

# Bibliometric Analysis of Statistical Data Processing Using SPSS

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**Abstract**— This article conducts a thorough bibliometric analysis to explore the theme of "Statistical Data Processing Using SPSS," sourced from the Web of Science. Statistical analysis, essential in research, employs various methods, particularly for statistical data processing. Among the tools available for quantitative data analysis, SPSS (Statistical Package for Social Science) is prominently used. This study aims to analyze the efficiency and accuracy of SPSS in processing data, facilitating researchers in understanding relationships between variables for enhanced data-driven decision-making. The method involved searching data on the Web of Science and employing Biblioshiny for the bibliometric analysis. The analysis resulted in visualizations that categorized field data based on keywords, publication levels, regional distribution, and several relevant document types, covering 500 documents dated from 1991 to 2023. The findings indicate an annual growth rate of 13.14% and an average document age of 6.08 years. The study concludes that SPSS offers a precise tool for testing quantitative research data, underscoring its utility in statistical data processing.

**Index Terms**— Statistical data processing, SPSS, Bibliometric.

## I. INTRODUCTION

In the current information era, having skills in mastering data analysis has become an advantage that brings benefits to science and education as a whole [1]. As time goes by, technology is also advancing. This increasingly sophisticated technology needs to be utilized correctly and consistently according to its function. One of the main factors that can be done is to innovate. It can be known that today's technology also brings many benefits to humans. Technology, such as the internet and gadgets, has made life easier, impacting various aspects of health communication. Currently, all

searches for solutions to a problem can be obtained with the help of the internet. It is well known that technology does provide ease of life, but it does not rule out the possibility that technology also has many negative influences on humans. Therefore, humans will continue to be required to be able to think critically, selectively, and innovatively to solve a problem. In terms of education, it will continue to grow to improve achievement, so several sophisticated systems are needed for today [2].

The development of the world of technology today is increasingly rapid it is expected that someone can face the dynamics of globalization and information technology developments. The main factor to lift the quality and competitiveness of the world is scientific research. The development of technology makes data processing important because information is a major factor in the transformation of human life. Data processing in question is the process of changing and updating information into a more effective and easily accepted form. Information technology has an important role in processing data, such as making innovations for data collection, processing, and storage. Data processing is also a driver in analysis and decision-making. By mastering the concept of technological developments, it can be interpreted that efficient data processing optimization can be done by understanding patterns in data analysis. As the amount of data generated every day increases, the need for efficient data continues to grow.

Data processing is considered a form of post-data collection stage. Data processing also has a purpose, namely so that the information that has been collected

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can be conveyed easily and effectively and is considered appropriate and accurate for users later. Data processing can be called a very important stage in statistics because good conclusions come from good and appropriate data processing. At present, research using quantitative methods is increasingly advanced, where there is a relationship between economic variables (numbers) that were previously only presented with qualitative methods but can now be formed into a systematic form. Quantitative research is the study of a particular sample or population of a study.

Statistics is one of the fields of science that is needed in this modern era. This is very influential in the development of science and technology. In learning, statistics must race on the concept of the facts of the reality of life. Statistics are created with strategies and methods to analyze or solve a problem [3]. Statistics is one part of mathematics, which discusses the steps of collecting, processing, presenting, and concluding data [4]. Statistics can be interpreted as a science that involves data, while statistics itself is data. Statistics has a very important role in the development of science. Examples include the implementation of calculation science (mathematics, algorithms) in data processing [5]. In addition to collecting data and facts, statistics is also concerned with the analysis, processing, and presentation of data, such as surveys, questionnaires, and observations. The use of statistics is also very broad and can be used in various fields, such as science, business, economics, and even social science. In aspects of human life, statistics began to be used in personal decisions to social activities. Statistics has several methods that are usually used in research, especially hypothesis testing.

