Mapping the Strength of Research in the Focus Areas for Maritime based on SCOPUS 2014-2018

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Abstract. This study investigated scientific research on mapping the strength of maritime focus research BASED on the 2014-2018 Scopus data. The Ministry of Research Technology and (Kemenristekdikti), especially the Directorate General of Research and Development (RISBANG), has a significant role in improving the quality of higher education. One way to improve higher education quality is through mapping the strengths of research. The power of the study that forms the basis of this mapping refers to RPJPN 2005-2025 and RPJMN 2015-2019, which focuses on Maritime Affairs. This study used three steps methodology; (1). Collecting data was collected from secondary Scopus data year 2014-2018 from Kemenristek dikt in scientific publication focus on Maritime affairs, (2) identifying Scopus data based on sub-focus of maritime affairs, (3). Data analysis using frequency distribution (Determine the range of data, determine the classes, and determine the class interval). This study concluded that 91.1 % (154) of 169 universities published journals indexed Scopus on range 1-19 journal publications within five years. UNDIP (Diponegoro University) has the most journal publications of Maritime Affairs focus.

1. Introduction

Higher Education is obliged to research, organize education, and community service [1]. Developing science and technology is directed in Higher Education, as well as improving the welfare of the competitiveness of people and nations. The results of the research must have benefits for the enrichment and learning of science and technology, improvement of the quality of higher education and the advancement of the nation's civilization, progress, increasing independence, and competitiveness of the country, meeting the strategic needs of national development, and transform communities into knowledge-based societies [2]. To make sure the quality of higher education, national standards of higher education are established. Universities in Indonesia used this standard to perform minimum measures for research activities. In other words, there a target minimum must be achieved for research activity.

Higher Education in Indonesia was trying to show its superiority. And the advantages of each PT are still limited to one side and are not based on good reasons. However, not all universities apply like that. In this case, the community has been recognizing several universities. For searching for superior
universities, this research using mapping. The mapping results can provide information about how many universities publish international journals (indexed by Scopus).

To align long-term research needs the direction of national development related to science and technology, the 2017-2045 National Research Master Plan (RIRN) is ready to improve the efficiency and effectiveness of implementation, especially among Ministries / Institutions. There are ten studies focused on RIRN. Areas of focus mean including Food-Agriculture; Energy - New and Renewable Energy; Health - medicine; Transport; Information and communication technology; Defense and security; Advanced material; Marine; Disaster and Social Humanities - Cultural Arts - Education. However, the parameters to determine the advantages of PT are not only seen from international journals (indexed by Scopus) can also be seen from several other publications that are not contained in this study.

One crucial thing is mapping in the maritime focus area. Because according to Ashari [3], Indonesia is a country that has the most significant number of islands in the world. Sea and strait were separating the islands of the Indonesian archipelago. However, the sea area is more comprehensive compared to land. Therefore Indonesia is known as a maritime country. In Indonesia, almost all provinces have territorial waters, geographical conditions, that conditions making Indonesia considered a maritime nation. Indonesia has a marine fishery area of no less than 6.85 million km², and it is estimating that the country has a fish production content of 10 million tons per year.

Seapower cannot stand alone but must cooperate with other forces such as political, diplomatic and official forces [4]. Till contends that technology may additionally alter the details of maritime strategy [5]. According to Bueger [6], maritime security ought to coordinate the majority of the following four different ideas namely marine safety, blue economy and resilience. That maritime strategy and the theory of sea power can be applied in military operations either in times of peace or in times of conflict. That in the conflict situation, it involves more complex principles than simply war fighting; It is truly a joint approach in that it recognizes the roles and importance of land and air forces; and that it integrates civil components of maritime power (the marine industries and maritime infrastructure) into its principles [7].

