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## *Uncovering patterns of author productivity in educational leadership and management in Indonesia: A bibliometric study using lotka's law*

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### **Abstract**

**Background of the study:** The rapid development in the field of educational leadership and management (EDLM) recently has led to an increase in the number of publications. In line with this, bibliometric analysis has been widely conducted to assess various fields of study, particularly in Indonesia. The abundance of publications also necessitates an examination of the extent to which authors' productivity levels contribute to the field of EDLM in Indonesia.

**Purpose:** This research aims to explore the pattern of author productivity by testing Lotka's Law on publications in the field of EDLM in Indonesia.

**Method:** The testing is conducted using the complete count and straight count methods to compare the results obtained from both approaches. The data for the study were collected from all 44 Indonesian accredited journals in the EDLM field. A total of 7,796 articles were screened based on specific criteria, resulting in a final sample of 5,158 articles with 6,604 authors (complete count) and 4,301 authors (straight count).

**Findings:** The results of the study indicate that the productivity levels of authors in the field of EDLM in Indonesia do not align with Lotka's law. While, most productive authors tend to publish their publication in a single journal only.

**Conclusion:** The study also reveals a disparity in the productivity levels between the two methods, as well as a tendency for productive authors to publish their work in a single journal.

**Keywords:** *lotka laws, educational leadership and management, bibliometrics*

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## Introduction

Education is a critical component of a country's development, and educational leadership and management (EDLM) play a vital role in ensuring the quality and effectiveness of education systems. Globally, educational leadership and management are particularly important due to the country's vast and diverse population, and complex social and economic challenges. This development certainly has an impact on research and scholarships in educational leadership and management. Like in Asia, the trend of research development from 1995-2012 was in the early stages of development. Several significant trends that emerged include K-12 school leadership, school change, effects and improvements, and organisational behaviour in the education context. (Hallinger & Chen, 2015). Another study shows the dominance of the most productive centres of scholarship from Hong Kong and Singapore, followed by China, Taiwan, Malaysia, and Thailand. (Hallinger & Bryant, 2013).

As research in the field of EDLM continues to develop globally, there is an increasing trend in research that reveals the publication trends in EDLM. Hallinger & Kovačević (2021) analysed the same publications from 21 Scopus journals, with a total of 22,492 articles published from 1960 to 2018. The results showed that the research direction in EDLM is Leadership for Learning, Leading Change, Leading Teachers, and School Effectiveness and School Improvement. Hallinger's (2020) study also conducted science mapping in EDLM in Asia, Africa, and Latin America. The findings indicated that the global literature on EDLM is undergoing significant changes in composition and recommended strengthening the quality and scope of research in developing regions of the world.

Several scientific literature on science mapping of EDLM research currently not only focuses on global contexts. Hallinger & Hammad (2019) conducted a specific study on Arab societies. The study showed the low volume of EDLM research in Arab societies, even conceptual publications were only at 20%. Other studies such as Gümüş et al., (2020) focused on the science mapping of EDLM publications in Turkey. The results showed the research focus on the field of leadership for learning, leading teachers, and administrative behaviour and effects in Turkey. Other results were also found in the context of EDLM publications in Malaysia, indicating that most literature is still contemporary, highlighting the need for the development of topics and methods for future research (Adams et al., 2021).

In addition to analysing publication trends through science mapping, some studies also explore publication trends from other perspectives. Mohamed et al. (2020) conducted a bibliometric study on the pattern of the 100 most-cited publications. They found that the highest global contributions came from the United States, United Kingdom, and Canada, while from Asia, it was Hong Kong, Thailand, Singapore, and Malaysia. Furthermore, Gömeç & Bozkuş (2021) also analysed publication trends in the field of EDLM and stated that authors from the United States dominate global publications, followed by the United Kingdom and Australia. Specifically in Asia, authors from Hong Kong dominate in the 6th position globally, followed by China (13<sup>th</sup>), Malaysia (14<sup>th</sup>), Thailand (15<sup>th</sup>), and Singapore (20<sup>th</sup>). This means that both the quality of publications indicated by citations and the authors from Southeast Asia also dominate in Asia and globally.

