Cyber Law Implications for the Use of AI Technology in Agriculture: Overview and Challenges in Indonesia

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Abstract. In contemporary times, advances in artificial intelligence have significantly contributed to various aspects of life, including health, education, and agriculture. The application of artificial intelligence in agriculture encompasses weather monitoring systems, pest attack warnings, and automatic tools for distributing fertilizer. However, despite artificial intelligence's numerous benefits, particularly in Indonesia's agricultural sector, specific regulations pertaining to artificial intelligence technology remain largely absent. This stands in contrast to the 2020-2025 National Strategy in Indonesia, which emphasizes the role of artificial intelligence in achieving national food security. Issues arising from the lack of regulation for artificial intelligence in relation to national food security encompass threats to data security, the potential misuse of artificial intelligence that may violate ethical and moral standards, dependence on foreign technology or artificial intelligence, and disparities in education and training for the use of artificial intelligence in agriculture across different regions in Indonesia. Consequently, the research in this study seeks to address the implications of cyber law on the utilization of AI technology in Indonesian agriculture. The research methodology employed in this study is normative juridical research using the statute approach. Primary legal materials in this study are derived from legislation, while secondary legal materials are gathered from the findings of literature reviews. The research concludes using a deductive method, moving from a general problem to the specific challenges encountered. The ultimate goal of this research is to ascertain the impact of cyber law on the application of AI technology in agriculture in Indonesia.

Keywords: Artificial Intelligence Advances, Cyber Agriculture Law, Indonesia Cyber Law, National Food Security, Smart Monitoring Agriculture

1 Introduction

The development of world technology has influenced several areas of human life. These technological advances start from internet technology to mechanical technology such as artificial intelligence systems. In its development, the internet technology was then connected to an artificial intelligence technology system where the two fields were connected via the internet or what is usually called the Internet of Things (IoT).[1]

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In the integrated relationship between artificial intelligence and the internet, several technologies have been produced to help humans in various fields such as health, knowledge, programming, social and agricultural issues. Based on this, Indonesia, like other countries, began to follow the development of the industrial revolution 4.0 in 2016. These technological developments were then utilized by the Indonesian government in the agricultural sector, this is in line with Indonesia which is an agrarian country where the food sector is one of the important sectors in accelerating the rise of the domestic economy.[2]

The development of artificial intelligence in agricultural technology in 2020 is contained in the National Strategy for Artificial Intelligence of the Republic of Indonesia 2020-2045 which was launched by the Agency for the Study and Application of Technology (BPPT) which is under the auspices of the Ministry of Research and Technology/National Research and Innovation Agency of the Republic of Indonesia or usually abbreviated as BRIN. Based on the main points of the National Strategy for Artificial Intelligence of the Republic of Indonesia 2020-2045, one of the main points is the use of artificial intelligence in creating food security in Indonesia. The artificial intelligence system in creating food security in question is Smart farming.

Smart farming is a modern agricultural system that uses current technology to help farmers in the farming process to support the productivity of agricultural products or it can also be said to aim to regulate and predict expected results and solve problems faced by farmers. Based on this, smart farming can be interpreted as an agricultural mechanization technology which is then integrated with an artificial intelligence system through IoT as an intermediary. The Internet of Things in the agricultural sector can change the agricultural paradigm towards a more advanced and accurate direction because it is supported and based on data that is always updated according to agricultural needs which is then analyzed, shared or stored in digital data banks online or offline.[3]

The use of smart farming technology which then in the process uses artificial intelligence connected to the internet can give rise to various problems in the future. Some of these problems include those related to an artificial intelligence system that is too independent, this can cause the artificial intelligence system to learn about data, analyze it until it has special autonomous rights to share it publicly, so that agricultural data that is private and protected can be leaked over the internet. The second problem is the risk of sensor errors in precision agriculture using artificial intelligence technology, which is in line with data from researchers at the Gartner research institute entitled, "Predicts 2019: Artificial Intelligence Core Technologies", stating that almost 85% of all processes involved artificial intelligence learns inaccurately and the accuracy of any insight obtained by artificial intelligence is only at 15%.[4] This has negative implications for decision making which is often unclear and automatic so that if it is connected to the agricultural sector it can cause a tremendous risk of loss. Another problem is artificial intelligence technology which operates without moral and ethical guidelines, which has the implication that artificial intelligence is free to use anyone's ideas so that in its implementation, especially in the agricultural sector, artificial intelligence can act without thinking about land damage, pollution caused, and even the loss of ecosystems of other living creatures.

