KINGDOM OF SAUDI ARABIA
Northern Border University (NBU)
Journal of the North for Basic & Applied Sciences(JNBAS)
p - ISSN : 1658 -7022 / **e-ISSN:** 1658 - 7014
www.nbu.edu.sa
s.journal@nbu.edu.sa

A Bibliometric Analysis of Probability and Statistics Research in Saudi Arabia

Zakariya M. S. Mohammed
Center for Scientific Research and Entrepreneurship, Northern Border University, Arar, Saudi Arabia
Department of Mathematics, College of Science, Northern Border University, Arar, Saudi Arabia

(**Received:** 22-03-2025; **Accepted**: 16-05-2025)

Abstract: This study presents a comprehensive bibliometric analysis of research output in probability and statistics in Saudi Arabia over the past decade (2014–2023). A total of 1,546 English-language articles indexed in the Web of Science database were extracted. Bibliometric analysis - a computationally intensive statistical method – is used to analyze the extracted research output. The analysis identifies key research productivity trends, prolific authors, leading institutions, prominent journals, international collaborations, and emerging research topics and themes. R Bibliometrix is used to facilitate statistical analysis.

The results indicate a significant upward trajectory in research productivity, with publications increasing from 95 in 2014 to 204 in 2023. The field also demonstrates high international collaboration (79.6%) and a strong citation impact, averaging 13.2 citations per article. King Abdulaziz University and King Abdullah University of Science and Technology (KAUST) were identified as the most productive institutions. Aslam M and Genton MG were the most prolific authors, while Rue H achieved the highest average citations per publication. The most prominent journal is Advances and Applications in Statistics, which published 110 articles, followed by Bioinformatics with 108 articles. This highlights the diverse nature of statistical research in Saudi Arabia, encompassing theoretical statistics, computational methods, applied statistics, and interdisciplinary fields such as bioinformatics. The USA leads the collaboration network with the highest number of connections, indicating strong research ties between Saudi Arabian institutions and American researchers.

Dominant research themes focus on statistical modeling, inference, prediction, and machine learning. This study offers valuable insights for policymakers by identifying key institutions capable of leading national research initiatives, for academic institutions seeking to strengthen research in statistics, for researchers aiming to establish collaborations with leading scholars, and for postgraduate students selecting institutions for advanced studies in statistics.

Keywords: Probability and Statistics, Bibliometric Analysis, Saudi Arabia, R Bibliometrix

DOI: 10.12816/0062226

(*) **Corresponding Author**:
Zakariya M. S. Mohammed
Center for Scientific Research and Entrepreneurship, Northern Border University, Arar, Saudi Arabia
Department of Mathematics, College of Science, Northern Border University, Arar, Saudi Arabia
E-mail: zakariya.mohammed@nbu.edu.sa

المملكة العربية السعودية
جامعة الحدود الشمالية (NBU)
مجلة الشمال للعلوم الأساسية والتطبيقية (JNBAS)
طباعة ردمد: 1658-7022 / إلكتروني - ردمد: 1658-7014
www.nbu.edu.sa
http://jnbas.nbu.edu.sa

تحليل ببليومتري لأبحاث الاحصاء والاحتمالات في المملكة العربية السعودية

زكريا محمد صالح محمد
مركز الأبحاث العلمية وريادة الأعمال، جامعة الحدود الشمالية، عرعر، المملكة العربية السعودية
قسم الرياضيات، كلية العلوم، جامعة الحدود الشمالية، عرعر، المملكة العربية السعودية

(**تاريخ الاستلام:** 22-03-2025؛ **تاريخ القبول:** 16-05-2025)

مستخلص البحث: تقدم هذه الدراسة تحليلاً ببليومتريًا شاملاً لمخرجات البحث العلمي في مجال الاحتمالات والإحصاء في المملكة العربية السعودية خلال العقد الماضي (2014-2023). اعتمدت الدراسة على الأوراق العلمية المنشورة باللغة الإنجليزية في شبكة العلوم في الفترة من 2014 الى 2023 وبلغ عددها 1546 ورقة علمية. استخدمت الدراسة التحليل الببليومتري - وهو أسلوب إحصائي مكثف حاسوبيًا - لتحليل تلك المخرجات البحثية. يحدد التحليل الاتجاهات الرئيسية للإنتاج البحثي، والمؤلفين ذوي الإنتاج العلمي الكبير، والمؤسسات الرائدة، والمجلات البارزة، والتعاون الدولي، ومواضيع البحث الناشئة. استُخدمت أداة R Bibliometrix في التحليل الإحصائي.

