Smart Home Appliances Regulation and Principles

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Abstract The development of artificial intelligence technology is increasingly sophisticated and has given birth to new technology in the field of home appliances, known as "smart home appliance". Smart home appliances that are used to operate optimally require personal data from its users and the habits of the users. Knowing the user's data has the potential to cause harm to the user himself if his personal data is misused or data is hacked by irresponsible people. Until now, Indonesia does not have specific regulations regarding smart home appliances. Starting from the above thinking, this research tries to examine what data is used in smart home appliances and how the regulation regulates it? This study uses primary legal sources by comparing smart home appliance principle in several countries such as the United States, China, United Arab Emirates, and the United Kingdom. The choice of countries mentioned above is based on the reasons for the availability of research data. This study found that there are principles in artificial intelligence that can be used as principles for managing smart home appliances.

Keywords: Smarthome, Regulations, Principles

1. Introduction

AI technology is increasingly sophisticated which makes a technology that is commonly called born smart home appliances, where this technology is made so that it can make it easier for someone to complete household chores and make the house safer devices. Smart home are a combination of technology and services in the home environment with the aim of increasing efficiency, comfort and safety. [1] The Compound Annual Growth Rate (CAGR) predicts that the growth of smart homes worldwide will increase to 29.5% in 2020, where the Asia - Pacific region is the location where the application of smart home systems is highest, at 37.7%, the high number of enthusiasts. Smart home Indonesia is also inseparable from the ease of setting up the smart home system itself. [2] America conducted a study that the global smart home appliance market is expected to reach USD 92.72 billion by 2027, proving that smart home appliances are in great demand in America. [3] China predicts that the development of themarket smart home will approach USD 37 billion by the end of 2025. [4] Regarding the development of AI in China, the Government has started to make plans related to development artificial intelligence entitled "Intelligence State Council on Printing and Distributing Notice on the development plan of the new generation of artificial intelligence Guofa" in 2017 No. 35. China's personal data protection regulations can refer to the Cybersecurity Law of the People's Republic of China which can be the basis for the protection of personal data ofusers smar home appliances.

Growth smart home According to IDC, in the Middle East itself, according to IDC, the smart home market in the Middle East and Africa is expected to grow at an annual rate of 22.85 percent in 2022. However, according to Statista's Market Outlook, revenue from the smart home market in the Middle East and Africa is expected valued at $ 678 million (Dh2.48 billion) in 2018. The market is expected to reach $ 2.815 billion by 2023, with an annual increase of 32.9 percent. Household penetration was at 3.9 percent in 2018 and is expected to reach 15.5 percent by 2023. [5] Regarding regulations, the UAE Teleommunication Regulatory Authority (TRA) has issued a new policy regulating IoT-related services and devices in the UAE, entitled UEA Regulates the Internet of Things.

The United Kingdom is the fastest growing and second largest market for sales of 'smart' devices for homes, according to a survey from global research expert GFK. September 2019 the world market for smart home devices is expected to grow 23.5% year-on-year in 2019 to nearly 815 million device shipments, according to the worldwide quarterly smart home device tracking international data company, estimated to be more than 1.39 billion in the year 2023 with a combined five-year (cagr) annual growth rate of 14.4%. [6] The Government is committed to ensuring proper regulation of smart equipment in the UK. In September 2018, the British government launched an experiment with the World Economic Forum to develop AI procurement policies. The regulation that can be used as a basis for data security is the Data Protection Act.

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Basically, smart home appliances is use artificial intelligence, in so regarding AI development, the United States has released 10 principles for government agencies that must be obeyed when making AI regulations. [7] The foundation for the development of AI regulations in U.S, especially in California entitled Assembly Concurrent Resolution No. 215 Chapter 206 which contains that the Legislative Body states its support for the 23 principles of AI as guiding values for AI development in California, then California also has privacy-related regulations governing devices connected to the internet of things entitled Senate Bill No. 327 Chapter 886.

In terms of cyber security problems in smart home appliances, researchers found that more than 49,000 Queuing Telemetry Transport (MQTT) servers were publicly visible on the internet due to misconfiguration of the MQTT protocol, including more than 32,000 servers - 120 originating in Indonesia, without passwords, putting users at risk of data leakage. [8] On another survei from 1,150 respondents in the Asia Pacific region surveyed by Aruba, a subsidiary of Hewlett Packard Enterprise, 88% reported having experienced an IoT-related security breach. [9] One of thedata leak cases smart home appliances currently being discussed is the case of John Baker Orange v Ring LLC et al. Amazon and Ring's home security camera unit have been sued by Alabama homeowner John Baker Orange.

