

Laws and Ethics Policy of Self-driving Cars in Taiwan

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Abstract: Countries have invested considerable sums of human capital and material resources in the practical application of self-driving cars demonstrating the impressive market opportunity. In light of this trend, Taiwan does not want to fall behind either. As on-road testing and technological development for self-driving cars continue to develop in different countries, the controversial issues of safety, ethics, liability, and the invasion of privacy continue to emerge. In order to resolve these issues, the government of Taiwan seeks to provide a good environment for AI (artificial intelligence) innovation and applications. This article summarizes and highlights relevant content and key points of Unmanned Vehicles Technology Innovative Experimentation Act, which was legislated in Taiwan in 2018. In addition, it points out the fundamental ethics regulation of AI, which has influenced Taiwan legal policy.

Key words: AI, Unmanned Vehicles Technology Innovative Experimentation Act, self-driving cars, ethics guideline, regulatory sandbox.

1. Preface

In recent years, with the rapid development of AI (artificial intelligence) and the increasing maturity of remote-control technology, unmanned vehicles have become a development priority of countries around the globe. Countries have invested considerable sums of human capital and material resources in the practical application of unmanned vehicles, also known as self-driving cars. Famous carmakers are all proactively researching and developing in the areas of unmanned vehicles, demonstrating the impressive market opportunity. In light of this trend, Taiwan does not want to fall behind either¹. However, the regulations of self-driving cars in Taiwan are insufficient. The regulations currently only cover pilot programs, so in order to explore the legal issues of

self-driving cars, the ethics of self-driving cars cannot be ignored either.

As on-road testing and technological development for self-driving cars continue to develop in different countries, the controversial issues of safety, ethics, liability, and the invasion of privacy continue to emerge. In order to resolve these issues, countries such as the United States, Germany, and Japan have drafted relevant regulations to serve as references.

For example, in 2017, the Ethics Commission of German Federal Ministry of Transport and Digital Infrastructure released a report *Automated and Connected Driving (Automatisiertes und Vernetztes Fahren)*. Twenty ethical guidelines called “The German Ethics Code for Automated and Connected Driving” (Ethics Regeln für den automatisierten und vernetzten Fahrzeugverkehr) [1] listed in this report make it the world-first ethical rules regarding how the autonomous vehicles should be programmed. These ethics guidelines fully comprehend the influence and the impacts among people’s rights and the society based on the thought of the protection for human’s traffic safety under the current development trend of self-driving cars.

Following the ethics guidelines, the government also amends their Road Traffic Act

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¹ In respond to the legal issue that artificial intelligence (AI) brings, many research centers in Taiwan were established these years, including AI Laws Research Center of National University of Kaohsiung College of Law and International AI and Law Research Foundation. For the further details about these two research centers, please see: Chang, Li-Ching 2020. “Trends of AI Laws Research Organization in Taiwan.” *Journal of Mechanics Engineering and Automation* 10: 37-40.

(Straßenverkehrsgesetz), regulating the highly or fully automated function vehicles [2], such as Article 1a Section 1 of the Act, motor vehicles with highly or fully automated function may be allowed to be operated if the function is used in accordance to the regulations [3, 4]. While the German vehicle industry has worked tirelessly to improve autonomous driving technology, the related laws and regulations have not only allowed on-road test for self-driving cars, but also established a set of guidelines on the safety and ethics of autonomous driving systems design. Without relevant standards and guidance, the technology and its practical application may not be able to integrate successfully or there might be a gap between the technology and its perceived application in real life. Furthermore, the amended Road Traffic Act demonstrates the spirit of the ethics guidelines and gains the trust from the public that believe autonomous vehicles could bring more convenience [5]. This legislative process for self-driving cars in Germany reveals that those ethics guidelines were discussed profoundly between the relative department of the government and the legislative branch before it was proposed officially and ethical standards of autonomous driving systems play an important role in the development process of autonomous driving technology.

Self-driving cars have not yet been allowed to hit on the road in Taiwan, but there are still needs for the industry to test whether the function or their technology has met the standards. This article will introduce current laws and regulations of self-driving cars in Taiwan, starting by the content of Unmanned Vehicles Technology Innovative Experiment Act (hereinafter referred to as Unmanned Vehicles Act). Furthermore, it discusses the ethics of AI related to autonomous driving, and then draws insights from the Unmanned Vehicles Act to identify future policy and regulatory recommendations.

