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ROLE OF INTELLECTUAL PROPERTY IN DEVELOPING KNOWLEDGE ECONOMY – "LEADERSHIP AND INNOVATION/ BUSINESS INTELLIGENCE AND INNOVATION"

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ABSTRACT

Systems related to intellectual property which motivate innovation play a vital and controversial role in knowledge Economies. Artificial Intelligence poses pivotal challenges to systems of intellectual property which are based on humanity. This research analyzes the complicated issues related to intellectual property rights in the presence of increasing innovations of Artificial Intelligence which have increasing independence. It explains also the reasons for exclusivity of intellectual property and discloses them considering criticisms related to excessive monopolism. Main points are focused on compatibility of smart production with standards of intellectual property which are based on human, rights and responsibilities Artificial Intelligence systems, and mechanisms of customizing knowledge goods for Artificial Intelligence. The promising legal points of view are discussed in order to achieve balance between protection and access including adapted structures of innovation and designed protections. Furthermore, motives of economy, auxiliary procedures and mechanisms of forming the market are explored as political tools for motivating the collective innovations which are useful for everyone. It has been focused on fixing bases of responsibility to remedy the algorithmic damages with supporting innovation. The research is concluded by the main results and recommendations which emphasize making policies related to intellectual property rights based on evidence in presence of Artificial Intelligence taking into account exclusivity, spreading, cooperation and ethics in order to enhance the consumer interest. The research provides arguments showing that systems of intellectual property can through careful governance play an important role in directing progress of Artificial Intelligence towards comprehensive economic and social prosperity.

KEYWORDS: Intellectual Property, Developing Knowledge Economy, Leadership, Innovation, Business Intelligence.

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1. INTRODUCTION

Intellectual property rights play a vital role in enhancing creation, innovation and economic growth in knowledge economy. However, the evolving technologies such as Artificial Intelligence - raise new challenges to the law and rights of intellectual property. This research reveals the complicated legal and economic issues related to intellectual property rights in presence of innovations in field of Artificial Intelligence in developed knowledge economy.

But first, it is necessary to determine concept of intellectual property rights, Artificial Intelligence and knowledge economy.

1.1. Intellectual Property Rights

Intellectual property rights refer to creations of the human mind which can be protected according to the law from unauthorized use by others. Main forms of intellectual property include patents, copyrights, trademarks, commercial secrets and industrial designs. Intellectual property rights provide motives for innovation by giving exclusive rights to benefit from new inventions, creative works, trademarks, confidential information and industrial designs. However, achieving the balance between motives and access was always considered as a problem in the law and policies of intellectual property.

1.2. Artificial Intelligence

Artificial intelligence refers generally to computer systems which can perform tasks requiring usually human intelligence such as optical imaging, speech sensing and making decisions. Technologies of Artificial Intelligence have made rapid progress in the last years such as automatic learning and neural networks. Systems of Artificial Intelligence can produce creative and innovative outputs, transform business operations and make decisions. However, capabilities and risks related to Artificial Intelligence are considered as challenges to frameworks of intellectual property which depend on humanity.

1.3. Knowledge Economy

"Knowledge Economy" represents an economic system where the intangible assets like ideas, information, technology, software, designs and other intellectual capital form a great part of transactions and economic growth. Intellectual property rights which protect these cognitive goods from unregistered copying play a critical role. However, enhancing spread of knowledge and its positive effects is also still vital in knowledge economies.

This research aims at studying main issues related to intellectual property rights, innovations of Artificial Intelligence and knowledge economy. It analyzes legal and economic challenges facing intellectual property systems increasingly because of innovative systems of Artificial Intelligence. Political views are explored in order to judge the cognitive goods of Artificial Intelligence through the specially designed protection, repairs of responsibility and mechanisms of cooperation and access. The analysis aims at providing visions to improve the role of intellectual property in knowledge economy which is directed by Artificial Intelligence.