Within Indonesian regulation on smart home appliances, until now there has been no specific regulation regarding smart home appliances. If smart home appliances viewed from the perspective electronic data, the regulation that can mentioned in Indonesia is the Law of the Republic of Indonesia Number 19 of 2016 concerning Amendments to Law Number 11 of 2008 concerning Electronic Information and Transactions (ITE law). Depart from the legal vacuum that specifically regulate smart home appliances, this research try to solve the problems regarding the smart home appliances in the perspective of data protection regulation and IA regulation.

This research will use doctrinal method with qualitative description. As a legal research the approach that use in this paper are comparing legal principle from the data sources in books, journals, scientific research, laws and regulations, court decisions, legal theories and opinions of leading legal scholars [10]. The country that use to compare are the country that already have a regulation of the object of this paper, namely: United States, United Arab Emirates, China and the United Kingdom and correspond the principle that found with Indonesian regulation

2. Literature Review

2.1 Smart Home Appliances and Artificial Intelligence

Smart home appliances is a computer-assisted system that will provide all the comfort, safety, security and energy savings, which takes place automatically and can be programmed via a computer that is applied to buildings or residences. The system applied to a smart home can be used to control all equipment and equipment in the house, from lighting settings to various household appliances, where orders can be carried out using a smart phone and can be controlled remotely. Smart home has several benefits, such as providing better comfort, more guaranteed safety and security, and saving electricity usage, called the system smart home, because all existing equipment in the home can be integrated with one another with a micro computer and a micro computer. [12] The system in this smart home is controlled by a microcontroller as a control center that is connected to a device to turn on the lights and lock the door, besides this microcontroller is connected to sensors that function as a device so that it can receive messages sent by the home owner's android that can open and close doors automatically, adjust lights and electronic devices, monitor conditions in the house from afar. [13] Smart home Is the development of Internet technology or known as internet of things where all devices are integrated and connected to the internet. [14]

AI in the World began in 1941 invented information storage and processing tools. The invention is called an electronic computer developed in the USA and Germany. AI or artificial intelligence is a field of computer science that emphasizes the creation of intelligent machines that work and react like humans. AI technology is developing very rapidly in the era of the fourth industrial revolution. The shift in the mechanism in the manufacturing process will be completed in the work of smart machines that interact with each other with users. AI can effectively address the challenges faced by the manufacturing industry today, through AI-enabled adaptive manufacturing, automated quality control, predictive maintenance, and more. AI can provide solutions around visual inspection, control and automation, calibration and tuning, and automated problem identification for large manufacturing partners. Mechanisms that run in the form of machine learning algorithms, applications, and platforms help manufacturers find new business models, improve product quality, and optimize manufacturing operations. [11]

2.2 Data on Smart Home Appliances

The data contained in the smart home appliance is divided into two data, namely data that is administrative in nature and data that is managed by smart home appliances. Administrative data, for example, such as names, addresses, phone numbers, e-mails, IP addresses, to the private WiFi router network ofusers smart home appliance. These data are usually used for the benefit of applications smart home appliances which aim to connect smart home appliances with applications. Data that is managed by smart home appliances, for example, such as sound, behavior and images. The data is obtained from the use of smart home appliances daily. Security in technological terms, this means a process to secure information as well as devices that store it from existing interference. This security aims to protect computers, smartphones, computer networks, and also the information stored on them. [15] Devices and technologies connected via IoT can monitor and measure data in real time, and this data can offer valuable insights to help save time, energy and money. Built-in sensors collect data from consumer IoT devices, such as security systems, smart devices, smart TVs and wearable health meters. Data is collected from commercial devices, including commercial security systems, traffic monitoring devices, and weather tracking systems. Data is sent, stored and can be retrieved at any time, below are examples of the types of data IoT devices collect:

Data Collected by IoT

Type	Description
Data Automation	Many people are skeptical of device automation. Whether it's an automatic light in the office or an automatic setting on a thermostat, automation is required. Without automation, the task of a person is to remember to adjust the thermostat setting twice a day, and lastly turn off all the lights.
Data Status	Data The most basic and common type of IoT data is status data. Most IoT devices generate status data, which is collected as raw data, and then used for more complex analysis.
Data Location	Data allows one to track packages, pallets and equipment in real time. Farmers can track equipment during harvest. A warehouse supervisor can find a specific spare part pallet on the shop floor. At the consumer level, you can use location data to track down your cell phone, laptop, or even your lost keys. [16]

Information or user data that can be obtained if you use smart home appliances is very diverse, ranging from sounds, images and behavior user. The following is a table of data groups of smart home appliances:

Devices	Tye of Data
Smart Assistances	Sound
Smart IP Camera	Pictures
Door Censor	Behaviour
Smart Light	Behavior

The data that has been colleted to smart home appliances are personal data inside user privacy. According to the Indonesian regulation in Article 1 number (1) Regulation of the Minister of Communication and Information Technology Number 20 of 2016 explains that "Personal Data is certain individual data that is stored, maintained, and maintained and its confidentiality is protected." Regarding data leakage in Article 26 paragraph (1) of the ITE Law which regulates as follows "Unless otherwise stipulated by laws and regulations, the use of any information via electronic media concerning a person's personal data must be carried out with the consent of the person concerned." In accordance with the explanation of Article 26 above. it can be concluded that the personal data of AI users must also be protected and must not be leaked without the consent of the data owner concerned.

3. Result and Discussion

3.1 Smart Home Appliances Cases

In spite the use of smart home appliances, there are several cases that can cause danger to the user. Some of the cases that can be found can be describe below.

Country	Year	Case	Type of Cases
U.S	2019	John Baker Orange v. Ring LLC	Hacking (illegal access)
U.S	2019	Ashley Lemay, Dylan Blakeley, Tania Amador, and Todd Craig Ring LLC	Hacking (illegal access)
China	2019	Orbivo	Data leak and hacking
U.S., UK, Egypt, UEA, Malaysia	2019	IoT Wyze	Employee liability, data leak

Based of the cases on smart home appliances hacking and data leak are the most common cases that must be anticipated. Also, the regulation that can be use are not particularly stated smart home appliances, can be found on regulation in cyber law and/or data protection. Related regulation that can be use namely: data protection, cyber crime, consumer protection and IoT regulation. Comparing the regulation based on the cases to several country can be described below.

3.2. Smart Home Regulation

Regulation in regards of smart home and its sectoral law that can be found in several country that already have AI principle can be shown below.

Regulation	Country				
	China	California	UEA	UK	Indonesia
Illegal access	Cybersecurity Law of the People's Republic of China	California Penal Code Section 502	UAE Cyber Crime Law Combating information technology crimes	Computer Misuse Act 1990	ITE Law
Personal data protection	Cybersecurity Law of The People's Republic of China	The California Consumer Privacy Act of 2018	n/a	The Data Protection Act 2018	ITE Law and Ministry Regulation on Data Protection
IoT related regulation	n/a	California's new Internet of Things (IoT) Security Law Chapter 886	UEA Regulates Internet Of Things	n/a	n/a
Consumer Protection Law	Law of the People's Republic of China on Protection of the Rights and Interests of the Consumers – 1994	The California Consumer Privacy Act of 2018	The Federal Law No. 24 of 2006 on Consumer Protection		Consumer protection law

Scope of regulation to regulate smart home appliances practically can not be separate with artificial intelligence. Main reason of inter-related regulation between AI and smart home appliance, because in smart home home appliances the devices are operate with smart algorithm that can be named as AI. This argument also depart from the means of AI is not connotes only decision making of the computer programs to solve problems, but also covers any devices that carry out the functions of AI principle. In the matter of AI principle regulation, there are several country that alredy define the principle among others, namely: U.S, China, United Kingdom, United Arab Emirates. The principle of AI regulation can be described below.

Country	Principle
United State	(1)Public trust in AI; (2) Public participation; (3) Scientific integrity and

	information quality; (4) Risk assessment and management; (5) Benefits and costs; (6) Flexibility; (7) Fairness and nondiscrimination; (8) Disclosure and transparency; (9) Safety and security; (10) Interagency coordination.
United Kingdom	(1)Human Goodness; (2) Respect to privacy; (3) Safety and security.
China	(1)Harmony and side by side; (2) Bias or honest and fair; (3) Inclusivity and sharing; (4) Respect privacy; (5) Safety and controllable; (6) Shared responsibility; (7) Open cooperation; (8) Responsive government.
United Arab Emirate	(1)Ethic; (2) Security; (3) Humanity and inclusivity.

Related to smart home appliances regulation, America in early January 2020 proposed 10 regulatory principles that would limit the “overreacting” taken by authorities regulating the development and use of artificial intelligence. California it self has 23 principles as guiding values for the development of artificial intelligence as outlined in Assembly Concurrent Resolution No. 215 Chapter 206. In September 2018, the Governor of California signed the law that made California the first state to expressly regulate the security of internet of things, namely Senate Bill No. 327 Chapter 886. Meanwhile, The Chinese government has made plans related to development artificial intelligence which the plan is entitled "Intelligence State Council on Printing and Distributing Notice on the development plan of the new generation of artificial intelligence Guofa" in 2017 No. 35. Regarding data security regulation, it can refer to the Cybersecurity Law of the People's Republic of China.

