IT in the Public Sector : a Road for Development Services, a Bibliographical Study

ABSTRACT

Aims: This research was conducted to find out the development of IT research articles in the public sector published in international journals from 2011 to 2020, to find out the collaboration map between researchers, to be input and direction for further researchers in determining the research study topic.
Study design: This research is a literature study using the bibliometrics analysis method.
Place and Duration of Study: The Google Schoolar Database, period 2011 to 2020.
Methodology: In the initial search, 976 journals were found. The following selection searched for journal articles that specifically discuss IT in the public sector; as many as 140 journals were found.
Results: In the initial search, 976 journals were found. The following selection searched for journal articles that specifically discuss IT in the public sector; as many as 140 journals were found. Based on research on the growth of IT research articles in the public sector in 2011-2020, an average of 14% or a total of 14 articles per year. The trend of research tends to decrease, and the authors of these articles come from developed countries, while from developing countries such as Indonesia, there are still few.
Conclusion: Based on research on the growth of IT research articles in the public sector in 2011-2020, an average of 14% or a total of 14 articles per year. The trend of research tends to decrease, and the authors of these articles come from developed countries, while from developing countries such as Indonesia, there are still few. The topic of further research development can be focused on improving public services for developing countries, such as agriculture, e-health, e-democracy, government initiatives and etcetra.

Keywords : Information Technology, e-Government, Public Sector, Governance, Bibliography

1. INTRODUCTION

This study aims to provide information about the development of IT research in the public sector in international journals through bibliometric research mapping from 2011–2020 using the VOSviewer analysis tool. The results of this study are expected to provide information on topics that are often used in research, determine the research area with the most significant research results, the year of research, and find out research journals. The research results are expected to provide an overview of the potential research topics to reference further research development in the same field.

New Public Management (NPM) proposed by Hood (1991) has encouraged most countries to use a private-sector approach and business in the public sector. Its main objective is to create a more effective, efficient, and transparent public administration system and to achieve broader democratic values [1] [2] [3] [4]. The use of information technology in the public sector as well as by private organizations aims to improve organizational performance and overcome various significant problems, reduce transaction costs and save time [5], so that it is in line with efforts to increase the NPM implementation through reforms in the public sector [6].

Community participation in development through the development of existing technologies supports the success of the development [7] [8]. In developing countries such as Indonesia, improving public services is the main agenda. Improving public services is often the main issue to improve people's welfare and quality of life. E-government provides many advantages for improving public services [9]. Development progress in developing countries is seen through the lens of improving education services, health services, social welfare, public housing, and others [10]. Good governance, including eliminating private transactions between officials and service users and reducing bureaucracy through faster and more efficient services, can reduce the problem of corruption that occurs continuously in developing countries [11]. E-government can reduce corruption through telecommunications infrastructure and the quality of online services reinforced by the more excellent internet [12]. The ease of public access to public funds is believed to be a preventive measure against corrupt practices [13]. Therefore, the government's attention needs to encourage people to use e-government [14].

IT research in the public sector is essential, considering a scant IT research in the public sector, especially in developing countries [15]. This article examines the development of information technology in the public sector to improve public services through effective and efficient public reforms. The use of research topics related to effectiveness, efficiency, and economy in the public sector is still scant [16]. This research is expected to be input and direction for new researchers in making a theoretical framework to know which journals and authors should be consulted when researching IT in Indonesia. The development of IT research in the public sector in 2011-2020 can be observed in tables and figures 1. This study uses bibliometric mapping analysis and VOSviewer with Publish on Perish (PoP) data. Science mapping attempts to describe the practical knowledge and then map the development of that knowledge. Bibliometrics is the study of bibliographic analysis of scientific activities based on the assumption that a researcher conducts research and must communicate the results to all [17].

2. LITERATURE REVIEW

2.1. Information Technology

Information Technology (IT) is a general term for any technology that assists humans in creating, changing, storing, communicating, and disseminating information [18]. IT brings together high-speed computing and data, voice, and video communications. According to [19], computer technology consists of hardware and software to process and store information to distribute information. The information technology used includes computers (mainframe, mini, micro), software (software), databases, networks (internet, intranet), electronic commerce, and other types related to technology [20].