One that is used for quantitative data analysis, is SPSS. SPSS is one application that has many benefits, usually managed by the education community. [6]. Evolving technology makes things easier. So, today many programs on computers can facilitate data processing. Usually, the application that can be used for statistical data processing is SPSS. SPSS is referred to as an application for statistical data processing with

mathematical calculation patterns so that it can analyze data easily. On the other hand, SPSS can also be used as a statistical test tool to train skills in statistical data processing [7]. SPSS has become one of the research tools that has been used by many researchers. SPSS has many advantages, ranging from diverse features to diverse statistical analysis. The ability of data exploration and hypothesis testing can also be applied to relevant methods [8].

The existence of software is needed for data processing. An example is SPSS, which can process quantitative research data [9]. SPSS is capable of calculating data at a high scale, making it easier for users to analyze data. SPSS Statistical Application (Statistical Package for the Social Science) is one of the tools that is quite popular and widely used in processing statistical data (research). SPSS is known as an application or software system (computer) used for interactive statistical data analysis. SPSS (Statistical Package for Social Science) functions as a tool for calculating statistical data or analysis both parametrically and non-parametrically on Windows [10]. Its use is also supported in various areas of *Software*, examples such as Windows, Linux, Mac OS, and so on. SPSS also has components that are already licensed and used as SaaS (*Software as a Service*). SPSS is usually more used by social researchers and beginners, such as students, because it is easier to understand and has a simple interface and a variety of visualization tools. In the process of statistical data analysis, SPSS applications are needed to make it easier to manage and process the data needed complexly. SPSS is also used for data management, correlation analysis, and analysis of other statistical techniques. Data that has been entered into SPSS is summarized and given product analysis that can be exported to Microsoft Word or Excel.

Skills in using SPSS become very important, especially in quantitative data. This is due to several researchers who can analyze various fields, such as Education, Community, Education, companies, Health, and many more [11]. The process of developing

innovation and science will be less optimal if there is an inability to process data with SPSS. It is expected that skills in using SPSS need to be applied to students to continue to increase innovation in the world of education [12]. The SPSS application provides a lot of material to facilitate data processing. Usually, the problem that is often experienced is the process of analysis and implementation in completing scientific papers [13]. It is known that the SPSS application is one of the educational programs that emerged due to increasingly sophisticated technology. SPSS is expected to make it easier for users to analyze and process data. Statistical tests require SPSS as a tool because beginners or social researchers can use SPSS for data analysis and processing. SPSS is also included in one program that is easy to apply [14].

This study contains *Research Questions* as follows:

RQ: What is the current publication trend in research on statistical data processing using SPSS?

The writing framework of this research report is as follows:

The first part has an introduction that describes topics related to statistical data processing using SPSS. Next, the second part explains the approach used in bibliometric analysis. Then, the third part contains an elaboration of the results of this research itself. Finally, the conclusion is part of the entire research report.

## II. METHODS

**B**ibliometrics is one of the instruments used to obtain a value from quantitative research, both individually and in groups. Typically, bibliometric analysis involves the value of quantitative research (the results of that study). Bibliometrics is also considered a field of science that uses quantitative methods to understand the process of measuring and analyzing various aspects of life in writing. This is expected to help the development of literature and research patterns [15]. This bibliometric analysis is one of the methods used in research to answer developmental and literature questions [16]. Bibliometrics is one of the appropriate learning media or analytical media for research [17]. Therefore, the bibliometric analysis method aims to

visualize the results of research and quantitative analysis.



Fig 1. Bibliometrics Research Method Flowchart

Fig 1. describes how the flow of methods in bibliometric research runs. The first method that must be done is to determine the problem topic to be raised in the analysis. Next, search for data on the Web of Science by entering keywords. These keywords will produce data to be studied. In the process of analysis on bibliometrics apply limits for determining data to be used in research by looking at the development of research on statistical data processing using SPSS. Limits are applied to data contained in the Web of Science, such as publication data namely title, year published, abstract, keywords, and author. Then, the data that has been studied is *exported* into Bibtex format. After *exporting* the data in BibTex format, the data is inputted into Biblioshiny. Then, in the Biblioshiny view, you will see a visualization of the exported data that has been inputted. If the results are visible, then data analysis and conclusions can be drawn.

