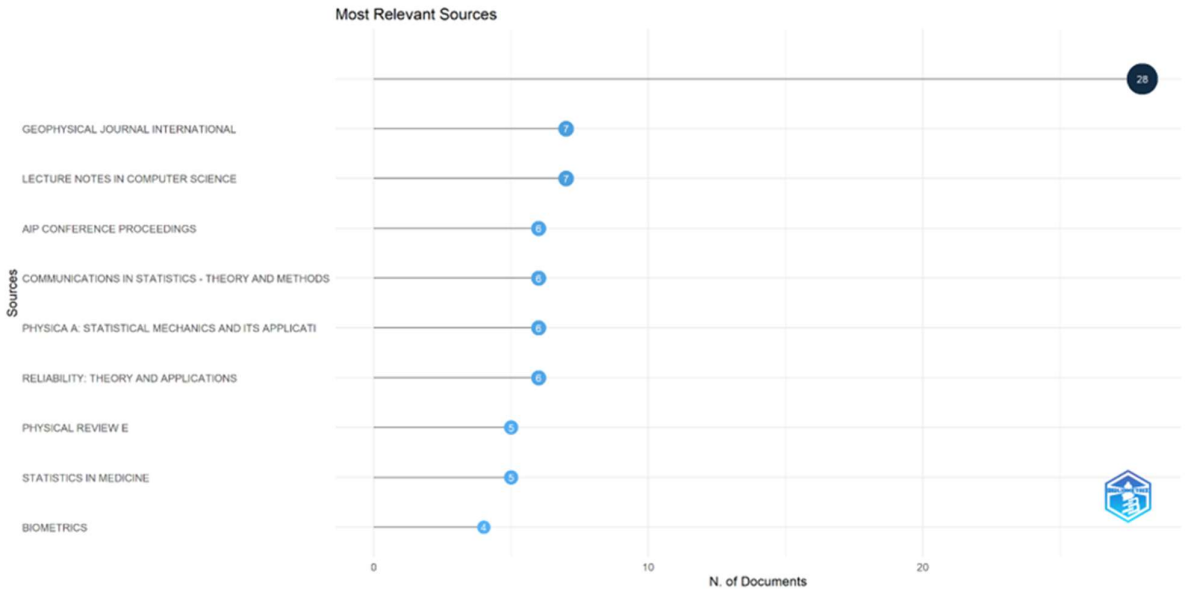


Figure 6: Most Relevant Sources

Table 2: Most Relevant Sources

Sources	**Articles**
COMMUNICATIONS IN STATISTICS – THEORY AND METHODS	28
GEOPHYSICAL JOURNAL INTERNATIONAL	7
LECTURE NOTES IN COMPUTER SCIENCE	7
AIP CONFERENCE PROCEEDINGS	6
COMMUNICATIONS IN STATISTICS - THEORY AND METHODS	6
PHYSICA A: STATISTICAL MECHANICS AND ITS APPLICATIONS	6
RELIABILITY: THEORY AND APPLICATIONS	6
PHYSICAL REVIEW E	5
STATISTICS IN MEDICINE	5
BIOMETRICS	4