تشير النتائج إلى مسار تصاعدي ملحوظ في إنتاجية البحث، حيث ارتفع عدد المنشورات من 95 في عام 2014 إلى 204 في عام 2023. كما يُظهر هذا المجال تعاوناً دولياً عالياً (79.6%) وتأثيراً قوياً في الاستشهادات، بمتوسط 13.2 استشهاداً لكل مقال. أظهر النتائج تفوق جامعة الملك عبد العزيز وجامعة الملك عبد الله للعلوم والتقنية (KAUST) كأكثر المؤسسات إنتاجية. كان أسلم م. وجينتون م. ج. أكثر المؤلفين إنتاجًا، بينما حققت رو هـ. أعلى متوسط استشهادات لكل منشور. أبرز المجلات هي مجلة " Advances and Applications in Statistics "، التي نشرت 110 مقالات، تليها مجلة " Bioinformatics " بـ 108 مقالات. يُبرز هذا تنوع البحث الإحصائي في المملكة العربية السعودية، والذي يشمل الإحصاءات النظرية، والأساليب الحسابية، والإحصاءات التطبيقية، والمجالات متعددة التخصصات مثل المعلوماتية الحيوية. تتصدر الولايات المتحدة شبكة التعاون بأكبر عدد من الروابط، مما يشير إلى روابط بحثية قوية بين المؤسسات السعودية والباحثين الأمريكيين. تركز مواضيع البحث السائدة على النمذجة الإحصائية، والاستدلال، والتنبؤ، والتعلم الآلي.

تقدم هذه الدراسة رؤى قيّمة لصانعي السياسات من خلال تحديد المؤسسات الرئيسية القادرة على قيادة مبادرات البحث الوطنية، وللمؤسسات الأكاديمية التي تسعى إلى تعزيز البحث في الإحصاء، وللباحثين الذين يسعون إلى إقامة تعاون مع كبار العلماء، ولطلاب الدراسات العليا الذين يختارون مؤسسات للدراسات المتقدمة في الإحصاء.

الكلمات المفتاحية: الاحتمالات والإحصاء، التحليل الببليومتري، المملكة العربية السعودية، R Bibliometrix.

(*) للمراسلة:
زكريا محمد صالح محمد
مركز الأبحاث العلمية وريادة الأعمال، جامعة الحدود الشمالية، عرعر، المملكة العربية السعودية.
قسم الرياضيات، كلية العلوم، جامعة الحدود الشمالية، عرعر، المملكة العربية السعودية.
البريد الالكتروني: zakariya.mohammed@nbu.edu.sa

DOI: 10.12816/0062226

1. Introduction

Statistics has a history that spans several centuries, evolving from basic data collection methods used for administrative and governmental purposes to a complex and independent discipline that influences science and discoveries. In the late 19th and early 20th centuries, statistics began to emerge as an independent discipline, driven by the contributions of pioneer scientists such as Francis Galton, Karl Pearson, and Ronald Fisher. Galton's work on correlation and regression, Pearson's contributions to biometry and popular statistical techniques such as the Chi-square test, and Fisher's introduction of maximum likelihood estimation and the foundation of the frequentist approach to statistical inference have immensely contributed to the establishment of statistics as a discipline. In the early 20th century, Karl Pearson established the first department of statistics at University College London. Since then, research in statistics has evolved, resulting in further statistical theories and techniques that have played a central role in scientific research and discovery across all fields (Bessant and MacPherson 2002; Cozzens 2013; Fraser 2018; Gigerenzer et al. 1990; Porter 2020; Salsburg 2002; Stigler 2002).

Technological advances have enabled the utilization of computationally intensive statistical methods such as simulation-based inference, bootstrap, and Bayesian approaches to statistical inference. Additionally, these technological innovations have resulted in the availability of big data, necessitating more advanced and scalable statistical methods to handle high-dimensional and unstructured data. Furthermore, artificial intelligence, machine learning, and data science have expanded and revolutionized the scope and methods of statistics, opening new research avenues and directions (Bispo et al. 2022; Blei and Smyth 2017; Efron and Hastie 2021; Efron 2012; Weihs and Ickstadt 2018). Consequently, the discipline is witnessing growing interest from scholars and practitioners to meet the increasing need for methodological and technological advances that enable the analysis and understanding of vast amounts of data for the benefit of mankind.