III. RESULT OF THE DISCUSSION

Main Information by Biblioshiny



Fig 2. Main Information

Tabel 1. Main Information

Description	Result
<b>MAIN INFORMATION ABOUT DATA</b>	
Timespan	1991:2023
Sources (Journal, Books, etc)	415
Document	500
Annual Growth Rate %	13.14
Document Average Age	7.08
Average citation per doc	8.988
References	13491
<b>DOCUMENT CONTENTS</b>	
Keyword Plus (ID)	940
Author's Keyword (DE)	1919
<b>AUTHORS</b>	
Authors	1802
Authors of single-authored docs	41
<b>AUTHOR COLLABORATION</b>	
Single-authored docs	43
Co-Authors per Doc	3.82
International co-authorship %	14.6
<b>DOCUMENT TYPES</b>	
article;	360
article; Book Chapter	2
article; Paper Data	23
article; early access	7
article; Proceedings Paper	3
Editorial Material	1
letter	1
Proceedings Paper	99
Reviews	4

In the first stage, based on Fig 3. the collection of bibliographic data for statistical data processing using SPSS is presented in the form of statistical information. There are 500 publications published from 1991 to 2023. The dataset includes 415 sources, consisting of journals and books. Then, the annual growth was 13.14% with an average age of 6.08 years from each document. From each article available, the average is written by 3-4 authors with a percentage of 2.4 documents. The average citation contained in each document is 8,988 with 13,491 references. In addition, there are 328 authors in the collection, but there are also 41 authors (singles) who write 1 document with a presentation of 14.6% co-authorship.

Annual Scientific Production

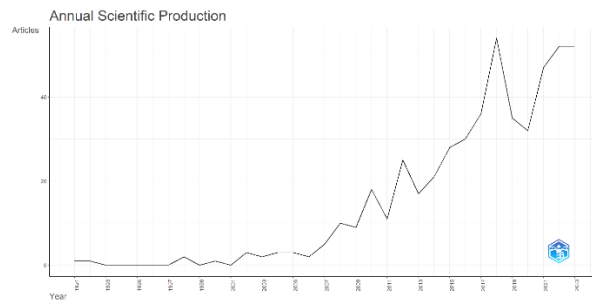


Fig 3. Annual Scientific Production

Based on the picture above it can be seen that from 1991-2005 there were not so many publications, maybe only 1 to 3 publications. However, there was an increase starting in 2007. In 2007 and 2008 the publications listed were 5-10 publications. The following year in 2010 as many as 18 publications, 2011 as many as 11 publications, 2012 as many as 25 publications. So, over the years publications began to multiply. Most recently, the most publications in 2018 were 54 publications. Followed by 2022 and 2023 which have 52 publications.

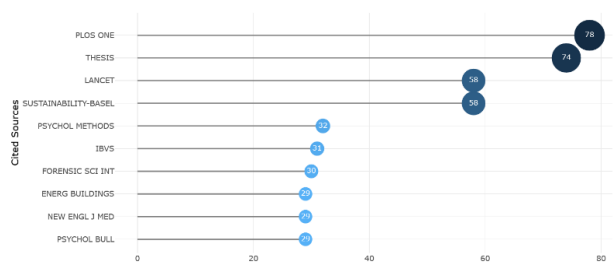
The most relevant source by Biblioshiny

Table 2. Most Relevant Source by Biblioshiny	
DATA IN BRIEF	24
SUSTAINABILITY	6
JOURNAL OF THE PAKISTAN MEDICAL ASSOCIATION	5
PLOS ONE	5
BEHAVIOR RESEARCH METHODS	4

CUREUS JOURNAL OF MEDICAL SCIENCE	4
ERPA INTERNATIONAL CONGRESS ON EDUCATION	3
IIOAB JOURNAL	3
INTERNATIONAL JOURNAL OF AGRICULTURAL	3
IRANIAN JOURNAL OF PUBLIC HEALTH	3

Based on Table 2. it can be seen that the results of the visualization are Visualization of the *Most Relevant Source* in the Biblioshiny. This means that the results of the visualization illustrate that 10 sources display topics of discussion that are by statistical data processing using SPSS on the Web of Science. The journal "Data in Brief" is the journal that discusses the most statistical data processing using SPSS, where the total corresponding documents are 24 documents. Then followed by Sustainability as many as 6 documents, Journal of the Pakistan Association and as many as 5 documents, Behavior Research Methods and Cureus Journal of Medical Science as many as 4 documents. Finally, there are Erpa CoN, IIOAB Journal, International Journal of Agriculture, and Statisti and Irian Journal of Public Health as many as 3 documents.