The bibliometric method is one of the methods used to obtain an overview of publication trends mentioned above. Bibliometrics is a method of applying mathematics and statistical analysis to examine the productivity and frequency of scientific works, author productivity, patterns and influences of authors on other scientific works, frequency of occurrence of words in texts, and other similar analyses (Latief, 2014). The bibliometric laws of Zipf, Bradford, and Lotka are the pillars of bibliometrics, scientometrics, and infometrics that have been widely applied in recent research. This field has emerged as the most active field of library and information science used to understand the patterns and productivity of various fields of



literature ([Mathankar, 2018](#)).

In Indonesia, EDLM research has also been an important area of study, with scholars investigating issues such as educational policy, leadership development, school administration, management, and improvement. Furthermore, the Indonesian context presents unique challenges and opportunities that may differ from other countries, which can be seen from the diverse types of publications in this field. The growth of EDLM publications in Indonesia is also reflected in the emergence of academic journals. However, the reputation of Indonesian journals poses a new challenge for authors to determine high-quality journals for publication.

Therefore, it is crucial to understand the current state of research and scholarship in educational leadership and management in Indonesia, as it can help identify trends, gaps, and opportunities for improvement. A comprehensive analysis of scholarly output in this field can offer valuable insights into the significant research themes, theories, and methods used by scholars, as well as the research gaps that need to be addressed to advance the field. Despite limited bibliometric analysis on EDLM in Indonesia, recent studies have explored this field in elementary education ([Adi et al., 2021](#)), economic and finance ([Aminy et al., 2021](#); [Firmansyah & Faisal, 2020](#)) health information systems ([Madjido et al., 2019](#)), and other areas.

One rarely conducted bibliometric analysis is the Lotka's law bibliometric analysis. Lotka's law is used to describe the productivity distribution of authors in writing articles. Lotka's law explains an inverse relationship between the number of articles written and the number of authors who write them. It states that as the number of articles written increases, the number of authors who write them decreases. This law suggests that around 60% of all authors in a specific field make a single contribution ([Wahyudi & Wijayanti, 2018](#)). In the context of calculating author productivity, there are three techniques: adjusted count, complete count, and straight count. The adjusted count technique assesses each author's contribution to an article. In other words, the count of one article is divided by the number of authors involved. The complete count technique assigns a full value of 1 to each author of an article. On the other hand, the straight count technique only considers the first author as the contributor to each manuscript. Through bibliometric analysis, this study aims to reveal patterns of author productivity using lotka's law in EDLM research in Indonesia, providing insights into the current state of research and scholarship in this crucial field. This study also aims to examine the differences in author productivity patterns when using the complete count and straight count techniques.

## Method

### *Search Criteria*

The selection of journals was based on the Science and Technology Index (SINTA) database. SINTA is an appropriate facility to find accredited national journals for scientific publication ([Saputra, 2020](#)). This platform categorizes journals into six categories based on manuscript screening, management feasibility, and timeliness of publication, which are SINTA 1 to SINTA 6 ([Ahmadi, 2019](#)). The existence of the SINTA database is one of the reliable national databases used by researchers to find journals that meet national standards.

The search for journals in the SINTA database was conducted using the keywords "Educational Management" OR "Educational Administration" OR "Educational Leadership" or their equivalent in Indonesian. A total of 47 journals with a focus and scope in the field of EDLM were identified, but after initial analysis, two journals were eliminated as their publications were not related to the field of EDLM. The journal data was then exported to Microsoft Excel along with the e-ISSN of each journal. Then the e-ISSN was used to search for articles in each journal using the Publish or Perish (PoP) software. PoP was used because it allows users to edit the presented result list, facilitate removal of duplicate entries, and dynamic sorting with eight metadata elements ([Jacsó, 2009](#)). The e-ISSN data of each journal is used for



searching with a time criteria from 2013-2022. One journal was also eliminated during the PoP search process because its e-ISSN was not valid. Finally, the search process is conducted on 44 selected journals.

### *Data Extraction and Cleaning*

The e-ISSN data of each journal was used for a time-based search from 2013-2022, from 44 selected journals with the document types of conceptual paper, research paper, and literature review. The metadata of each journal was then exported in BibTex format, which is a bibliographic management tool used to create and manage bibliographic references in LaTeX documents. This file type can be edited using a text editor or a reference management software, and new references can be added or existing ones can be modified.