Mahan believes that nations with the best possible advantages [natural and strategic endowments] ought to leverage upon their sea power advantages (especially naval power) as the way to succeed. This is supported by Till who broadly acknowledged the significance and military character of sea power [8]. Technology then plays an important role. Similarly, the development of maritime warfare technologies like submarines have grown into the fifth generation. According to Keck, Russia has developed the fifth-generation submarines which focus on network-centric capabilities thus reduce the primary importance of dimension and speed [9].

One of the important things in maritime is developing transportation systems is still a new and expanding concept. It encompasses not only the vessels, maritime routes and ports as traditional components of the marine sector, but also their sea-borne trade, maritime logistics, and the interactions among entities in one shipping region [10] in terms of cooperation or policies.

Machine learning applications in maritime transportation industry is quite limited since it is capable of analysing large data and develop a logic. In recent years, some researchers have attempted to adopt machine learning methodologies in the analysis of data. For instance, Obradovic et al. [11] utilized some of fundamental machine learning methodologies such as support vector machine, neural network, Bayesian network, etc. to carry out anomaly detection in the maritime domain. Likewise, Dobrkovic et al. [12], adopted machine learning algorithms called as DBSCAN algorithm to determine efficient waypoints for voyage planning by using AIS data.

Based on the description above, this study aims to map a maritime focus area using a frequency distribution. Frequency distribution is the arrangement of numerical data according to magnitude (quantity) or by category (qualitative) [13]. The advantage of using a frequency distribution is data presented in certain classes or categories together with the corresponding frequencies.
Therefore, research on mapping maritime focus areas is very useful for the Ministry of Research, Technology and Higher Education, especially the Director General of Research and Development in developing strategic policies.

2. Methodology

The data used in this study are secondary, namely the Scopus data for 2014-2018 obtained from the Ministry of Research and Technology. The population in this study is the data collection of Scopus in 2014-2018. The sample taken in this study is the Scopus data of the Maritime Focus Areas in 2014-2018.

2.1. Collecting data

The data were collected from Kemenristekdikti in scientific publications focus on Maritime affairs. The search covers the journal published from 2014 until 2018. In the beginning, the study uses the keywords “Maritime”. The initial search keywords were limited to the title of the paper and the keywords.

2.2. Identify Scopus data based on areas of focus in maritime affairs

The initial search keywords were limited to the title of the journal and the keywords. At first, 1,319 papers were derived using those combinations of keywords and the keywords specific to Maritime.

2.3. Data analysis using frequency distribution

Data from all universities that publish journals with a focus on Maritime were analyzed using frequency distribution. The frequency distribution is useful to see the class division for universities that send the most journals in the 2014-2018 range on Scopus. The formula that frequency distribution is using to determine the class of journal publications such as 1) determine the scope of data, 2) determine the types, 3) determine the class interval.

Determine the range of data using the largest value and the smallest value. The data range is the result of the difference between the largest value and the smallest value of the existing data: [4].

\[ R = X_{max} - X_{min} \]  

\[ R \] = Range

\[ X_{max} \] = Largest value

\[ X_{min} \] = Smallest value

Where \( R \) is the data range; \( X_{max} \) is the largest value of the data; \( X_{min} \) is the smallest value of the data.

To determine each class, this research use Sturges rules. Sturges rules in this research methodology use a total of data.

\[ K = 1 + 3.322 \log(n) \]  

\[ K \] = Classes

Where \( K \) is the total of classes; \( n \) is the total of data.

Determine the class interval or commonly called class length is the result of the difference from the largest data value minus the smallest data value then divided by the total of classes.

\[ P = \frac{X_{max} - X_{min}}{1 + 3.322 \log(n)} \]  

\[ P \] = Class Length

\[ R \] = Range

\[ K \] = Classes

Where \( X_{max} \) is the largest value of the data; \( X_{min} \) is the smallest value of the data; \( n \) is the total of data.
3. Results and discussion

This study using secondary data obtained from the data collection of reputable journals (Scopus) in 2014-2018. This study uses maritime affairs focus data with an overall data of 1319 Journals.