Based on this problem, the cyber legal rules that regulate artificial intelligence in Indonesia are only contained in Article 1 point 8 of Law of the Republic of Indonesia Number 19 of 2016 concerning Amendments to Law Number 11 of 2008 concerning Electronic Information and Transactions, which states that " An Electronic Agent is a device from an Electronic System

which is created to carry out an action on certain Electronic Information automatically which is maintained by a Person". As for Article 1 point 8 of the Electronic Information and Transaction Law, it is clear that it cannot overcome modern problems, especially those related to increasing The advancement of the sophistication of artificial intelligence technology in Indonesia, this can be found in the substance of Article 21 of Law Number 11 of 2008 concerning Information and Electronic Transactions, where the substance of the article only focuses on electronic transactions so it cannot accommodate the mechanical processes of artificial intelligence that move the equipment. -automatic mechanical devices, especially weather monitoring devices and tools for clearing agricultural land. The problem related to cyber legal regulations in Indonesia is if there is a data leak caused by artificial intelligence technology, where the data leak is the result of artificial intelligence learning about data, analyzing it until it has the autonomous right to share it without the knowledge of the artificial intelligence development company. The implications related to data leaks caused by artificial intelligence technology are a challenge in itself for Law Number 27 of 2022 concerning Personal Data Protection in Indonesia, where the recognized legal subjects are people or individuals, corporations, public bodies and international organizations, so that artificial intelligence is considered not as a "Legal Subject".

Fiction Theory explains that a legal entity is a fiction, namely a presupposition, not a reality, so that its existence or formation is closely related to construction. The pioneer, von Savigny, was an adherent of historical views. There are two factors that cause the "fiction theory" to be put forward, namely:[5]

a) practical basis in the form of economic considerations;
b) psychological basis, namely respect for tradition.

Based on practical and psychological factors, namely economic interests and traditions, it is juridically constructed that there is a "legal entity" which is assumed to be able to carry out legal acts which can actually only be carried out by humans (subjects of natural law), but with consideration of respect for traditions and economic interests, these acts applied to legal entities (subjects of juridical law). In Indonesia, there is the Information and Electronic Transactions Law as the first form of cyberlaw implemented in this country. This law is the legal basis for all members of society who carry out activities in the cyber domain. Regulations regarding cyber crimes in Indonesian law, as mandated in the Information and Electronic Transactions Law, have filled the gap in Indonesian material criminal law by regulating various types of crimes that have developed in line with advances in information and communication technology.

The stipulation of legal norms related to cyber crime in the Information and Electronic Transactions Law along with other statutory regulations reflects an effort to provide legal protection for the legal interests of society. The main focus of this protection involves aspects such as computer data or electronic data, electronic documents, electronic information, as well as computer systems or electronic systems that are confidential and not public, whether they are privately owned or state owned. Apart from that, aspects of other legal interests such as wealth, honor, morality, state security and similar matters are also accommodated in these provisions. There are various forms of cybercrime that occur in Indonesia, including activities such as hacking, breaking security systems, changing the appearance of sites, illegal use of credit cards, fraudulent practices, sending excessive spam messages, spreading pornographic content online, and carrying out gambling via online platforms.

As for artificial intelligence, it is still not explicitly regulated in the Information and Electronic Transactions Law in Indonesia as in Article 1 point 8 of Law of the Republic of Indonesia Number 19 of 2016 concerning Amendments to Law Number 11 of 2008 concerning Information and Electronic Transactions. , which states that "Electronic Agent is a device from an Electronic System that is created to carry out an action on certain Electronic Information automatically organized by a Person". In Article 1 Point 8 of the Electronic Information and Transaction Law, this is different from artificial intelligence which capable of thinking and developing like humans, in this law artificial intelligence is only considered a system that only works in a limited way to access or control certain information.