The use of BibTex was chosen because some of the PoP metadata results were truncated, with some parts of the field being replaced by dots [...], especially in the Author, Title, and Publication columns. The BibTex data of each journal was then imported using Mendeley software to update the truncated data. This was done to ensure that all entries had complete data. After each entry had complete data, the data was exported into comma-separated values (CSV) files. A data cleaning process was then conducted to identify incomplete entries, wrongly entered entries, or redundant data. After the data cleaning process, 2640 data entries were eliminated from the study.

### *Data Analysis*

The data is further analyzed using R Studio with the bibliometrix package and the Biblioshiny app. A total of 5,157 articles are analyzed for the research. Each author in the articles is assigned an author(s) ID to distinguish one author from another. The grouped data in CSV format is then analyzed using the Biblioshiny app.

This research employs a quantitative approach aimed at determining the productivity of authors in publishing on the topic of EDLM in Indonesia. Bibliometric analysis using Lotka's law is used in this study. The data analysis process begins with categorizing articles based on the number of authors. Then, the estimation of the Lotka's law parameters  $n$  and  $C$  is conducted.

The equation used is:  $Y(x) = \frac{C}{x^n}$  (1)

To determine the estimation value of parameters  $n$  and  $C$ , the formula used is:

$$b = \frac{\sum XY - n \bar{X}\bar{Y}}{\sum X^2 - n \bar{X}^2}$$

with  $b = -n$ , and the value of  $C$  is obtained from the following equation  $C = \frac{1}{\sum \frac{1}{x^n}}$

Next, the calculation of the theoretical distribution of Lotka's law is carried out using the following equation  $y_x = C \frac{1}{x^n}$

Testing of Lotka's law is conducted using the Kolmogorov-Smirnov test (K-S test) with a critical value of  $\alpha = 0.05$  (95% confidence level). The purpose of this test is to determine whether the observed distribution is in accordance with Lotka's law. If the  $D_{maks}$  value is greater than the critical value, then the null hypothesis ( $H_0$ ) is rejected, and the alternative hypothesis ( $H_1$ ) is accepted.

## **Result and Discussion**

The global development of publications also has an impact on publications in Indonesia, including in the field of educational leadership and management (EDLM). The results of this study reveal a dramatic trend in the increase of the number of publications and EDLM journals over the past 10 years. This trend is illustrated in the following figure.



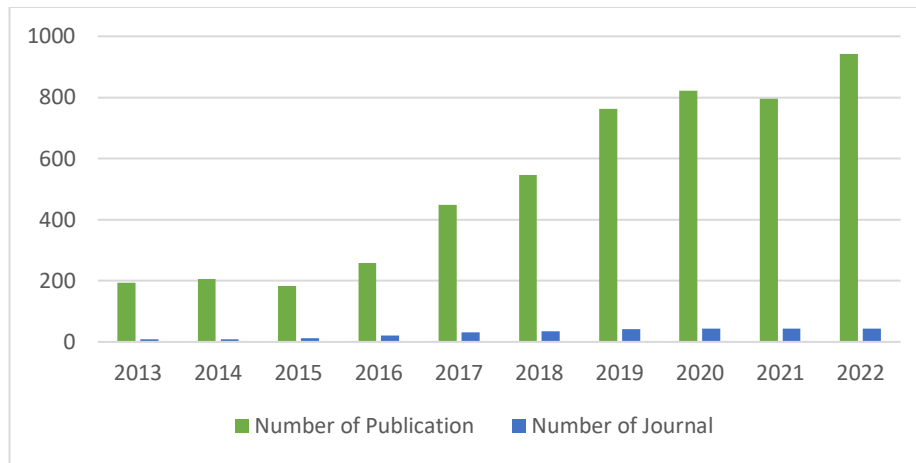


Figure 1. EDLM publication in Indonesia

Specifically, Figure 1 shows an increase in the number of publications over the past 10 years. Although there were slight declines in 2015 and 2021 compared to the previous years, they were not significant.

*Calculating the Values of Parameters n and C for complete count*

The determination of the values of n and C begins with calculating the number of authors and articles. Table 1 shows that the number of authors producing x articles in 10 years ranges from 1 to 151 articles. The data is then analyzed using an algorithmic function to calculate the parameters of Lotka's Law. The third and fourth columns represent the values of log X (represented by the annotation X) and the values of log y (represented by the annotation Y), respectively. The values of XY and X<sup>2</sup> in the fifth and sixth columns are also calculated. These values are used as the basis for calculating the estimated values of the parameters n and C in Lotka's Law.

