

The Concept of an Electronic-Based Government System and the Six-Ware Cyber Security Framework in Supporting the Digitization of the Indonesian Government

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Abstract— The change in the era from manual to digitalization has an impact in every country, including Indonesia. In the last decade, Indonesia has experienced a boom in the digitalization era, which is marked by many aspects of digitalization in various government sectors. This makes the Indonesian people dependent on information and communication technology (ICT). Digitization among the public can encourage business actors and public services to follow the trends that occur so that it can be seen that more and more parties are connected to the internet. The Indonesian government sector and government-owned enterprises (BUMN) continue to develop public services that lead to digitalization. The development of the digital world can create vulnerabilities in national infrastructure. This can be minimized by using the concept of an Electronic-Based Government System (SPBE) and the Six-Ware Cyber Security Framework (SWCSF). The purpose of this paper is to assess the effectiveness of the SPBE and SWCSF concepts that have been used by several Indonesian government agencies.

Keywords— Digitalization, Government, SPBE, SWCSF, Indonesia.

I. INTRODUCTION

The development of the digital era in Indonesia certainly brings significant changes to the actions of the Indonesian people. One of the impacts of the digital era is the dependence of society on information and communication technology (ICT). In Indonesia, digitalization shows bright prospects and is predicted to continue to grow every year. This is influenced by the increasingly widespread internet access, the affordable price of smartphones, and the increasing number of internet users in Indonesia as you can see at Figure 1 [1].

In 2014, the number of internet users in Indonesia reached 55 million and increased in 2015 to 67 million. Judging from this data, it can be predicted that Indonesia's traffic data will increase six times for internet users. This digitalization era certainly provides economic benefits for Indonesia. This is evidenced by the increasing number of e-commerce businesses in Indonesia. So it can be concluded that digitalization is something that Indonesia continues to develop because the resulting productivity can increase Indonesia's GDP to reach 120 billion dollars by 2025.

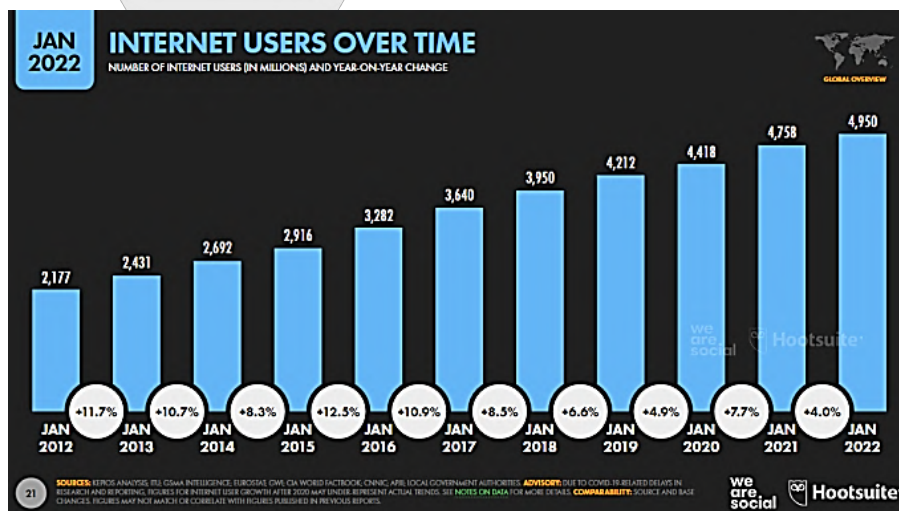


Figure 1: Internet Users Over Time [1]

The era of digitalization has a dependence on technology and globalization. Technology has an important role in the development of the flow of production, consumption, and distribution of information. The role of technology is changing information that is limited by space and time into unlimited information [2]. Digitalization in the industrial era 4.0 is a must in Indonesia. This industrial era synergizes various aspects such as digital, physical, artificial intelligence, machine learning, and big data, cloud computing, and the internet of things [3].

This shows that the internet and computers will become a necessity for everyone in the future. In the current era of digitalization and industry 4.0, the use of internet access through cyberspace has become dominant, important, and strategic. This use provides convenience and the many facilities offered to internet users to use the available features such as websites, Facebook, Instagram, Twitter, You Tube, and others. The era of digitalization provides convenience in obtaining the information needed.

One of the changes felt by the Indonesian people with the development of digitalization is digital public services. Currently, the concept of public service leads to effective and efficient [4]. Implementation of digitization in public services such as making e-passports, making e-KTPs, e-tolls, electronic ticketing, and cashless transactions. The development of the digital era has many benefits and advantages for Indonesia. However, the digital era also provides vigilance for Indonesia. Indonesia's growing dependence on the digitalization era can create potential vulnerabilities in the national cyber system. This paper aims to explain the concepts of the Electronic-Based Government System (SPBE) and the Six-Ware Cyber Security Framework (SWCSF) which are used to prevent cyber crime in Indonesia.

II. METHODOLOGY

This study uses a qualitative research methodology. Qualitative research methods aim to analyze and describe phenomena or research objects through the social activities, images, and perceptions of individuals and groups. This research was conducted with a case study approach and literature review from various sources, which were then narrated in this study. Findings and analyses were collected by gathering various information from references to relevant journal findings.