Saudi Arabia has experienced rapid growth in scholarly publications. The total scholarly output increased from 24,057 in 2018 to 59,016 in 2022, with a 25% increase. Meanwhile, the total number of authors participating in research increased from 23,766 in 2018 to 45,862 in 2022, with an 18% annual increase (Saudi Arabia's Leap in Research and Development Excellence 2023). While several studies have investigated the scientific landscape of fields of research in Saudi Arabia such as neurosciences (Alhibshi et al. 2020), sustainable water planning and management (Almulhim et al. 2021), and cardiovascular disease (Saquib et al. 2017)—no study has been conducted to analyze research output within the field of probability and statistics. This study aims to address this gap by identifying productivity trajectories, the most influential institutions, prolific authors, key publication sources, and emerging topics and themes. To achieve this, a bibliometric analysis was conducted using data extracted exclusively from the Web of Science database, chosen for its comprehensive coverage and high-quality indexing of scientific research (Birkle et al., 2020; Singh et al., 2021). Globally, bibliometric methods have been widely employed to assess scientific output across various disciplines, including mathematics (Tsilika, 2023), machine learning (Ahmed et al., 2022), and big data (Liao et al., 2018).

This study is significant for its potential to offer strategic insights for future research, inform policymakers by identifying leading scholars and institutions, highlight existing research gaps, and assist prospective graduate students in selecting institutions for advanced studies.

The rest of the article is structured as follows: In Section 2, the methodology is presented, whereas Sections 3, 4, and 5 present the results, discussion, and conclusion, respectively.

2. Methods

2.1 Data extraction

Scientific publications on statistics and probability were extracted from the Web of Science database using the Web of Science category "Statistics and Probability". To capture the most recent trend and patterns articles published in the last 10 years were extracted, that is article that are published from 2014 to 2023. Only, articles written in English-language were considered. The search returned 1546 articles. The study exclusively utilizes the Web of Science database due to its high quality indexed scientific publications (Birkle et al. 2020; Singh et al. 2021).

2.2 Data analysis

Bibliometric analysis is a computationally intensive statistical method used to examine large volumes of scientific literature. It is a widely adopted and effective approach for exploring and analyzing research output, enabling the identification of evolving trends and emerging areas within a specific field, and reflecting the evolution and complexity of research landscapes. Therefore, bibliometric analysis identifies key research areas, offering researchers a solid foundation for contextualizing significant contemporary contributions and uncovering potential directions for future studies. Details on concepts, definitions, formulas, and steps for

conducting such analysis could be found in (Donthu, 2021 & Zupic I and Čater T, 2015) be This study utilizes bibliometric analysis to understand the evolution of statistics and probability research in Saudi Arabia in the last 10 years. Various bibliometric indicators were used, encompassing trend analyses, authorship analysis, citation and impact analysis, most prolific sources along with identification of most pertinent affiliations, and evolving themes and topics. Bibliometrix, an R package, is used to conduct the analysis and visualize the findings (Aria et al, 2017).

3. Results

3.1 Overview

A total of 1,546 articles indexed in the Web of Science database were analyzed. These articles were published in 140 sources ((journals, conference proceedings, etc) with 158 being single-authored. The average number of co-authors per article is 3.5. Additionally, the percentage of international co-authorships is notably high at 79.6%. The average document age is reported as 4.6 years, and each document receives an average of 13.2 citations, highlighting the high quality of these publications. The number of publications doubled from 95 articles in 2014 to 204 articles in 2023. The trend shows a general increase in research output over the years, reflecting an overall positive trajectory in Saudi Arabia's research productivity in probability and statistics.

