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Performance of Universities based on Research Output

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ABSTRACT

Performance of universities based on research ranking has become a trend to gauge the credibility and quality of the university. One of the parameters used to assess university ratings is the result of research in the form of papers, patents, copyrights. Therefore, universities in the world compete to publish research results in the form of journals or conferences and others. This paper discusses on performance of universities based on research output. The results of research index in developed countries shows that there is not much change from year to year, it may be said that it almost reaches a saturation point. On the other side of the earth, the increase in research results in ASEAN countries is still high, reaching 70-80 percent. More impressive, universities in Indonesia have tried very enthusiastically in the study as the percentage increase was 500%

KEY WORDS: *Research Output; Universities Performance; Ranking; Scopus; ISOMAse.*

NOMENCLATURE

LIPI	Lembaga Ilmu Pengetahuan Indonesia
ASEAN	Association of Southeast Asian Nations
CWUR	Centre of World University Ranking
QS	Quacquarelli Symonds
SCIC	Consejo Superior de Investigaciones Científicas
THE	Times Higher Education
LIPI	Lembaga Ilmu Pengetahuan Indinesia
RPI	Research Paper Index
BPI	Book Publication Index

1.0 INTRODUCTION

In the twenty-first century, researchers, board directors of institutions and the government showed very high interest by using various methods to rank universities in assessing the performance of higher education institutions. Both private and public universities in various parts of the world measure themselves in various dimensions that are believed by important institutions to determine improvement and success.

At the same time, there is no single indicator or composite number that accurately represents what an individual institution has done. In order to improve the quality and productivity of universities, teaching staff, students, staff and supporters need to follow a number of indicators which, taken together, provide estimates of achievement and strength that make sense relative to the best universities in each country.

At present, both public and private universities live on the basis of resources generated from many sources, which is very important for their success is the amount of endowments and their annual contributions. Endowments reflect the long-term strength of the accumulation of personal, public support and in some cases institutional savings that provide income for important purposes each year. The annual grant provides an indicator of the current level of the institution's personal contribution both to current expenditure and to increasing endowment. The results of all of these, annual contributions and contributions are also two factors in assessing university performance.

Many indicators serve this purpose, but most observers know that research matters more than anything else in defining the best institutions. This paper discusses on several university ranking

systems, research output in Indonesia and performance of global universities based on rating of research output.

2.0 UNIVERSITIES RANKING METHODOLOGY

The university rankings began in 2004 and were based on a combination of indicators that takes into account both the volume and content of the Web, the visibility and impact of web publishing in accordance with the number of external links received. Various rankings consider combinations of measures of funding and endowment, research excellence and/or influence, specialization expertise, admissions, student options, award numbers, internationalization, graduate employment, industrial linkage, historical reputation and other criteria. Various rankings mostly are evaluating on institutional output by research. Some rankings evaluate institutions within a single country, while others assess institutions worldwide. There are several university ranking systems at present, Centre of World University Ranking (CWUR), Webometrics, QS, Times Higher Education and 4ICU.

2.1 Center for World University Rankings

The CWUR has been doing university rankings in the world since 2012. The Center for World University Rankings (CWUR) publishes the only global university ranking that measures the quality of education and training of students as well as the prestige of the faculty members and the quality of their research without relying on surveys and university data submissions [1, 2]. CWUR uses seven objective and robust indicators to rank the world's top 1000 universities:

1. Quality of Education, measured by the number of a university's alumni who have won major international awards, prizes, and medals relative to the university's size (15%)
2. Alumni Employment, measured by the number of a university's alumni who have held CEO positions at the world's top companies relative to the university's size (15%)
3. Quality of Faculty, measured by the number of academics who have won major international awards, prizes, and medals (15%)
4. Research Output, measured by the the total number of research papers (15%)
5. Quality Publications, measured by the number of research papers appearing in top-tier journals (15%)
6. Influence, measured by the number of research papers appearing in highly-influential journals (15%)
7. Citations, measured by the number of highly-cited research papers (10%)

