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## CYBERSECURITY ISSUES IN ASEAN COUNTRY FOR SOCIETY 5.0: BIBLIOMETRIC ANALYSIS ON SCOPUS DATABASES

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### Abstract

Implementation of Society 5.0 was adopted in various countries, including ASEAN. The abbreviation of ASEAN is the Association of Southeast Asian Nations with a total of ten member countries, mainly to promote regional peace and security. The development of decentralized data and communication that has spread across various media and channels has had a positive impact considering ASEAN's role as a link for many investors in various lines such as banking, transportation, e-commerce, telecommunications, and shipping, but it has also raised new concerns about cybercrime. Without supervision, government data including confidential information can be stolen due to cybercrime. It can be a threat to countries that are the target of terrorist attacks or wars through cyberattacks. Cyber security is a concern, without monitoring, the potential for cyberattacks and crimes will become a threat at any time. This study will analyze the development of cybersecurity in ASEAN countries in the Society 5.0 era using a bibliometric approach on several studies in Scopus indexed journals. The research phase begins with data collection using the Publish or Perish (PoP) application, data processing using the Mendeley and Ms. applications. Excel with the aim of selection so that the data is ready to be processed, then analyzed with the VOSviewer application. Based on the results of network visualization analysis, it was found that the keywords that appear the most in each cluster are: 'ASEAN-civil society', 'cloud-storage', 'attack-cyberspace-defense', and 'big-data'. This cluster represents the "research stream" of cybersecurity and society. The keywords that appear are based on co-occurrence. The results of the analysis are expected to provide an overview of the latest research themes in the field of cybersecurity and international relations.

**Keywords:** Cybersecurity; ASEAN; Society 5.0; Bibliometric Issue

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## 1. Introduction

The Industrial Revolution (IR4.0) is demonstrated by the accelerated growth of digital technology in modern countries globally. This is shown by the significant development of the Internet of Thing (IoT), the emergence of big data, 3D printing, artificial intelligence (AI), genetic engineering, robot, and smart machines. The IR4.0 era has not yet ended; the expansion of technological developments appears with the concept of Society 5.0 which emphasizes that the potential for progress lies in collaboration between humans and machines (Panatagama, 2022). Apart from the innovation side, the role of society is a consideration where all technology is part of the human being himself.

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The concept of industrial revolution 4.0 and society 5.0 does not have much difference. Namely the industrial revolution 4.0 uses artificial intelligence (artificial intelligence) while society 5.0 focuses on the human component. The concept of society 5.0 is an innovation from society 1.0 to society 4.0 in the history of human civilization. Society 1.0 humans are still in the era of hunting and knowing writing. In society 2.0 is agriculture where humans have started to get to know farming. Then in society 3.0 it has entered the industrial era, namely when humans started using machines to support their daily activities, after that society 4.0 emerged, namely humans from computers to the internet as well as their application in life. If society 4.0 allows us to access and share information on the internet. Society 5.0 is an era where all technology is part of humans themselves. The internet is not only for information but for living life. So that technological developments can minimize the gap in humans and economic problems in the future. Several studies discussing the era of Society 5.0 include: (Atmojo, Edison Siregar, and Kirsten Audrey 2021; Ievgeniia et al. 2022; Y. Puspita, Y. Fitriani, S. Astuti 2020). Based on this study, cybersecurity preparations are an important part of welcoming the Society 5.0 era.

Implementation of Society 5.0 was adopted in various countries, including ASEAN. The abbreviation for ASEAN is the Association of Southeast Asian Nations. The beginning of ASEAN was formed by 5 countries on August 8, 1967, which were Indonesia, Malaysia, the Philippines, Singapore, and Thailand in 1967. Brunei Darussalam joined in 1984, and Cambodia, Lao People's Democratic Republic, Myanmar, and Vietnam joined between 1995 and 1999 which resulted in a total of ten member states, mainly to promote regional peace and security (Mohamed Mizan 2019).

The abundance of natural resources and raw materials owned by countries in Southeast Asia, as well as its strategic location has made it one of the factors for the economic growth of countries in the region. At the opening of the 50th ASEAN Economic Meeting at that time, the Prime Minister of Singapore emphasized that ASEAN was predicted to become the fourth largest economy by 2030, after the United States, China and the European Union (Mohamed Mizan 2019).