2. ROLE OF INTELLECTUAL PROPERTY IN KNOWLEDGE ECONOMY

2.1. Principles of Intellectual Property Systems

Intellectual property rights have emerged as an important tool of innovation with emersion of economies depending on knowledge where the tangible assets such as ideas, information, skills, trademarks and services contribute to creating value and competitive advantage instead of tangible factors and natural resources. Intellectual property systems aim at resolving the problem of acquiring knowledge and the market failure in terms of the cognitive goods as described by economists like Kenneth Arrow. (Arrow, K. (1962). In a leading scientific paper in 1962, Arrow has noticed that information products like inventions and creative works have characteristics of public goods. Its benefit is not competitive as the consumption of one person can't be less than the quantity available for others, and it is difficult to prevent other persons from accessing the information goods at a minimal cost. This shall create obstacles to private investments in producing and spreading the cognitive goods.

To resolve the problem of acquiring knowledge related to these public goods, intellectual property rights establish exceptional rights through monopolies with limited periods like patents and copyrights. These rights give the creative people exclusive rights which are legally executable for intangible innovations. This enables them to benefit commercially from investments in producing information goods. (Lemley, M. A. (2015)

Intellectual property rights allow the knowledge holders through motivating artificial scarcity of knowledge origins to make profits from the virtual goods and establish markets to exchange them, which encourage investments in researching, inventing and creative endeavors that generate innovations supporting prosperity and cultural works. (Scotchmer, S. (2004)

Therefore, protecting intellectual property aims to

achieve the maximum of social prosperity by making balance between innovation motives and costs like the restricted access to the knowledge origins during the exclusivity period. Disclosure requirements in the law of intellectual property rights guarantee also inserting the knowledge in the public field when protection expires.

2.2. Exclusive Rights in Intellectual Property Rights

Modern systems of intellectual property guarantee many forms of the exclusivity rights with limited periods designed for different categories of the intangible assets. Patents give monopolies for new and useful technological inventions which provide a motive to investments in research and development. Copyrights also cover original literary, dramatic, musical, and artistic creations, which allow benefiting from cultural efforts.

Trademarks create exclusive links for the identity of trademark, which helps the consumers to determine the product's quality and source.

Rights of industrial design protect the commercial aesthetic designs and allow the commercial secrets to keep the confidential commercial information away from competitors.

Exclusive rights in intellectual property rights encourage investments in the intangible assets, while they guarantee the disclosure conditions and periods determined for protection in order to make balance with spread of knowledge. (Landes, W. M., & Posner, R. A. (2003).

2.3. Disclosure Function in Intellectual Property

Exclusive rights are given under laws of intellectual property only for inclusive disclosure of protected intangible assets like inventions and creative works. Applicants for patents must disclose sufficient technical details about the invention so that other specialists in the field can repeat it. (Fromer, J. C. (2009).

All works which are protected by copyrights such as novels, movies and music compositions are provided to public through requirements of publishing and distributing. Intellectual property systems aim by imposing disclosure to expand public knowledge and enable the following and sustainable innovation after the protection expires. (Eisenberg, R. S. (1996). Employing the disclosure can distinguish between patents and trade secrets and enable the scientific and cultural progress.

However, some experts argue that disclosure requirements became inefficient increasingly due to complicated technologies like software. Moreover, patents reveal the minimum of implied knowledge that can be better obtained through knowledge inflow from one person to another. (Lemley, M. A. (2012).

All works which are protected by copyrights have low benefit of disclosure after enjoying and creative expression. However, the motive to disclosure is still important symbolically and functionally as it is totally forbidden that the intellectual property rights become mechanisms to search only for profit.

2.4. Empirical Evidence about Impact of Intellectual Property Rights

There is broad empirical research examining how intellectual property systems which help in directing process of designing policies affect the innovation, productivity and economic growth. Many studies focus on advanced economies and find that the power of patents enhances innovation, productivity and economic growth at general levels. (Schneider, P. H (2005). Analysis made by Branstetter and others about patent reforms in 16 countries between 1852 and 1915 has revealed that strong rights of intellectual property motivate technology transfer and enhances productivity, especially in the countries with high risks of copying. (Lerner, J. (2009).

However, there is also evidence proving that the excessive range of patents and risks of litigation shall hinder the accumulative innovation. (Murray, F., & Stern, S. (2007).

Results are more confusing for the developing countries in terms of the perfect power of patents due to limited ability to understand. (Maskus, K. E. (2000). Protecting strong intellectual property seems to facilitate the direct foreign investment and licensing technology and innovation mainly in the countries with medium income levels. (Branstetter, L., Fisman, R., Foley, C. F., & Saggi, K. (2011). Moreover, effectiveness of intellectual property motives differs between industries based on technology characteristics as patents play a greater role in the chemical and pharmaceutical innovations. (Cohen, W. M., Nelson, R. R., & Walsh, J. P. (2000).