2.2. Information Technology in The Public Sector

Agency theory is the design of the valid contract to align the interests of the principal and agent in the event of a conflict of interest [21]. The use of IT can minimize information asymmetry between government and society. IT is a tool to help create new and better delivery services to increase efficiency, effectiveness, and transparency and improve coordination of procedures and administrative management [22]. The data used in the information system produces more accurate data, closer supervision of employee productivity, and identifies the potential for delays and corruption [13].

The existence of the 4.0 industrial revolution since 2011 has made IT in the public sector be necessary [23] explaining the three types of innovation in the public sector :

1. Incremental innovation (which is closer to 'continuous improvement,' and hence a more unclear definition of innovation).
2. Radical innovation: new services, products, delivery methods, *et cetera*.
3. Systemic innovation: large-scale and fundamental institutional change.

Additional innovation will build on existing knowledge and increase resources in the company, which will increase competence by only making simple technology with the resulting products to remain competitive in the market. Radical innovation requires entirely new knowledge and resources to take advantage of technological advances and provide products that can beat the market competition. The innovation of the information technology utilization system is currently growing in the community, thus facilitating the company's management in the diffusion of innovation to the community and increasing the development of service product innovations.

Technology in e-governance in developing countries functions to improve government services to provide budget information, revenue growth, cost reduction, and ease of implementation of supervision and control of public sector controls in a decentralized government system [13].

3. RESEARCH METHODOLOGY

The population of this research is all IT journals in the public sector for the period of 2011-2020 whose data was taken from Google Scholar through a search using the Harzings Publish or Perish (PoP) application with the keyword "technology information at public sector" in the search process in December 2021. To analyze the content of the scientific article literature is use Bibliometric analysis. The study of research literature is systematic, explicit, and reusable [24].

[25] said that the bibliometric method could be used to evaluate the results of scientific research because it has three functions, namely : (1) The description function means providing several publishing activities at the state, province, city, or institutional level as a comparative productivity analysis; (2) To assess the performance of research units, use the evaluation function, and; (3) As part of standard procedures for evaluating and monitoring science and technology. The indicators can examine the interaction between science and technology, resulting in scientific mapping fields, and track new developments in specific knowledge fields [26].

The initial search was found 979 articles. The first step was to select 14 citation-link articles. Deletion of this citation type article because it was inaccessible (according to the Publish or Perish User Manual Guide). Deletion selection was also carried out on Book type articles that did not fit into the selection criteria for this study as many as 193 articles. The next step is the selection of journals that specifically discuss IT in the public sector, found as many as 140 journals for the 2011-2020 period.

The data found from the final results of the data selection process are 140 journals (shown in Table 1) which will be sampled in this study. In processing and downloading research data uses Microsoft Excel. Library metadata is using Mendeley applications. This research uses the VOSviewer application to find out the map of the development of international publications.

4. RESULT AND DISCUSSION

4.1. Development of Research on IT in The Public Sector in 2011-2020

The search for IT articles in the public sector from 2011-2020 found 979 journals attached to the year as many as 978 journals. After being selected, 140 journal titles were found that met the criteria for IT research topics in the public sector. The development of research during these ten years experienced fluctuations that tended to decrease. The research average per year is 14%. Most research was found in 2011-2015, which may be due to the euphoria of the 4.0 industrial revolution, which was introduced to the public in 2011, so that it attracted the author's attention to research IT implementation in the public sector. Meanwhile, research experienced saturation and decreased research in 2016-2020. The development of this research can be seen in Figure 1.

Table 1. Article Data Processing

Year	Outset	Filtration				Private Sector	Public Sector
		Citation	Book	Not English Language	Cannot be Access		
2020	24	2	10			9	3
2019	39		12			22	5
2018	47	1	15		1	29	2
2017	72	3	19	1		42	7
2016	66	1	17			39	9
2015	110	2	20		2	75	13
2014	128		27			79	22
2013	162	2	37			98	25
2012	161		23	1		103	33
2011	169	3	13		3	127	21
Total	**978**	**14**	**193**	**2**	**6**	**623**	**140**