2.2 Webometrics

The Webometrics Ranking of World Universities" is an initiative of the Cybermetrics Lab, a research group belonging to the Consejo Superior de Investigaciones Científicas (CSIC), the largest public research body in Spain [6]. The original aim of the Ranking is to promote academic web presence, supporting the Open Access initiatives for increasing significantly the transfer of scientific and cultural knowledge generated by the universities to the whole Society. The Webometrics are based its ranking on four indicators, namely

1. Impact
2. Presence
3. Openness
4. Excellence

These four factors are rated from the academic sites of each university [3]. These four indicators are used by Webometrics as a representative for an in-depth evaluation of the university's performance in the eyes of the community by considering its activities, results, relevance, and impact.

Through the first indicator (*impact*) has weighing 50 percent. The Webometrics calculates how many external links are received from third parties. Many links will make a university recognized with regard to institutional prestige, academic performance, information value, and usability levels of the site services provided.

The last three indicators (*presence*, *openness*, and *excellence*) have weighting 50 percent with equivalent allocation. The *presence* indicator is used to calculate the number of university web pages indexed by search engines, Google. The *openness* indicator shows the published research data volume in rich files format, such as *pdf*, *doc*, *docx*, and *ppt* on the site, according to Google Scholar search engine. Meanwhile, the last indicator (*excellence*) is used to calculate the number of academic works successfully published in international journals, such as those listed in Scimago Lab. This indicator is considered able to show the quality of research from the college.

All indicators are claimed not to evaluate design issues, usability, or number of clicks on their academic sites. These four indicators are used by Webometrics as a representative for an in-depth evaluation of the university's performance in the eyes of the community by considering its activities, results, relevance, and impact.

2.3 4ICU

4 International Colleges & Universities (4ICU) is a search engine and directory that assesses the popularity of sites owned by 11,307 colleges worldwide that have been accredited and spread over 200 countries [4]. The 4ICU based its rating based on mapping conducted by five ranking sites, namely Google Page Rank, Alexa Traffic Rank, Majestic Seo Citation Flow, Majestic Seo Citation Flow, and Majestic Seo Trust Flow [5]. These five sites also do ranking based on various technical indicators of the site or blog. 4ICU lists colleges with popular sites. That is, colleges are considered popular because the site is indexed in search engines and easily searchable.

The benefits, in addition to upholding information disclosure to the public, Webometrics and 4ICU ratings show colleges that are diligent in publishing scientific work of lecturers and researchers. College leaders are encouraged to apply professional website management with due regard to the quality and quantity of their publications. Another important thing is the civitas academic colleges are encouraged to be productive in research.

The disadvantage is that these rankings are vulnerable to make-up by a number of colleges for their site to be seen as qualified. If you want to cheat, then a number of technical steps can be done to boost the college ranking.

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2.4 QS

QS World University Rankings is an annual publication of university rankings conducted by Quacquarelli Symonds (QS) [6]. QS World University Rankings was formerly known as THE-QS World University Rankings, in collaboration with Times Higher Education (THE) magazine to publish an international league table from 2004-2009 before the two of them began announcing their own version..

The QS World University Ranking publishes the annual ranking of world universities by measuring the following parameters.

1. Academic Reputation
2. Employer Reputation
3. Faculty Student
4. Citations per Faculty
5. International Faculty
6. International Students

The undue allocation of loads for subjective indicators and having highly fluctuating results is a major criticism of this ranking [6]. Several individual indicators from the Times Higher Education Survey (THES) data base the overall score, the reported staff-to-student ratio, and the peer ratings demonstrate unacceptably high fluctuation from year to year [7]. This instability can only strengthen the existing critique of the overall ranking system by earlier evaluators, such as van Raan (2005) [8], who highlighted the invalidity of yet another component of these totals, the bibliometric component (the citation-based scores)

At this time, the QS ranking has become a benchmark for universities in every country. The Ministry of Civilization of every country in ASEAN has spent a lot of money to pursue the ranking. During this time, the ranking of QS World University Ranking is also used by Ministry of Research, Technology and Higher Education of the Republic of Indonesia as one of the benchmarks of universities in Indonesia to a world-class university.