Empirical studies pointed out that the intellectual property systems have positive impacts on innovation and productivity if they are compatible with context of countries although there are concerns about distributive justice. (Sweet, C. M., & Maggio, D. S. E. (2015).

Case Example: DABUS (2021): In 2021, a patent application was submitted naming an artificial intelligence system called DABUS as the sole inventor, without direct human involvement. The

application was rejected in the United States, the European Union, and the United Kingdom on the grounds that an inventor must be a "natural person." In contrast, South Africa accepted the application, becoming the first country to recognize an AI system as an inventor. This case highlights the legal challenges facing traditional intellectual property frameworks and underscores the need to update legal systems to accommodate non-human innovation. (European Patent Office. (2021)

2.5. Criticizing the Excessive Privilege of Intellectual Property Rights

Intellectual property rights give the inventors and creative people privileges with limited time for their innovations as a motive and reward for innovation, which allow them to make profits from commercial marketing. However, intellectual property rights create tensions between access and protection which require a precise balance. (Lemley, M.A. (2015). Critics object saying that the excessive privilege of intellectual property rights may affect negatively the innovation, competition and access to information.

One of the main argument's states that the broad or long-term rights of intellectual property may allow the rights holders to suppress the competition increasingly and hinder the following innovations. (Bessen, J. & Meurer, M.J. (2008) (Heller, M.A. & Eisenberg, R.S. (1998). For example, the broad patents of main technologies such as software interfaces or search tools may give an excessive market power, block competitors and impose "taxes" on the following innovations which depend on these technologies. (Cohen, W.M. & Lemley, M.A (2001). Periods of copyrights which go far beyond the age of writers may restrict the derived creations. (Lessig, L. (2001).

3. TYPES OF INTELLECTUAL PROPERTY AND THEIR ROLE IN INNOVATION

Intellectual property (IP) includes four main types, **each playing a specific role in supporting innovation**

1. **Patents** Protect technological inventions, encouraging research and development by granting exclusive rights to inventors.
2. **Copyrights** Safeguard creative works such as literature, software, and music, supporting the digital economy and knowledge production.
3. **Trademarks** Distinguish goods and services, enhance market trust, and promote competitiveness and brand-driven innovation.
4. **Trade Secrets** Protect confidential business or technical information, encouraging innovation in processes and industrial models.

Together, these IP types form an integrated system that stimulates creativity, transforms knowledge into economic value, and supports innovation ecosystems in modern economies.

4. ISSUES EMERGING DUE TO INTERSECTION OF ARTIFICIAL INTELLIGENCE WITH INTELLECTUAL PROPERTY RIGHTS

Increasing development and spread systems of Artificial Intelligence which can produce innovative and creative outputs raising many important issues emerging from intersection of Artificial Intelligence technology with law of intellectual property rights, **main fields include**

4.1. Definitions in the Law of Intellectual Property Rights are focused on Human

Current systems of intellectual property rights are based on definitions focusing on human like writing and inventing which represent the view stating that intellectual property rights must reward and motivate the human creativity. The law of copyrights gives exclusive rights to the owners of original literary and artistic works, provided that these works shall reflect the writers' choices and intellectual creativity. (Berne convention). The writing concept shall be kept for natural persons who provide these creative contributions. (Gervais, D.J. (2020). Similarly, patents acknowledge the human inventors who provide technological contributions. (Abbott, R (2016).

Growth of Artificial Intelligence systems pose challenges to these pivotal principles focusing on human in the law of intellectual property rights. Can works generated by Artificial Intelligence systems containing limited or unlimited human creative contributions be qualified for writing? Should Artificial Intelligence systems working independently be considered as inventors? (Fruehwald, E.S. (2019) If the current systems of intellectual property rights don't acknowledge writing and non-human invention, how can the law of intellectual property rights be developed to give rights related to the innovative outputs of the Artificial Intelligence? Some experts suggest that since Artificial Intelligence systems lack human awareness and creative comprehension, their outputs should not have protection by intellectual property rights equally like works created by human. (Grimmelmann, J. (2015) (Guadamuz, A. (2017).