III. RESULT AND DISCUSSION

The Industrial Revolution Era 4.0 continues to develop in Indonesia, which is marked by digitalization entering various sectors in Indonesia, namely the economy, education, health, and government. Changes in this era have a positive trend in society. This is due to the COVID-19 pandemic that occurred in 2020 until now. With the limited activities that can be carried out in direct interaction, the internet and digital facilities are mandatory to use. The development of digitalization is colored by artificial intelligence, super computers, genetic engineering, nanotechnology, and automatic cars. The era of the industrial revolution 4.0 fully utilizes information and communication technology. Digital infrastructure and the acceleration of digital transformation are also developing in the Indonesian government. Public services have changed from conventional to online, and the implementation of e-government is becoming increasingly massive. E-government is the use of technology by governments, particularly web-based internet applications, to improve access and delivery of government information and services to citizens, business partners, employees, and government entities [5]. The use of the internet and social media by individuals and governments can cause losses such as data leakage, hacking, and other cybercrimes. Currently, the government is developing a measurement model called the Electronic-Based Governance System (SPBE). SPBE is used to measure the implementation of national information and communication technology (ICT) policies in an agency. SPBE must be used in the government sector and BUMN. There are 7 assessment indicators on the SPBE, which can be seen in table 1.

Presidential Regulation No. 95 of 2018 governs SPBE. This is done to evaluate the SPBE implementation's level of maturity [7]. To promote and actualize an open, participatory, creative, and accountable government administration, SPBE is being implemented. The SPBE indicator in Table 1 intends to analyze or measure the maturity level of the SPBE implementation across central and local government entities. The Ministry of Communication and Informatics received an SPBE index of 3.82 in 2021, placing it in the very good category on a scale of 1-4. A 3.72 SPBE index was attained by the Ministry of Finance, while a 3.68 SPBE index was attained by the Ministry of Law and Human Rights. The existence of this SPBE evaluation will continue to enhance the BUMN and governmental ICT governance systems.

Table 1: SPBE's Indicators

No.	Indicator
1.	Governance policy
2.	Service policy
3.	Institutional
4.	Strategy and planning
5.	Information and communication technology
6.	Administration service
7.	Public service

For the digital age of today, evaluation utilizing SPBE can be deemed insufficient. Cybercrime is another issue that has emerged in the age of digitization. Important data was exposed in September 2022 by a hacker, which upset Indonesia. Data on 1.3 billion SIM card registrations and customer information for IndiHome, which belonged to the Ministry of Communication and Information, were leaked by the hacker. Although the SPBE index of the Ministry of Communication and Information is in the very good range, the organization still has data leaks. While national ICT policies are evaluated by agencies using the SPBE evaluation approach, cyber security is not assessed by these authorities. Measurements are made using the Six-Ware Cyber Security Framework (SWCSF) paradigm. In order to strengthen an agency's information systems and cyber defense, this concept offers computer network system security solutions. Through internal and external risk assessment and threat analysis procedures, the SWCSF idea is thought to be able to raise cyber security awareness [8]. Table 2 lists the six assessment metrics for the SWCSF concept.

Each factor in the SWCSF concept has a relationship with one another. The use of the six factors contained in the SWCSF concept can help in assessing the readiness of an agency in cybersecurity. Currently, the SWCSF concept is widely used in defense and military agencies. Meanwhile, non-military agencies or organizations have not used this concept to evaluate the cybersecurity system at the agency.

Table 2: The SWCSF Concept [9]

Factors	Defenition	Indicators
Brainware	Human Factor	Security Awareness
Hardware	Physical computers and peripherals	No compromises

Software	Operating system and applications	No pirated Appl. etc.
Infrastructureware	Physical and logical network infrastructure	No network security breaches, etc
Firmware	Document and procedures	Good Bussiness Pro-cesses
Budgetware	An estimate of income and expenciture for a set period	Licences always updated, etc

The SWCSF concept was used at the Palu Lanal Command Headquarters (2021) to evaluate the condition of the cyber defense system. The results show that the SWCSF index is 83.83 on a scale of 1-100 and is categorized as good [10]. Other agencies that use the SWCSF concept are the Data and Information Center (Pusdatin) and the Cyber Defense Center (Pushansiber) of the Ministry of Defense. Both agencies obtained a SWCSF index of >3.5 and were in the good category [11]. The SWCSF measurement method can be a good consideration in evaluating the cybersecurity system of an agency or organization.

IV. CONCLUSION

The measurement model is a framework used to evaluate an object. The Government of Indonesia has developed a SPBE measurement model with the aim of evaluating the implementation of national ICT policies in government agencies and SOEs. The indicators used in the SPBE are an assessment of the concept and will produce index values that have been categorized on a scale of 1-4. The SPBE measurement model cannot perfectly evaluate the ICT system in the current digitalization era because SPBE does not evaluate the

cybersecurity system used in the agency. The SWCSF measurement model can be used to evaluate an agency's readiness for cybersecurity. In order to analyze ICT and cybersecurity policies in an agency, the concepts of SPBE and SWCSF can be used in conjunction with one another.

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