3.0 RESERCH OUTPUT IN INDONESIAN

Research is very important in the development of life and civilization. Through research, new knowledge emerged, a series of new technologies continue to be developed. Various obstacles and problems faced by humanity are very possible to find answers through research. Until now, there is only 4,500 to 5,500 research results published in the online. This figure is very low compared to Indonesia's total population of 250 million. In response to this, the government has targeted 8,000 research results that will be published in the future. Due to limited funds and adjusted to the available budget, the government only targets 6,000 to 6,500 studies that can be published [17]. In 2016, at the world level, Indonesia was ranked 45th for the number of internationally research published documents. In the Asian region, Indonesia's position is at number 11, while at the ASEAN level it ranks fourth [18].

Based on data from the Ministry of Research, Technology and Higher Education, currently the number of researchers and research journal publications in Indonesia is still very low and this condition clearly needs to be improved in the future. In order to achieve these targets, the government strives to increase scientific activities by involving the community in scientific activities, such as disseminating research results.

The low number of documents published internationally, one of them, is due to the small number of researchers in Indonesia. Around 12 to 14 percent of 120 thousand lecturers in Indonesia have doctorates [17].

Data from the Indonesian Institute of Sciences (LIPI) in 2010 showed researchers in Indonesia amounting to 7502 people as shown in Table.1. In 2011 the number of researchers in Indonesia reached 7658 people, in 2012 there were 8075 people. Figures continue to increase to 9685 people in 2017.

Table.1: Number researchers in Indonesia [19]

Years	Researchers
2010	7502
2011	7658
2012	8075
2013	8713
2014	9128
2015	9308
2017	9685

As university rankings have become a trend in the world including ASEAN countries such as Indonesia, Malaysia, Singapore, Thailand, etc. Many universities in the world are ambitious to pursue rankings by publishing their research results in conferences and journals. This paper discusses on development of research activities in Indonesia than compared to other universities in ASEAN and around the World.

4.0 GLOBAL RESEARCH PUBLICATION INDEX

The performance of universities are measured based on the Book Publication Index (BPI). The Book Publication Index (BPI) is determined using the following equation:

$$BPI = \frac{RP}{NR} \quad (1)$$

Where; RP is book published by university and NR is number of researchers.

4.1 Data Collection

In order to verify the accuracy of the data, the published paper by universities ware taken from Scopus as shown in Figure 1 and ISOMAse databases as shown in Figure 2 from 2015 to 2017.

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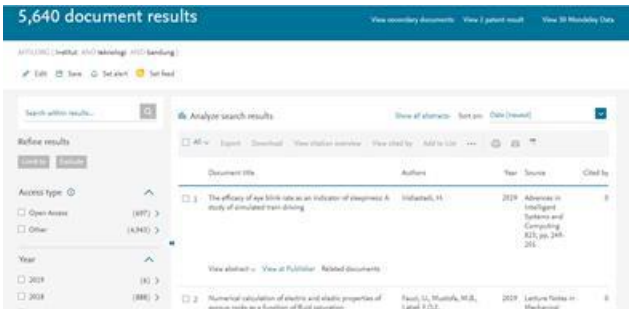

Figure 1: An example of list of papers published in Scopus.

Figure 2: An example of list of papers published in ISOMAse

The number of staffs in each university was taken from website of RISTEKDIKTI Indonesia as shown in Figure 3 and website of QS Top Universities Ranking as shown in Figure 4.

Figure 3: List of universities in Indonesia [17].

Figure 4: An example of number of students and staffs of a university in QS Top Universities [10].

