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CHALLENGES AND RECOMMENDATIONS FOR THE LEGAL FRAMEWORK IN THE EMERGING AGE OF ARTIFICIAL INTELLIGENCE

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Abstract

Artificial intelligence (AI) affects many aspects of socio-economic life; And the development of AI has a huge impact on the law. Because the current legal system has not yet adjusted the newly aroused legal relationships, the law needs to change accordingly to accommodate these relationships in the era of artificial intelligence. Within the scope of this article, we do not aim to completely solve the legal issues that arise related to the development of AI; Yet only "recommend" some AI-related contents so that some "fields" of law introduce new regulations or amend existing ones to effectively supervising these profound relationships. Therefore, we raise challenges and suggestions for the following legal areas: Consumer Rights Protection Law, Criminal Law, Intellectual Property Law, Traffic Law, and Competition Law.

Keywords: *Artificial intelligence, challenge, legal, recommendation;*

1. Introduction

The “ongoing process of digital transformation is being accomplished in part with the use of artificial intelligence (AI)” (Hoffmann-Riem, W., 2020, 2). “An interdisciplinary technology that aims to use large data sets (Big Data), suitable computing power, and specific analytical and decision-making procedures to enable computers to accomplish tasks that approximate human abilities and even exceed them in certain respects” (Kaplan, J, 2016). Accordingly, AI is applied in many different areas of social life, specifically: *(i) AI applied to work*: AI applied to business (Soni, N. & Sharma, E. & Singh, N. & Kapoor, A., 2020; Chojecki, P., 2020; Fotis, K. & Kamariotou, M., 2021); AI applications in health (Bhattad, P, & Jain, V., 2020; Kashyap, A., 2018; Ahuja, A., 2019); AI applications in education (Goksel, N. & Bozkurt, A., 2019; Roll, I. & Wylie, R., 2016; Chen, X. & Xie, H. & Hwang, G., 2020); AI applications in transportation(Woschank, M. & Rauch, E. & Zsifkovits, H., 2020; Lytras, M. D. & Chui, K. T. & Liu, R. W., 2020; Nikitas, A. & Michalakopoulou, K. & Njoya, E. T. & Karampatzakis, D., 2020); AI applied in production (Chaudhry, I. A. & Shami, M. & Khan, A., 2004; Burggräf, P. & Wagner, J. and Koke, B., 2018; Cioffi, R. & Travaglioni, M. & Piscitelli, G. & Petrillo, A. & De Felice, F., 2020); etc. *(ii) AI applied in daily life*: AI is used in technological devices such as Siri, Bixby, Cortana, etc to make people's lives more convenient and comfortable. Artificial intelligence is applied in "virtual assistant": assisting in the working process (Arora, S. & Athavale, V. & Maggu, H. & Agarwal, A., 2021); assisting students to find their way to school (Page, L. C. & Gehlbach, H., 2017, 1-12); customer support (Brill, T. & Munoz, L. & Miller, R., 2019); etc.

"The expansion of AI's capabilities and the tasks for which it can be used is associated with both risks and opportunities. The following will look at the challenges that AI poses for law and regulation" (Castilla, A. & Elman, J., 2017). In addition, the arising relationships related to AI inventors, manufacturers, and applications still required the regulations of the law. The development of AI has changed social relationships, that requires the law to change accordingly, and the impacts of AI on every aspect of the law.

2. Methodology

The main method used in this study is legal research (Pham, D.N. 2014). The legal sources used for analysis in this study include Law on Road Traffic of Vietnam No. 23/2008/QH12 dated 13 November 2008; Competition Law of Vietnam No. 23/2018/QH14 dated June 12, 2018; Consolidation document of Vietnam's Intellectual Property Law No. 07/VBHN-VPQH dated June 25, 2019; Criminal Code of Vietnam No. 100/2015/QH14 dated November 27, 2015; Law on the protection of consumer rights of Vietnam No. 59/2010/QH12 dated November 17, 2010.

This article uses analytic - descriptive research methods to clarify legal content and analyze social relations arising when artificial intelligence develops strongly. From there, it shows that Vietnamese law needs to change to match the development of artificial intelligence. In addition, the article uses a system of integrated research methods of the social sciences, including system, structure-function, history, logic (Bhattacherjee, A., 2012) to evaluate studies on social sciences of the subject of product liability, subject of crime, criminal liability, author of work and invention, protection of copyright and invention, and many issues others published in specialized scientific journals. Through the method of synthetic research, the article inherits the research results from previous works to suggest some contents to improve the Vietnamese law in many areas: Law on the protection of consumer rights, road traffic law, competition law, criminal law, and intellectual property law.