Seeing the ability of artificial intelligence technology which is able to carry out actions and functions as carried out by humans, becomes the basis for a legal regulation in a country to specifically regulate the presence of Artificial Intelligence. Based on legal sources in force in Indonesia relating to technology regulations, there is Law Number 19 of 2016 concerning Amendments to Law Number 11 of 2008 concerning Electronic Information and Transactions, which is better known as the "Electronic Information and Transaction Law" . This regulation is the state's response to rapid technological developments in Indonesia. The hope of the Information and Electronic Transactions Law is to be able to handle various problems related to technology and information systems in Indonesia, with the aim of realizing legal certainty and providing benefits in resolving technological issues. However, in reality the Information and Electronic Transactions Law does not provide a clear definition of Artificial Intelligence in its provisions, giving rise to various views from various groups who try to interpret and relate Artificial Intelligence to the regulations contained in the Electronic Information and Transactions Law.

According to the legal provisions in force in Indonesia, it can be concluded that the presence of artificial intelligence is basically not a legal subject, but is only considered a legal object. Artificial intelligence as a technology is practically carried out by humans during its implementation. In the context of positive law, the operation of artificial intelligence is carried out by electronic system operators, in accordance with the provisions explained in Government Regulation Number 71 of 2019 concerning Implementation of Electronic Systems and Transactions.

Based on the problems previously explained, this research is entitled, "Cyber Law Implications for the Use of AI Technology in Agriculture: Overview and Challenges in Indonesia". The problem formulation in this research is What are the Implications of Cyber Law for the Use of AI Technology in the Agricultural Sector: General Overview and Challenges in Indonesia. This research aims to determine the implications of cyber law on the use of AI technology in the agricultural sector: an overview and challenges in Indonesia and in general to provide a legal framework in the future related to cyber legal regulations related to the use of artificial intelligence technology in Indonesia.

2 Method

This research uses a normative research method with a Statute Approach research approach. The data sources used are primary and secondary data sources. Primary data sources include statutory regulations, official minutes, court decisions and official state documents. Secondary data sources in this research are law books, legal journals which contain basic principles (legal principles), views of legal experts (doctrine), legal research results, legal dictionaries, legal

encyclopedias and non-legal data sources, namely research materials. which consists of non-law textbooks, which are related to this research. The technique for collecting legal materials is carried out using library research. Data analysis in this research uses a qualitative analysis method in which legal interpretation involves the interpretation of the legal material being processed. This method aims to identify void norms, antinomies and unclear norms, especially in primary legal materials. The nature of normative research analysis is prescriptive, aiming to provide arguments and assessments of the truth or conformity of legal facts with norms, principles, principles, doctrine or legal theory. All legal materials collected will be filtered, sorted and processed systematically according to the legal issue being faced, with the aim of producing a conclusion after in-depth study and analysis. The method for concluding this research is deductive. The deductive method concludes a general problem from the concrete problems faced.

3 Result and Discussion

3.1 Cyber Law Implications for the Use of AI Technology in Agriculture

Technological progress has developed very massively, marked by everyone's ability to control the world with just a few clicks and touches of their fingers on their smart devices. These technological advances include supporting all work activities, social relations and the economy. Technological progress, usually called the internet or cyberspace, is a virtual environment created due to human and technological evolution. The social paradigm of the real world, which previously only interacted directly and physically, is now moving towards cyberspace. Interactions that were previously carried out directly clearly had provisions that limited them, this is different from cyberspace which is currently still gray. Regulations regarding provisions in cyberspace or what is usually called cyber law are still very limited, especially in Indonesia.