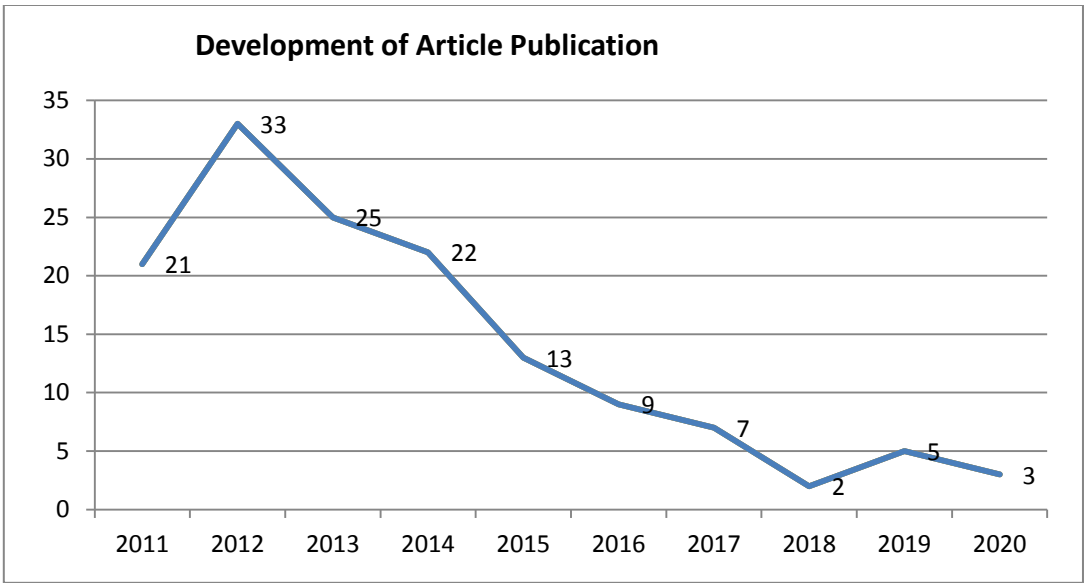


Figure 1. Development of Article in 2011-2020

From the research results, as many as 140 international journals were published in international journals with Q1-Q4 criteria in SCImago. One hundred six journals and the remaining 34 were published in international journals outside the Q1-Q4 criteria, as shown in tables 2 and 4.

From the results of further observations, it is known that the Q1-Q4 criteria journals that contributed the most research were the Government Information Quarterly journals as many as 29 journals during 2011-2019. Elsevier Publisher is the publisher that most often publishes journals related to research topics. Meanwhile, research auditors are dominated by developed countries such as the USA and Spain. Meanwhile, research auditors from developing countries in Asia and Africa are still very few (see table 3).

Table 2. Journals Published by Quartile in SCImago

Rate	Source	Scopus	Publication's Number	Year
1	Technology Analysis & Strategic Management	Q1, Q2	2	2013, 2012
2	Government information quarterly	Q1	29	2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019
3	Cambridge Journal of Regions, Economy and Society	Q1	1	2015
4	International Journal of Enterpreneurial Behaviour & Research	Q1	1	2011
5	Computers and Electronics in Agriculture	Q1	1	2017
6	International Review of Administrative Science	Q2	1	2016
7	Technological Forecasting and Social Change	Q1	2	2017, 2014
8	Smart Technologies and Innovation for a Suistanable Future, Advances in Science, Technology & Innovation	Q3	1	2019
9	Research Policy	Q1	3	2015, 2012, 2011
10	Organization studies	Q1	1	2013
11	Structural change and economic dynamics	Q3	1	2013