3. Results and Discussion

3.1 Law on consumer protection (product liability) – Challenges and recommendations

A famous computer magazine asked the following question: "It is the year 2023, and for the first time, a self-driving car navigating city streets strikes and kills a pedestrian. A lawsuit is sure to follow. But exactly which laws will apply? No one knows" (Greenblatt, N.A., 2016, 46-51). With the development and application of AI in products, certain risks for consumers arise. A series of issues arise and need to be adjusted by the law on consumer protection in general and the regulation of product liability in particular. Specifically:

Firstly, define the concepts: Is AI a product or a service: The first issue to be solved is: does the "product" include digital content and digital services? The second problem to be solved is: computer instruction software is considered a "product" and human instruction software is considered a "service" (Cabral, T. S., 2020, 615-635). To determine who is responsible, the law needs to identify AI as a product or service. The clear identification of this issue will serve as a basis for pursuing legal liability when a risky event occurs during the use of products or services with AI.

Secondly, producer: To determine who bears the liability, the Law on the protection of consumers' rights in general and the regulation of product liability, in particular, should clearly define the concept of "producer". A Producer can be (i) the manufacturer of a finished product; (ii) the manufacturer of any part; (iii) the producer of any raw material and; (iv) any person who presents himself as the product's producer (Cabral, T. S., 2020, 617). To identify the producer of AI-powered devices and AI-powered robots, the broad concept of producer mentioned above is particularly relevant. Accordingly, anyone in the production chain can be liable to the aggrieved party when they claim damages (with some exceptions).

Defective products: The identification of defective products is the basis for consumers to ask the responsible subject to bear responsibility for themselves. When determining that a product with an AI application is a defective product, consideration should be given to the level of safety expected by users of that product.

Damage: Usually, product liability in particular and liability for damage, in general, is determined based on material damage (not considering non-material damage). However, products and services with AI applications have the potential to cause non-material damage to consumers. Therefore, the law when introducing the concept of "damage" needs to consider non-material damage.

Thirdly, responsible subject: Identifying the responsible person based on the AI identifier. In case AI is a product, it becomes incumbent on the developers of AI systems to ensure that their systems are free from design defects; manufacturing defects; or inadequate warning or instructions (Gerstner, M. E., 1993, 239-269). In case AI is a service, the responsible subject is the service provider (it can be the producer or the service provider).

Fourthly, the obligations of suppliers of products and services with AI applications: In addition to the provisions on obligations of ordinary product and service providers, those providing products and services with AI applications should be obliged to describe in detail the features, how to operate and warning of risks that may arise in the process of using products and services. The law should require manufacturers and suppliers of products and services to provide detailed (specific) information for this type of product or service.

3.2 Criminal Law - Challenges and recommendations

In the research review of the author Yueh-Hsuan Weng et al (Weng, Y. H. & Chen, C. H. & Sun, C. T., 2009, 273): In 1981, a 37-year-old Japanese employee of a motorcycle factory was killed by an artificial intelligence robot that works near him. The robot misidentified the employee as a threat to its mission and calculated that the most effective way to eliminate this threat was to push him into an adjacent operating machine. The robot used its very powerful hydraulic arm to suddenly push the worker into the running machine, killing him instantly. The robot then continues its work without anyone interfering with its task.

The above incident raises a series of questions: Is the robot the subject of criminal responsibility? Who should bear the criminal responsibility in this case? To what extent can a machine with AI application become the subject of criminal legal relations? etc. Science and technology up to this point have developed very strongly. Especially, AI already has presented in many areas of socio-economic life and risks like the one mentioned above are inevitable. As the result, the Criminal Law has its mission to changes for the adaptation with the development of AI tech, specifically:

Firstly, criminal subject: A question that needs to be proposed in Criminal Law is whether to recognize AI as a fully capable entity as a criminal subject? There are five characteristics that humans expect from an intelligent entity: (1) Communicability: a human can communicate with an intelligent entity; (2) Self-knowledge: An intelligent entity is expected to have some knowledge of the entity itself; (3) External knowledge: An intelligent entity is expected to know about the outside world to learn about it and use information from it; (4) Goal-directed behavior: An intelligent entity is expected to act to achieve the goal set forth by the entity; (5) Creativity: An intelligent entity is expected to have some degree of creativity (Hallevy, G., 2010). Furthermore, some types of 21st century AI entities possess more attributes that allow them to function in more complex ways. The AI entity may have the ability to think, learn, and choose its actions. Therefore, Criminal Law should consider AI as a subject that can commit crimes.