2. Laws on Self-driving Cars in Taiwan: Unmanned Vehicles Technology Innovative

Experimentation Act

2.1 Purpose of Legislation

Unlike other countries around the world, Taiwan has not allowed self-driving cars on the road. However, in order to meet the technological development and testing needs of unmanned vehicles, Unmanned Vehicles Act was published in December 2018. The Act creates a reasonable and safe testing environment for innovation. The Act encourages different sectors to invest in the research, development, innovation, and application of unmanned vehicles. Furthermore, the Act allows unmanned vehicles to step into the field of life. Unmanned Vehicles Act is the first legal regulation in Taiwan on subjects related to AI, and it is also the first legal regulation in Taiwan on self-driving cars.

Article 3, Subsection 1, of the Act defines an unmanned vehicle as a “driverless transport vehicle”, including an automobile, aircraft, ship, or any combinations of the above and of the land, sea that “operates through autonomous driving or remote-control operations.”² In other words, unmanned vehicles may have an operator, or conversely, none. Unmanned vehicles that have operators rely on remote driving technology, providing the ability to operate vehicles from afar via remote control technology; unmanned vehicles without operators on the other hand use self-operating technology for movement. Multinational corporations are primarily focused on developing unmanned vehicles without operators, specifically “self-operating and driving” vehicles, which is also the focus of this article.

The legislative purpose of the Unmanned Vehicles Act “is formulated to encourage the research and development and the application of unmanned vehicle technology, and to create a sound and safe environment for innovative experimentation, so as to

² Taiwan seeks to create best environment for AI innovation and applications. Please see: <https://english.ey.gov.tw/Page/61BF20C3E89B856/419fa63e-1029-4f12-b93a-c82f899a9e92> (last visited: 2021/02/26).

advance the development of industry technology and innovative services". In short, despite the lack of maturity of unmanned vehicle industry and applicability of its technology, the industry is expected to continue to develop and change human lives in the foreseeable future. Countries should provide testing environments to enable industry growth, facilitating growth potential of the unmanned vehicle industry.

2.2 Main Content of the Act

Unmanned Vehicles Act could be organized into two parts: administrative control of experiments and regulatory exemptions.

Administrative control of experiments includes the application and review procedures, the management and safety of the field involved in experiments, and the management of innovative experimentation. In other words, applicants need to submit proposals and receive approvals before they conduct on-road testing. In addition, testing environments need to uphold safety standards, and the testing environments are subjected to various inspections from governing bodies.

This Act includes 24 articles. The first to fourth articles are general principles, which indicate the purpose of legislation, the authority in charge, the definitions of terms, and the establishment of a unit dedicated to innovative tests. Articles 5 to 12 specify application and review procedures. Articles 13 to 18 stipulate safety and management of testing areas. These five articles state that applicants need to abide by the Act, and report on the tests based on the requirements set forth by governing authority. In addition, applicants cannot evade, hinder, or refuse onsite visits of governing authorities. Articles 19 to 21 stipulate the methods of handling, abolishing, and reporting of experiments. These articles also state that, if the testing programs lead to bodily harm and monetary losses of testing subjects or stakeholders, governing bodies have the authority to request the

testing programs and projects to make improvements within a limited time period. If the improvements do not occur before the deadline, then the approval to experiment would be revoked. The Act is summarized as follows³:

Test duration is limited to one year, and if necessary, the applicant can request for a one year extension. If the need to study and amend the Act arises, the testing period can receive additional extension up to four years. In regards to the application of unmanned vehicle testing, there is a need for a singular contact window to facilitate in the creation of more convenient administrative processes.

Review procedures are carried out by the MEA (Ministry of Economic Affairs). MEA is tasked with the work to hold review meetings and invite representatives from the central government and local government, experts of law and relevant industries, and academics in the field in question. The items reviewed include the innovativeness, conditions, and the qualification of the unmanned vehicle testing program as well as the safety and risk management of the program.