4.2 Research Paper Index of Universities

Table 1 shows Research Paper (RP) Index of selected universities rankings in the world. Research indices in developed countries show that there are not many changes from year to year which show almost reaching saturation points. According to the Table 1, universities from China such as Peking University, UK such as University of Cambridge, USA such as California Institute of Technology and Massachusetts Institute of Technology, Japan such as Tokyo University and South Korea such as Seoul National University publish 2 papers per person per year. This trend is also followed by a high publication of books [1].

While universities in ASEAN countries from Malaysia such as Universiti Teknologi Malaysia, Universiti Sains Malaysia and Universiti Kebangsaan Malaysia, Singapore such as National University of Singapore, Canada such as University of Toronto and Australia such as University of Melbourne and Australian National University have published 1 paper per lecturer per year. This is shown in Table 1 and Table 2. This may be due to academic staffs have less interested in writing books which is less than 2.5 percent [1].

Even though publication of papers by universities in Indonesia are still low but the RP index has increased until 2018, but universities in Indonesia still publish papers less than 1 per person per year as shown in Table.3 except Ocean and Aerospace Research Institute which publishes papers 1 per person per year as shown in Table 4. This may be due to academic staffs in Indonesia are still focusing on book publications. [1].

The Indonesian Institute of Sciences (LIPI) claimed that the LIPI journals were able to reach the international level of 415 during 2015. Meanwhile, in the national sphere there were 887 scientific works. Citation for LIPI publications was 35,314 with the number of LIPI researchers indexed globally around 401 people [17].

Table 1: Research Paper Index (RPI) of selected top universities in the world

No	Universities or Research Institutes	Research Paper Index (RPI)			Percentage of Increasing or Decreasing	Countries
		2016	2017	2018		
1	Massachusetts Institute of Technology	2.680	2.681	2.686	0.20%	United States
2	Stanford University	2.938	2.902	3.031	4.46%	United States
3	Duke University	3.120	3.085	3.251	5.36%	United States

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4	Harvard University	3.808	4.057	4.172	2.84%	United States
5	California Institute of Technology (Caltech)	7.102	7.630	7.789	2.08%	United States
6	Princeton University	4.573	4.417	4.475	1.31%	United States
7	Cornell University	2.863	3.005	3.085	2.66%	United States
8	Yale University	1.596	1.623	1.650	1.63%	United States
9	Johns Hopkins University	2.561	2.629	2.725	3.66%	United States
10	Columbia University	3.260	3.230	3.390	4.98%	United States
11	University of Pennsylvania	2.884	2.935	3.008	2.46%	United States
12	University of Michigan	2.783	2.861	3.011	5.26%	United States
13	University of Chicago	4.444	4.401	4.593	4.37%	United States
14	University of California, Berkeley (UCB)	1.655	1.634	1.679	2.78%	United States
15	Northwestern University	2.678	2.809	3.114	10.89%	United States
16	University of California, Los Angeles (UCLA)	1.271	1.242	1.309	5.37%	United States
17	University of California, San Diego (UCSD)	1.589	1.610	1.634	1.51%	United States
18	Carnegie Mellon University	2.786	2.684	2.754	2.60%	United States
19	University of Wisconsin-Madison	0.755	0.798	0.799	0.04%	United States
20	University of Oxford	2.017	2.067	2.181	5.54%	United Kingdom
21	University of Cambridge	3.585	3.757	3.865	2.87%	United Kingdom
22	University College London	3.053	3.211	3.374	5.10%	United Kingdom
23	Imperial College London	2.120	2.188	2.352	7.50%	United Kingdom
24	King's College London	1.700	1.768	1.842	4.17%	United Kingdom
25	The University of Edinburgh	0.322	0.367	0.456	24.22%	United Kingdom
26	University of Bristol	1.940	2.068	2.146	3.77%	United Kingdom
27	University of St Andrews	1.754	1.813	1.819	0.34%	United Kingdom
28	The University of Manchester	0.359	0.438	0.493	12.55%	United Kingdom
29	ETH Zurich - Swiss Federal Institute of Technology	0.693	0.683	0.656	-3.86%	Switzerland
30	EPFL - Ecole Polytechnique Federale de Lausanne	1.937	1.791	1.897	5.96%	Switzerland
31	University of Zurich	1.684	1.732	1.887	8.93%	Switzerland
32	National University of Singapore	1.770	1.838	1.884	2.47%	Singapore
33	Nanyang Technological University	1.890	2.029	2.132	5.09%	Singapore
34	Singapore Management University	1.254	1.266	1.324	4.65%	Singapore
35	Tsinghua University	2.314	2.458	2.587	5.23%	China
36	Peking University	2.433	2.636	2.725	3.37%	China

