

# Knowledge Mapping of Transportation Optimization Researcher: A Visual Analysis Using Publish or Perish

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**Abstract**— The development of computer-based technology is an opportunity for optimizing research. Many knowledge mapping applications are available, one of which is Publish or Perish (PoP). The application can collect databases from various journal sources, both paid and open source. The purpose of this paper is to discuss the use of PoP to analyze the development of research conducted by the Author in a particular field. The data and case studies were from Indonesian transportation optimization researchers with data sources from Google Scholar. The discussion results show that the PoP application can be used to find the citation metric numbers owned by the Author. Visualizations are presented as impact metrics, including h-index and others. Information on citation numbers includes publication years, citation years, papers, cites per year, cites per paper, cites per Author, papers per Author, Author per paper, h-index, g-index, hI, norm, and hI, annual.

**Keywords**— Author, knowledge mapping, publish or perish, researcher, publish or perish.

## I. INTRODUCTION

The development of road network infrastructure has increased rapidly. In addition to developing a new road network with a modern pavement structure, some of the road network, which is a traditional road structure, needs attention in maintenance. Both types of road structures certainly require a sound pavement management system with sufficient funding. A good pavement management system can produce road performance according to the needs of road users. Along with the development of technology and the broader scope of needs, the road pavement management system needs to be further developed for more optimal achievement. Budget planning recommendations for policyholders are an essential part of this system as a basis for determining the budget amount by considering priorities, road functions, and road networks through economic principles [1].

An optimization is a normative approach by identifying the best solution to a problem directed at an objective function's maximum or minimum point. Optimization can be done in two ways: maximization and minimization [2]. Maximization is the optimization of output by using or allocating specific inputs to get maximum results. At the same time, minimization is input optimization to produce a certain level of output by using minimal input. Optimization problems are divided into two types: without constraints and with constraints.

In optimization without constraints, the factors that become constraints or limitations on the objective

function are ignored. In determining the maximum or minimum value, there are no limitations on the various available choices. In optimization with constraints, the factors that become constraints on the objective function are considered in determining the maximum or minimum point of the objective function [3]. Optimization requires specific techniques, often referred to as optimization techniques. The optimization technique is a method used to provide the best-desired results. This optimization technique provides many benefits in making decisions and can be applied in various fields of science.

Various studies on transportation and its optimization are very much developed in this world. Bibliometric analysis can be used to find out the research trends that are currently the most popular. [4]. The rapid development of science in this modern era makes the needs and problems in society more diverse from time to time. The development of science periodically continues to innovate slowly to form new findings that complement each other. Systematically, science continues to develop from various findings that continue to accumulate. This development must be separate from the efforts of various research and research carried out by various groups, especially students at universities.

Bibliometrics aims to map various scientific issues that are the topic of discussion. Bibliometrics is the application of the study of information to books, articles, and other publications. Bibliometric analysis has three advantages over traditional literature reviews. First, the bibliometric method provides a network overview of the entire research topic by analyzing hundreds to tens of

thousands of documents in a complete database through professional software and high-performance computers. Second, bibliometrics can measure the impact of a study through citation analysis. Third, it can identify classical literature and research topics efficiently. [5].

Currently, bibliometric analysis has been implemented on a wide scale. This approach is used to study research trends in various scientific fields. However, from these various studies, not much has been discussed about the tendency of a writer to publish his research. The trend of an author needs to be mapped to find out the scope, depth of research, uniqueness of research, and institutional collaboration, to predict the productivity of his research. This paper aims to discuss an author's bibliometrics to discover his research passion.

## II. LITERATURE REVIEW

Science is a conscious effort to investigate, discover, and improve human understanding of the various facets of reality in the human world [6]. In the world of scientific or scientific literature, they are grouped into fields of science to facilitate the storage and retrieval of information in any collection of information related to specific sciences, which are commonly used as a standard for grouping fields of science. Various standards can be used as a guide for grouping in the grouping of fields of science.

The research is necessary to understand research trends from various published articles. Bibliometric analysis is a bibliographic study of scientific activities based on the assumption that a researcher must link his research with others. Bibliometrics will provide progress and development of knowledge related to a particular topic. In bibliometric analysis, research will reveal the development of literature, such as the number of publications, subject of articles, research approach, and author productivity. [7]. PoP is a software that can be used to harvest metadata (not full text) of scientific works in all fields of science for free. PoP is an alternative tool for those if not have subscription access to commercial databases.