Safety Control: Applicants for unmanned vehicle experiment are required to provide an insurance plan. Furthermore, the applicant needs to provide notifications in the vehicle or around the testing location. In the event of an accident, the applicant should promptly notify authority and provide the cause of the accident and follow-up actions. Moreover, the applicant is obligated to equip the unmanned vehicles with dash cameras to reduce the possible complexity of accountability due to the lack of a driver in the event of an accident. Evidence collected by dash cameras is conducive to the transparency and impartiality for the subsequent investigations.

During the testing period for unmanned vehicles, the legislators are required to loosen regulations and

³ For further detail reference, please see: Chang, Liching 2019. "The New Bill of Artificial Intelligence: Unmanned Vehicles Technology Innovative Experimentation Act." *The Taiwan Law Review* 293: 81-92.

simplify administrative procedures by removing certain laws, regulatory orders and penalties established in administrative law to create a friendlier legal environment.

2.3 Characteristics of the Regulation

As mentioned previously, the Act is designed to create a friendly legal environment. Hence, other than introducing the spirit of Regulatory Sandbox, under specific scopes and conditions, the Act exempts testing programs from relevant laws. This spirit is embodied by Article 22, where the Exemption rule is exerted. Upon approval of the experiments and during the time of experiments, authority may grant “exemptions to the acts, codes, regulations, orders, and administrative rules related to the experiment”. For instance, the testing program may be exempt from the Road Traffic Management and Penalty Act, Highway Act, Civil Aviation Act, Law of Ships, Seafarer Act, Telecommunications Act and other relevant regulations. However, tort and criminal liabilities created during testing may not be removed, nor the regulations of the Money Laundering Control Act, Counter-Terrorism Financing Act, and other relevant laws.

In accordance with the above, Article 23 states exemptions from existing law are only applicable to the testing experiments that have been approved. Further, the exemptions from acts, codes, regulations and directions are only applicable to testing periods.

Of the legal exemptions, Road Traffic Management and Penalty Act involves the broadest areas of regulations, including regulations on drivers, vehicles, and autonomous vehicles.

First, the driver is regulated by Articles 21, 21-1, 25, 31-1, 34, 36, 60, 63 and 73, the first item of Article 31-1, and the first item of subsection 6 of Article 73. If the driver violates the Articles, the driver may receive three types of administrative penalty: (1) on qualifications of drivers: the driver must hold a legal driver’s license and carry it at all times. Taxi drivers

must register to practice. (2) On driver safety, the Act prohibits acts that may affect the driver’s ability to drive safely: the use of mobile phones while driving is prohibited. The driver is also prohibited from driving continuously for over 8 h, which lowers the driver’s ability to drive safely. People with diseases that affect their ability to drive safely are prohibited from driving. (3) Driver should comply with the law. Driver should be cooperative with authority for traffic control, inspections, or other surveillance activities.

However, according to Article 22 of Unmanned Vehicles Act, the Articles listed above are not subject to compliance during the experiment period.

For instance, Article 25 of Road Traffic Management and Penalty Act states all drivers of vehicles shall carry driver licenses during driving period. However, Article 25 will not be applicable for the experiments of unmanned vehicles (i.e. self-driving cars) for the vehicles without drivers, which are uncomparable with existing laws. Therefore, in Unmanned Vehicles Act Article 22, Paragraphs 1 and 2, Subparagraph 1 stipulate: Within experiment environments and time period, authority may exempt Article 25 of Road Traffic Management and Penalty Act. In other words, for unmanned vehicle experimenting within its reported testing range and time period, despite without a driver and a driver’s license, the experiment is not fined and may continue the testing of AI in driving. Above applications of the exemption rule are reflections of the Regulatory Sandbox. The experiments may be conflicting with existing laws and legislators need to take in consideration of such; furthermore, legislators need to provide legal and suitable experimental environments.

Exemption on Road Traffic Management and Penalty Act for all types of vehicles include automobiles, electronic bikes, and other types of motion vehicles. Articles 16, 19, 32, 32-1, 69-1 and 72 of Road Traffic Management and Penalty Act stipulate that automobiles shall not be modified arbitrarily including its turn signals, windshield wipers,

horns, mirrors, exhaust pipes, mufflers and etcetera. In case of damages, repairs are to be done without violating alterations; further, breaks and steering wheels shall properly be adjusted. Electronic bikes shall be inspected according to specifications and shall not arbitrarily modify or recreate. Furthermore, “for motor-powered vehicles not classified as automobiles” shall obtain special permit. All other “moving device[s], a moving sports and leisure equipment, or a similar moving equipment that is classified as neither a vehicle nor a motor-powered machine” shall not be permitted on the road. Nevertheless, within the scope of the experiments, by loosening the restrictions and regulations for automobiles, electric bikes, and other types of vehicles, applicants may exert potentials and possibilities in unmanned vehicles experiments.