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37	Fudan University	2.729	2.970	3.199	7.68%	China
38	Zhejiang University	3.348	3.605	3.903	8.29%	China
39	Shanghai Jiao Tong University	2.724	2.979	3.370	13.09%	China
40	The University of Tokyo	1.755	2.156	2.339	8.50%	Japan
41	Kyoto University	2.769	2.861	2.859	-0.07%	Japan
42	Osaka Prefecture University	1.211	1.104	1.163	5.37%	Japan
43	Osaka University	3.128	2.986	3.014	0.92%	Japan
44	Tokyo Institute of Technology	4.397	4.456	4.678	4.98%	Japan
45	Tohoku University	1.876	1.946	1.935	-0.55%	Japan
46	The Australian National University	0.933	1.062	1.127	6.14%	Australia
47	The University of Melbourne	0.893	1.080	1.304	20.72%	Australia
48	The University of Queensland	1.156	1.360	1.630	19.90%	Australia
49	The University of Sydney	0.926	1.177	1.425	21.04%	Australia
50	The University of New South Wales	0.436	0.553	0.663	19.80%	Australia
51	The University of Hong Kong	1.647	2.068	2.771	33.97%	Hong Kong
52	The Hong Kong University of Science and Technology	0.766	1.048	1.444	37.84%	Hong Kong
53	The Chinese University of Hong Kong	0.829	1.024	1.311	28.07%	Hong Kong
54	University of Toronto	1.617	1.633	1.674	2.56%	Canada
55	McGill University	2.206	2.160	2.256	4.46%	Canada
56	University of British Columbia	2.066	2.088	2.102	0.67%	Canada
57	Seoul National University	2.421	2.481	2.609	5.18%	South Korea
58	KAIST - Korea Advanced Institute of Science and Technology	2.509	2.553	2.684	5.12%	South Korea
59	Pohang University of Science And Technology	2.269	2.317	2.178	-6.02%	South Korea
60	Korea University	4.589	4.720	4.995	5.83%	South Korea
61	Yonsei University	1.627	1.683	1.699	1.00%	South Korea
62	Ecole Normale Supérieure, Paris	2.764	3.567	4.242	18.90%	France
63	Ecole Polytechnique	0.020	0.025	0.032	31.25%	France
64	Delft University of Technology	2.460	2.525	2.589	2.55%	Netherlands
65	University of Amsterdam	3.016	3.071	3.294	7.29%	Netherlands
66	Technical University of Munich	0.153	0.342	0.546	59.47%	Germany
67	Ludwig-Maximilians-Universität München	0.403	0.471	0.472	0.06%	Germany
68	Lomonosov Moscow State University	0.509	0.616	0.662	7.45%	Russia
69	Saint Petersburg State University	0.435	0.556	0.652	17.18%	Russia
70	University of Cape Town	1.953	2.143	2.150	0.36%	South Africa
71	Cairo University	0.286	0.326	0.327	0.10%	Egypt
72	Makerere University	0.603	0.586	0.666	13.69%	Uganda