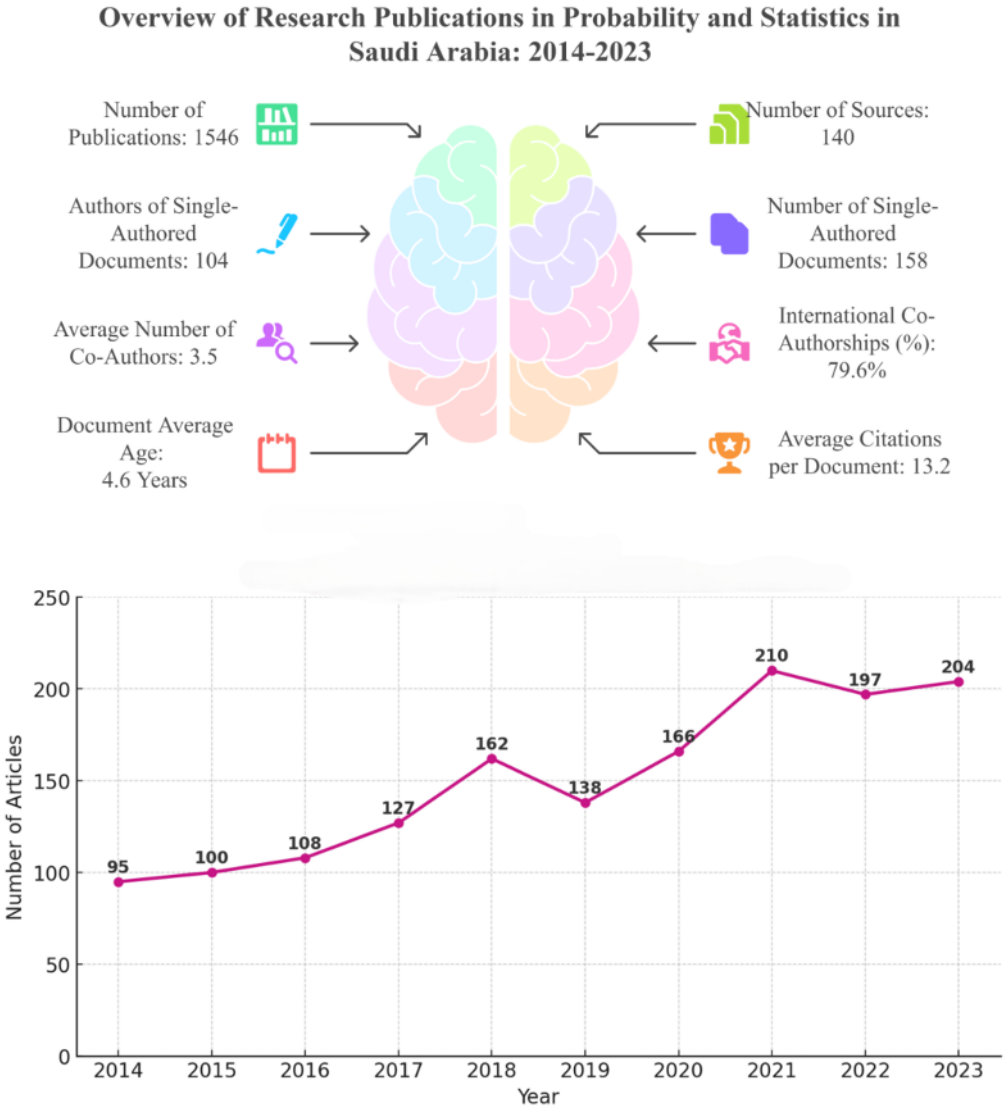

Figure 1: Key bibliometric indicators

3.2 Authorship Analysis

Table 2 presents a comparative analysis of the most productive authors and publication influence measured by citation impact using citation metrics; namely, h-index, g-index, m-index, total citations, and average citations per publication. In terms of productivity, Aslam M has the highest number of total publications (112), followed by Genton MG (104). However, Genton MG exhibits a higher h-index (23) and g-index (34), indicating that his work is more frequently cited and has a greater cumulative influence compared to Aslam M (h-index = 18, g-index = 25). Genton MG also has the highest m-index (2.09), suggesting a strong research impact relative to the duration of his career. Despite having only 45 publications, Rue H has the highest g-index (36), reflecting a strong citation impact for his top-cited papers. Furthermore, Rue H has the highest average citation per publication (29.5), indicating that his research is highly influential. Other notable contributors to research productivity include Sun Y (48), Balakrishnan N (47), Rue H (45), Gao X (41), Huser R (40), Jun CH (36), Riaz M (36), and Ombao H (34). The results reflect the significant contributions of these researchers, particularly Aslam M and Genton MG. This trend indicates a strong research presence in the field of statistics and probability in Saudi Arabia.