12	Nonprofit and voluntary sector quarterly	Q1	1	2014
13	International Journal of Public Sector Management	Q2, Q3	4	2020, 2019, 2014
14	Health Informatics journal	Q1	1	2012
15	The Journal of High Technology Management Research	Q2	1	2019
16	Public Administration Review	Q1	4	2013, 2012
17	Agriculture and human values	Q1	1	2011
18	Human Resource Management Review	Q1	1	2015
19	Administration & Society	Q1	1	2011
20	Journal of the Knowledge Economy	Q3, Q4	2	2013, 2011
21	Policy & Politics	Q2	1	2012
22	Structural change and economic dynamics	Q3	1	2013
23	Journal of Public Administration Research and Theory	Q1	1	2011
24	Applied geography	Q1	1	2014
25	Communications of the ACM	Q1	1	2014
26	Science Robotics	Q1	1	2020
27	Cities	Q1	1	2017
28	Trends in Food Science & Technology	Q1	1	2011
29	Public administration	Q1	1	2016
30	Automation in construction	Q1	1	2013
31	Management of Environmental Quality : an International Journal	Q4	1	2015
32	The Lancet	Q1	1	2011
33	Health affairs	Q1	1	2014
34	Advanced Engineering	Q1	1	2012
35	International Journal of Information Management	Q1	2	2017, 2014
36	Information Polity	Q1	2	2015, 2012
37	Information Systems Management	Q1	1	2012
38	Health informatics journal	Q3	1	2014
39	Information Systems Research	Q3	1	2012
40	Transportation Research	Q1	1	2011
41	Technology in Society	Q2	1	2012
42	IEEE Intelligent System	Q1	1	2012
43	World Development	Q1	1	2014
44	Computers in Human Behaviour	Q1	1	2015
45	Public Money & Management	Q2	1	2016
46	Automation in construction	Q1	1	2014
47	Journal of Asia-Pacific Business	Q3	1	2012
48	Information & Management	Q1	1	2013
49	Journal conference on electronic Government	Q3	1	2012
50	Information Systems Frontiers	Q2	1	2012
51	International Journal of Operations & Production Management	Q1	1	2011
52	Journal of the knowledge economy	Q3	1	2013
53	International Journal of Production Economics	Q1	1	2015
54	Management decision	Q1	1	2012
55	British Journal of Management	Q1	1	2013
56	Food policy	Q1	1	2011
57	Australian Planner	Q3	1	2015
58	Information and Organization	Q1	1	2011
59	Journal of health organization and management	Q2	1	2011
60	Journal of urban technology	Q1	1	2015
61	Waste management	Q1	1	2011
62	Socio-Economic Planning Sciences	Q1	1	2020
63	Journal of Enterprise Information Management	Q2	1	2013
64	Organization Science	Q1	1	2012
65	China Economic Review	Q2	1	2011

TOTAL	**104**

Table 3. Country of Journals Author Origin Criteria Q1- Q4 in SCImago

Rate	Country's Author	Name of Publisher	Year
1	USA	Elsevier ; Emerald ; Academic.oup.com ; Citeseer ; Content.iospress.com ; healthaffairs.org ; ingentaconnect.com ; journals.sagepub.com ; olcstage.worldbank.org ; pubsonline.informs.org ; Springer ; Wiley Online Library.	2011, 2012, 2013, 2014, 2015, 2016, 2018
2	UK	Taylor & Francis ; Elsevier ; Emerald.com ; journals.sagepub.com ; Wiley Online Library	2011, 2012, 2013, 2014, 2016
3	Netherland	Elsevier ; Taylor & Francis ; Wiley Online Library	2012, 2013, 2014, 2016
4	England	Elsevier	2012
5	Spain	Elsevier	2012, 2013, 2014, 2015, 2017, 2019
6	Canada	Elsevier ; pubsonline.informs.org ; Taylor & Francis	2011, 2012, 2015
7	Denmark	Elsevier ; journals.sagepub.com	2011, 2013, 2018
8	France	Elsevier	2013, 2015
9	Finland	Elsevier	2017
10	Ireland	emerald.com	2011
11	Portugal	Elsevier	2015, 2020
12	Norwegia	Elsevier	2017
13	Switzerland	journals.sagepub.com	2013
14	Brazil	Elsevier ; emerald.com	2011, 2020
15	Meksiko	Elsevier	2012
16	Albany	content.iospress.com	2012
17	Estonia	Elsevier	2017
18	Greece	Elsevier ; Springer	2012, 2013, 2019
19	Australia	Elsevier ; Taylor & Francis	2011, 2012, 2013, 2014, 2015, 2016
20	Emirate	Elsevier ; Springer	2014, 2019
21	India	Elsevier	2017
22	China	Elsevier ; science.org	2011, 2020
23	South Korea	Elsevier ; dl.acm.org ; Emerald.com	2014, 2019
24	Taiwan	Elsevier	2011
25	Brunei	Elsevier	2013
26	Vietnam	emerald.com	2011
27	Indonesia	Springer	2012
28	Austria	Elsevier	2012
29	Iran	Elsevier	2012
30	Serbia	Elsevier	2014
31	Jordania	Elsevier	2015
32	Kazakhstan	emerald.com	2019
33	Nigeria	emerald.com	2015
34	Ethiopia	Springer	2011