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73	Université Mohammed V de Rabat	0.012	0.014	0.014	3.33%	Morocco
74	Universidad de Buenos Aires	0.145	0.152	0.172	13.25%	Argentine
75	Universidade de São Paulo	1.609	1.688	1.648	-2.42%	Brazil
76	Universidad Nacional Autónoma de México	0.305	0.326	0.342	4.96%	Mexico
77	National Taiwan University	3.415	3.355	3.397	1.25%	Taiwan
78	National Tsing Hua University	2.265	2.179	2.137	-1.93%	Taiwan
79	National Chiao Tung University	2.210	2.155	2.086	-3.24%	Taiwan
80	Indian Institute of Technology Delhi	2.435	2.771	3.483	25.70%	India
81	King Fahd University of Petroleum & Minerals	1.223	1.241	1.382	11.37%	Saudi Arabia
82	KU Leuven	2.089	2.219	2.371	6.84%	Belgium
83	Ghent University	1.288	1.298	1.342	3.42%	Belgium
84	University of Copenhagen	1.259	1.316	1.332	1.24%	Denmark
85	Technical University of Denmark	1.952	1.939	2.069	6.70%	Denmark
86	Lund University	1.790	1.863	1.881	0.96%	Sweden
87	Uppsala University	2.164	2.247	2.339	4.06%	Sweden
88	Trinity College Dublin, The University of Dublin	1.385	1.506	1.644	9.15%	Ireland
89	University College Dublin	2.389	2.618	2.786	6.40%	Ireland
90	University of Helsinki	2.181	2.308	2.343	1.51%	Finland
91	Aalto University	4.638	4.907	4.981	1.51%	Finland
92	The University of Auckland	0.489	0.604	0.747	23.65%	New Zealand
93	Pontificia Universidad Católica de Chile	0.919	1.109	1.082	-2.39%	Chile
94	University of Oslo	2.275	2.452	2.644	7.82%	Norway
95	Norwegian University of Science And Technology	1.218	1.393	1.548	11.18%	Norway
96	Politecnico di Milano	2.555	2.649	2.748	3.71%	Italy
97	Universitat de Barcelona	1.698	1.714	1.859	8.45%	Spain
98	University of Lisbon	0.618	0.625	0.610	-2.37%	Portugal
99	Vienna University of Technology	3.794	3.095	2.657	-14.15%	Austria

Table 2: Research Paper Index (RPI) of selected universities in ASEAN countries

No	Universities or Research Institutes	Research Paper Index (RPI)			Percentage of Increasing or Decreasing	Countries
		2016	2017	2018		
1	Vietnam National University, Hanoi	0.299	0.369	0.410	11.14%	Vietnam
2	Ho Chi Minh City University of Technology, Vietnam	0.248	0.380	0.433	13.96%	Vietnam
3	Hanoi University of Science & Technology, Vietnam	0.364	0.543	0.608	11.97%	Vietnam
4	Vietnam National University Ho Chi Minh City, Vietnam	0.030	0.032	0.042	33.65%	Vietnam
5	Chulalongkorn University	0.701	0.797	0.830	4.18%	Thailand