Based on the data obtained will be made using a frequency distribution, after that continue to make a mapping with categories of low, medium, and high on the number of universities based on the number of journals that have been uploaded in Scopus. Following are the results of the mapping.

Table 1. Frequency distribution of scopus indexed journal publications in Indonesia

| No  | Interval | Frequency | Percentage |
|-----|----------|-----------|------------|
| 1.  | 1-19     | 154       | 91.1       |
| 2.  | 20-38    | 5         | 3.0        |
| 3.  | 39-57    | 4         | 2.4        |
| 4.  | 58-76    | 3         | 1.8        |
| 5.  | 77-95    | 1         | 0.6        |
| 6.  | 96-114   | 0         | 0.0        |
| 7.  | 115-133  | 1         | 0.6        |
| 8.  | 134-152  | 0         | 0.0        |
| 9.  | 153-171  | 1         | 0.6        |

TOTAL 169 100

Table 1 show that the majority of tertiary institutions in Indonesia or around 91.1% of the total universities that publish scopus indexed journals is 154 and can only publish journals ranging from 1 to 19 publications. While universities that publish journals ranging from 153-171 total 1 university, or it can be said that only 0.6% of the total number of universities publish scopus indexed journals.

From the results of the analysis, the government is expected to be able to make a sustainable policy regarding the number of publications, namely to make a minimum publication limit for a college, so that all universities will jointly competent in the standards set. While universities that have published a large number of journals are expected to be given an award by the government, so that in the future these universities can maintain their excellence in publishing journals and even further improve the quality and quantity of their research.

Table 2. Higher education with the most number of publications

| Rank | Universities | Number of Publication | Research Sub-Focus                                                                 | Number of Sub-Focus |
|------|--------------|-----------------------|-----------------------------------------------------------------------------------|---------------------|
| 1    | UNDIP        | 168                   | Empowerment and enhancement of women's participation and social inclusion in maritime environments | 9                   |
|      |              |                       | 3T regional sovereignty technology                                                  | 58                  |
|      |              |                       | Maritime environmental conservation technology                                       | 66                  |
|      |              |                       | Technology for strengthening maritime infrastructure                                | 35                  |
|      |              |                       | Empowerment and enhancement of women's participation and social inclusion in maritime environments | 9                   |
| 2    | IPB          | 118                   | 3T regional sovereignty technology                                                  | 41                  |
|      |              |                       | Maritime environmental conservation technology                                       | 55                  |
|      |              |                       | Technology for strengthening maritime infrastructure                                | 13                  |
Table 2 shows that the first position is UNDIP (Diponegoro University) is a university with a number of journal publications as much as 168, while the second position is IPB (Bogor Agricultural University) with a number of journal publications as much as 118, and finally ITB (Bandung Institute of Technology) occupies the third position with journal publications 77. Therefore, the position of universities with the most journal publications is UNDIP with a dominant focus on research in the field of maritime environmental conservation technology as much as 66. Then for IPB colleges that have a dominant research focus in the field of maritime environmental conservation technology with a total of 55 and ITB colleges which have a dominant research focus in the field of Technology to strengthen maritime infrastructure with 32 publications journals.

4. Conclusion

Based on the analysis described in the discussion chapter, the following findings are obtained The majority of tertiary institutions in Indonesia or around 91.1% of the total universities that publish scopus indexed journals is 154 and can only publish journals ranging from 1 to 19 publications. While universities that publish journals ranging from 153-171 total 1 university, or it can be said that only 0.6% of the total number of universities publish scopus indexed journals.

The conclusion is that Diponegoro University (UNDIP) was the university with the highest number of journal publications in the maritime focus area of 168, while IPB (Bogor Agricultural Institute) ranked second with 118. Finally, ITB (Bandung Institute of Technology) was third with publication 77 journal Scopus indexed publications.

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