Table 4. Other International Journals Title

Rate	Source	Publication's Number	Year
1	Administrative Sciences	1	2012
2	Administrative Theory & Praxis	1	2011
3	AI & Society	1	2014
4	American Journal of Public Health (AJPH)	1	2012
5	Available at SSRN 2709713	1	2015
6	Big Data & Society	2	2014
7	Computer and Society	1	2012
8	Communications of The Association for Information System (CAIS)	1	2014
9	EJEG	1	2012
10	European Scientific Journal	1	2016
11	Global Consortium on Higher Education and Research for agriculture (GCHERA) Confrence	1	2011

12	GSTF Journal on Computing	1	2014
13	Human Resource Management Review	1	2015
14	Health Affairs	1	2012
15	Information Development	1	2016
16	International Journal of Economics and Management Engineering	1	2014
17	Innovation, Technology and Enterpreneurship Global Practice	1	2013
18	International Journal of Instruction	1	2012
19	International Journal of Education and Development using ICT	1	2012
20	International Journal of Managing Information Technology (IJMIT)	1	2014
21	International Journal of Advanced Research in Computer Engineering & Technology (IJARCET)	1	2013
22	2016 13th International Confrence on Service Systems and Service management (ICSSSM)	1	2016
23	Journal Of Social and Development Science	1	2013
24	Journal of Arts and Humanities	1	2012
25	Journal of Advanced Research in Business and Management Studies	1	2016
26	Journal of Computer Mediated Communication	1	2012
27	Journal of Humanities and Social Science (JHSS)	1	2012
28	Management Science Letters	1	2017
29	Nanotechnology Research Directions for Societal Needs	1	2011
30	Philosopical Transaction of the Royal a Society	1	2013
31	Policy & Internet	1	2011
32	Review of Integrative Business and Economics Research	1	2016
33	Scandinavian Journal of Public Administartion	1	2017
34	Thirty Fifth International Conference on Information Systems	1	2014
35	The Economic and Labour Relations Review	1	2013
	Total	**36**	

4.2. Map of IT Research Cooperation in the Public Sector in 2011-2020

The first step in conducting research is to determine the research topic. So to ensure that the research topic has never been or has just been done, it can be seen from the research map to ensure that the topic to be researched has often been done or not, which is helpful to avoid plagiarism or develop research from previous research.

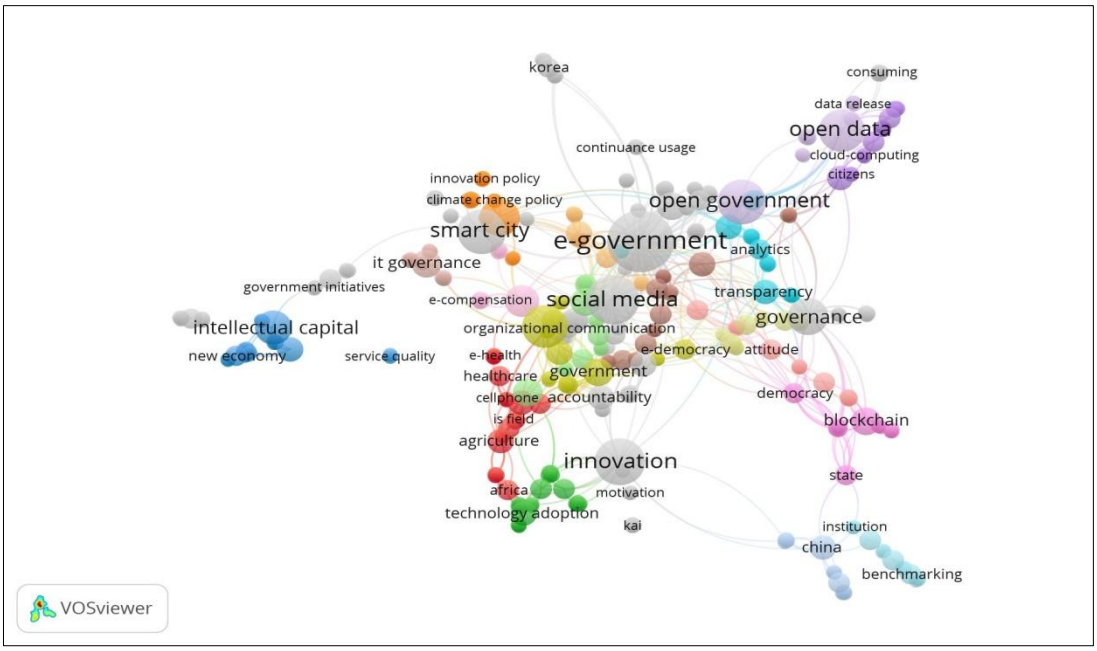
The tool used to conduct research maps using VOSviewer software. This software displays a map of previous research data with a particular research topic. Research topics can be in publications, researchers, or terms. To map bibliographic research data on 140 IT journal articles in the Public Sector, the author uses the VOSviewer.ris. application software.