Determining the values of n and C begins with calculating the number of authors and articles. In Table 1, it can be observed that the number of authors producing x articles in 10 years ranges from 1 to 151 articles. The subsequent data is analyzed using an algorithm function. The calculation results are used to determine the parameters of Lotka's Law. The third and fourth columns represent the values of log X (notated as X) and log y (notated as Y), respectively. Additionally, the values of XY and X<sup>2</sup> are included in the fifth and sixth columns. These values are used as the basis for calculations to estimate the values of parameters n and C in Lotka's law.

Tabel 1. Estimating the parameters in Lotka's Law calculation.

Number of articles (x)	Number of authors (y)	X=log x	Y=log y	XY	X <sup>2</sup>
1	5432	0.00000	3.73496	0.00000	0.00000
2	598	0.30103	2.77670	0.83587	0.09062
3	215	0.47712	2.33244	1.11286	0.22764
...	...	...	...	...	...
151	1	2.17898	0.00000	0.00000	4.74794
Σ=31	6604	37.26605	27.11636	19.58405	52.60311

The equation used to determine the productivity pattern based on Lotka's law is as follows:

$$Y(x) = C/x^n, \text{ specifically}$$

$$Y(x) = \text{The number of authors with x articles}$$



$C = 1, 2, 3, \dots, k$  (constanta)

$X$  = The number of articles contributed by individual authors.

$n$  = exsponent

The calculation to determine the estimated values of the parameters in Lotka's Law can be seen in Table 1. To obtain the value of  $n$ , the following equation is used:.

$$\log y_x = \log C - n \log x$$

for example  $Y = \log y_x$

$$X = \log x$$

$$a = \log C$$

$$b = -n$$

So that,  $y = a + bX$

The calculated values in Table 1 are then inserted into the least square method equation to estimate the value of  $n$  as follows.

$$a = \bar{y} - b\bar{x}; \text{ and}$$

$$b = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sum (x-\bar{x})^2}$$

$$b = -1.66742763$$

Since  $b = -n$ , then  $n = 1.66742763$ .

Next, calculations are performed to obtain the value of  $C$  by distributing the values in the table as follows.

Table 2. Calculating the Value of Parameter C

Number of publications (x)	$x^n$	$1/x^n$
1	1	1
2	3.176477126	0.314814167
3	6.245470525	0.160116039
...	...	...
151	4298.197503	0.000232656
Total		1.94765586

The estimated values of Lotka's law parameters in Table 1 are then inserted into the equation:  $C = \frac{1}{\sum \frac{1}{x^n}}$

With  $\sum \frac{1}{x^n} = 1.94765586$  Then the value of  $C$  is obtained as follows 0.513437728.

Based on the calculations in the table 2, the productivity pattern of authors in the field of EDLM is determined to be:  $y_x \cdot x^{1.66742763} = 0.513437728$ . This means that a certain number of authors contributing to a specific article, with an exponent of 1.66742763, account for 51.34% of the total number of authors. Lotka stated that the number of authors contributing to one article is around 60% of the total contributing authors. Next, the results are distributed into the table for theoretical calculations of Lotka's law.

Table 3. Percentage of Authors' Observational Data and Theoretical Calculation of Lotka's Law with the Pattern  $y_x \cdot x^{1.66742763} = 0.513437728$

Number of articles (x)	Number of authors (y)	% of authors based on observational data	$x^n$	C	% estimated authors
1	5432	82.25318	1	0.513437728	51.34377281
2	598	9.05512	3.176477126	0.513437728	16.16374706

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3	215	3.25560	6.245470525	0.513437728	8.220961512
...	...	...	...	...	...
151	1	0.01514	4298.197503	0.513437728	0.01194542
Total	6604	100%			100

According to Table 3, the observed data shows that 82.25% of the 5432 authors contribute to one article, while Lotka's law calculation suggests it to be 51.34%. In general, Lotka's law demonstrates an inverse relationship between the number of authors and the number of articles produced. The more articles are produced, the fewer authors contribute to them. Conversely, the fewer articles are produced by individual authors, the greater the number of authors.

Next, a Kolmogorov-Smirnov test is conducted to examine whether Lotka's law can be applied to the data group, as shown in the following table.