However, some experts suggest that a kind of protecting copyrights can motivate the continuous development of Artificial Intelligence even without any human writers. (Denicola, R.C. (2016). Some special rights of intellectual property are suggested which are

designed for inputs and outputs of Artificial Intelligence that lack the human element. (Senftleben, M., et al. (2020). Nevertheless, there are concerns that such expansions in intellectual property rights may lead to excessive protection and obstacles to innovation in field of Artificial Intelligence. (Parchomovsky, G., & Siegelman, P. (2018) (Samuelson, P. (2016). Analyzing these tensions and adapting concepts and requirements of intellectual property rights focusing on human to comprehend the innovative outputs of the independent Artificial Intelligence systems increasingly remain an open challenge.

4.2. Self-Generating of Smart Systems by Artificial Intelligence

At present, most of Artificial Intelligence systems depend widely on human guidance, choosing input data and continuous creativity choices by developers and users. However, Artificial Intelligence systems in the future may be able to generate innovative, valuable and creative outputs more independently.

The techniques used in modern machine to learn algorithms allow analyzing the input data independently and extracting its models independently. With existence of sufficient amount of data, Artificial Intelligence systems may be able to generate new inventions or creative works with authenticity without largely continuous human interference. (Yanisky-Ravid, S., & Liu, X. (2018).

Possibility of Artificial Intelligence self-generation makes it more complicated to apply principles of intellectual property rights focusing on human. When can outputs be considered as real independent generation instead of guidance by human? If patents dispense with human inventors in the future, how can rights be allocated? Should intellectual property rights be created for works lacking evidence to human writing? (Yanisky-Ravid, S. (2017). Distinguishing directive outputs against Artificial Intelligence self-generation raises difficult technological and philosophical questions for the law of intellectual property rights.

4.3. Matter of Determining Feature of Inventor and Possession of Intellectual Property

Even the innovation supported by Artificial Intelligence using human and mechanical contributions raises uncertainty about feature of inventor and possession of intellectual property. Many persons may participate in developing Artificial Intelligence systems including programmers, data providers and users. Nevertheless, their technical and creative contributions related to Artificial Intelligence systems as well as any innovative outputs may be mysterious and difficult to differentiate definitely. (Hristov, K. (2017). Confusions emerge frequently about allocating privilege of inventor's feature and related intellectual property rights between human and mechanical contributors. Developers who design the main capabilities of Artificial Intelligence may claim the inventor's feature generally, but the final users who use tools of Artificial Intelligence may do it in the same context. (Margoni, T., & Perry, M. (2020).

It may require reevaluating or explaining the existing rules and norms about determining the inventor's feature and intellectual property rights in order to deal with emerging contexts of Artificial Intelligence. These directions need clearer guidance to resolve these tensions in a fair way and allocating inventor's feature between human and mechanical innovators. (Shemtov, N. (2020).

4.4. Need to Make Balance in Motives

The main goal of intellectual property rights systems is motivating innovation which is useful for the society. However, applying protection of intellectual property rights easily to outputs of Artificial Intelligence systems constitutes risk of excessive protection and imbalances.

Increasing patents and copyrights of the increasing creative outputs resulted from Artificial Intelligence systems may lead to hindering the following innovation and restricting the reuse of the protected materials creatively. (Darshana, T., & Dharani, T. (2021). Restrictions of intellectual property rights may also result in restricting access to input data required to train and improve Artificial Intelligence systems. (Band, J. (2018). It will require wide interest to reward innovation in field of Artificial Intelligence appropriately and at the same time to keep access to data, competition and future creativity. It is necessary to obtain more evidence about whether the current models of intellectual property rights or the new rights suggested for Artificial Intelligence or other tools may provide motives to develop the Artificial Intelligence. (Gurry, F. (2019). Resetting the scope of protection and exemptions of intellectual property may probably be critical to enhance the progress of technology in field of Artificial Intelligence instead of hindering it.

5. LEGAL CHALLENGES OF INTELLECTUAL PROPERTY RIGHTS IN FIELD OF ARTIFICIAL INTELLIGENCE

Spread of Artificial Intelligence systems which can produce innovative and creative outputs constitutes many major legal challenges of intellectual property rights focusing on human inventors and authors.