Cyber law is a provision that regulates regulations and restrictions which then become reference guidelines for accessing cyberspace, so that it can give rise to legal consequences for violators. In Indonesia, cyber regulations are regulated in several statutory provisions. The provisions governing cyber law specifically include Law of the Republic of Indonesia Number 19 of 2016 concerning Amendments to Law Number 11 of 2008 concerning Information and Electronic Transactions and Law Number 27 of 2022 concerning Protection of Personal Data. Based on several legal provisions related to cyber, there are several limitations related to its implementation.[6]

Based on several existing cyber law provisions in Indonesia, the limitations of some of these regulations lie in the contents of the articles which are deemed unable to answer new problems that may arise in the future related to the increasingly massive use of artificial intelligence in all areas of human life. Intelligence as is known as a very sophisticated system that can think and learn like humans, this is proven in the use of new technology in the agricultural sector in Indonesia which is usually referred to as smart agriculture. Smart farming has the benefit of increasing the efficiency of modern agricultural processes compared to conventional methods usually used by farmers. The implementation of smart agriculture by utilizing the Internet of Things (IoT) involves Unmanned Aerial Vehicles (UAV), smart irrigation systems, as well as smart irrigation control and monitoring systems. The development of this smart agricultural

system has the potential to support sustainable agriculture. Apart from being real-time and precise, IoT implementation can be considered as a solution for building a smart agricultural system in Indonesia.

This smart agricultural system is contained in the National Strategy for Artificial Intelligence of the Republic of Indonesia 2020-2045 which aims to create food security in Indonesia. Based on this, legal regulations regarding artificial intelligence should be a very substantial thing to be created considering that Indonesia is a country of law, where rules or regulations are an absolute thing that exist in the process of state administration. This includes the implementation or use of smart agricultural systems in creating food security.[7]

Another problem that arises as a result of the use of artificial intelligence in the agricultural sector is the loss of human livelihoods or jobs. As is known, the agricultural or plantation industry in Indonesia generally employs daily laborers. The work of daily laborers, who usually harvest and clean gardens, can easily be replaced by artificial intelligence systems, which can have implications for increasing poverty rates in areas that have agricultural or plantation industries. This of course can create a new chain of poverty so that those in power are entrepreneurs while people live in limitations, even though food security is achieved, if the increasingly massive use of artificial intelligence in agricultural technology is not regulated, it can create a chain of injustice. The chain of injustice, especially human work being replaced by robots, can violate Article 27 paragraph (2) of the 1945 Constitution of the Republic of Indonesia, which explains that Indonesian citizens have the right to a decent life and work. This is also in line with Article 33 paragraph (4) of the 1945 Constitution of the Republic of Indonesia which states that the national economic system is run based on the principles of economic democracy which emphasize togetherness, fair efficiency, sustainability, caring for the environment, independence and protecting balance and unity of the national economy.

The lack of regulation of artificial intelligence technology in Indonesia is inversely proportional to businesses in the agricultural sector which have started to use artificial intelligence. The rules related to artificial intelligence must be formed so that human civilization is always developing, so that the law must also follow human development. Human development in following the law can be found in Sajipto Rahardjo's thoughts related to progressive legal theory. According to Sajipto Rahardjo, law was created for the problems of humanity, where the law must be able to make meaningful changes so as to create a system that delivers human prosperity.[8]

Based on progressive legal theory, the field of artificial intelligence, especially in cyber law, needs to be specifically regulated. Regulation of artificial intelligence in cyber law is actually intended for technological systems such as the agricultural industry which uses robotics. The use of robotics in its dynamics is connected to a network called the Internet of Things, where this network is the entry point for artificial intelligence to learn and work independently. Artificial intelligence systems will generally collect information from cyberspace and put it into practice in real-time so it needs to be specifically regulated. what data can be studied by artificial intelligence through cyber law regulations.[9] Cyber law rules can also be a rule that filters artificial intelligence to learn randomly. Random learning carried out by artificial intelligence can be so dangerous that artificial intelligence ultimately has absolute control over itself. An artificial intelligence system that ultimately controls itself beyond what humans command, could be a disaster in the future.[10]

Regarding artificial intelligence in Indonesia, it is still considered a legal object that is controlled by humans, not a legal subject that can think and control itself. This can be found in Article 21 of the Electronic Information and Transactions Law which states that the rights and obligations of electronic agents are borne by the system operator. Article 21 of the Information and Electronic Transactions Law states clearly that artificial intelligence is not a legal subject but only an object created by humans. This is inversely proportional to legal entities which are considered legal subjects because they have rights and obligations. Based on this, and analyzed using progressive legal theory, thinking related to artificial intelligence which is considered unable to control itself or as a legal subject is the result of the conservative thinking of policymakers.