After the 2015 ASEAN Community, regional integration in various fields has in fact also opened the vulnerability of various countries in the region to cybercrime attacks. In dealing

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with this threat, ASEAN needs to create a more comprehensive framework for cybersecurity cooperation through a cybersecurity regime in Southeast Asia as an implementation of ASEAN values and norms in realizing regional stability. The Cyber Security Regime in Southeast Asia is a more rational choice in achieving ASEAN connectivity in 2025 as an agenda in realizing integration in the Southeast Asian region (N. S. Qalbi, F. Marinda 2020). A few cybersecurity studies in international studies such as (Al 2021; T. Rsis, W. Paper, I. Studies, U. If 2013).

Information and Communication Technology (ICT) has become an important function in business and government as well as a means of diplomacy in state affairs. The development of decentralized data and communication that has spread across various media and channels has had a positive impact considering ASEAN's role as a link for many investors in various lines such as banking, transportation, e-commerce, telecommunications, and shipping, but it has also raised new concerns about cybercrime. Without supervision, government data including confidential information can be stolen due to cybercrime. It can be a threat to countries that are the target of terrorist attacks or wars through cyberattacks. Cyber security is a concern, without monitoring, the potential for cyberattacks and crimes will become a threat at any time.

The study of cybersecurity focuses on several themes, such as defense against innovative cyberattacks (DCA), strategies against cybersecurity threats (SCS), government policies and protection of privacy (GPP), protection of computer infrastructure in government (PCG), and issues law and ethics in cyberspace (LEC) (Mohamed Mizan 2019). This is in line with the Cybersecurity Body of Knowledge (CyBOK) which consists of Human, Organizational & Regulatory Aspects, Attack & Defense, System Security, Software & Platform Security, and Infrastructure Security (Chivers 2019).

This study will analyze the development of cybersecurity in ASEAN countries in the Society 5.0 era using a bibliometric approach in a few studies in Scopus indexed journals. The results of the analysis are expected to provide an overview of the latest research themes in the field of cybersecurity and international relations.

This study uses a Bibliometric approach by conducting a paper review, which is an effective method for conducting a literature review on an online database, using keywords

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based on publications within a certain time (Rahim et al. 2015; Rahmawati 2017). Several studies using a bibliometric approach include (Batubara et al. 2021; Tupan 2016).

Thus, the state of the art in this study, issues that are developing in ASEAN countries in facing the Society 5.0 era in the field of cybersecurity in the 2020-2022 period will be modeled using a Bibliometric approach using the VOSviewer application.

## **2. Method**

This study uses the Bibliographical analysis method, which is the method used in studying the contents of the bibliography, citation analysis of each article published in a source or database in a certain period. The phase of this method includes:

- a. Collecting data
- b. Selecting data and processing
- c. Network visualization analysis
- d. Determine the issues.

## **3. Findings and Discussion**

This study conducts a bibliometric analysis on the theme of cyber security in society 5.0. Materials or data used to support this research are article data published in the Scopus Database. The data collection process was carried out using Publish or Perish (PoP) tools. The results of data collection in the form of csv.

In the process of searching for data sourced from Scopus, a total of 804 journal article themes have been found. After being selected from several journals that have similarities (duplicates), 170 article themes were obtained. The search process uses the keywords CyBOK and society such as: "organization regulator society" with the search and selection results shown in Table 1. The keyword "attack defense society" with the search and selection results shown in Table 2. The keyword "system security society" with the search and selection results shown in Table 3. The keyword "Software Platform Security society" with the search and selection results shown in Table 4. And the keyword "Infrastructure Security" with the search and selection results shown in Table 5. Meanwhile, to see keywords that appear in ASEAN countries related to Society 5.0 is shown in Table 6.