Secondly, criminal liability: (1) In case AI is considered a machine and cannot be "human": AI cannot be the subject of a crime. In other words, AI does not have the subject capacity to participate in criminal legal relations. Accordingly, in legal terms, AI is a tool and means of crime. The subject of liability is another entity such as the AI programmer or the user or end-user. (2) Where an AI performs a behavior while the programmer or user is unaware, does not intend, and does not participate in the behavior: The programmer or user is not required to know about the behavior of any upcoming AI breaches in the course of their operations. However, programmers or users must be aware that such a violation of AI is a "natural" consequence (State v. Kaiser, 260 Kan. 235, 918 P.2d 629 (1996)). So, there are two cases: Firstly, if the AI behaves like a "machine", the programmer or the user of the AI is liable. Secondly, if the implementation of AI is not merely an "innocent machine", the liability rests with the programmer or the user and the AI. (3) Where AI is considered as an independent subject and does not depend on programmers or users: The process of analysis in AI systems parallels that of human understanding (Boden, M. A., 2006). AI has full capacity to commit violations, so AI must bear legal responsibility.

3.3 Intellectual Property Law - Challenges and recommendations

Artificial intelligence technology is increasingly seen as a tool with high proficiency to assist people in many different fields. Artificial intelligence products can assist judges in making fair and consistent decisions (Naughton, J., 2017). AI is used to see the magnitude and duration of the sun's rays to improve the accuracy of predictions (Fukuoka, K., 2017). Besides, AI is also applied in the field of art. Thus, artificial intelligence can paint pictures in the style of famous painters like Pablo Picasso (Gatys, L. A. & Ecker, A. S. & Bethge, M., 2015). The AI can also generate polyphonic choirs by various musicians such as Johann, Sebastian, and Bach (Hadjeres, G. & Fachet, F., 2017). AI has made a huge contribution to the formation of intellectual properties. Because of the development and contribution of AI to human life, a series of questions are raised: Does the current legal system effectively support the development of AI? Are AI-generated products considered intellectual property? How does Intellectual Property Law protect AI-generated works? Who is the owner of that intellectual property? Etc. To answer these questions, the Intellectual Property Law shall have its own adjustments, specifically:

Firstly, the author of the work; the subject of patent protection: AI can now create poetry, music, drawings, and artwork; create 3D printing and have inventions without any human involvement. The questions that need to be answered are “who is the author of the works” and “who is the patentee”. Hence, Intellectual Property Law needs to address the following issues: Is AI recognized as the author of the work? Does AI have the registration right of patent? What are the conditions for an AI to become an author of a work or a subject of patent protection? The current Vietnam’s Intellectual Property Law only recognizes the author of the work and the subject of patent protection as a person or organization established by people (humanity). Therefore, if the law recognizes AI as the author of the work or the subject of patent protection, the Intellectual Property Law must change to answer all the questions posed above.

In contrast, assuming that the law does not recognize AI as the author of the work and the subject of patent protection. Then who will be the author of the work and the patentee in the following subjects: AI software developer; or AI programmer; or AI user if the user is constantly entering new sources of information for the AI to create work? These are some suggestions for the Intellectual Property Law to determine who is the author of the work or the subject of patent protection.

Secondly, conditions for recognition of works or inventions

Conditions for recognition of works. A work is a creative product in the field of literature, art, and science expressed in any medium or form (Article 4(7) of the Law on Intellectual Property of Vietnam). There is another approach, “A work is “created” when it is fixed in a copy or phonorecord for the first

time…" (17 U.S. Code § 101) and "works of authorship include the following categories: literary works; musical works, including any accompanying words; dramatic works, including any accompanying music; pantomimes and choreographic works; pictorial, graphic, and sculptural works; motion pictures and other audiovisual works; sound recordings; and architectural works." (17 U.S. Code § 102 (a)). Accordingly, the condition to be considered work must be "creative".

Conditions for being granted a patent. "Patent eligibility" requirement (Parasidis, E., 2010, 326): novelty (17 U.S. Code § 102; Article 58(1a)), non-obvious (17 U.S. Code § 103; Article 58(1b) of the Law on Intellectual Property of Vietnam), the patent application must describe the invention clear and detailed (35 U.S.C § 112) (some countries require the invention to be industrially applicable (Article 58(1b) of the Law on Intellectual Property of Vietnam)). Artificial intelligence is defined as "the ability of machines to do things that people would say require intelligence." (Philip, D. & Jackson, J., 2019). Thereby showing, AI can simulate human intelligence such as language understanding, pattern recognition, problem-solving, and experiential learning (Philip, D. & Jackson, J., 2019). That means AI can create novelty and non-obvious inventions. Therefore, the Intellectual Property Law should consider to recognize and protect AI's inventions.