Progressive thinking related to the entry point for artificial intelligence to become a legal subject can be seen from the fictional theory put forward by the 19th-century thinker, Von Savigny. According to Von Savigny, a legal entity is an abstract concept and not a concrete entity. Law plays a central role in granting rights to legal subjects and generating the will to power. In this context, a legal entity is a legal construction produced by the state, which does not actually exist physically, but is brought to life by humans as a representation to explain something. Legal entities are represented by humans to carry out their actions. Furthermore, the function of law is to follow developments in society and, as far as possible, provide validation of these changes. Thus, in the context of this research, legal subjects related to artificial intelligence can be considered as changes in society that require legal approval. Von Savigny's theory of fiction is in line with Hans Kelsen's view which states that legal subjects tend to be fictitious, because of the assumption that the existence of individual rights has implications for the obligations of other parties. Rights can be owned by a person based on the provisions of objective rules, such as law, and not solely based on the wishes of the legal subject himself. Thus, legal subjects, even though they are living creatures, are considered to exist because they are constructed by law.[10]

3.2 Artificial Intelligence and Internet of things connectivity with smart farming

The Industrial Era 4.0 is very close to the use of technology such as the Internet of Things in all fields such as agriculture. The increasing population from year to year has an impact on increasingly high food needs; This requires breakthroughs in smarter agricultural systems. The use of drones for agriculture, livestock monitoring and greenhouses is the use of the Internet of Things so that farming activities are more efficient and effective and can be sustainable with basic problems in improving agriculture in general.

Smart farming or also known as precision farming or smart farming is a technology-based intelligent farming method that provides data that can be measured and integrated in managing agricultural processes; so that plant productivity can be optimal. In other words, it can be said that smart farming is the concept of changing conventional agriculture into modern agriculture. Conventional farming emphasizes or is oriented towards manual production results alone, while smart farming places more emphasis on temperature regulation; soil moisture and air humidity; providing and monitoring nutrition; raising or lowering pH; providing irrigation according to plant needs and predicting harvest time and yields automatically and everything can be monitored remotely and can also display plant information via smartphone. Not all farmers use these electronic devices and sensors, but some farmers use this application, for example they already understand how to regulate the

irrigation system according to the rules set for certain plants and; monitor weather conditions; soil moisture conditions and in turn make farmers smarter.[11]

Smart farming will focus on getting accurate data and being able to know and monitor the agricultural land environment. If this intelligent farming system is implemented and displays optimal data according to the needs of a farming area, it is hoped that farmers will be better able to manage agricultural processes professionally and can reduce the costs of farming facilities and infrastructure, as well as increase profits, which in turn will improve farmer welfare. The advantage of precision farming, if implemented correctly, is that farmers no longer use farming facilities and infrastructure uniformly, for example using fertilizer, water; pesticides and herbicides with uniform measurements or doses in each farming area with the same commodity. However, by using smart farming; So the conventional method above has led to the use of minimum costs for infrastructure in accordance with data obtained by farmers in specific areas and different crops. Farmers who have received data; then it is the farmer's turn to make better and more thorough decisions in order to achieve more productive and sustainable production to achieve food independence and added value with a more precise and intelligent approach as well as optimal and efficient agricultural results from resources. Considering the advantages of smart farming and the small size of farmers' land ownership, it would not be wrong if the concept of precision farming is slowly but surely becoming mandatory for future agriculture that will lead to industrial agriculture.[12]