**Most Locally Cited Source**



**Fig 4. Most Local Cited Source**

Based on Fig 4. it can be seen that the results of the "Most Local Cited Source" visualization in Biblioshiny. 10 local sources correspond to statistical data processing using SPSS on the Web of Science. The conclusion obtained is Plos One as the most cited local source. A total of 78 documents discussing statistical data processing using SPSS. This was followed by the Thesis with 74 documents, the Lancet, and the Basel Sustainability with 58 documents. Followed by Psychol Methods 32 local sources, IBVS 31 documents, and Forensic Sci int 30 documents. Then, the last one is

Eng Buildings, New Engl J Med, and Psychol Bull with the same nominal, namely, as many as 29 documents.

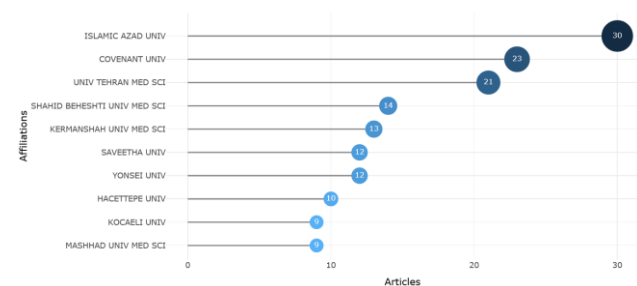
**Most relevant author by Biblioshiny**

**Table 3. Most Relevant Author by Biblioshiny**

Author	Count	Normalized Value
WANG Y	5	0.78
SHANG Y	5	1.53
LI Z	4	1.66
PARK S	4	0.98
YANG Z	4	1.75
ZHANG X	4	0.58
IBIDUNNI S	3	0.51
LIU Y	3	0.56
OLOKUNDUM M	3	0.51
SEVINDIR HK	3	1.00

Based on Table 3. it is known that the results appear in the Visualization "Most Relevant Author in Biblioshiny. The results obtained from the visualization "Most Relevant Author explained that there were 10 authors who wrote publications following statistical data processing using SPSS. Then, in the picture, it can also be seen that Wang Y and Zang Y are the authors with the most documents, a total of 5 documents, which can be accessed through Biblioshiny. Next, followed Li Z, Park S, Yang Z, and Zhang X for 4 documents. Also followed by Ibidunni S, Liu Y, Olokundun M, and Sevindir HK for 3 documents.

**Most relevant affiliations by Biblioshiny**



**Fig 5. Most Relevant Affiliations by Biblioshiny**

Based on Fig 5. it can be seen that the results of the "Most Relevant Affiliations" visualization use biblioshiny. From this data, it can be seen that 10 affiliates correspond to statistical data processing using SPSS, and Islamic Azad Univ is the highest affiliate, where there are 30 articles displayed from Biblioshiny.

It was also followed by Covenant Univ 23 articles, Univ Tehran Med 21 articles, Shahid Behesti Univ Med 14 articles, Kermanshah Univ Med 13 articles, Saveeta Univ 12 articles, Hacettepe Univ 10 articles. Finally, there are Kocaeli Univ and Mashhad Univ which have the same nominal of 9 articles.