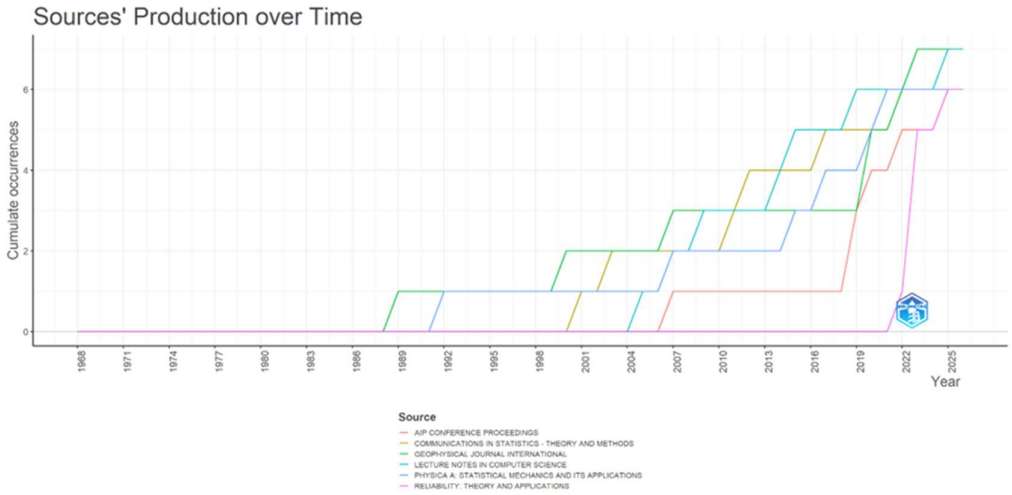


Figure 7: Sources Production Overtime

3.7 Source Local Impact

Figure 8 presents the local impact of publication sources based on the H-index. Geophysical Journal International has the highest local impact with an H-index of 6, followed by Communications in Statistics – Theory and Methods with an H-index of 5. Insurance: Mathematics and Economics, Journal of Statistical Physics, Journal of the American Statistical Association, Physica A: Statistical Mechanics and its Applications, and Statistics in Medicine each record an H-index of 4, while Biometrics and Geophysics have an H-index of 3. These findings indicate that a relatively small group of journals has made a substantial impact on the development of inverse continuous probability distribution research, highlighting their role as the primary sources of influential publications.

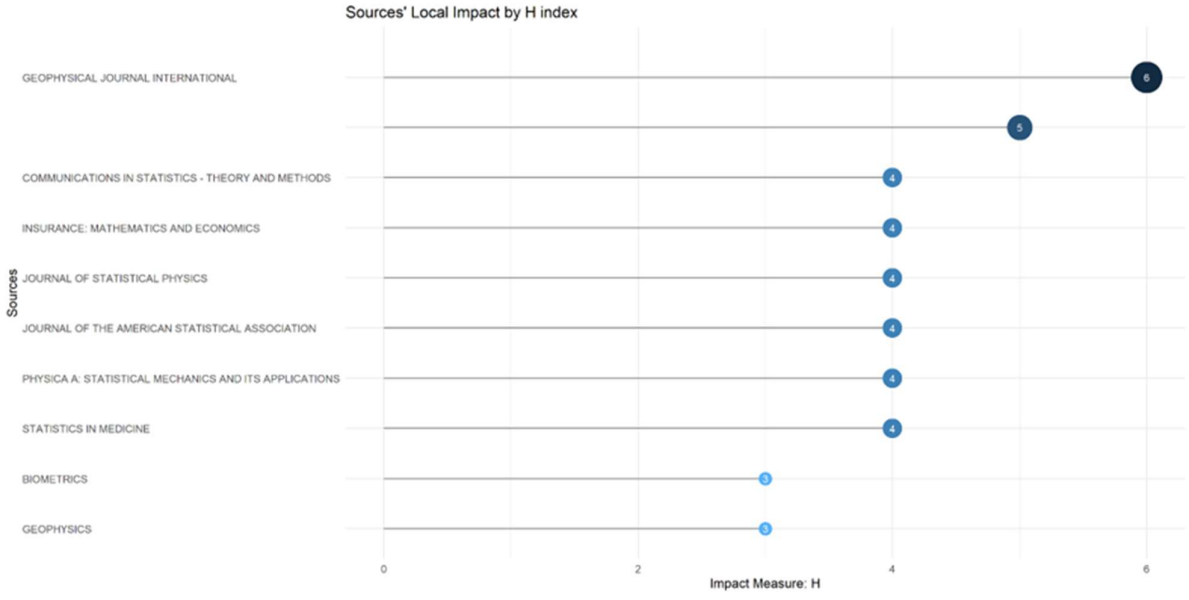


Figure 8: Sources Local Impact

Table 3: Sources Local Impact

Source	h_index	g_index	m_index	TC	NP	PY_start
GEOPHYSICAL JOURNAL INTERNATIONAL	6	7	0.158	305	7	1989
COMMUNICATIONS IN STATISTICS - THEORY AND METHODS	5	19	0.1	397	28	1977
INSURANCE: MATHEMATICS AND ECONOMICS	4	6	0.154	42	6	2001
JOURNAL OF STATISTICAL PHYSICS	4	4	0.125	93	4	1995
JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION	4	4	0.074	365	4	1973
PHYSICA A: STATISTICAL MECHANICS AND ITS APPLICATIONS	4	4	0.089	966	4	1982
STATISTICS IN MEDICINE	4	6	0.114	37	6	1992
BIOMETRICS	4	5	0.308	3453	5	2014
GEOPHYSICS	3	4	0.143	94	4	2006