Table 1. Keyword “organization regulator society”

<b>term</b>	<b>occurrences</b>	<b>relevance Score</b>
Challenge	3	0.6443
Action	2	0.9144
Cancer	2	0.5292

Table 2. Keyword “attack defense society”

<b>term</b>	<b>occurrences</b>	<b>relevance score</b>
Biocybersecurity	1	1.1748
defense strategy	1	0.7284
dos attack detection	1	1.1748

Table 3. Keyword “system security society”

<b>term</b>	<b>occurrences</b>	<b>relevance score</b>
detection	9	1.0015
food security	7	0.8322
attack	5	1.4761
privacy	4	1.2918
sustainability	4	0.4447
blockchain technology	3	0.4155
intrusion detection system	3	1.0694
big data	2	0.7965
edge computing	2	2.1274
smart city	2	0.9971

Table 4. Keyword “Software Platform Security society”

<b>term</b>	<b>occurrences</b>	<b>relevance score</b>
blockchain security algorithm	1	1.5058
cloud application	1	1.5058
ict platform	1	0.7456
responsible vulnerability disclosure	1	1.5058
socio technical attack approximation	1	1.0609

Table 5. Keyword “Infrastructure Security”

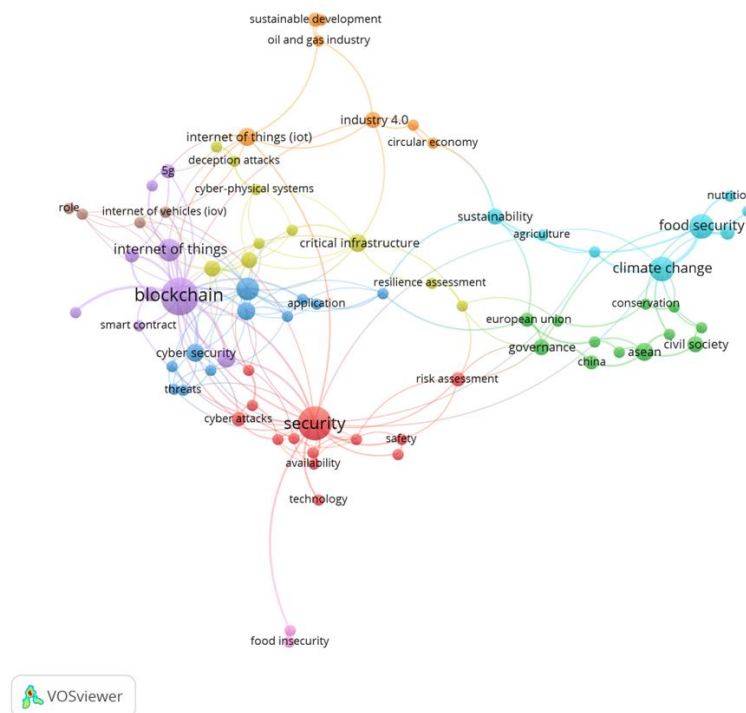
<b>term</b>	<b>occurrences</b>	<b>relevance score</b>
blockchain	20	0.1914
iot	9	0.3735

<b>term</b>	<b>occurrences</b>	<b>relevance score</b>
intrusion detection system	5	0.7011
edge computing	3	0.7562
authentication scheme	2	1.2679

**Table 6.** Keyword “ASEAN and society”

<b>keyword</b>	<b>occurrences</b>	<b>total link strength</b>
blockchain	21	36
climate change	9	12
food security	9	11
machine learning	8	26
critical infrastructure	5	10

From the results of data processing, a Network Visualization analysis was carried out in the VOSviewer application with the results shown in Figure 1.



**Figure 1.** Network Visualization

Based on the analysis in Figure 1, 9 clusters were found which were determined based on co-occurrence. The following is a sequence of 5 selected clusters that have the most co-occurrence which means the issues most discussed in published research. The list of the 5 clusters can be seen in Table 7.

This study reviews the five clusters generated from VOSviewer. The keywords that appear the most in each cluster are: 'ASEAN-civil society', 'cloud-storage', 'attack-cyberspace-defense', and 'big-data'. This cluster represents the "research stream" of cybersecurity and society.

#### **4. Conclusion**

Based on the results of network visualization analysis, it was found that the keywords that appear the most in each cluster are: 'ASEAN-civil society', 'cloud-storage', 'attack-cyberspace-defense', and 'big-data'. This cluster represents the "research stream" of cybersecurity and society. The keywords that appear are based on co-occurrence. The results of the analysis are expected to provide an overview of the latest research themes in the field of cybersecurity and international relations.

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