4.2.1 Research Cooperation Map Based on Co-Occurrence

The keywords used by the author in the study can be seen based on the co-occurrence mapping of the keyword index used. The keywords found were 529 keywords. The most frequently used keywords are e-government, social media, innovation, open government, smart city, open data, governance, public sector, intellectual capital, and technology (table 5). In the mapping, it is divided into 32 keyword clusters which are marked by the different colors shown in Figure 2.

4.2.2 Map of Cooperation between Researchers Based on Co- Authorship

To see a collaboration map between researchers is carry out the Co-authorship mapping. There have been 3 clusters of IT researchers in the public sector during the last ten years, as shown in Figure 3. The clusters use the exact keywords in research on IT topics in the public sector. The most research trends are seen in 2012-2014, indicated by the blue link. The lighter color link, namely green and yellow, indicates the rest for research in 2018-2020.



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210 **Figure 2. Collaboration Map Based on Co-Occurrence Keyword's**
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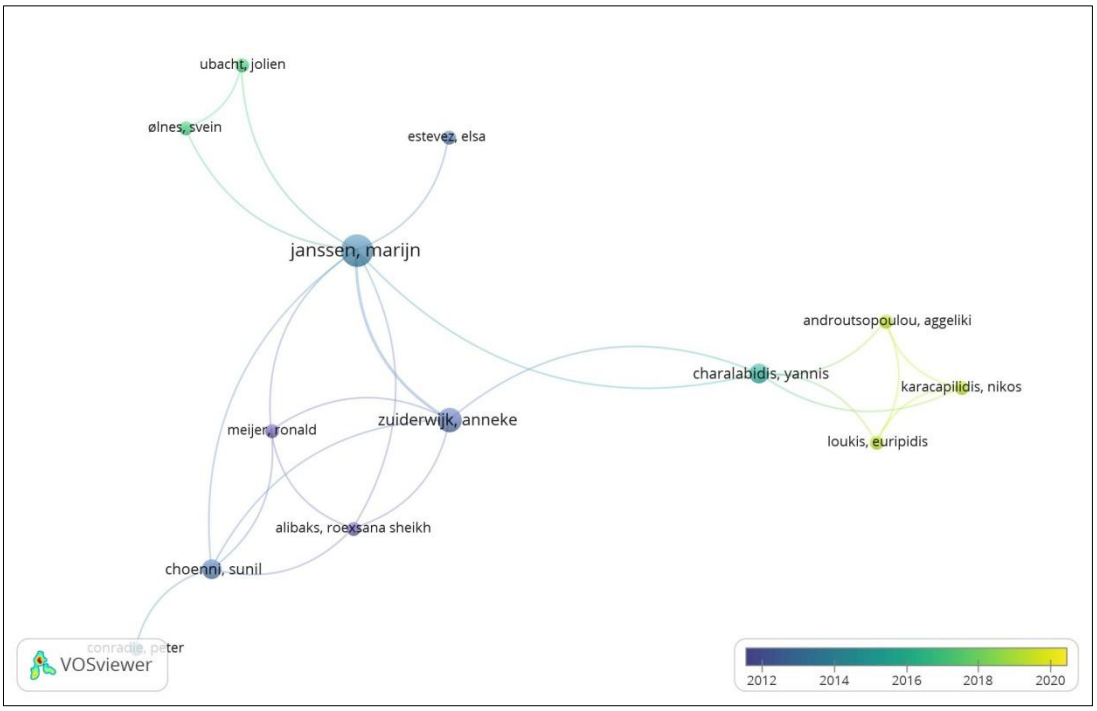

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213 **Figure 3. Map of Cooperation between IT Researchers in the Public Sector**
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4.2.3 Topics of Interest in the Research

The topics most frequently used in IT research in the public sector in 2011-2020 are e-government, social media, innovation, open government, smart city, open data, governance, public sector, intellectual capital, technology. Table 5 shows the keywords with a minimum occurrence rate of five. Figure 4 shows the development of the most use of keywords over the last ten years, where the color of the link indicates the keywords have links to each other in the same year.