3.8 Core Sources Based on Bradford's Law

Figure 9 illustrates the distribution of publication sources according to Bradford's Law, identifying the core journals contributing to inverse continuous probability distribution research. The core zone comprises a small group of highly productive journals, including Communications in Statistics – Theory and Methods, Geophysical Journal International, Lecture Notes in Computer Science, AIP Conference Proceedings, Physica A: Statistical Mechanics and its Applications, and Reliability: Theory and Applications. Beyond the core, the number of journals increases while the number of publications per journal decreases, consistent with Bradford's Law. This distribution indicates that research output is concentrated in a limited number of key journals, which serve as the primary sources for disseminating advances in inverse continuous probability distribution research.

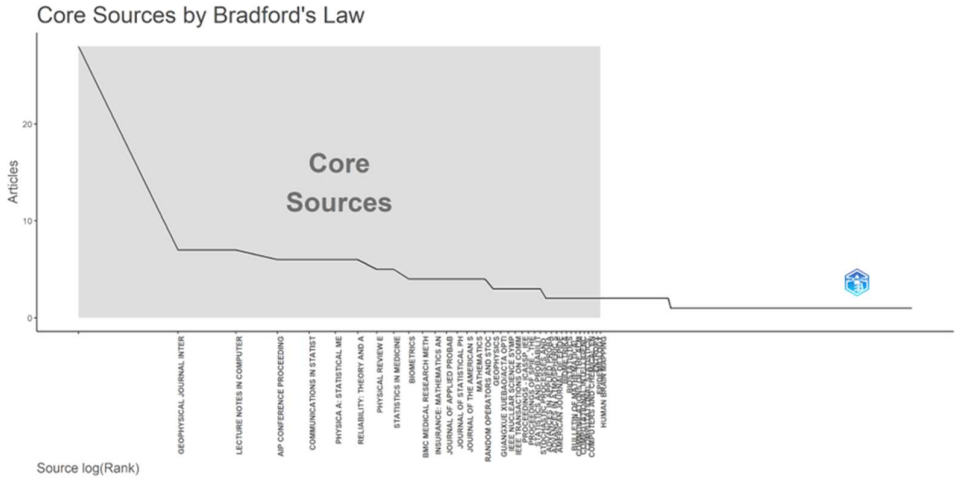


Figure 9 Bradford's Law

3.9 Top Productive and Highly Cited Authors

Table 2 presents the most productive and highly cited authors in inverse continuous probability distribution research. Selvam A.M. is the most productive author with six publications, followed by Zhu Y. with five publications, reflecting sustained contributions to the field. In terms of citation impact, Austin P.C. (3,577 citations) and Stuart E.A. (3,419 citations) are the most influential authors, primarily through their pioneering work on causal inference and propensity score weighting. Robins J.M. has also made significant contributions with 996 citations, particularly in semiparametric models. Although Selvam A.M. and Zhu Y. have comparatively lower citation counts, their continued publication activity demonstrates their active role in advancing research. Overall, the results indicate that author productivity and citation impact do not always coincide, with a few highly influential studies generating substantial citations while other authors contribute through consistent research output.