Article 22 of Unmanned Vehicles Act also applies on Highway Act for land transportation. Article 63, Paragraph 1 of Highway Act provides the inspection instructions for safety qualification of vehicles. It states automobile, electric vehicles, domestic cars & electric cars manufacturers, regular manufacturers, and importers shall comply with MOTC’s code (Ministry of Transportation and Communications R.O.C) on safety inspections, registrations, licensing requirements. Furthermore, Article 22 of Unmanned Vehicles Act also exempts Article 77, Paragraph 3 of Highway Act. Article 77-3 states utilization of commercial airport requires approval from authority. Nevertheless, for the purpose of experiment, Article 77-3 of Highway Act is exempted.

Lastly, regarding exemption on Telecommunication Act is as below. In testing unmanned vehicles, making or exporting restricted telecom equipment is possible and such may invade personal privacy. Nonetheless, if not obtained with permit, produce or export restricted telecom, 65-1 of Telecommunication Act will be applied. On the other hand, for the development of unmanned vehicles, such law shall be exempted.

3. Application of the Principles of AI on the Ethics Policy of Self-driving Cars

Ethical norms of self-driving cars are to be reckoned when solving the legal issues of them, and ethics policies of self-driving cars best reflect the fundamental ethics of AI. For instance, like the above mentioned in the Preface, Ethics Commission of German Federal Ministry of Transport and Digital Infrastructure presented a report on automated driving listing 20 ethical guidelines for self-driving cars.

The guidelines are solidly reasoned and comprehensive enough to provide a legal basis for German vehicle industry to move forward with their plans for the development of any automated driving systems. The report especially noted the special requirements in areas of safety, human dignity, choice freedom and data autonomy, which inspired the regulation of ethical norms in Taiwan. The main content of the report are as follows:

The protection of individuals takes precedence over all other utilitarian considerations. In hazardous situations that prove to be unavoidable, the protection of human life enjoys top priority in a balancing of legally protected interests. Thus, within the constraints of what is technologically feasible, the systems must be programmed to accept damage to animals or property in a conflict if this means that personal injury can be prevented.

Genuine dilemmatic decisions, such as a decision between one human life and another, depends on the actual specific situation, incorporating “unpredictable” behavior by parties affected. They can thus not be clearly standardized, nor can they be programmed such that they are ethically unquestionable.

In the event of unavoidable accident situations, any distinction based on personal features (age, gender, physical or mental constitution) is strictly prohibited. It is also prohibited to offset victims against one another.

The above indicates if ethical decisions are made by the systems and programs (Operational Design Domain) of self-driving cars, they not only violate the values of humanity but also encounter ethics disputes

“humans are restricted by technology” or “human dignity is belittled”.

How does a self-driving car make decisions in the face of a difficult situation? For instance, a difficult situation whereby will kill its passengers if the self-driving car continues driving forward, yet if the car shifts to the right, it would hit a helmeted motorcyclist [6]⁴. Nonetheless, if the self-driving car moves the left, it would hit an unhelmeted motorcyclist. In this moment in time, should the self-driving car sacrifice the passengers? Under these circumstances, shall the system be programmed to move to the right to save passengers’ lives because a protected motorbike rider is more likely to survive in this incident? Or shall the system be programmed to move to the left and jeopardize an unhelmeted motorbike rider because the rider violates the law for not wearing protective gear? Indeed, the above questions are potential ethical problems for the development and application of AI on self-driving cars. Once the ethical problems are presented, it is significant to resolve them in the program design.

Therefore, when a legal or ethical dilemma occurred in difficult situations involving accidents, as the above mentioned, the below policies of self-driving cars are to embody the fundamental ethics principles of AI.

3.1 Human Safety as the Primary Objective

Safety of self-driving cars has to be the number one priority. It is the duty of the countries to protect the environment for self-driving cars and safety of automation and connectivity. Self-driving software and technology design needs to completely avoid possibilities of creating threats to human safety and be improved continuously.