Thirdly, copyright or patent owner

According to the Vietnam's Intellectual Property Law: "Intelligent property right holder means an owner of intellectual property rights or an organization or individual to whom intellectual property rights are assigned by the owner" (Article 4(6) of the Law on Intellectual Property of Vietnam). With the development of AI, the opinion of the owner of copyright and patent also changes. Obviously, Vietnam's intellectual property law needs to change from the following perspective:

Copyright owner: (1) In case of not recognizing AI as an independent subject: The approach is allocating copyright ownership to the user, programmer, or artificial intelligence company by expanding the "work for hire" doctrine (Palace, V. M., 2019, 217-242). In the case of a "work made for hire", ownership is transferred to the "employer" (17 U.S. Code § 201 (b)). That is, AI creates works, AI is considered as an "employee", so the copyright owner belongs to the user or the programmer or the AI development company. (2) The case of recognizing AI as an independent subject: Usually, ownership of copyright belongs to the author or authors of the work (17 U.S. Code § 201 (a)). So the AI is the author of the work and the owner of the work. If programmers or AI users are involved in the creation of the work, then these people become co-authors and co-owners of copyright. In short, the owner of the copyright is the author or the person to whom the author transfers all or part of the ownership of the work.

Patent owner: (1) In case of recognition of AI as a subject of patent protection: the patent owner can be AI (AI is not an employee), or AI development company or AI user (AI is an employee). (2) Cases where AI is not recognized as a subject of patent protection: AI is a tool for creating inventions. The patent owner is the person who owns the AI – The person who has the right to register for patent protection.

Fourthly, copyright and patent protection issue

The AI as an owner: Granting standing to artificial intelligence would lead to many unsettling questions: Who enforces the right? What remedies should artificial intelligence be granted? What other rights should artificial intelligence receive? (Hristov, K., 2017, 431-454). However, the purpose of copyright and patent protection is to encourage people to create works and inventions and to promote scientific and artistic progress. Currently, AI doesn't need an engine to be creative; they simply use electricity to create works and inventions (Samuelson, P., 1986, 1199). The financial incentive to gain from copyright would be meaningless for AI (Hristov, K., 2017, 444). It is not necessary to specify that AI is the

right holder and is protected by copyright and patent at present. Vietnam's Intellectual property Law currently does not recognize that AI is the right holder and is protected by copyright and patent. In the future, the questions posed above need to be answered because AI is evolving and AI may be sentient in the future. Subsequently, in the future when AI has sentience, the law should provide for the protection of AI's rights like humans.

The user, programmer, AI development company as the owner: (1) In case the AI is considered the author of the work and invention: User, programmer, or developer company AI developer is a co-owner of work and invention with AI. The lawfully protects the rights of owners. (2) In case the AI is not considered the author of works and inventions: Users, programmers, or AI development companies use AI "tools" to create works and inventions. The law protects the ownership of these objects, the fruits of their labor (Samuelson, P., 1986, 1185–1228). (3) In case the AI is considered as an "employee" for users, programmers, or AI development companies: the law should consider the content of protection for the owner because they would be rewarded despite not contributing to the intellectual conception of the work, contrary to the purpose of copyright law (Palace, V. M., 2019, 236). In addition, the law also needs to clearly define the limit of protection for users, programmers, or AI development companies because they could “own everything the program was capable of generating” by merely allowing the computer to run indefinitely (Samuelson, P., 1986, 1208).

3.4 Traffic Law - Challenges and recommendations

“One of the prime areas where AI will make its most paradigm-shifting impact is transport. Examples of AI methods that are finding their way into the transport field include Artificial Neural Networks (ANNs), Genetic Algorithms (GAs), Simulated Annealing (SA), Artificial Immune System (AIS), the Ant Colony Optimiser (ACO), Bee Colony Optimisation (BCO) and the Fuzzy Logic Model (FLM)” (Abduljabbar, R. & Dia, H. & Liyanage, S. & Bagloee, S.A., 2019, 189-203). “These AI interventions have potential applications for the vehicle, the infrastructure, the driver or transport user, and in particular, for how these interact dynamically to deliver a transport service that promotes user empowerment and supports human-machine interactions” (Miles, J.C. & Walker, A.J., 2006, 183-198). In the face of such big changes in technology, the Traffic Law need to be changed correspondingly. Therefore, some outstanding contents need to be adjusted when applying AI into traffic:

Firstly, subjects participating in traffic: According to the traditional view, “road user means operator or user of a vehicle joining in road traffic; person guiding or driving animals and pedestrian walking on the road” (Article 3(22) of Law on Road Traffic of Vietnam). However, the application of AI shall present in self-operated or semi-operated vehicles. In this case, is a self-operated vehicle considered to be an independent participant in traffic?