Table 4: Most Relevant Authors

Author	Articles
SELVAM AM	6
BARAT É	5
DAUTREMER T	5
HUANG Y	5
ZHU Y	5
BAMBER D	4
CHEN Z	4
COOK RJ	4
GOODMAN IR	4
GUPTA AK	4

Table 5: Most Local Cited Authors

Author	Local Citations
BAMBER D	6
GOODMAN IR	6
GUPTA AK	6
NGUYEN HT	6
BARAT É	3
COMTAT C	3
DAUTREMER T	3
MONTAGU T	3
SELVAM AM	3
ALAMATSAZ MH	2

3.10 Word Cloud Analysis

Figure 10 shows the word cloud of author keywords, highlighting the most frequently occurring terms in inverse continuous probability distribution research. The most prominent keywords are probability distributions, inverse problems, and probability, indicating that these constitute the core research themes. Other frequently occurring terms, including probability density function, distribution functions, Bayesian networks, computer simulation, Monte Carlo methods, and parameter estimation, reflect the strong emphasis on statistical modelling and computational techniques. The presence of keywords such as humans, clinical study, male, and female further demonstrates the growing application of inverse continuous probability distributions in medical and health-related research. Overall, the word cloud reveals the multidisciplinary nature of the field, with research spanning theoretical probability, statistical methodology, and diverse real-world applications.



Figure 10: Word Cloud

4. Science Mapping Analysis

Science mapping provides a comprehensive understanding of the intellectual, conceptual, and social structure of a research field by examining relationships among publications, authors, keywords, and institutions. Unlike descriptive bibliometric analysis, which focuses on research productivity and citation performance, science mapping reveals the underlying knowledge structure, collaboration patterns, and thematic evolution of a discipline. In this study, science-mapping techniques, including co-citation analysis, bibliographic coupling, keyword co-occurrence, collaboration network analysis, thematic mapping, and conceptual structure analysis, were employed using Bibliometrix, Biblioshiny, and VOS viewer. These techniques identify influential research clusters, emerging themes, and collaborative networks, providing deeper insights into the development and future directions of inverse continuous probability distribution research.

4.1 Collaboration Network Analysis

Figure 11 illustrates the collaboration network among the most active authors in inverse continuous probability distribution research. The network consists of several distinct collaboration clusters, indicating that research is primarily conducted within well-defined groups rather than through a single, highly interconnected community. Strong collaborative relationships are observed among Montagu T., Dautrémer T., Barát É., and Comtat C., forming one of the largest clusters. Another prominent cluster includes Goodman I., Gupta A.K., Nguyen N., and Bamber D., while Chen Z., Huang Y., and Zhu Y. lead additional collaborative groups. Although connections between clusters are relatively limited, the presence of multiple active research teams reflects the growing collaborative nature of the field. These findings suggest that strengthening collaboration across research groups could enhance knowledge exchange, foster methodological innovation, and promote broader interdisciplinary applications of inverse continuous probability distributions.

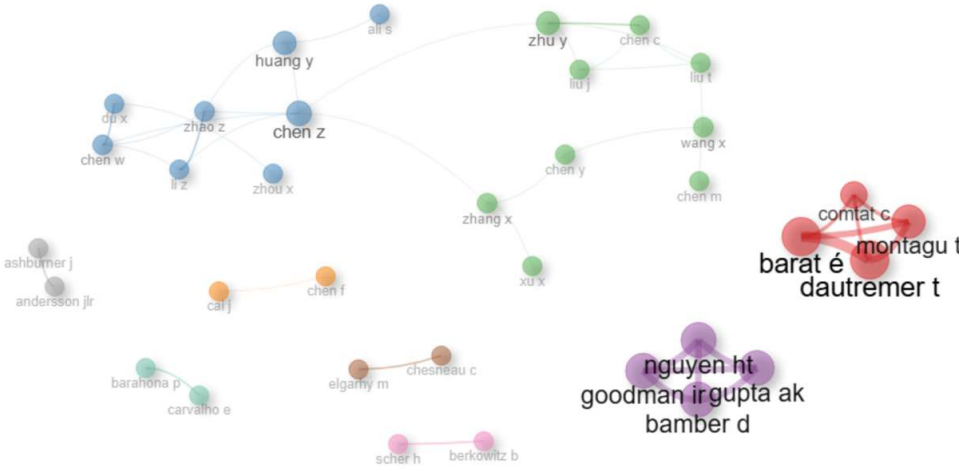


Figure 11: Collaboration Network

4.2 Co-citation Network Analysis

Figure 12 presents the co-citation network, illustrating the intellectual structure of research on inverse continuous probability distributions. The network is organized into several citation clusters, each representing closely related research themes and frequently co-cited publications. Foundational works by Bak et al. (1988), Metzler et al. (2000), and Comtet (2008) occupy central positions within the network, indicating their significant influence on subsequent studies. The presence of distinct yet interconnected clusters suggests that the field has evolved through multiple research directions, including probability theory, stochastic processes, fractional dynamics, and statistical modelling. Overall, the co-citation network highlights the key publications that have shaped the development of inverse continuous probability distribution research and reveals its well-established intellectual foundation.