Safety review of self-driving cars echoes the developing fundamental ethics of AI, and it protects

human safety and focuses on not causing humans to humans as its core value. It is especially emphasized that self-driving cars are to be protective of humankind, and if any inevitable accident occurs, self-driving cars shall not take individual characteristics as a decision-making criterion [7]. The statements above aim to demonstrate fundamental ethics of AI.

3.2 Transparency and Accountability of the Systems of Self-driving Cars

AI system transparency and liability are closely related. To be able to account the liabilities of unfortunate accidents⁵, it shall have interpretative transparent system designs. Otherwise, black-box systems without transparency are difficult to detect failures and may cause potential hazard in future. Public is entitled with rights to know and understand the new technology in regard to the operation of self-driving cars. At the same time, both the usages and systems of self-driving cars shall be monitored by a third-party authority.

Transparency and liability of self-driving cars’ programs are the means to reaching a reliable AI principle. Therefore, different types of records of the research and development of self-driving cars need to be interpretable and auditable. The purpose is to ensure that the application of AI is trackable, which makes the identification of problems possible, thereby, creating human trust in AI and becoming willing to use AI.

3.3 The Law Ought to Create a Balance between Technology and Liberty

The liberty of using self-driving cars, the liberty of road users, and the liberty of technology development may all be jeopardized and face difficulties never seen

⁴ For more details about instances of dilemmas, please see Coca-Vila, I. 2018. “Self-driving Cars in Dilemmatic Situations: An Approach Based on the Theory of Justification in Criminal Law.” *Criminal Law, Philosophy* 12: 59-82.

⁵ For further reference about the criminal responsibility when an accident of self-driving cars occurred, please see: Chang, Li-Ching. 2019. “The Challenge and Response of Criminal Law in the Era of Artificial Intelligence—Focus on Automated Driving.” *The Taiwan Law Review* 286: 87-103.

before due to the risk that technology brings. Therefore, the role of law is not to overly protect the liberty of any sides; instead, to reach an equilibrium by consulting all levels of the societies. The balance of rule and regulation is related to the balance of AI's developing ethical standards. In other words, the balance and trade-off of all types of liberty shall be considered. Furthermore, the law ought to reach an equilibrium between technology and liberty. The basics of AI's ethical applications are also to ensure and deliver fundamental human rights. To assure the fundamental value of individual liberty, law shall not only guarantee but also moderately restricts.

4. Fundamental Ethics of AI on the Ethics Policy of Self-driving Cars

In 2018, Taiwan legislated Unmanned Vehicles Act, which reflects the influence of AI on policy making in Taiwan. This is the first Act that touched upon the research and development of AI. From the Act, it discloses the influence of AI ethics on legal policy⁶. Detailed explanations regarding its influence are below.

4.1 Embodiment of the Ethical Requirements of Human Safety and Autonomy of AI

Article 1 of the Act states the purpose of legislation is “formulated to encourage the research and development and the application of unmanned vehicle technology, and to create a sound and safe environment for innovative experimentation, so as to advance the development of industry technology and innovative services”. In other words, by formulating a legally protected environment for innovative technology developers to perform experiments, it adheres to the ethics policy on human safety that AI shall ensure. Articles 5, 13, 16, 20 in below articulate the concept further.

Article 5 and posterior of Article 5 require research

units to apply and report experiment plans to the authority. Specifically, Article 7-6 stipulates that “potential risks [shall] have been assessed, and that relevant response measures and other safety or risk control measures relating to the innovative experimentation program, [shall] have been established”. The applicant cannot begin testing until the submitted application is reviewed by government authority for its safety requirements. Similarly, Article 13 provides details of the experimental environment management and its safety regulations. Article 16 states applicants during the experimental period shall provide adequate and appropriate data security to ensure the collection, management, utilization, and transmission of information are safe. Article 20 stipulates authority may demand for limited-time improvement orders if there are any violations including endangering human life, body, and property safety during the testing period. However, in case of serious violations, the testing program will be terminated immediately. The regulation embodies the concept to ensure human safety.