Secondly, Operator: According to the traditional view, “Operator means operator of a motor vehicle, rudimentary vehicle or special-use vehicle joining in road traffic” (Article 3(23) of Law on Road Traffic of Vietnam). The operator is "human". However, the application of AI shall present in self-operated or semi-operated vehicles. One problem that needs to be solved is: is the subject of installing to operating the AI-applied vehicle the driver of the vehicle?

Thirdly, traffic planning: Urban planning, planning on transport infrastructure shall have significant achievements when applying AI. The urban structure and the development of the transport system are firmly connected, so there is an inseparable relationship between traffic and urban land utilization (Knowles, R.D. & Ferbrache, F. & Nikitas, A., 2020). Therefore, the Traffic Law stipulates the planning of traffic infrastructure must also ensure: (i) Conformity with urban planning - the field that is greatly affected by AI; (i) Suitable for technical works applying AI.

Fourthly, traffic signal system and other contents: Due to the application of AI, the traffic signal system is not only a system of lights, signs, road signs, etc but also sounds and signals. sensors, automatic barriers, etc. AI is widely used in operating and managing traffic systems and penalizing traffic participants. Therefore, the regulations of the traffic law should update the traffic signal system applying AI. In addition, the traffic law adds regulations about the operation and management of traffic systems applying AI and fines for traffic participants based on AI decisions.

3.5 Competition Law – Challenges and recommendations

In the not-too-distant future, AI and algorithm-based applications will be the foundation for market competition and competition between different markets. Today, there are many different algorithm-based business models that attract the attention of researchers and regulators from the perspective of competition law (Ezrachi, A. & Stucke, M., 2017, 1775-810). However, defining and evaluating of legal of respective business models (and the algorithms used in this situation) is still in its early stages and fraught with challenges. There are several AI-based business models that limit competition such as (i) Messenger (Ezrachi, A. & Stucke, M., 2017, 1782): concerns the use of computers to execute the will of humans in their quest to collude and restrict competition. Under this basic scenario, humans agree to the cartel and use their computers to assist in implementing, monitoring, and policing the cartel. (ii) Hub and Spoke (Ezrachi, A. & Stucke, M., 2017, 1782): using a single algorithm to determine the market price charged by numerous users. In this case, an intermediary helps to orchestrate industry-wide collusion in a vertical agreement that leads to higher prices. This means that companies use a unique algorithm to increase prices, which affects the competitive environment. (iii) Predictable Agent (Ezrachi, A. & Stucke, M., 2017, 1782): humans unilaterally design the machine to deliver predictable outcomes and react in a given way to changing market conditions. In this case, the application of similar algorithms by competitors on an industry-wide scale may result in a competitive restraint effect through the creation of interdependent actions. (iv) Autonomous Machine (Ezrachi, A. & Stucke, M., 2017, 1782): Here competitors unilaterally create and use computer algorithms to achieve a certain goal, such as profit maximization. The machines, through self-analysis and testing, independently determine the methods for optimizing profits. The computer executes whatever strategy it deems optimal, based on continuous learning and feedback from the data collected from the market. Therefore, the competition law needs to have appropriate changes to adjust the anti-competitive practices due to the application of AI.

Firstly, concept of "*Relevant *market": *According to the traditional view, "*Relevant market" means the market of those products and/or services that are regarded as interchangeable because of their characteristics, intended use, and prices in a specific geographical area with homogeneous conditions of competition, which is considerably differentiated from neighboring geographic areas*" (*Article 3(7) of Vietnam's Competition Law 2018). *Or take a similar approach: "A relevant market is defined according to both product and geographic factors. A relevant product market comprises all those products and/or services that are regarded as interchangeable or substitutable by the consumer, because of the products' characteristics, their prices, and their intended use. The relevant geographic market comprises the area in which the undertakings concerned are involved in the supply and Remand of products or services, in which the conditions of competition are sufficiently homogeneous and which can be distinguished from neighboring areas because the conditions of competition are appreciably different in those areas"* (European Commission, 1997).