Recently, people in urban areas have been doing a lot of farming in urban areas, known as urban farming, which is a concept that moves conventional farming to urban farming and uses planting media instead of soil; and planting hydroponic cultivation with organic plants and changing lifestyle and awareness of living a healthy life. The application of the Internet of Things in urban farming is also very suitable for using the Internet of Things to overcome problems such as regulating light to obtain the appropriate temperature for the plants being planted; humidity of the planting medium; Plant pH and the most important thing is to regulate water and plant nutrition and irrigation, better known as fertigation. Urban farming can also be known as home gardening because it can also be used as an ornamental plant or ornamental plant at home.[13]

Smart farming or precision farming will have an impact on agricultural management, apart from being more efficient, it will also be controlled and accurate, including in raising livestock. Usually precision farming is used for certain cultivations, especially when carried out using the urban farming concept; This is because land is limited in urban areas and what is planted is hydroponic cultivation and organic plants. The smart farming application is divided into four activities, namely:[14]

a) Precision Agriculture;
b) Agriculture Drones;
c) Livestock Monitoring
d) Smart Greenhouse.

Combining smart farming with IoT is very useful for supporting maximum productivity of agricultural products because it can regulate and predict harvest results and solve problems faced by farmers. The accuracy of the sensors used is reliable so that farmers can monitor the data obtained for use in automation so that farmers can improve their activities.[15]

Problems in the agricultural sector include limited land; natural resources and human resources; global climate change which will affect on longer dry seasons and short rain duration with high amounts of rain; water shortages in the dry season; pests and plant diseases as well as farmers' lack of technological mastery. The Internet of Things is a technological revolution that can be said to represent the future of computing and communications; because it can connect to unlimited devices information via the internet.[16]

Internet of Things (IoT) is a concept and method for remote control, monitoring, data transmission, and various other tasks. IoT will be connected to a network so that it can be accessed anywhere and can make various things easier. IoT can be used in various fields and one of them is agriculture to be used to monitor and regulate various things to support agriculture. Internet of Things is a technology that is used for sensing, identification, processing and sending information. All of these objects interact with each other and are connected in an IoT network which functions to retrieve and send data, move devices; send information and help with communication. From the two opinions above, it can be concluded that the Internet of Things, especially in the agricultural sector, is a concept in the agricultural environment that can be connected to each other via the internet so that farmers can easily communicate to solve problems in the agricultural sector.

The Internet of Things has a big impact so that it can be used to develop the agricultural industry because it has the ability to change all agricultural work effectively and efficiently and can also be developed continuously for improvement; compared to before. The use of the Internet of Things in the agricultural industry can also be accelerated on an ongoing basis to solve fundamental problems in the agricultural sector such as providing food due to farmers' limited land; global climate change which has an impact on weather and environmental conservation protection due to human activities that grow crops without heeding farming rules.[17] IoT-based agriculture allows users to obtain precise and useful data because all agricultural activities will be designed efficiently within a certain time while human resources are adjusted to the required scale; for example, an industrial scale will require a larger workforce compared to non-industrial or household scale resource requirements.[18]

In the livestock sector, wireless IoT applications have recently been designed which are used for livestock monitoring. IoT-based data on the location and health of livestock can help farmers identify sick animals; so that it can be separated from healthy livestock more quickly and can prevent the spread of disease. This situation can reduce labor costs because monitoring can be carried out with the help of electrical sensors at the farm location.[19] The Internet of Things concept is a suitable technology for smart agriculture because this technology is integrated in various processes starting from problem identification to creating computing-based networks to solve problems. If we look at the advantages of Internet of Things technology, especially in the agricultural sector at large, including cultivated agriculture, whether planted outdoors or indoors; farm; plantations, IoT should be used to be developed sustainably.[20]

The purpose of IoT, apart from expanding and simplifying connectivity via the internet, is also to share data; remote control and sensor reception. A concrete example is that agricultural activities can be monitored via local or global network connections through sensors that are always actively recording and everything can be monitored in real-time from every place connected to the internet.[21] Meanwhile, Vermesan & Friess argue that IoT can connect everything on earth via the internet and will collect data which is considered very useful and very valuable information. Data development will be important to make it an intelligent

system to provide services and a clean environment.[22] In 1956 John McCarthy described Artificial Intelligence as the ability to achieve success in solving a particular case. Humans become intelligent in solving the problems they face because of the knowledge they have from learning and the experience they have.[23]