In addition, Article 17 reflects the respect on human autonomy. The article stipulates “[w]hen collecting, processing, or utilizing personal data, the applicant shall comply with the provisions of the Personal Information Protection Act”. Development of self-driving cars may collect, process, and utilize personal data. For instance, with cars and road sensor in real-life driving simulation, data are collected in helping AI to learn driving behaviors and establish database for environment simulation. Through the above, costs for self-driving cars testing are lowered. However, such method involves personal data protection. Therefore, respecting human autonomy in the ethics of AI is performed by legislating the law to protect personal data autonomy. It is also one of the current developing regulations of the ethics of AI in Taiwan [8].

4.2 Embodiment of the Ethics of the Transparency and Reliability of AI

⁶ For further reference about ethics guidelines for AI applying in Taiwan, please see: Chang, Liching. 2020. “Ethics Guidelines for AI and Its Influences on Legislation in Taiwan.” *The Taiwan Law Reviews* 301: 97-117.

In the developing stage of AI, the potential dangers of the development shall be disclosed to the public; thus, urging research and development participants to effectively prevent and be cautious. Hence, article 11 indicates during the experiment period, the competent authority shall publish information of the below on the official website: applicant names, innovative experiment contents, durations, scopes exempted acts, codes, regulations, orders related to the experiment, and other relevant information. It is also to demonstrate that in order for AI to be plausible and reliable, principle of transparency is performed.

In addition, article 16 of the Act also requires applicants to disclose their information in traditional media or electronic media platform prior to initiating the innovative experiments. Furthermore, applicants shall make proper announcement of the experiments either via the unmanned vehicles or by posting around the experimental environments in order to achieve the principle of transparency. In Taiwan, from the perspectives of the law of AI, it is known that through public announcements and illustrations, AI is made persuasive, more accepted and used by the public.

4.3 Demonstration of the Requirement on the Balance between Ethical Norms and AI

Technology development and legal regulation may conflict with each other. The same logic is applied to the Unmanned Vehicles Act. To encourage unmanned vehicles' researchers in the development and to propel Taiwan's transport industry and the convenience of people's life, the coordination between the development of AI and legal policy regulation shall be considered. Hence, application of Regulatory Sandbox is embodied in the conditions for exemptions stated in Article 22 of the Act.

Specifically, Article 22 stipulates that upon approval of the experiments and during the time of experiments, authority may grant "exemptions to the acts, codes, regulations, orders, and administration rules related to the experiment". The exemption rule is

applied on Road Traffic Management and Penalty Act, Highway Act, Civil Aviation Act, The Law of Ships, The Seafarer Act, Telecommunication Act, and portions of relevant laws. In addition, "other applicable laws that should be exempt for the development and application of unmanned vehicle technology" is also applicable. Nonetheless, it does not grant exceptions concerning Civil Code and the Criminal Code of Taiwan. Neither could it grant exception from below laws and relevant codes of: Money Laundering Control Act, Counter-Terrorism Financing Act. The application of Regulatory Sandbox by exempting administrative regulations, larger mutual benefits are created. In other words, Regulatory Sandbox obtains balance among technology development liberty, participant's liberty, and supervision of decision maker.

5. Conclusion

In regards to the development and application of AI, people share a common vision. They hope that AI will not harm people, and it would protect people's rights and ensure people's safety. For such reason, self-driving cars shall prioritize human safety as its core principle, and it shall also ensure the protection of personal data and the autonomy of decision-making. Furthermore, it shall avoid any danger caused by distinction bias while self-driving cars are in action. This shows the importance of equality and fundamental human rights in AI ethics. Legal obligation and liability shall be considered alone and integrated with comprehensive evaluations of the self-driving cars' characteristics in order to promote societal progress and safety.

This report summarizes and highlights relevant content and key points of Unmanned Vehicles Act, which was legislated in Taiwan in 2018. In addition, the report points out the fundamental ethics regulation of AI, which has influenced Taiwan legal policy. The research, design, development, and testing of unmanned vehicles shall prioritize human safety and shall provide transparency to gain people's trust.

Moreover, the research and testing shall comply with fundamental ethics of AI, yet the regulation shall not be so strict that it hinders the development of unmanned vehicles. Therefore, the laws in Unmanned Vehicles Act regulate that applicant is to be provided with exemptions from other existing law and hence, the research and development for unmanned vehicles is protected. Indeed, regulatory content of the Unmanned Vehicles Act simultaneously provides and protects the people and further, does not hinder the technology enhancement and provides guarantee for the participants.

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