The UAE Teleommunication Regulatory Authority (TRA) has issued a new policy regulating services and devices related to IoT, namely the UAE Regulates the Internet Of Things. Regarding regulations for data security and the use of smart home appliances, it can refer to the UAE Cyber Crime Law Combating information technology Crimes, which in the UAE Cyber Crime Law Combating information technology Crimes explains that it will punish illegal access to any electronic website, system or electronic means. Also, it also emphasizes severe penalties if this illegal access results in the destruction or deletion of any data. The Government is committed to ensuring proper regulation of smart equipment in the UK. In April 2018, the Committee published a 183-page report, “AI in the UK: ready, willing and able?“ This report aims to consider the development and governance of AI in the UK. The Committee Report urged the UK to establish a national AI strategy and propose an "AI Code" with five principles as the basis for the development of AI in the UK.

3.3. AI Related to Smart Home Regulation in Indonesia

Smart home regulation in Indonesia is related to AI principle that already mention in The Indonesian government in the National Strategy for Indonesian Artificial Intelligence 2020-2045 (STRANAS KA), that stated Indonesian government will adhere to the principles of G20 Artificial Intelligence (G20 AI Principles). Regarding data protection and security regulations on the use of smart home appliances, until now, it can refer to ITE Law, The Law Number 19/2016 and Indonesian Ministry of Communication and Information Regulation of Personal Data Protection Number 20/2016. Other related regulation is Consumer Protection, Law Number 8/1999. Although within the law describe above there is no explicit mention about smart home appliances and/or AI, but the interpretation of the law can be defined with the definition namely: (1) Computer definition to define the devices; (2) Electronic system to define the software; and (3) Electronic data to define information and electronic information. Thus, the smart home appliances still can be regulated under existing law.

Another sectoral law for the cosumer protection can be defined that a consumer is any person who uses goods and / or services available in society, whether for the benefit of himself, family, other people, or other living creatures and not for when viewed from the definition of consumers, users of smart home appliances can be referred to as consumers as stipulated in the Consumer Protection Law. According to the law, consumer protection is any effort that ensures legal certainty to provide protection to consumers, where one of the rights of consumers is the right to comfort, security and safety in consuming goods and / or services and the right to correct information. Clear and honest regarding the conditions and guarantees of goods and / or services, if viewed from the obligations of consumers, users of smart home appliances are required to have security over smart home appliances. According to AZ. Nasution consumer protection is a part of consumer law which contains principles or rules that are regulatory in nature, and also protect the interests of consumers [20]. Therefor the consumer protection law can support the ITE law and data protection law to enhance the regulation regarding smart home appliances and IA related devices.

4. Conclusion

To describe the concept of smart home appliances, at first can be seen as an integrated concept between IoT and artificial intelligence that are combined concept of ability to transfer data, and the use of computer assited to help human. Integrated concept above can not be viewed partially if we want to correspond the regulation. The reason this point of view because, the regulation must be interpreted on the concept to respond the new phenomenon like smart home appliances with the existing law. Inside smart home appliances there are two data processed, the first data is administrative data that are generally describe the user information. Furthermore, the second data are very personal data and/or user privacy that will be generated by the device to be fully operate, for example, such as sound, behavior and images, which data is obtained from theuse of smart home appliances daily. These data are obtained to be able to monitor smart home appliances remotely with the internet network, or devices that are now often used tomonitor smart home appliances directly, namely by using a mobile phone that supports internet connection.

Depart from the process and the activity of smart home appliances there are several existing law can be use to respond smart home appliances phenomenon, namely: ITE Law, Information and Communication Ministry Regulation on Personal Data Protection and Consumer Protection Law. This condition shown that Indonesian regulation indirectly regulate smart home appliance. Although the regulation is not sistematicaly and specifically mentioned the terms of smart home devices, but the interpretation of the legal concept can be use to anticipate to answer the legal issues.

Moving on the concept of AI, some of the countries have forward thingking to regulate artificial intelligence with the principle. Although the specific regulation was not legislated but defining the principle can be use as a guidance in later to issue the new law. In the Indonesian perspective, there is no specific regulation to regulated smart home appliances. But, the AI principle already known on National Strategy for Indonesian Artificial Intelligence 2020-2045 (STRANAS KA), and the principle more or less are similar with the principle in many country, namely principles of: (1) Inclusive, (2) sustainability development, (3) prosperity, (4) justice and security, (5) Transparency and accountability. In the future this principle available to elaborated and can be use as the principle of law to be included inside the positive law to regulate AI its related devices.

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