Bibliometrics comes from the word Biblio which comes from the word bibliography, or Biblio, which means book, and metrics which means to measure. Bibliometrics generally measures or analyzes literature or books using statistical and mathematical approaches. Bibliometrics is closely related to statistics. The application of bibliometrics in the world of literature as an evaluation of various bibliographic studies such as knowing the distribution of book subjects, reviewing authorship, analyzing institutions, studying the usability

of citations, analyzing book indexes, and various other studies related to literature and bibliography [8].

Performing bibliometric analysis can be done manually or using an application. One currently popular application is the Publish or Perish (PoP) application. The PoP is designed to help individuals or academics to find and analyze the sources of information they need [9]. In addition, PoP can also help select articles in online databases according to their quality and is used to retrieve and analyze academic citations. PoP can filter the quality of articles or information and present them in neat and good metadata. The PoP application can take reference sources from significant scientific articles or works databases, such as Google Scholar, Scopus, Web Science, Microsoft Academic, PubMed, and Crossref. In addition, PoP also offers a range of the number of articles we want.

The most accessible database is Google Scholar (GS). GS is the scientific search tool of the world's largest and most powerful search engine, Google. Since its founding in 2004, GS has attracted the scientific community's attention as a scientific literature search and citation tracking tool. GC is almost like the general search engine Google. GC displays its search results based on the strength of the link between the search terms and how often and recent work was cited. GS indexes nearly everything available on the web in any language, including journal articles, academic books, book chapters, and non-peer-reviewed material such as conference papers, working papers, theses, and dissertations [10].

GS varies significantly compared to databases and platforms like Scopus or WoS. This is because GS is an open source that is dynamic and automatic. However, the advantages of GS are accompanied by weaknesses because it is not controlled. Instead, Scopus and WoS position themselves as controlled and closed products. Scopus' quality control is more static and designed to compete directly with WoS. However, GS coverage is better against subject-specific sources when compared to paid databases, such as WOS and Scopus [11]. In situations of general and immediate need, academics mostly use GC to view citations and literature research. This choice is because GS is considered more accessible to access sources and has a straightforward search interface.

## III. METHOD

This research is descriptive qualitative research using a bibliometric approach. Descriptive research is used to describe the condition of objects naturally. The study of

bibliometric analysis is a mechanistic approach to understanding global research trends in a particular area based on the output of the academic literature database. This kind of approach distinguishes the bibliometric analysis literature from other literature reviews. They are primarily intended to discuss recent progress, challenges, and future directions of a particular topic. This research method adopts a five-stage method. The five steps include defining search keywords, initial search results, narrowing search results, compiling initial data statistics, and data analysis.

The focus of this study is to make statistical data from one variable as a descriptive analysis to find out more in-depth variables to evaluate statistical findings. The population of the object of this research is all research that an author has carried out. The case study chosen in this paper is the theme of transportation research conducted by the researchers. The purposive sampling technique is also one of the non-random sampling techniques, which in the sampling process is based on the researcher's considerations following the research objectives. The sample drawn using this technique is based on the characteristics of each sample as a reference for determining the sample taken to obtain factual data in the study. The keywords used in this research are keywords created about the Author himself. To regulate the use of words, filtering is carried out by

eliminating words that do not have a whole meaning and adding keywords that follow the standards. Then the keywords are processed using PoP.

#### IV. RESULT AND DISCUSSION

##### A. Metrics Citation Journal of Transportation Optimization Researcher

One of the indicators that can be used to determine the Author's track record in writing is to ensure the contribution to the advancement of science. The meaning of contribution of scientific journals to the progress of science, technology, and art can be measured significantly and high the contribution of journals. Journal articles on advancing science and technology and solving development problems in their respective scientific fields are very regular and less accurate. Scientific journals can raise the name of the Author whose work has been accommodated and its influence on the scientific and educational environment. Identification can be made by analyzing citation metrics owned by each scientific journal with the help of the publish or perish application. As a case study in this paper, mapping was carried out on one of the Indonesian authors who have many papers in the field of transportation optimization. As an initial step, PoP can be seen in figure 1.