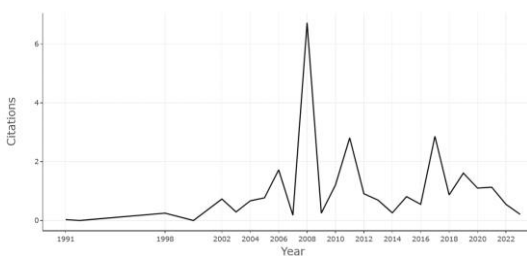
**Most cited countries**

**Table 4. Most Cited Countries by Biblioshiny**

Country	TC	Average Article Citations
USA	1164	48.50
CHINA	711	8.40
AUSTRALIA	606	101.00
IRAN	300	6.10
TURKEY	255	6.70
NETHERLANDS	199	49.80
INDIA	115	4.40
ITALY	104	14.90
UNITED KINGDOM	93	18.60
CANADA	86	12.30

Based on Table 4. it can be seen that the results that appear in the "Most Cited Countries" visualization in the biblioshiny, are related to statistical data processing using SPSS. This means that there are 10 countries cited according to statistical data processing using SPSS. Then, in the picture, it can be concluded that the USA is the most cited country. There are 1164 citations obtained from the Web of Science, followed by 9 other countries such as China 711 citations, Australia 606 citations, Iran 300 citations, Turkey 255 citations, the Netherlands 199 citations, India 115 citations, Italy 104 citations, the United Kingdom 93 citations, and finally Canada 86 citations.

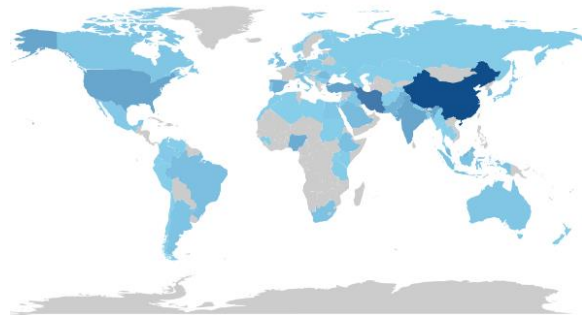
**Average citations per year**



**Fig 6. Average Citations Per Year**

Based on Fig 6. it is known that the results of the "Average Citation Per Year" visualization using biblioshiny, are related to statistical data processing using SPSS. It can be interpreted that there is a diagram of the average citation per year. From 1911 to 2022, citations per year can increase or decrease. The highest citation occurred in 2008, which amounted to 6.5 citations on the Biblioshiny display.

**Countries' Scientific Production**



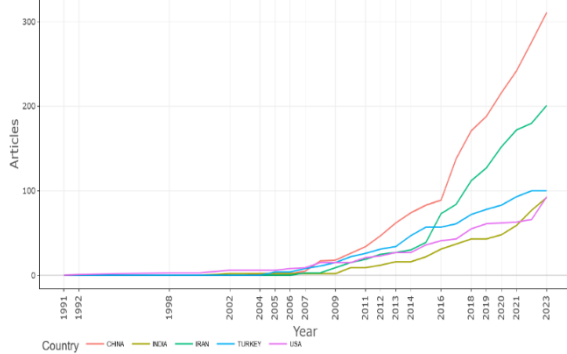
**Fig 7. Countries' Scientific Production**

**Table 5. Countries' Scientific Production**

REGION	FREQ
CHINA	311
IRAN	201
TURKEY	100
USA	93
INDIA	92
NIGERIA	75
SPAIN	68
PAKISTAN	63
SOUTH KOREA	56
MALAYSIA	50

Based on Fig 7. and table 5. It is shown that there are map Figs and tables that describe the countries that produce the most articles related to statistical data processing using SPSS. It can be seen that 10 countries produce the most articles. This time China became the winner because it succeeded in producing 311 articles. Then, followed by Iran with 201 articles, Turkey with 100 articles, the USA with 93 articles, India with 92 articles, Nigeria with 75 articles, Spain with 68 articles, Pakistan with 63 articles, South Korea with 56 articles, and finally Malaysia with 50 articles.