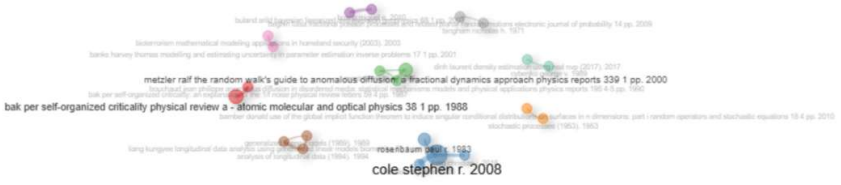


Figure12: Co-citation Network

4.3 Historiographic Analysis

Figure 13 presents the historiograph of inverse continuous probability distribution research, illustrating the chronological development and citation relationships among influential publications. The network reveals several distinct citation paths, highlighting the evolution of the field through successive contributions. Early studies, such as Selvam (1992), represent foundational work, while publications by Barát (2007), Fall et al. (2011), and Bamber et al. (2011) contributed to the expansion of the research area. More recent studies, including Meerschaert et al. (2011) and Na (2019), demonstrate the continued development of new methodologies and applications. Overall, the historiograph shows a progressive evolution of the field, with influential publications serving as milestones that have guided subsequent research on inverse continuous probability distributions.

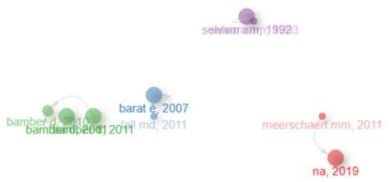


Figure 13: Historiograph

4.4 Co-occurrence Network Analysis

Figure 14 shows the keyword co-occurrence network, revealing the conceptual structure of research on inverse continuous probability distributions. The network is divided into two major clusters. The red cluster is centred on probability, inverse problems, and probability distributions, with strong links to topics such as probability density functions, computer simulation, Bayesian networks, parameter estimation, and Monte Carlo methods, reflecting the theoretical and computational aspects of the field. The blue cluster is dominated by keywords such as humans, human, article, major clinical study, male, and female, highlighting the application of inverse probability methods in biomedical and clinical research. The close connections within and between the clusters indicate that the field integrates theoretical probability with practical applications, demonstrating the interdisciplinary nature and expanding scope of inverse continuous probability distribution research.

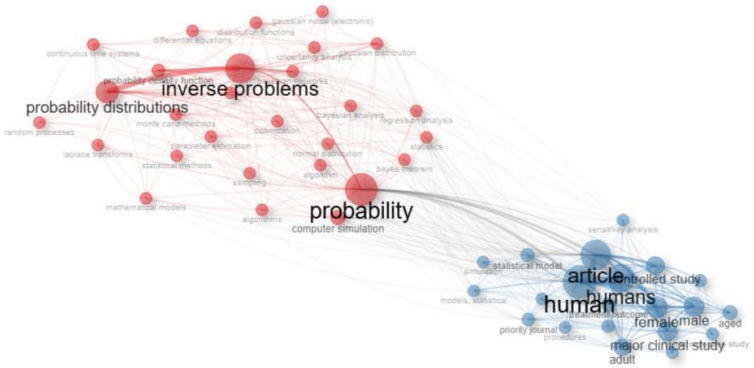


Figure 14: Co-occurrence Network

4.5 Thematic Map Analysis

Figure 15 presents the thematic map, which classifies research themes according to their centrality (relevance) and density (development). The motor themes quadrant is dominated by human, humans, and article, indicating well-developed and influential topics with broad applications, particularly in biomedical and clinical research. The basic themes include inverse problems, probability distributions, and probability, representing the fundamental concepts that underpin research in the field. The emerging or declining themes consist of computer simulation, simulation, and Bayes theorem, suggesting topics with lower development but potential for future growth. In contrast, the niche themes, including conditional expectations, conditional probability measures, and distributions on hypersurfaces, are highly developed but relatively specialized. Overall, the thematic map indicates that inverse continuous probability distribution research is built upon strong theoretical foundations while continuing to expand into computational and interdisciplinary application areas.