Artificial intelligence is the study of how to make computers perform actions better than humans do. Artificial intelligence is a part of computer science that studies how to make computer machines do things like and as well as humans do, even better than what humans do. At the beginning of its creation, computers were only used as calculation machines. However, as time goes by, the role of computers increasingly dominates human life. Computers are no longer used as calculation machines, more than that, computers are expected to be empowered to do everything that humans can do.[24] Based on the Encyclopedia Britannica, Artificial Intelligence (AI) is a branch of computer science that represents knowledge mostly using attributes rather than numbers, and processes information based on heuristic methods or based on a number of rules. Artificial Intelligence seeks to build intelligent entities as well as understand them. Another reason to study AI is that these constructed intelligent entities are interesting and useful. Smart means having knowledge and experience, reasoning (how to make decisions & take action), good morals.[25]

According to Alexander Simon, artificial intelligence is an area of research, application and instruction related to computer programming in carrying out all things that in the human view are classified as intelligent. Rich and Knight define Artificial Intelligence as the study of the use of computers to do things better than human power. In order for computers to behave like humans, computers must also be given a supply of knowledge and the ability to think. Therefore, in Artificial Intelligence, we will try to provide several methods to equip computers with these two components so that computers can become intelligent machines. The definition of Artificial Intelligence can be translated from various points of view, including:

a) Intelligence point of view
   Artificial intelligence will make computer machines more intelligent (able to do things like humans do).
b) Research viewpoint
   Artificial intelligence is the study of how to make computers do things as well as humans do. Domains that are often discussed by experts and researchers include:
   a) Mundane task
      - Perception (vision & speech)
      - Natural language (understanding, generation, & translation)
      - Commonsense thinking
      - Robot control
   b) Formal task
      - Games
      - Mathematics (geometry, logic, integral calculus, proofs)
   c) Expert Task
      - Financial analysis
      - Medical analysis
      - Scientific analysis
      - Engineering (design, failure finding, manufacturing planning)

c) Business point of view
   Artificial intelligence is a group of tools that are quite powerful and systematic in solving business problems.
d) Programming point of view
   Artificial intelligence includes the study of symbolic programming languages, problem solving and search. To use artificial intelligence applications, there are 2 important parts that are really needed, including:
   1) Knowledge Base, contains facts, hypotheses, thoughts and relationships between one another.
   2) Inference engine is the ability to draw decisions based on experience.

According to Winston and Prendergast, the objectives of artificial intelligence include:

a) Make machines smarter
b) Understand the scientific goals of artificial intelligence
c) Make the machine more useful

Artificial Intelligence has the aim of developing methods and systems for solving problems, usually solved through human intellectual activity, for example image processing, planning, forecasting, etc. as well as improving the performance of computer-based information systems. Artificial intelligence systems are also able to increase understanding or comprehension of how the human brain works. Meanwhile, according to Lenat and Feigenbaum, there are nine goals of artificial intelligence, namely:[26]

a) Understanding human understanding, trying to gain in-depth human memory skills, problem solving skills, analyzing, making decisions and so on.
b) Cost effective mechanization, taking over humans in intelligence tasks, having programs that perform as well as humans in doing the work.
c) Strengthening practical intelligence, manifesting systems to help humans think better, faster, deeper, etc. Example: disease detection system.
d) Great human intelligence, creating programs that have the ability to exceed human intelligence.
e) Solving general problems, a system for handling various broad matters, this system has breadth of thought.
f) Integrated discourse, correspondence in humans using natural language, for example: dialogue, intelligence in the Turing Test.
g) Study (induction), the system should be able to obtain its own data and know how to obtain it, the system can generalize, make hypotheses, use or study heuristically, make arguments by analogy.
h) Independence, having an intelligence system that works on its own efforts, must react to the real world.
i) Information, store information and understand how to get information.