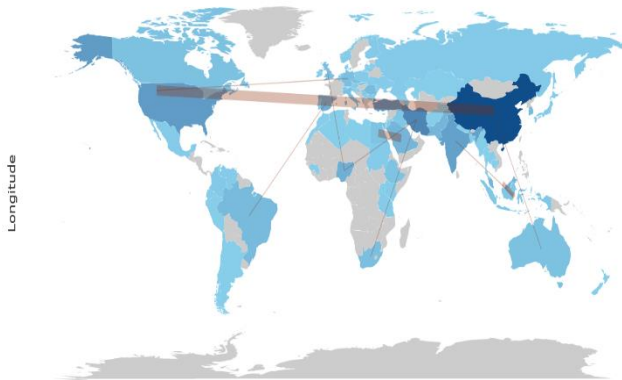
**Countries' production over time**



**Fig 8. Countries' Production Over Time**

Based on Fig 8. below can be seen there is a diagram of various countries of article production from time to time, related to statistical data processing using SPSS. It can be concluded that in 2023 China will produce as many as 300 articles. Then, followed by Iran with as many as 200 articles, Turkey with as many as 100 articles, India and Russia have the same value, which is still 90 articles produced.

**Countries' Collaboration**



**Fig 9. Countries' Collaboration**

Based on Fig 9. It can be seen that cooperation between countries has been presented, where there is a collaboration of articles related to statistical data processing using SPSS. In the map, there is a thick line of each region that represents the sum of their collaboration proportions. The map shows social networks of cooperation at the country level. The point in the network indicates the frequency of cooperation of the country. Similarly, the thickness of the edges shows

cooperation between countries. There are top 10 countries in alphabetical order. These countries include Albania with Guinea, Argentina with Italy, Australia with Albania, Tanzania and Guinea. Then there is also Brazil with Canada and Portugal, Chile with Ecuador, and China with Australia, etc.

**Wordcloud**



**Fig 10. Worldcloud**

Based on Fig 10. presented a technical analysis to detect topics raised related to statistical data processing using SPSS using Wordcloud. Analysis of statistical data processing using SPSS shows the 50 most common keywords in the combined publication. Keyword size from figure 14. indicates the frequency of keywords in the data set.

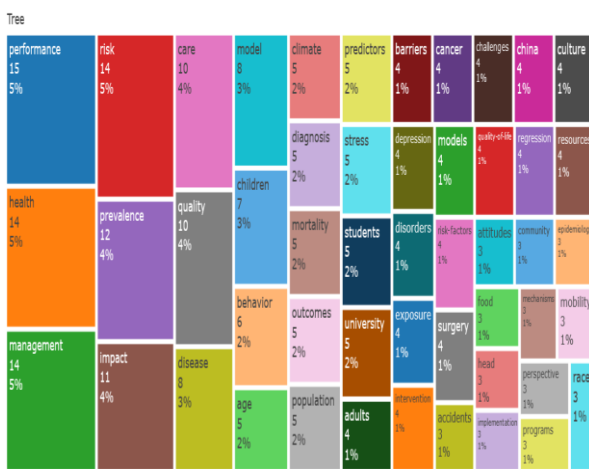
**Table 6. Worldcloud**

TERMS	FREQUENCY
PERFORMANCE	15
HEALTH	14
MANAGEMENT	14
RISK	14
PREVALENCE	12
IMPACT	11
CARE	10
QUALITY	10
DISEASE	8
MODEL	8

Based on it can be seen that there are top 10 keywords, keywords based on the largest size in figure

14. is *performance* with a frequency of 15 in the data set. Followed by *health*, *management*, and *risk* with a total frequency of 14 in the data set. Furthermore, there is a *prevalence frequency of 12*, *impact* with a frequency of 11, and *care* and *quality* with the same frequency of 10. Finally, there is *disease* and *the model* has the same frequency of 8. So, the conclusion obtained is that if you detect the topic of statistical data processing using SPSS, a vocabulary will appear that reflects the keywords of the topic.

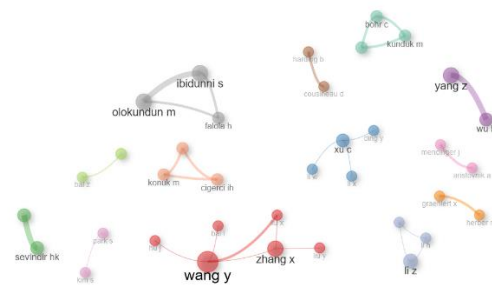
**TreeMap**



**Fig 11. TreeMap**

Based on Fig 11. It is a *TreeMap Chart* visualization which is part of the results of Web of Science analysis. The visualization illustrates the compatibility between the topic of data processing using SPSS and publications on the Web of Science. *This TreeMap Chart* visualization is the result of publications relevant to the topic raised. The number of publications obtained is 276 publications in 1991-2023. The category field that has the most publications is "Performance" with 15 publications, followed by "Health", "Management", and "Risk" with the same number of 14 publications.