Table 1: Most productive authors and comparative analysis of their impacts

Author	Total Publications	H-index	G-index	M-index	Total citation	Average citation
Aslam M	112	18	25	1.8	1105	9.9
Genton MG	104	23	34	2.1	1558	15.0
Sun Y	48	12	19	1.1	459	9.6
Balakrishnan N	47	14	19	1.3	513	10.9
Rue H	45	13	36	1.6	1329	29.5
Gao X	41	15	27	1.5	806	19.7
Huser R	40	14	27	1.4	788	19.7
Riaz M	36	14	24	1.3	622	17.3
Jun CH	36	13	20	1.3	501	13.9
Ombao H	34	8	14	1	246	7.2

3.3 Source Analysis

Table 2 presents the top 10 sources of publications in the field of probability and statistics, reporting the number of articles published in each journal. The most prominent journal is Advances and Applications in Statistics, where 110 articles were published, followed by Bioinformatics with 108 articles and the Pakistan Journal of Statistics and Operation Research with 104 articles. Other major sources include Communications in Statistics-Theory and Methods (92 articles), Communications in Statistics-Simulation and Computation (88 articles), Hacettepe Journal of Mathematics and Statistics (66 articles), Journal of Statistical Computation and Simulation (46 articles) and Fuzzy Sets and Systems (31 articles), Journal of Applied Statistics (30 articles), and Statistics and Computing (27 articles).

Table 2: Top 10 sources of publications

Rank	Source	Number of Published Articles
1	ADVANCES AND APPLICATIONS IN STATISTICS	110
2	BIOINFORMATICS	108
3	PAKISTAN JOURNAL OF STATISTICS AND OPERATION RESEARCH	104
4	COMMUNICATIONS IN STATISTICS-THEORY AND METHODS	92
5	COMMUNICATIONS IN STATISTICS-SIMULATION AND COMPUTATION	88
6	HACETTEPE JOURNAL OF MATHEMATICS AND STATISTICS	66
7	JOURNAL OF STATISTICAL COMPUTATION AND SIMULATION	46
8	FUZZY SETS AND SYSTEMS	31
9	JOURNAL OF APPLIED STATISTICS	30
10	STATISTICS AND COMPUTING	27

3.4 Affiliation Analysis

Regarding most productive and influential research hubs in the areas of probability and statistics, King Abdulaziz University leads with 661 published articles, followed closely by King Abdullah University for Science and Technology (KAUST) with 632 articles. These two universities dominate the list, contributing a significantly higher number of publications compared to the others, indicating their strong research emphasis. King Saud University, with 144 articles. Other institutions with extensive contributions include Qassim University (113 articles), King Khalid University (82 articles), Taibah University (75 articles), Prince Sattam Bin Abdulaziz University (74 articles), King Fahd University for Petroleum and Minerals (72 articles), Umm Al Qura University (46 articles), and Imam Mohammad Ibn Saud Islamic University (41 articles).

Table 3: Top 10 most productive institutions

Rank	Affiliation	Number of Articles
1	King Abdulaziz University	661
2	King Abdullah University for Science and Technology (KAUST)	632
3	King Saud University	144
4	Qassim University	113
5	King Khalid University	82
6	Taibah University	75
7	Prince Sattam Bin Abdulaziz University	74
8	King Fahd University for Petroleum and Minerals	72
9	Umm Al Qura University	46
10	Imam Mohammad Ibn Saud Islamic University	41

3.5 Collaboration and Networking Analysis

Table 4 presents collaboration and networking analysis of Saudi Arabia's research ties in probability and statistics, showing the number of collaborative connections with different countries. The USA leads the collaboration network with the highest number of connections (249), indicating strong research ties between Saudi Arabian institutions and American researchers. This is followed by Egypt (225 connections), Pakistan (173 connections), China (152 connections), Canada (105 connections), United Kingdom (104 connections), India (103 connections), France (65 connections), Korea (58 connections), and Tunisia (58 connections).

Table 4: Collaboration and Networking Analysis

Rank	Collaborating Country	Number of connections
1	United States of America	249
2	Egypt	225
3	Pakistan	173
4	China	152
5	Canada	105
6	United Kingdom	104
7	India	103
8	France	65
9	Korea	58
10	Tunisia	58

3.6 Co-words and Term Frequency Analysis

The word cloud in Figure 2 visually represents the most frequently occurring terms in probability and statistics research in Saudi Arabia. The size of each word reflects how frequently it appears, with larger words indicate higher frequency. The most dominant words in the word cloud include "model", "inference", "prediction", "regression", and "distributions", suggesting that research in this field focuses on statistical modeling, predictive analytics, and inferential statistics. Other frequently occurring words are "classification" and "algorithm" indicating interest in machine learning.