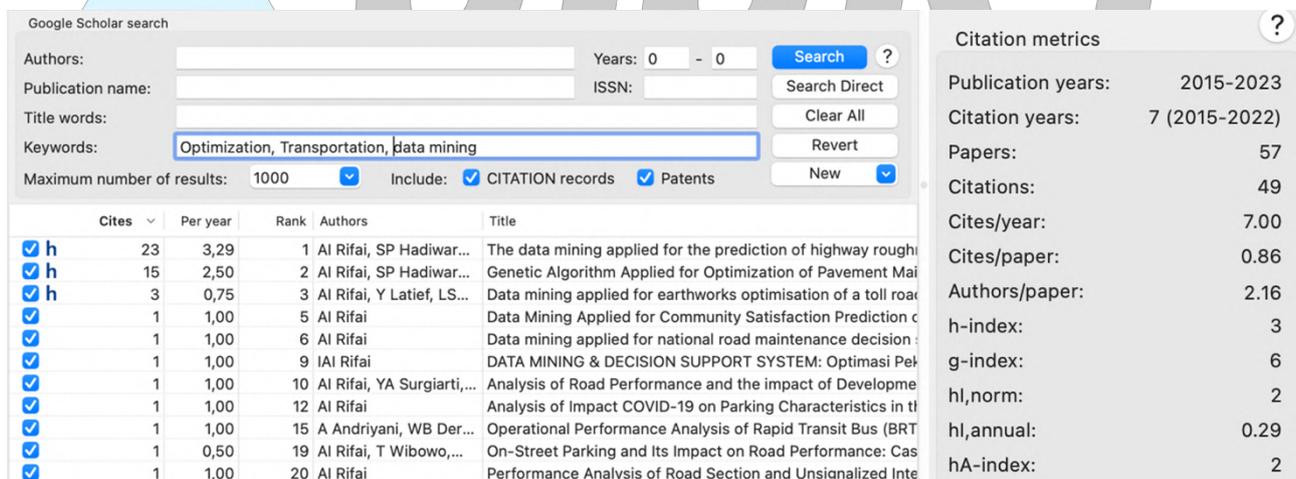


Figure 1: The search for paper database on GS using PoP

The PoP application can be used to find out the number of citation numbers in scientifically published articles with data sources from Google Scholar. One form of evaluation in communication studies journals is seen from the number of citations obtained in the journal. The quality of articles in communication studies journals is seen in the number of citations obtained in articles.

Still, on the same page, it can be seen that based on the information, it is known that the results of the PoP

analysis of the study journals conducted by the Author are described as follows: publication years, which is the year the journal was published on the online site detected by Google Scholar (open journal system), identified starting from the year of the earliest publication to the most recent issue published, namely 2015-2023. The year of publication is 2023 because one of the Author's papers has been published in the Scopus journal, which will be released in 2023. The citation years figures are obtained from the results of

citations/citations made by the Author from 2015 to 2022. Number of Papers (articles) published in the open journal system in 2015-2023 a total of 57 articles were published, with a total of 49 citations. The journal citation per year (cites/year) of 7 is obtained from the total number of citations divided by the number of years published. The citation number per article (cites/paper) of 0.86 is obtained from the total number of citations divided by the number of articles, and the number of authors per article (author/paper) is 2.16.

A publication has an index used to measure the productivity and impact of an article published by authors, researchers and scientists called the h-index. This index is based on the number of scientific works produced by the Author and the number of citations received from other authors/publications. An author/journal can have an h-index if every article published is h and has been quoted at least h times. The H-index reflects the number of publications and the number of citations per publication. The number of citations from the cumulative number of cited articles affects other articles and can be used to calculate the g-index. The g-index calculation is the average number quoted after being sorted up to the number g. The citation weights received by the document are considered in the g-index calculation, and the total number of publications does not limit the g-index for a particular author (researcher/scientist). H-index and g-index are numbers in the order of documents to, after documents are sorted by number quoted as we know that hI, the norm is the individual h-index obtained by normalizing the number of citations for each article by dividing the number of citations by the number of authors for that article, and then calculating the h-index of the normalized number of citations. While hI, annual (HLA) is a number obtained from hI,norm divided by academic age (number of years valid since the first publication). In Figure 1, the transportation optimization journal used as a case study has h-index 3, g-index of 6, hI, norm 2, and hla of 0.29.

**B. Clustering of Research**

This study identifies research on transportation based on the type of research conducted. The mapping was carried out over seven years, from 2015 to 2022. The research data that had been collected was then processed, and the results of demographic identification from Google Scholar were obtained as follows. The identification findings from the PoP consist of three types found in the Google Scholar Author. The three types of publications are papers published in journals, printed books, and research in the form of a published thesis. Therefore, the database collected by PoP can be clustered into several parts, as shown in figure 2.

The results of bibliometrics on published documents drawn using POP software are then dominated by data mining research. The results of the visualization of 12 publication documents ([12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22], [23]). Data mining is collecting and processing data that aims to extract important information from the data. Collecting and extracting this information can be done using software with the help of statistical calculations, mathematics, or Artificial Intelligence (AI) technology. Data mining is often called Knowledge Discovery in Database (KDD). The publications identified by PoP show that the research on transportation optimization uses a data mining approach.