**Author Collaboration Network**



**Fig 12. Author Collaboration Network**

The author's collaboration network is on Fig 12. Contains 13 different colored groups of writers. The size of the symbols large and small globular indicates that the level of collaboration is more or less. There are clusters of colors, such as red, pink, dark blue, light blue, purple, light purple, light gray, dark green, brown, to orange. The red cluster was the most prolific and quoted wang y's work. In the red cluster, there is the second most quoted Zhang X. Then, followed by Hu J, Bai L, Liu X, and Liu Y, each writer in the cluster was working with another writer, but not one of them was working with another writer.

**IV. DISCUSSION**

This bibliometric analysis reveals publication patterns that show growth and fluctuations in the topic of statistical data processing using SPSS from 1991 to 2023. These findings show that interest in processing statistical data with SPSS has experienced a significant spike, especially since the early 2000s, with the number of publications peaking in 2018.

At the beginning of the period, publication was very low, with only one article in 1991 and 1992, as well as no publication from 1993 to 1997. The absence of this publication could be due to various factors, such as lack of awareness, limited accessibility of SPSS at the time, or even due to different research focuses. However, from 2002 to 2005, there was a slow increase, indicating an increase in interest in using SPSS for statistical data analysis. An even bigger surge occurred in 2010, reflecting wider adoption and increased application of SPSS in research.



The peak of publications in 2018 may be related to technological advances and the increasing need for more complex data analysis and wider deployment of SPSS. However, after 2018, there was a decline in 2019 and 2020, which can be influenced by a variety of factors, including the possibility of the emergence of new analytical tools or changes in the focus of the research. Despite the decline, publications began to increase again in 2021 and stabilized at high levels in 2022 and 2023, signaling that interest in SPSS remains strong and stable. The prediction that the number of publications will continue to increase indicates that there is a sustainable trend in the use of SPSS in the future.

However, this bibliometric analysis also has limitations that need to be considered. First, bibliometrics only provide quantitative data and do not present qualitative insights into the quality or relevance of the research. Second, fluctuations in publications may be influenced by external factors such as changes in publishing policies, shifts in research trends, or the influence of new technologies, which are not always reflected in bibliometric data. Third, this analysis does not include an assessment of the specific impact or contribution of each publication to the development of the field, which is important for understanding the influence of the research as a whole. Therefore, although bibliometric analysis provides a useful overview, more research is needed to gain a more comprehensive understanding of the dynamics and impact of the use of SPSS in statistical data analysis.

#### V. CONCLUSION

Based on the bibliometric analysis conducted on statistical data processing using SPSS, it can be concluded that this topic is still a significant field and is widely discussed in the scientific literature to date. The analysis result using Bibliometrix show an in-depth visualization of various aspects related to publications in this field. This includes information about the level of institutional affiliation, frequency of annual publications, sources of publications, citations received,

and the number of documents or articles that have been produced.

The collection of bibliographic data for statistical data processing using SPSS is presented in the form of statistical information. There are 500 articles published from 1991 to 2023. The sources used amounted to 115 sources, consisting of journals or books. Then, the annual growth was 13.14% with an average age of 6.08 years from each document. From each article available, the average is written by 3-4 authors with a percentage of 2.4 documents. The average citation contained in each document is 8,988 with 13,491 references. In addition, there are 328 authors in the collection, but there are also 41 authors (singles) who write 1 document with a presentation of 14.6% co-authorship.

With a significant growth trend in SPSS-related publications, there is an opportunity for research focused on the development of new data analysis methods and techniques that can be integrated into SPSS. This can include algorithm improvements or the addition of new features that can extend the functionality of SPSS.

With the high percentage of single authors, future research could be focused on efforts to improve collaboration between researchers. Building a stronger collaborative network can improve the quality and quantity of research in this field.

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