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6	Mahidol University	0.753	0.872	0.950	9.05%	Thailand
7	Khon Kaen University, Thailand	0.515	0.567	0.617	8.93%	Thailand
8	Chiang Mai University, Thailand	0.561	0.659	0.721	9.47%	Thailand
9	Thammasat University	0.220	0.280	0.268	-3.98%	Thailand
10	Kasetsart University	0.331	0.352	0.401	13.81%	Thailand
11	King Mongkut's University of Technology Thonburi	0.448	0.462	0.647	40.12%	Thailand
12	Prince of Songkla University	0.341	0.367	0.443	20.87%	Thailand
13	University of the Philippines	0.213	0.252	0.271	7.72%	Philippines
14	Ateneo de Manila University	0.134	0.144	0.179	24.44%	Philippines
15	University of Santo Tomas, Philippines	0.084	0.097	0.141	44.85%	Philippines
16	University of San Carlos	0.483	0.510	0.560	9.80%	Philippines
17	De La Salle University	0.392	0.533	0.533	0.00%	Philippines
18	Universiti Brunei Darussalam	0.429	0.561	0.559	-0.36%	Brunei
19	Universiti Teknologi Brunei	0.118	0.487	0.829	70.27%	Brunei
20	University of Malaya	1.825	1.887	1.765	-6.47%	Malaysia
21	Universiti Putra Malaysia	1.022	1.050	1.173	11.67%	Malaysia
22	Universiti Teknologi Malaysia	2.066	1.870	1.983	6.05%	Malaysia
23	Universiti Sains Malaysia, Malaysia	1.139	1.212	1.461	20.56%	Malaysia
24	Universiti Kebangsaan Malaysia, Malaysia	1.046	1.083	1.070	-1.21%	Malaysia
25	International Islamic University Malaysia, Malaysia	0.495	0.554	0.668	20.53%	Malaysia
26	Universiti Teknologi Petronas, Malaysia	1.678	3.031	2.636	-13.03%	Malaysia
27	Universiti Malaysia Terengganu	0.810	0.976	1.265	29.54%	Malaysia
28	Universiti Utara Malaysia (UUM)	0.571	0.877	0.746	-14.95%	Malaysia
29	Universiti Teknologi MARA - UiTM	0.524	0.632	0.736	16.32%	Malaysia
30	Royal University of Phnom Penh	0.040	0.040	0.076	88.24%	Cambodia
31	National University of Laos	0.000	0.041	0.044	8.51%	Laos

RPI = number of research paper published /number of researchers
Sources: Scopus, ISOMAse, Universities Website, etc.

Table 3: Research Paper Index (RPI) of universities in Indonesia

No	Universities or Research Institutes	Research Paper Index (RPI)			Percentage of Increasing or Decreasing	Countries
		2016	2017	2018		
1	Universitas Indonesia	0.236	0.516	1.254	143.18%	Indonesia
2	Institut Teknologi Bandung	0.387	0.564	0.757	34.17%	Indonesia
3	Universitas Riau	0.016	0.069	0.126	84.42%	Indonesia
4	Institut Teknologi Sepuluh Nopember	0.278	0.383	0.794	107.45%	Indonesia

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5	Universitas Diponegoro	0.013	0.029	0.071	145.83%	Indonesia
6	Universitas Gadjah Mada	0.105	0.252	0.357	41.83%	Indonesia
7	Universitas Andalas	0.153	0.220	0.222	0.96%	Indonesia
8	Universitas Padjadjaran, Indonesia	0.046	0.095	0.186	94.48%	Indonesia
9	Universitas Brawijaya, Indonesia	0.164	0.188	0.268	42.64%	Indonesia
10	Universitas Syiah Kuala, Indonesia	0.009	0.010	0.023	123.53%	Indonesia
11	Universitas Sebelas Maret, Indonesia	0.023	0.074	0.168	127.12%	Indonesia
12	Badan Pengkajian dan Penerapan Teknologi	0.003	0.000	0.005	1200.00%	Indonesia
13	Ocean & Aerospace Research Institute	1.250	1.750	2.375	35.71%	Indonesia
14	Airlangga University	0.084	0.152	0.297	95.33%	Indonesia
15	Bogor Agricultural University	0.372	0.478	0.567	18.76%	Indonesia
16	Universitas Muhammadiyah Surakarta	0.024	0.068	0.080	17.78%	Indonesia
17	Universitas Sumatera Utara	0.016	0.035	0.123	250.00%	Indonesia
18	Universitas Hasanuddin	0.013	0.014	0.037	153.85%	Indonesia
19	Universitas Sriwijaya	0.018	0.017	0.089	438.10%	Indonesia
20	Universitas Lambung Mangkurat	0.003	0.010	0.018	81.82%	Indonesia
21	Universitas Sam Ratulangi	0.003	0.002	0.006	125.00%	Indonesia
22	Universitas Nusa Cendana	0.004	0.007	0.013	83.33%	Indonesia
23	Universitas Mulawarman	0.002	0.014	0.041	200.00%	Indonesia
24	Universitas Mataram	0.004	0.008	0.020	144.44%	Indonesia
25	Universitas Cenderawasih	0.002	0.008	0.009	20.00%	Indonesia
26	Universitas Jambi	0.001	0.005	0.011	100.00%	Indonesia
27	Universitas Pattimura	0.001	0.004	0.008	125.00%	Indonesia
28	Universitas Tanjungpura	0.010	0.012	0.029	133.33%	Indonesia
29	Universitas Palangka Raya	0.001	0.001	0.008	500.00%	Indonesia
30	Universitas Tadulako	0.002	0.004	0.014	233.33%	Indonesia
31	Universitas Halu Oleo	0.014	0.013	0.021	61.11%	Indonesia
32	Universitas Bengkulu	0.007	0.007	0.028	300.00%	Indonesia
33	Institut Teknologi Kalimantan	0.010	0.019	0.115	500.00%	Indonesia
34	Institut Teknologi Sumatera	0.005	0.029	0.088	200.00%	Indonesia