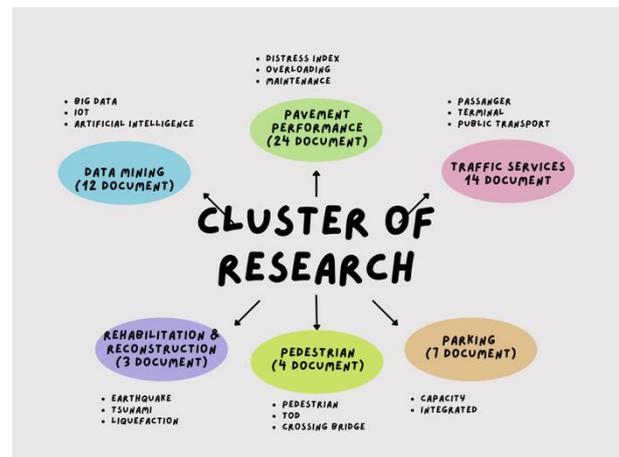


Figure 2: Cluster of research

The next publication document that can be clustered in the pavement performance and service level field. The PoP application used successfully identified 24 publication documents ([24], [25], [26], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41], [42], [43], [44], [45], [46], [47]). The research database on traffic maintenance and service with keywords selected in this PoP leads to optimization using data mining. In these various studies, it is stated that a large database that collects some data regarding the condition of the road pavement layer, the type and level of damage, and the type and maintenance schedule summarized in the road pavement management system can be defined. The algorithm can be arranged to become real information support in improving road performance. The development of such a system has a great impact on scientific development. Even if the prediction accuracy is slight, it is still better than random guessing.

Research clusters that are widely published from the results of PoP mapping are with the theme of the level of service for road users. These various publications are prepared to ensure that transportation optimization follows the plan. Because the output and outcome of

various optimizations produce optimal services for road users. The database collected by PoP about the level of service published by the author is 14 publication documents ([48], [49], [50], [51], [52], [53], [54], [55], [56], [57], (Andriyani, Dermawan, Isradi, & Rifai, 2021), [59], [60], [61]). In the cluster, the Author discusses the evaluation of performance and road service levels. Various methods and processes for assessing road performance in one approach under performance standards or predetermined goals. This collection of writings tries to raise the performance evaluation that has been achieved to produce information on the assessment results. In addition, several articles regarding the evaluation of road performance compared with the previous condition.

In other clusters, the author is seen discussing parking with a total of seven publication documents ([62], [63], [64], [65], [66], [67], [68]). The discussion about parking did not escape the discussion carried out by the author with a total of seven publication documents ([69], [70], [71], [72], [73], [74], [75]). Meanwhile, the other cluster that has a smaller number of published documents is a discussion about airports which consists of two documents ([76], [77]), railway as much as one document ([78]), pedestrian and passenger cross-bridge as many as four documents ([79], [80], [81], [82]). In addition, there are two clusters that complement the diversity of the author's research, namely on the rehabilitation and reconstruction of three documents ([83], [84], [85]) and various other studies as many as five documents ([86], [87], [88], [89], [90], [91]).

The diversity of publications can be seen from the scientific impact, namely the number of citations. The number of articles cited in a journal during a certain period of the year in scientific studies and having relevance to research makes the quality of publications high.

More articles with a high citation mean that more articles are published by citing the article, so the publication's usefulness is more visible. Google Scholar is a media commonly used by managers of scientific journals and writers to see the citation numbers generated.

The collection of works listed in Google Scholar is not always from scientific works (scientific journals or books), so when using PoP, it is necessary to pay attention to what works will be analyzed. In addition to Google Scholar, the use of software can be used to assist in knowing the citation statistics in a scientific journal. In addition to the number of citations, PoP can be used to determine the diversity of types of research themes.

## V. CONCLUSION

The Publish or Perish application can be used to find the citation metric numbers owned by the Author, for example, the transportation optimization researcher described in the article above. The PoP application uses Google Scholar Query data sources to analyze citation numbers on a research theme whose results are presented as impact metrics, including h-index and others. Information on citation numbers includes publication years, citation years, papers, cites per year, cites per paper, cites per Author, papers per Author, Author per paper, h-index, g-index, hI, norm, and hI, annual. The resulting analysis is complete and can be used as evaluation material for the quality of articles per Author and the quality of the journal.

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