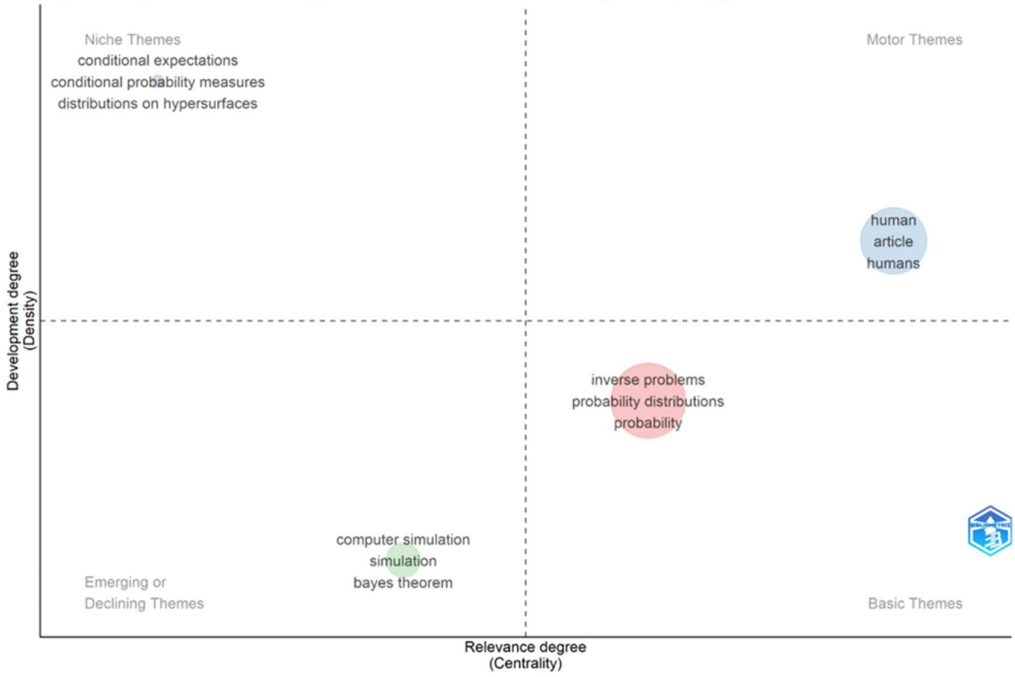


Figure 15: Thematic Map

4.6 Country Collaboration Analysis

Figures 16 and 17 illustrate the global collaboration network and the citation impact of countries contributing to inverse continuous probability distribution research, while Table 5 summarizes publication productivity and international collaboration. The United States is the most productive country with 62 publications (13.0%), followed by China with 52 publications (10.9%). Although the United States has the highest number of publications, Canada and France exhibit the highest degree of international collaboration, each with a Multiple Country Publications (MCP) rate of 36.4%, followed by Germany (33.3%), India (30.8%), and the United Kingdom (28.6%). In contrast, the United States (17.7%), China (21.2%), Iran (12.5%), and Spain (12.5%) show lower proportions of internationally co-authored publications, indicating a greater reliance on domestic research collaborations.

The global collaboration map further reveals strong research links among North America, Europe, and Asia, with the United States serving as a major hub connecting countries such as China, Canada, the United Kingdom, Germany, and Australia. Citation analysis shows that Canada is the most influential country with 4,506 citations, followed by the United States (2,333 citations) and China (602 citations), while Israel, the United Kingdom, Germany, France, Iran, Australia, and the Netherlands also make notable contributions. These findings demonstrate that although research productivity is concentrated in a few leading countries, international collaboration and citation impact are essential factors driving the global development of inverse continuous probability distribution research.