The "relevant markets for the competition for AI and the competition with AI have to be defined" (Hennemann, M., 2020, 365). (i) Competition "for" AI: In this case, AI is seen as a characteristic of a good or service. The concept of an AI-related market is approached as follows: the "relevant product market

consists of all those goods or services which the opposite market side compares and reasonably regards as interchangeable or substitutable for the fulfillment of a certain need" (Hennemann, M., 2020, 366). Now and in the future, certain technologies will become the new standard and will shape the product market itself. Relying on technology in general and AI technology, in particular, is one of the factors to determine the relevant market. (ii) Competition "with" AI: In this case, AI is considered as the "nature" of the market. When introducing the concept of the relevant market, competition law should consider the geographical area of the market. Accordingly, "depending on the specific technical application, a geographical distinction could be made between regional and global markets" (Hennemann, M., 2020, 366). In addition, considering the "similar competitive conditions" of the market is one of the contents to give the concept of the relevant market. AI applications can create business environments with similar or different competitive conditions. Finally, identifying the market for substitute goods and services also needs to consider AI. Therefore, the following two questions need to be answered: (1) Can 'traditional' goods or services be reasonably interchangeable with applications of AI? or (2) can these respective AI applications establish independent and 'new' product markets?

Secondly, market dominance. *For the purpose of prohibiting the abuse of market power, competition law should clearly state whether a company holds a dominant position in the relevant market. "To allow an adequate assessment of market dominance, the essential 'resource' and driving force behind the development of AI, i.e. data, must be examined"* (Hennemann, M., 2020, 368). *Firstly, can business AI-related database resources lead to a dominant market position and to what extent? To answer the above question, it is necessary to consider the following factors: quantity of data, nature of data, quality of data, degree of data exclusivity, and third-party access to data. Secondly, how do AI-related databases play in assessing a company's market position? To answer this question, it is important to consider the following: comparing data sources used for AI among competitors; comparing databases of different level enterprises.*

However, there are number of questions to answer: (1) is the enterprise in control of the "data power" the dominant one in the market? (2) Is an AI-based technology standard-setting enterprise dominating the market? The above-mentioned enterprises are not dominant market because using the power of data helps the market moving. Therefore, determining the dominant market position is case-by-case when considering data, AI standards, and applications that may create barriers to market entry.

Thirdly, abuse of market power: To identify an abuse of market power of enterprises using AI technology is very difficult. Therefore, it is very important to analyze whether AI technologies exhibit a tendency to abuse market power and to what extent market power abuse. AI systems can affect the prices of goods and services; fix buying and selling prices; restrict the distribution of goods and services; restraint market; obstruct the scientific and technological development of customers; etc (Ezrachi, A. & Stucke. M., 2016). In addition, AI-based systems can be used not only to design or customize pricing terms, but also to construct terms such as general terms, terms of conditions, and terms of data protection. This shows that considering the factors constituting a dominant market position by AI, Competition Law not only comprehensively measures the factors of price, discrimination, transfer of rights, but also considers abuse unfair terms to consumers.

Fourthly, anti-cartel and anti-competitive agreements: In this context, it is assumed that AI systems pursue the goal of maximizing the profits of the businesses that use them. To achieve this goal, the systems will use the "basic mechanism of deep learning - aims to find the most favorable decision-making parameters by comparing and matching data as well as analyzing the parameters. pattern, hierarchy, and correlation" (Hennemann, M., 2020, 375). Thus, the formation of the cartel will help the system to achieve maximum profit and the development of the system will be better and safer (Ezrachi, A. & Stucke, M.,

2017, 1775-810). Alternatively, the AI system might conclude that to get the most benefit, the AI needs to make an 'agreement' that restricts competition with a competitor's system. Therefore, Competition Law needs to take into account the situation of cartel formation and agreement to limit competition through AI to make appropriate adjustments.

4. Conclusion

The era of artificial intelligence has been and soon affects many areas of human life. In fact, there is substantial development of AI that has posed many challenges to mankind, along with great legal challenges. Respectively, many different legal areas need to be Improvised to standardize the social relations arising from the presence of AI, such as Competition Law, Intellectual Property Law, Criminal Law, Consumer Protection Law, etc. This article outlines the legal challenges which humanity is facing and offers some suggestions for changing the composition in some branches of legal system. The author has no ambition to thoroughly solve legal issues in the era of artificial intelligence but only bring in the recommendations that the author and interested people currently researching.

References

Abduljabbar, R. & Dia, H. & Liyanage, S. & Bagloee, S.A. (2019). Applications of artificial intelligence in transport: An overview. *Sustainability,* Vol. 11, 189-203.

Ahuja, A. (2019). The impact of artificial intelligence in medicine on the future role of the physician. *PeerJ*, Vol. 7 (4). https://doi.org/10.7717/peerj.7702.