RPI = number of research paper published /number of researchers
Sources: Scopus, ISOMAse, Universities, etc.

5.0 CONCLUSION

In conclusion, research index of universities has been discussed based on research output. Results show that academic staffs of top universities such as Peking University, Stanford University, National University of Singapore, Universiti Teknologi Malaysia and University of Hong Kong and in Australia such as University of Melbourne are high more than one paper per person per year. However, the percentage of RP index of universities in Indonesia has increased up to 500 percent in 2018, but the universities in Indonesia still publish papers less than 1 per person per year.

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REFERENCE

1. J.Koto, A.A.Widjaya, M.Putrawidjaya, 2018, *Book Publication Index as a World University Rank Indicator*, Journal of Ocean, Mechanical and Aerospace -Science and Engineering- Vol. 58: pp.12-16.
2. J.Koto, A.A. Wijaya, M. Putrawidjaja, 2018, *Inconsistencies and Doubtful of World University Rankings*, Journal of Ocean, Mechanical and Aerospace -Science and Engineering- Vol. 57: pp.5-11.
3. Marklein, Mary Beth. "Rankings create 'perverse incentives' – Hazelkorn". University World News. University World News. Retrieved 14 September 2016.
4. Caroline Damanik, Jangan Salah Kaprah soal Ranking Kampus di Dunia, 28 February 2013,
5. https://cwur.org/methodology/world-university-rankings.php
6. Nadim Mahassen, A quantitative approach to world university rankings, Center for World University Rankings
7. http://www.webometrics.info/en/About_Us
8. https://www.4icu.org/
9. Fred L. Bookstein, Horst Seidler, Martin Fieder, Georg Winckler, 2010, *Too much noise in the Times Higher Education rankings*, Scientometrics, Volume 85, Issue 1, pp 295–299
10. https://www.topuniversities.com/
11. https://www.timeshighereducation.com/world-university-rankings/2018/world-ranking#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats
12. Raan, F. J, 2005, *Fatal attraction: Conceptual and methodological problems in the ranking of universities by bibliometric methods*. Scientometrics, 62(1), 133–143.
13. https://www.topuniversities.com/university-rankings/world-university-rankings/2018
14. http://cwur.org/2018-19.php
15. J.Koto, Nazri Nasir, 2018, *Experimental Method for Mechanical Engineering*, Ocean & Aerospace Research Institute, Indonesia
16. Kristen Koontz, 209, *The Impact of Mergers in Higher Education on Employees and Organizational Culture*, The Graduate School University of Wisconsin-Stout
17. Jumlah Peneliti dan Publikasi Penelitian Masih Rendah, https://www.republika.co.id
18. Scimago Journal & Country Rank, https://www.scimagojr.com/
19. Lembaga Ilmu Pengetahuan Indonesia, http://lipi.go.id/
20. J. Koto, M. Syukri, Dodi Sofyan Arief, 2018, Research Output in Indonesia Comparing to Other Countries in ASEAN and the World. *Proceeding of Ocean, Mechanical and Aerospace -Science and Engineering-*, Vol.5, N.1, p. 47-56