Table 4. Kolmogorov-Smirnov Test for complete count test

Number of articles (x)	Number of authors (y)	% Number of authors [y']	Cumulative sum y'[S <sub>n</sub> (x)]	Theoretical Frequency of Lotka's Law [Y <sub>x</sub> ]	Cumulative Sum of Theoretical Frequencies y'[F <sub>0</sub> (x)]	D <sub>max</sub> F <sub>0</sub> (x)-S <sub>n</sub> (x)
1	5432	0.822531799	0.822531799	0.513437728	0.513437728	0.309094070804
2	598	0.090551181	0.91308298	0.161637471	0.675075199	0.238007781291
3	215	0.032556027	0.945639007	0.082209615	0.757284814	0.188354192822
...	...	...	...	...	...	...
151	1	0.000151423	1	0.000119454	1	0.000000000000

The result of the Kolmogorov-Smirnov (K-S test) is used to compare the theoretical cumulative frequency with the observed cumulative frequency. The maximum deviation (D<sub>max</sub>) is formulated to measure the discrepancy.

$$D_{max} = \max | F_0(x) - S_n(x) |$$

The critical value of K-S for  $\alpha = 0.05$  is calculated using the equation  $1.36/\sqrt{N}$ , resulting in 0.016735372. Meanwhile, the calculated value of D<sub>max</sub> is 0.309094070804. Since the critical value is larger than the maximum deviation, the null hypothesis is not accepted, indicating that the productivity of the authors not inline to Lotka's law.

*Calculating the Values of Parameters n and C for straight count*

There is a significant difference in the calculation of authors using the straight count method. In this method, there are 4301 authors who have written articles ranging from one to seventeen times according to the criteria of this research. At this stage, the values of parameters n and C will be calculated.

Table 5. Estimating the parameters in Lotka's Law calculation.

Number of articles (x)	Number of authors (y)	X=log x	Y=log y	XY	X <sup>2</sup>
1	3804	0.00000	3.58024	0.00000	0.00000
2	321	0.30103	2.50651	0.75453	0.09062
3	100	0.47712	2.00000	0.95424	0.22764
...	...	...	...	...	...
17	1	1.23045	0.00000	0.00000	1.51400
Σ=12	4301	8.83160	13.43056	5.68235	7.81366

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In Table 5, there are only 12 groups of articles written by 4301 authors. Next, the calculation of the value of n is performed using the formula:

$$a = \bar{y} - b\bar{x}; \text{ and}$$

$$b = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sum (x-\bar{x})^2}$$

$$b = -1.897458663$$

Therefore, the value of n is determined to be 1.897458663. Next, the analysis of the value of C is conducted by distributing it according to the following table.

Table 6. Calculating the Value of Parameter C

Number of publications		
(x)	$x^n$	$1/x^n$
1	1	1
2	3.725563527	0.268415769
3	8.041144348	0.124360409
...	...	...
17	216.1354307	0.004626729
Total		1.632957973

The estimated values of Lotka's law parameters in Table 6 are then inserted into the equation:  $C = \frac{1}{\sum \frac{1}{x^n}}$

With  $\sum \frac{1}{x^n} = 1.632957973$ , Then the value of C is obtained as follows 0.612385632

Based on the calculations in the table 5, the productivity pattern of authors in the field of EDLM with straight count method is determined to be:  $y_x \cdot x^{1.897458663} = 0.612385632$ . This means that a certain number of authors contributing to a specific article, with an exponent of 1.897458663, account for 61,23% of the total number of authors. Next, the results are distributed into the table for theoretical calculations of Lotka's law.

Table 7. Percentage of Authors' Observational Data and Theoretical Calculation of Lotka's Law with the Pattern  $y_x \cdot x^{1.897458663} = 0.612385632$

Number of articles (x)	Number of authors (y)	% of authors based on observational data	$x^n$	C	% estimated authors
1	3804	88.44454778	1	$\frac{0.61238563}{2}$	61.23856316
2	321	7.463380609	$\frac{3.72556352}{7}$	$\frac{0.61238563}{2}$	16.43739604
3	100	2.325040688	$\frac{8.04114434}{8}$	$\frac{0.61238563}{2}$	7.615652762
...	...	...	...	...	...
17	1	0.023250407	$\frac{216.135430}{7}$	$\frac{0.61238563}{2}$	0.283334218
Total	4301	100%			100

Based on Table 7, it can be observed that in the observed data, 88.44% of the 3804 authors contribute to one article, while according to the Lotka's law calculation, it is 61.23%. In the final stage, a K-S test is conducted as follows.