Arora, S. & Athavale, V. & Maggu, H. & Agarwal, A. (2021). *Artificial Intelligence and Virtual Assistant—Working Model. In Marriwala, N. & Tripathi, C. C. & Kumar, D. & Jain, S. (Eds): Mobile Radio Communications and 5G Networks, 163-171*. Springer. DOI: 10.1007/978-981-15-7130-5_12.

Bhattacherjee, A. (2012). *Social Science Research: Principles, Methods, and Practices.* University of South Florida. ISBN 13: 9781475146127.

Bhattad, P, & Jain, V. (2020). Artificial Intelligence in Modern Medicine – The Evolving Necessity of the Present and Role in Transforming the Future of Medical Care. *Cureus,* Vol. 12(5). DOI: 10.7759/cureus.8041.

Boden, M. A. (2006). *Has AI Helped Psychology? In Partridge, D. and Wilks, Y. (Eds): The foundations of artificial intelligence 108.*

Brill, T. & Munoz, L. & Miller, R. (2019). Siri, Alexa, and other digital assistants: a study of customer satisfaction with artificial intelligence applications. *Journal of Marketing Management*, Vol. 35. DOI: 10.1080/0267257X.2019.1687571.

Burggräf, P. & Wagner, J. and Koke, B. (2018). Artificial intelligence in production management: A review of the current state of affairs and research trends in academia. *Presented to the 2018 International Conference on Information Management and Processing (ICIMP),* 82-88. DOI: 10.1109/ICIMP1.2018.8325846.

Cabral, T. S. (2020). Liability and artificial intelligence in the EU: Assessing the adequacy of the current Product Liability Directive. *Maastricht Journal of European and Comparative Law,* Vol. 25(5), 615-635.

Castilla, A. & Elman, J. (2017). Artificial intelligence and the law. TechCrunch, Bay Area, accessible at Artificial intelligence and the law | TechCrunch.

Chaudhry, I. A. & Shami, M. & Khan, A. (2004). Manufacturing Applications of Artificial Intelligence. *Journal of Engineering and Applied Sciences,* Vol. 23, 29-33.

Chen, X. & Xie, H. & Hwang, G. (2020). A multi-perspective study on Artificial Intelligence in Education: grants, conferences, journals, software tools, institutions, and researchers. *Computers and Education: Artificial Intelligence,* Vol. 1. https://doi.org/10.1016/j.caeai.2020.100005.

Chojecki, P. (2020). *Artificial Intelligence Business: How you can profit from AI (1st Edn)*. Packt Publishing. ISBN: 9781800566514.

Cioffi, R. & Travaglioni, M. & Piscitelli, G. & Petrillo, A. & De Felice, F. (2020). Artificial Intelligence and Machine Learning Applications in Smart Production: Progress, Trends, and Directions. *Sustainability,* Vol. 12(2). DOI: 10.3390/su12020492.

Ezrachi, A. & Stucke, M. (2017). Artificial intelligence & collusion: when computers inhibit competition. *University of Illinois Law Review,* Vol. 5, 1775-1810.

European Commission (1997). *Commission Notice on the definition of the relevant market for the purposes of Community competition law (97/C 372 /03)*.

Ezrachi, A. & Stucke. M. (2016). *Virtual competition*. Harvard University Press, Cambridge.

Fotis, K. & Kamariotou, M. (2021). Artificial Intelligence and Business Strategy towards Digital Transformation: A Research Agenda. *Sustainability,* Vol. 13 (4). https://doi.org/10.3390/su13042025 .

Fukuoka, K. (2017). Solar Flare, A Prediction Accuracy of 80% with AI, Flare may Still Occur in the Next Seven Days. *NIHON KEIZAI SHINBUN* (Sept. 8, 2017), accessible at https://www.nikkei.com/article/DGXLASDZ08H7H_Y7A900C1000000/ .

Gatys, L. A. & Ecker, A. S. & Bethge, M. (2015). *A Neural Algorithm of Artistic Style* (Aug. 26, 2015), accessible at https://arxiv.org/pdf/1508.06576v2.pdf .

Gerstner, M. E. (1993). Comment, Liability Issues with Artificial Intelligence Software. *Santa Clara L. Rev,* Vol. 33(1), 239-269. https://digitalcommons.law.scu.edu/lawreview/vol33/iss1/7.

Goksel, N. & Bozkurt, A. (2019). *Artificial Intelligence in Education: Current Insights and Future Perspectives. In S. Sisman-Ugur, & G. Kurubacak (Eds.): Handbook of Research on Learning in the Age of Transhumanism, 224-236*. Hershey, PA: IGI Global.

Greenblatt, N.A. (2016). Self-driving Cars and the Law. *IEEE Spectrum,* Vol. 53, 46-51.