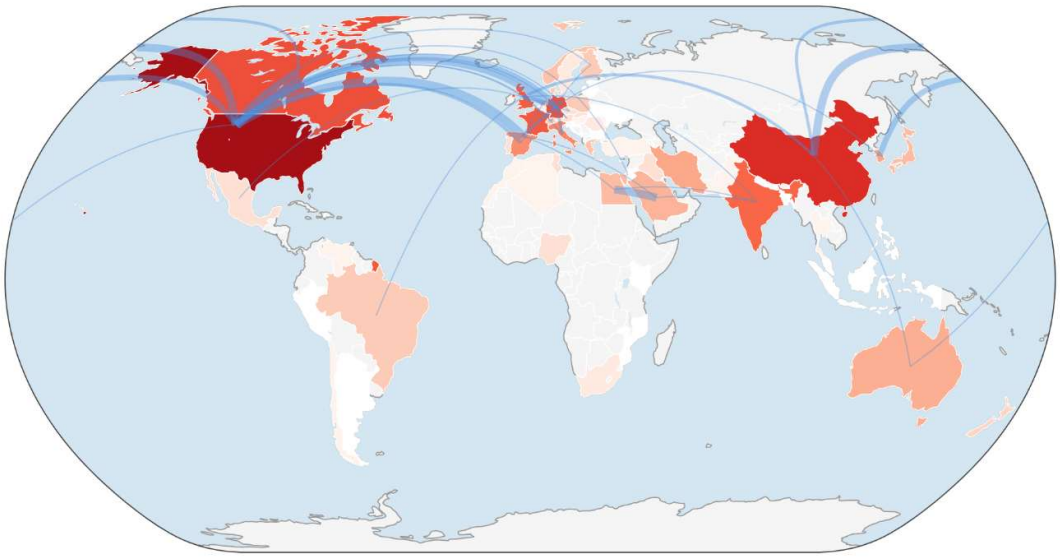


Figure 16: Countries' Collaboration World Map

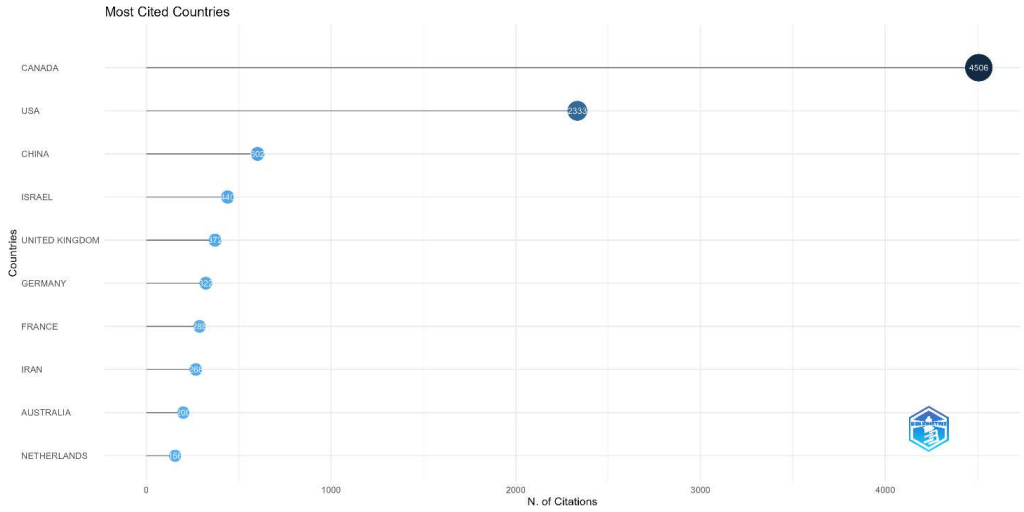


Figure 17: Most cited Countries'

Table 6: Corresponding Author's Countries

Country	Articles	Articles %	SCP	MCP	MCP %
USA	62	13	51	11	17.7
CHINA	52	10.9	41	11	21.2
CANADA	22	4.6	14	8	36.4
FRANCE	22	4.6	14	8	36.4
GERMANY	18	3.8	12	6	33.3
UNITED KINGDOM	14	2.9	10	4	28.6
INDIA	13	2.7	9	4	30.8
ITALY	10	2.1	8	2	20
IRAN	8	1.7	7	1	12.5
SPAIN	8	1.7	7	1	12.5

5. Discussion

The bibliometric analysis reveals a substantial increase in research on inverse continuous probability distributions over the past five decades, with publication output accelerating significantly after 2015. This growth reflects the increasing importance of inverse continuous probability distributions in probability theory, reliability analysis, survival modelling, and other interdisciplinary applications. Citation analysis further indicates that several foundational studies continue to exert a lasting influence, providing the theoretical basis for subsequent methodological developments.