4.2.4 Opportunities for Future Research Development Topics on IT in the Public Sector

Figure 5 shows research topics often of interest, as seen in the more significant keyword posts than the surrounding posts. The most frequently researched research topics with lighter colors to darker colors are rarely used in research. Based on the map, it can be an opportunity for further research development for researchers to develop IT research in the public sector by looking at the development of research topics especially in improving public services in developing countries, such as agriculture, e-health, e-democracy, government initiatives and etcetra.

Table 5. The Most Used Keywords in Research

Rate	Keywords	Occurances	Total Link Strength
1	E-government	19	97
2	Social media	12	66
3	Innovation	11	56
4	Open government	10	54
5	Smart city	10	47
6	Open data	9	46
7	Governance	7	45
8	Public sector	9	44
9	Intellectual capital	6	33
10	technology	5	32

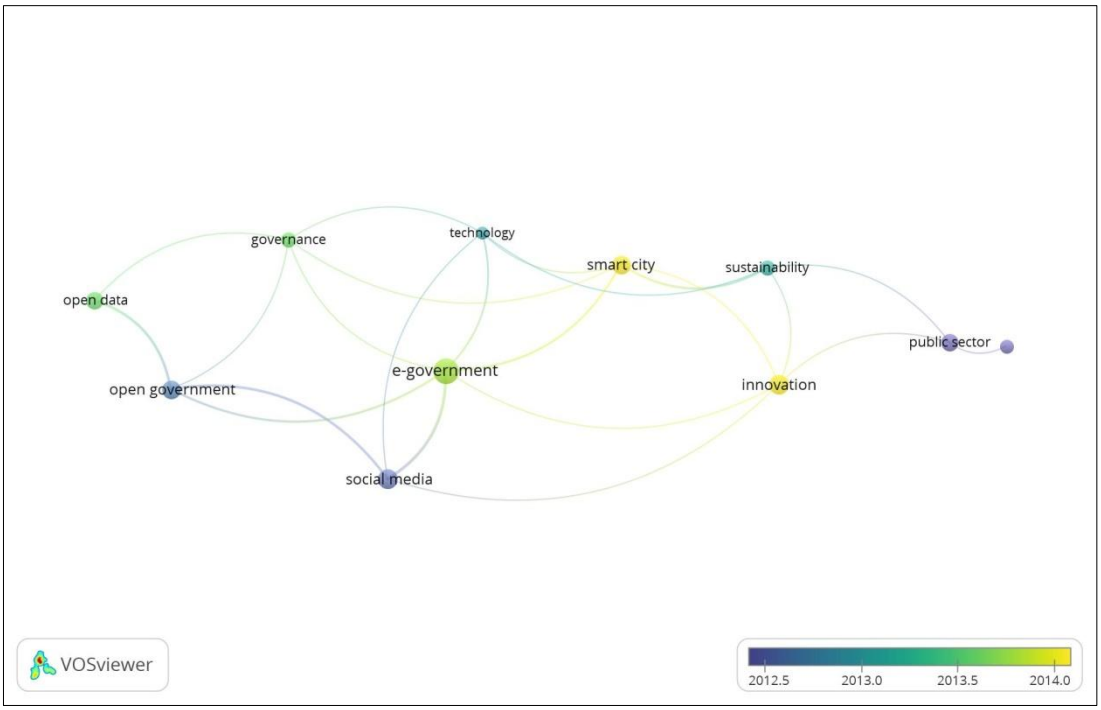

Figure 4. Map of Most Keywords Based on Overlay Period 2011-2020

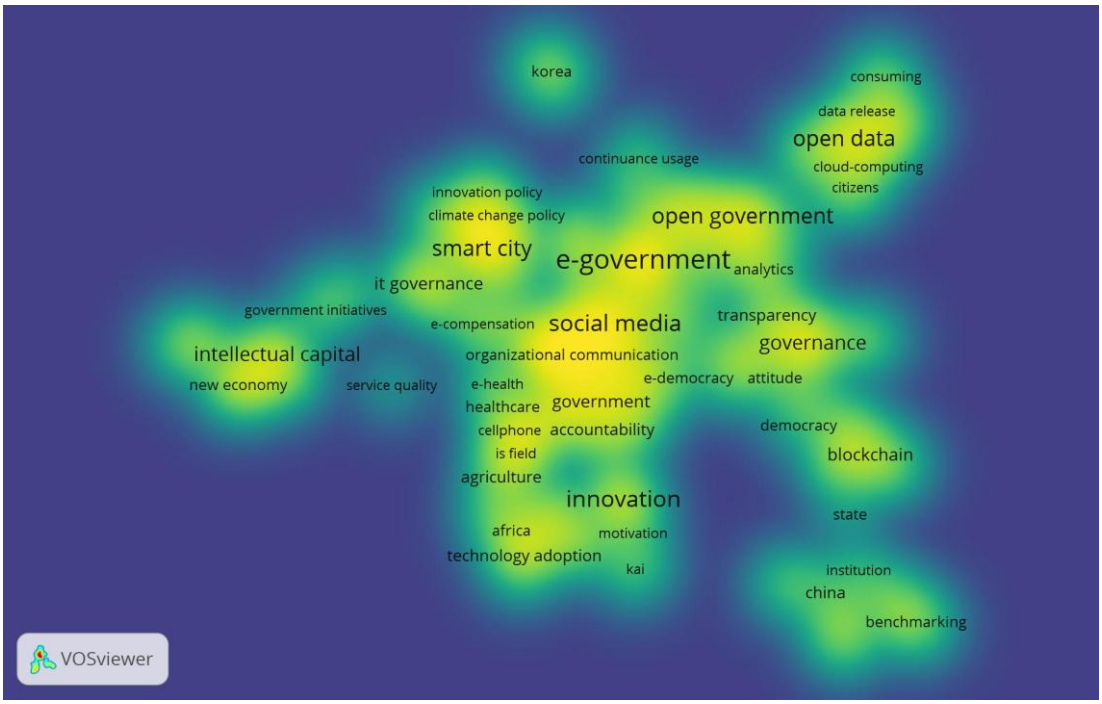

Figure 5. Keyword Map Based on Research Density Period 2011-2020

5. CONCLUSION

Based on the research that has been done, it is concluded that the growth of IT scientific articles in the public sector in 2011-2020 has an average of 14% or as many as fourteen articles per year. The highest article publications in 2012 were 33 articles, while in 2019, there were only two articles. The number of international article publications found was 140 articles. There are 104 journal publications published in Scopus quartiles 1 to 4, while the remaining 36 journals are published in international journals outside Q1-Q4. From the observations made, obtained 529 keywords which are divided into 32 clusters.

Research topics are often found in e-government, social media, innovation, open government, smart city, open data, governance, public sector, intellectual capital, and technology. The topic of further research development can be focused on improving public services for developing countries, such as agriculture, e-health, e-democracy, government initiatives and etcetra.

For ten years, the trend of research tends to decrease, which may be due to the euphoria of the 4.0 industrial revolution introduced to the public in 2011. Further observations, it is known that in the Q1-Q4 criteria, journals that contributed the most research were the Government Information Quarterly journals as many as 29 journals for the year 2011-2020. Elsevier Publisher is the publisher that most often publishes journals related to research topics. Meanwhile, research auditors are dominated by developed countries such as the USA and Spain. Meanwhile, research auditors from developing countries in Asia and Africa are still very few.

This study has limitations that can be used as opportunities for future research. First, article collection is still focused on IT keywords in the public sector for the period 2011 to 2020, so that it has the potential to produce quite a lot of articles if the research range is longer. For further research, it is possible to enter more diverse keywords to collect more data from research articles on IT in the public sector. Second, this study uses a PoP application on the Google Scholar database, which allows for limited data so that future researchers can use other databases such as Scopus, Web of Science.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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