Hadjeres, G. & Fachet, F. (2017). *Deepbach: a steerable model for Bach chorales generation 1* (Jun. 17, 2017), accessible at DeepBach: a Steerable Model for Bach Chorales Generation (arxiv.org).

Hallevy, G. (2010). *The Criminal Liability of Artificial Intelligence Entities*, Available at https://ssrn.com/abstract=1564096 or http://dx.doi.org/10.2139/ssrn.1564096 .

Hennemann, M. (2020). *Artificial Intelligence and Competition Law. In Wischmeyer, T. & Rademacher, T. (Eds): Regulating Artificial Intelligence*. Springer.

Hoffmann-Riem, W. (2020). *Artificial Intelligence as a Challenge for Law and Regulation. In: Wischmeyer T., Rademacher T. (eds): Regulating Artificial Intelligence, 1-29*. Springer, Cham. https://doi.org/10.1007/978-3-030-32361-5_1.

Hristov, K. (2017). Artificial Intelligence and the Copyright Dilemma. *J. FRANKLIN PIERCE CTR. INTELL. PROP,* Vol. 57, 431–454.

Kaplan, J. (2016). *Artificial intelligence*. Oxford University Press, New York.

Kashyap, A. (2018). Artificial Intelligence & Medical Diagnosis. *Scholars Journal of Applied Medical Sciences (SJAMS).* Vol. 6(12), 4982-4985. DOI: 10.21276/sjams.2018.6.12.61.

Knowles, R.D. & Ferbrache, F. & Nikitas, A. (2020). Transport's historical, contemporary and future role in shaping urban development: Re-evaluating transit oriented development. *Cities,* 99. http://dx.doi.org/10.1016/j.cities.2020.102607.

Lytras, M. D. & Chui, K. T. & Liu, R. W. (2020). Moving Towards Intelligent Transportation via Artificial Intelligence and Internet-of-Things. *Sensors,* Vol. 20(23). DOI:10.3390/s20236945.

Miles, J.C. & Walker, A.J. (2006). The potential application of artificial intelligence in transport. IEEE Proc. *Intell. Transp. Syst,* Vol. 153, 183–198.

Naughton, J. (2017): Why a Computer Could Help you Get a Fair Trial. *THE GUARDIAN,* accessible at https://www.theguardian.com/technology/commentisfree/2017/aug/13/why-a-computer-could-helpyou-get-a-fair-trial.

Nikitas, A. & Michalakopoulou, K. & Njoya, E. T. & Karampatzakis, D. (2020). Artificial Intelligence, Transport and the Smart City: Definitions and Dimensions of a New Mobility Era. *Sustainability,* Vol. 12 (7). DOI:10.3390/su12072789.

Page, L. C. & Gehlbach, H. (2017). How an Artificially Intelligent Virtual Assistant Helps Students Navigate the Road to College. *AERA Open,* Vol. 3(4), 1-2. DOI:10.1177/2332858417749220.

Palace, V. M. (2019). What if Artificial Intelligence Wrote This? Artificial Intelligence and Copyright Law. *Fla. L. Rev,* Vol. 71(1), 217-242.

Parasidis, E. (2010). A Uniform Framework for Patent Eligibility. *TUL. L. REV,* Vol. (85), 323-394.

Pham, D.N. (2014). *Methods of studying jurisprudence*, Public Security Publishing House, Hanoi.

Philip, D. & Jackson, J. (2019). *Introduction to artificial intelligence (3st ed).* Dover Publications.

Roll, I. & Wylie, R. (2016). Evolution and revolution in artificial intelligence in education. *Int. J. Artif. Intell. Education,* Vol. 26, 582–599. DOI 10.1007/s40593-016-0110-3.

Samuelson, P. (1986). Allocating Ownership Rights in Computer-Generated Works. *U. PITT. L. REV,* Vol. 47, 1185-1228.

Soni, N. & Sharma, E. & Singh, N. & Kapoor, A. (2020). Artificial Intelligence in Business: From Research and Innovation to Market Deployment. *Procedia Computer Science*, Vol. 167, 2200-2210.

Weng, Y. H. & Chen, C. H. & Sun, C. T. (2009). Towards the Human-Robot Co-Existence Society: On Safety Intelligence for Next Generation Robots. *INT. J. SOC. ROBOT,* Vol. 267(1), 267-282.

Woschank, M. & Rauch, E. & Zsifkovits, H. (2020). A Review of Further Directions for Artificial Intelligence, Machine Learning, and DeepLea rning in Smart Logistics. *Sustainability,* Vol. 12. https://doi.org/10.3390/su12093760 .

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