The collaboration network demonstrates that research is organized into several active author groups, although collaboration between clusters remains limited. A small number of journals, particularly Communications in Statistics – Theory and Methods, Geophysical Journal International, and Lecture Notes in Computer Science, account for a significant proportion of the publications, confirming their role as the primary dissemination platforms. Similarly, a limited number of authors have contributed substantially to the development of the field, while countries with established statistical research communities dominate scientific productivity and international collaboration.

Science-mapping analyses reveal that the research has evolved from classical probability theory and inverse continuous probability distribution modelling toward computational and interdisciplinary applications. Thematic and keyword analyses identify probability distributions, inverse problems, and probability as the core research themes, while computer simulation, Bayesian methods, and parameter estimation represent emerging directions. The increasing presence of clinical and biomedical keywords also highlights a transition from predominantly theoretical studies to broader applications in medicine, engineering, finance, environmental science, and data science. Overall, the findings indicate that inverse continuous probability distribution research has developed into a mature and expanding field with strong potential for future methodological innovation and interdisciplinary collaboration.

6. Applications and Emerging Research Opportunities

Research on inverse continuous probability distributions has expanded beyond theoretical developments to a wide range of practical applications. These distributions are extensively employed in reliability engineering and survival analysis for modelling lifetime and failure-time data, as well as in actuarial science and finance for risk assessment and extreme-event modelling. Increasing applications are also evident in biomedical research, environmental science, hydrology, and engineering, where flexible inverse models provide improved representation of complex stochastic processes [12], [13]. Furthermore, emerging research trends indicate growing interest in integrating inverse continuous probability distributions with Bayesian inference, machine learning, artificial intelligence, and computational statistics [2], [4]. These developments demonstrate the versatility of inverse continuous probability distributions and highlight their potential for addressing complex data analysis problems across diverse scientific disciplines.

7. Limitations and Future Scope

This study has several limitations. First, the analysis is based solely on the Scopus database, which may exclude relevant publications indexed in other databases such as Web of Science, Dimensions, or Google Scholar. Second, only English-language publications were considered, potentially omitting valuable research published in other languages. In addition, bibliometric indicators primarily measure publication and citation patterns and do not directly assess the scientific quality or methodological rigor of individual studies.

Future research may incorporate multiple bibliographic databases to provide a more comprehensive overview of the field. Greater emphasis should also be placed on generalized inverse continuous probability distribution families, Bayesian inference, artificial intelligence, and machine learning applications. Furthermore, the development of open-source statistical software and increased interdisciplinary collaborations will facilitate wider adoption of inverse continuous probability distributions and promote further methodological and applied research.

8. Conclusion

This study presents a comprehensive bibliometric analysis of research on inverse continuous probability distributions using 476 Scopus-indexed publications spanning the period 1968–2026. By integrating descriptive bibliometric indicators with science-mapping techniques, the study provides a systematic overview of publication trends, influential authors, journals, countries, collaboration networks, and the intellectual and conceptual structure of the

field. The findings demonstrate a steady growth in research output and an increasing shift from theoretical distribution development to interdisciplinary applications.

From a theoretical perspective, the analysis identifies the foundational literature, core research themes, and evolving knowledge structure that have shaped the development of inverse continuous probability distributions. Practically, the results highlight their growing applications in reliability engineering, survival analysis, biomedical research, finance, environmental science, and computational statistics. The study also identifies promising future directions, including generalized inverse continuous probability distribution families, Bayesian inference, artificial intelligence, machine learning, and enhanced international collaboration. Overall, this work serves as a valuable reference for researchers by summarizing the current state of the field and providing a foundation for future methodological and applied research.

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