There are several characteristics of artificial intelligence, including:

a) A mechanism that is capable of thinking like humans, where the initial desire is to create an artificial intelligence concept that is embedded in a system, namely the aim of solving problems exactly like humans think, even with better results than humans themselves.
b) Systems that work like humans, East Asian countries, especially Japan, are one of the world's most up-to-date technological advancement domes. By creating the ability of a machine to act like a human which is applied in the robotic concept, it is very possible that in future generations of humans, most of the robot machines will play a more important role.
c) A system capable of thinking scientifically. Where the logical conception that is implanted is able to sort the data presented to carry out a machine thinking process with a more rational decision method. For example, humans can think and act rationally on a machine itself without any data or information, whereas a machine without the data and information provided is nothing more than an inanimate object like a stone.
d) The system is capable of acting rationally, where the concept of rational thinking is embedded in the machine itself and will be able to carry out actions which are of course rational and reasonable. Artificial intelligence itself is a combination of knowledge in the form of experience, science, machine language and natural language which is conceptualized in the area of intelligence itself in the form of robotics, computers, natural language, machine learning, partner recognition, expert systems, speech.

An intelligent machine is a machine that is capable of acting like and as well as the actions or work carried out by humans. Therefore, intelligent machines need to be supplemented with intelligence so that they have the qualifications to think, where two main parts are needed, including:

a) Knowledge base, are facts, theories, opinions, and relationships between one another.
b) Inference engine, the ability to make decisions based on expertise and knowledge.

Applications of artificial intelligence include:

a) Expert System. Here computers are used as a facility to record expert knowledge. In this way, the computer will have the expertise to solve problems by taking over the expert knowledge possessed by an expert.
b) Natural Language Processing. With natural language processing, it is hoped that users will be able to interact with computers using everyday language.
c) Speech Recognition. Through voice recognition, it is hoped that humans will be able to interact with computers using voice.
d) Robotics and Sensor Systems.
e) Computer Vision, trying to interpret images or visible objects via a computer.
f) Intelligent Computer Assisted Instructions. Computers can be used as guides who can teach and train.
g) Smart play.

Along with the development of problems experienced by humans, humans need to make good use of resources. To carry out this, humans need help with good capacity from computers. In human life, computers are able to help in various ways including:

a) Agriculture, computers are able to drive machines that detect pests, cut trees, and select crops.
b) Manufacturing (Industry), computers are able to control machines that must carry out high-risk work, supervise and carry out company maintenance.
c) Health, computers are able to do the doctor's work in diagnosing disease, monitoring the patient's condition, producing appropriate treatment.
d) Household activities, computers are able to provide warnings about activities in the household, so they can help clean the house, and protect the house from theft, and other things.

4 Conclusion

Discussions about technological advances, especially artificial intelligence, highlight the paradigm shift from social interactions in the real world to cyberspace. Although technology has helped advance various sectors, especially in smart agriculture, the limitations of cyber legal regulations in Indonesia pose potential risks and challenges that need to be overcome. Regulations related to cyber law, such as Law Number 19 of 2016 concerning Amendments to Law Number 11 of 2008 concerning Electronic Information and Transactions and Law Number 27 of 2022 concerning Personal Data Protection, provide a legal basis, but still have limitations. The implementation of artificial intelligence technology in smart agriculture shows its benefits, but also issues such as control, ethics and socio-economic impacts arise. The importance of comprehensive legal regulation of artificial intelligence, especially in agriculture, is very relevant to prevent negative consequences, such as environmental damage, loss of human jobs, and loss of control over the system. Regulations that support artificial intelligence technology need to pay attention to these aspects and adapt to dynamic technological developments.

In the context of cyber law, more detailed and clear regulations are needed to overcome the challenges that arise due to the use of artificial intelligence. The law must be able to answer new problems that may arise, especially those related to data security, privacy and the social impact of artificial intelligence technology. Therefore, Indonesia needs to consider drafting legal regulations that support the development of artificial intelligence technology in a balanced and sustainable manner. From a progressive legal perspective, policies that are proactive and adapt to technological changes can create a legal system that provides protection and guarantees the welfare of society. This thinking underlines the importance of responding to the dynamics of technological progress with careful and comprehensive regulation so that artificial intelligence can become a legal subject that is recognized and regulated effectively.

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