Figure 2: Word Cloud

4. Discussion

This study aimed to analyze the scientific landscape of probability and statistics research in Saudi Arabia by identifying productivity trends, the most influential institutions, prolific authors, relevant publication sources, key collaborating countries, and trending keywords and themes. A total of 1,546 articles indexed in the Web of Science database were analyzed. The average number of co-authors per article is 3.5, indicating a collaborative research environment. Additionally, the percentage of international co-authorships is notably high (79.6%), reflecting strong global research connections. The average citation per document is 13.2, highlighting the high quality of these publications. The overall trend shows a positive trajectory in Saudi Arabia's research productivity in probability and statistics, reflecting the efforts made by the Saudi government and institutions to improve the research environment and provide funding for research.

Authorship analysis highlights the leading contributions of Aslam M (112 articles) and Genton MG (104 articles). However, Genton MG exhibits a higher h-index (23) and g-index (34), indicating that his work is more frequently cited and influential compared to Aslam M (h-index = 18, g-index = 25). Meanwhile, Rue H, despite having only 45 publications, has the highest g-index (36), reflecting a strong citation impact for his top-cited papers. Furthermore, Rue H has the highest average citation per publication (29.5), demonstrating the significant influence of his research.

Source analysis reveals a diverse range of statistical research areas, including theoretical statistics, computational methods, applied statistics, and interdisciplinary fields such as bioinformatics and fuzzy systems. The dominance of journals focusing on statistical applications and computation suggests a growing trend in integrating advanced statistical techniques with real-world applications.

Affiliation analysis identifies King Abdulaziz University and KAUST as the leading research institutions in probability and statistics, with a substantial gap between them and the rest. The results suggest that research activity is concentrated in a few major universities, while others contribute at a relatively lower level.

The collaboration analysis reveals that the United States is Saudi Arabia's top research partner in probability and statistics, with 249 collaborative connections. This is followed by Egypt (225), Pakistan (173), China (152), Canada (105), the United Kingdom (104), India (103), France (65), South Korea (58), and Tunisia (58), reflecting a strong international research network across diverse regions. This finding is consistent with the notably high percentage of international collaboration (79.6%)

The word cloud analysis reflects a strong emphasis on statistical modeling, inference, and prediction, indicating that probability and statistics research in Saudi Arabia is application-oriented and linked to emerging areas such as machine learning and predictive analytics. It also highlights the interdisciplinary nature of statistics and the convergence of statistics with emerging fields such as data science and machine learning.

5. Conclusion

Key Findings:

- There is positive growth in probability and statistics research in Saudi Arabia, with two universities—King Abdulaziz University and King Abdullah University of Science and Technology (KAUST)—dominating research productivity. Similarly, the most prominent authors are affiliated with these institutions.
- Source analysis identifies *Advances and Applications in Statistics* and *Bioinformatics* as the leading journals for publishing research in this field. The findings reveal a diverse range of topics, including theoretical and applied statistics, as well as interdisciplinary fields like bioinformatics, which integrate advanced statistical techniques with real-world applications.
- There is a high level of international collaboration (79.6%), with the United States emerging as Saudi Arabia's top research partner.
- A strong emphasis on statistical modeling and prediction suggests that research in this field

is application-oriented and closely linked to emerging domains such as machine learning.

Limitations:

This study only considered publications indexed in the Web of Science database. Although Web of Science is widely regarded as a source of high-quality scholarly output, other major indexing platforms—such as Scopus—were not included.

6. References

Ahmed, Shamima, Muneer M. Alshater, Anis El Ammari, and Helmi Hammami. 2022. "Artificial Intelligence and Machine Learning in Finance: A Bibliometric Review." Research in International Business and Finance 61:101646. doi: 10.1016/J.RIBAF.2022.101646.

Alhibshi, Amani H., Widyan A. Alamoudi, Ikram Ul Haq, Shafiq Ur Rehman, Rai K. Farooq, and Foziah J. Al Shamrani. 2020. "Bibliometric Analysis of Neurosciences Research Productivity in Saudi Arabia from 2013-2018." Neurosciences (Riyadh, Saudi Arabia) 25(2):134–43. doi: 10.17712/NSJ.2020.2.20190087.