Table 8. Kolmogorov-Smirnov Test for complete count test

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Number of articles (x)	Number of authors (y)	% Number of authors [y']	Cumulative sum y'[S <sub>n</sub> (x)]	Theoretical Frequency of Lotka's Law [Y <sub>x</sub> ]	Cumulative Sum of Theoretical Frequencies y'[F <sub>0</sub> (x)]	D <sub>max</sub> F <sub>0</sub> (x)-S <sub>n</sub> (x)
1	3804	1.435471698	1.435471698	0.612385632	0.612385632	0.823086066492
2	321	0.121132075	1.556603774	0.16437396	0.776759592	0.779844181567
3	100	0.037735849	1.594339623	0.076156528	0.85291612	0.741423503002
...	...	...	...	...	...	...
17	1	0.000377358	1.623018868	0.002833342	1	0.623018867925

The critical value of K-S for  $\alpha = 0.05$  is calculated using the equation  $1.36/\sqrt{N}$ , resulting in 0.020737394. Meanwhile, the calculated value of  $D_{\max}$  is 0.823086066492. Since the critical value is larger than the maximum deviation, the null hypothesis is not accepted, indicating that the productivity of the authors not conforms to Lotka's law.

#### Methods comparison

The research findings indicate a significant difference between the two methods, particularly in terms of the number of authors. The difference in the number of authors between the two methods is 2,303 authors. However, both Lotka methodologies applied in this study yield the same result, which is the rejection of the hypothesis or inconsistency with Lotka's law. The dominance of authors with a single publication occurs in both methods, with 82.25% in the complete count and 88.44% in the straight count. This research emphasizes that the productivity level of authors in the field of educational leadership and management in Indonesia is still low.

The findings of this research are consistent with the study conducted by [Aksel & Bozkuş \(2022\)](#) that found similar patterns in the publication of educational administration and management journals in the Scopus database. In fact, that study revealed that the proportion of authors with a single publication reached 0.971. Other studies, such as [Kahraman & Bozkus \(2022\)](#) examining a specific subfield in EDLM, found a proportion of 0.89, and [Gömeç & Bozkuş \(2021\)](#) with a proportion of 0.804.

#### Author productivity distribution

This study also analyzed the distribution of authors in both methods. The analysis was conducted using the Biblioshiny App, examining the productivity over a 10-year period of publication. The results for both methods are as follows:



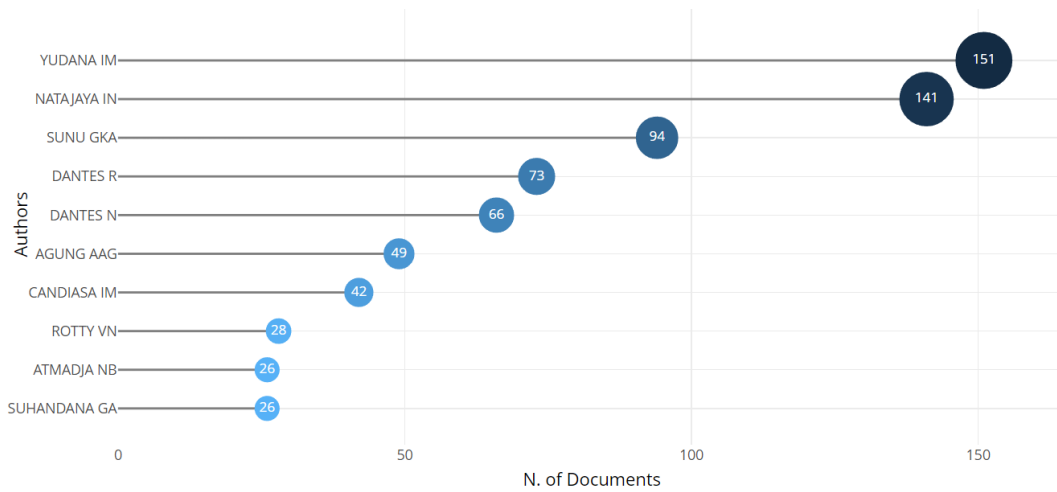


Figure 2. Authors' Production over Time pada metode complete count

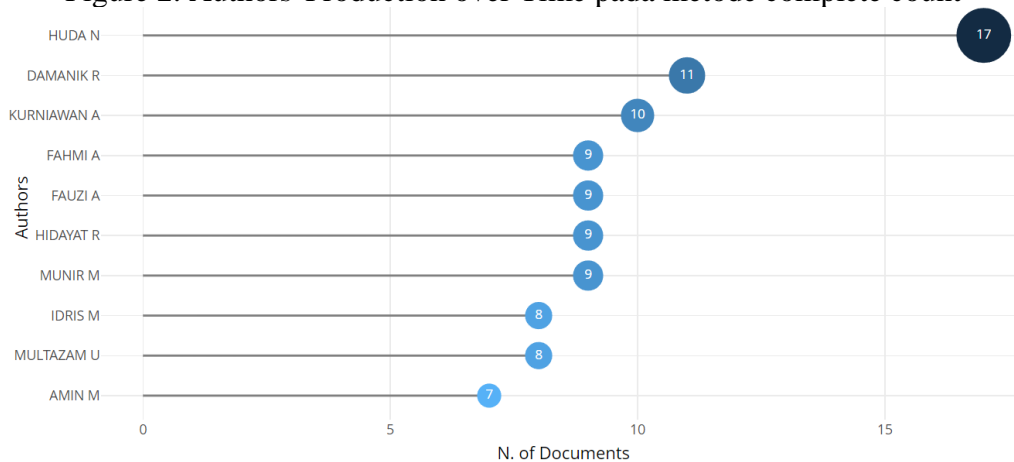


Figure 3. Authors' Production over Time pada metode straight count

Based on Figure 2 and Figure 3, there are 10 productive authors based on the complete count and straight count methods. The most active author according to the complete count method is Yudana IM with a publication count of 151 articles, followed by Natajaya IN (141 articles) and Sunu GKA (94 articles) (see Figure 2). A significant difference can be observed in the most productive authors using the straight count method. The most active authors using this method are Huda N (17 articles), Damanik R (11 articles), and Kurniawan A (10 articles) (see Figure 3). The analysis reveals that productive authors in the complete count method do not necessarily serve as the first/main authors.

Further analysis also revealed that most productive authors only published their work in one journal, while the rest published their work in various journals ranging from 2 to 10 different journals. This information suggests that while some authors may choose to focus on publishing in a single journal, many others have chosen to diversify their publications across multiple journals. This research also found evidence of suboptimal journal management in the field of EDLM in Indonesia. In several journals, there was a concentration of high publication numbers within a single year. Additionally, there was a tendency for journals published by organizations to be dominated by authors from the same organization. However, further investigation is needed to explore this phenomenon in future research. This may be a strategic decision to reach a wider audience or to address different research questions in different contexts. Understanding the publication patterns of authors in the field of EDLM can help researchers and practitioners to better navigate the landscape of scholarly literature in this field.



## Conclusion

The results of the analysis of the productivity pattern of EDLM authors in Indonesia from 2013 to 2022 using the complete count method show that the parameter values of Lotka's law are an exponent (n) of 1.66742763 and C of 0.513437728. This means that authors contributing 1 article account for 51.34% of the total number of authors. The K-S test indicates that the distribution of author productivity does not align with Lotka's law.

Similarly, in the analysis using the straight count method, the parameter values of Lotka's law are an exponent (n) of 1.897458663 and C of 0.612385632. In this method, authors contributing 1 article account for 61.23% of the total number of authors. The K-S test also confirms that the distribution of author productivity does not conform to Lotka's law.

Furthermore, there is a significant disparity between the productivity levels of authors in the complete count analysis and the straight count analysis. Most productive authors tend to publish their articles in a single journal only. This study recommends conducting additional analyses using the adjusted count method to gain a more comprehensive understanding of author productivity in the field. Future research needs to enhance the criteria for selecting journals to be analysed.

This study is confined to the analysis of the productivity of authors in the field of EDLM in accredited journals in Indonesia. Further research could also incorporate the adjusted count method in calculating author productivity. Additionally, other bibliometric analyses are warranted in the field of EDLM in Indonesia.

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## Authors' Contributions

All authors have contributed to the final manuscript. The contribution of all authors: conceptualization, methodology, formal analysis, writing original draft preparation, writing review and editing. All authors have read and agreed to the published version of the manuscript.

## Conflict of Interest

All authors have no conflict of interest related to this study.

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