Almulhim, Abdulaziz I., Mohammad Aqil, Shakil Ahmad, Isam Mohammed Abdel-Magid. 2021. "Sustainable Water Planning and Management Research in Saudi Arabia: A Data-Driven Bibliometric Analysis." ArJG 14(18):1950. doi: 10.1007/S12517-021-08353-Z.

Bessant, Kenneth C., and Eric D. MacPherson. 2002. "Thoughts on the Origins, Concepts, and Pedagogy of Statistics as a 'Separate Discipline.'" The American Statistician 56(1):22–28. doi: 10.1198/000313002753631321.

Birkle, Caroline, David A. Pendlebury, Joshua Schnell, and Jonathan Adams. 2020. "Web of Science as a Data Source for Research on Scientific and Scholarly Activity." Quantitative Science Studies 1(1):363–76. doi: 10.1162/QSS_A_00018.

Bispo, Regina, Lígia Henriques-Rodrigues, Russell Alpizar-Jara, and Miguel de Carvalho. 2022. Recent Developments in Statistics and Data Science. Springer.

Blei, David M., and Padhraic Smyth. 2017. "Science and Data Science." Proceedings of the National Academy of Sciences 114(33):8689–92. doi: 10.1073/PNAS.1702076114.

Cozzens, Susan E. 2013. "The Discovery of Growth: Statistical Glimpses of Twentieth-Century Science." Pp. 127–42 in Science in the twentieth century. Routledge.

Efron, B., and T. Hastie. 2021. Computer Age Statistical Inference: Algorithms, Evidence, and Data Science. Cambridge University Press.

Efron, Bradley. 2012. Large-Scale Inference: Empirical Bayes Methods for Estimation, Testing, and Prediction. Vol. 1. Cambridge University Press.

Fraser, D. A. S. 2018. "On Evolution of Statistical Inference." Journal of Statistical Theory and Applications 17(2):193–205. doi: 10.2991/JSTA.2018.17.2.1.

Gigerenzer, Gerd, Zeno Swijtink, Theodore Porter, Lorraine Daston, John Beatty, and Lorenz Kruger. 1990. The Empire of Chance: How Probability Changed Science and Everyday Life. Vol. 12. Cambridge University Press.

Liao, Huchang, Ming Tang, Li Luo, Chunyang Li, Francisco Chiclana, and Xiao Jun Zeng. 2018. "A Bibliometric Analysis and Visualization of Medical Big Data Research." Sustainability 2018, Vol. 10, Page 166 10(1):166. doi: 10.3390/SU10010166.

Porter, Theodore M. 2020. The Rise of Statistical Thinking, 1820–1900. Princeton University Press.

Salsburg, David. 2002. The Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century. Macmillan.

Saquib, Nazmus, Mohammed Saddik Zaghloul, Abdul Rahman Mazrou, and Juliann Saquib. 2017. "Cardiovascular Disease Research in Saudi Arabia: A Bibliometric Analysis." Scientometrics 112(1):111–40. doi: 10.1007/S11192-017-2393-Z.

Saudi Arabia's Leap in Research and Development Excellence. 2023. Research Development and Innovation AuthoritySaudi Arabia's Leap in Research and Development Excellence.

Singh, Vivek Kumar, Prashasti Singh, Mousumi Karmakar, Jacqueline Leta, and Philipp Mayr. 2021. "The Journal Coverage of Web of Science, Scopus and Dimensions: A Comparative Analysis." Scientometrics 126(6):5113–42. doi: 10.1007/S11192-021-03948-5/METRICS.

Stigler, Stephen M. 2002. Statistics on the Table: The History of Statistical Concepts and Methods. Harvard University Press.

Tsilika, Kyriaki. 2023. "Exploring the Contributions to Mathematical Economics: A Bibliometric Analysis Using Bibliometrix and VOSviewer." Mathematics 2023, Vol. 11, Page 4703 11(22):4703. doi: 10.3390/MATH11224703.

Weihs, Claus, and Katja Ickstadt. 2018. "Data Science: The Impact of Statistics." International Journal of Data Science and Analytics 6:189–94. doi: 10.1007/s41060-018-0102-5.