5.1. Doctrinal Compatibility of Artificial Intelligence Outputs with Standards of Intellectual Property

The first main legal challenge is evaluating whether the innovative outputs of Artificial Intelligence fulfil significantly the applicable standards of intellectual property protection, which are designed under assumption of human creation.

Laws of copyrights require that protected works shall offer originality through the author's choices. (Berne Convention) (Infopaq International A/S). Can the output of Artificial Intelligence which witnesses to a small human creative contribution be qualified? Some experts argue that Artificial Intelligence can't make creative choices like humans. (Shtefan, A. (2021). However, works created by Artificial Intelligence may differ significantly from training data and show originality directed by Artificial Intelligence. (Hristov, K. 2017).

Laws of patents state that the protected inventions shall include obvious and technical progress. (Agreement on Trade). Nevertheless, using tools of Artificial Intelligence regularly may lead to making the resulted inventions obvious for skilled practitioners. (Shemtov, N., & Gabison, G. (2022). Some outputs of Artificial Intelligence like data models may not be eligible to patent. (Drexl, J. (2017). It is still arguable to determine briefly whether Artificial Intelligence outputs deserve intellectual property protection regarding standards of intellectual property focusing on human. Protecting the industry secrets depends on existence of commercial value for the information through confidentiality. (Directive (EU) 2016/943). Many Artificial Intelligence systems depend largely on owned data and algorithms. However, keeping these secrets can be hindered by transparency and progress of Artificial Intelligence. (Hagendorff, T. (2020). Standards of intellectual property protection related to balance between confidentiality and disclosure face challenges requiring understanding that Artificial Intelligence is based on data. Generally, laws of intellectual property rights based on human creativity face difficulties when applying them regularly to the creative capabilities of Artificial Intelligence. The limits of originality, unclear progress and confidentiality require reevaluation in context of Artificial Intelligence.

5.2. Legal Personality and Rights of Artificial Intelligence Systems

The second important issue is that most frameworks of intellectual property give exclusive rights to human creative persons or owners. However, Artificial Intelligence which works increasingly in independent way lacks the natural personality.

Can Artificial Intelligence systems hold intellectual property rights without legal personality? (Gurry, F. (2017). Some experts suggest that contributions of Artificial Intelligence justify giving intellectual property rights for its products. (Fruehwald, E.S (2020). There are other suggestions to give "legal personality" to Artificial Intelligence (European Parliament Resolution), but there are political risks related to enabling Artificial Intelligence increasingly through legal agency. (Bryson, J.J., Diamantis, M.E. and Grant, T.D. (2017).

Other alternatives like allocating intellectual property rights generated from Artificial Intelligence for companies or governments have disadvantages too. (Ramalho, A. 2019). Some questions are still open about necessity of that? And how to give intellectual property rights to the outputs of Artificial Intelligence without humans to restrict them? There is still a deep debate about expanding the legal personality to include Artificial Intelligence.

Briefly, laws of intellectual property face major legal challenges about whether outputs of Artificial Intelligence deserve rights designed significantly for humans.

5.3. Mechanisms to Allocate Rights of Artificial Intelligence

Supposing that outputs of Artificial Intelligence deserve some forms of intellectual property rights, the main question shall be how to allocate rights appropriately without human creative persons or inventors. One of the methods is giving intellectual property rights in creations of Artificial Intelligence to its system specifically through the electronic personality. (Solum, L.B. (1992). (European Parliament Resolution of 16 February 2017).

However, skeptical persons state that the legal agency of Artificial Intelligence may lead to enabling machines widely (Bryson, J.J., Diamantis, M.E. and Grant, T.D. (2017) or embodying them incorrectly. (Fruehwald, E.S. (2020).

There are alternatives to allocate the rights to humans that contribute in Artificial Intelligence systems including programmers (Samuelson, P. (1985), data providers (Hall, M.A. and Fienberg, S.E. (2003) and users (Hristov, K. (2017), but it is difficult to separate their various contributions. Several groups may deserve partial rights. (Guadamuz, A. (2015).

Giving broad rights to one contributor like

developers of Artificial Intelligence may result in excessive control and reducing motives for other human participants. (Elkin-Koren, N. (2020). Generally, there are still questions related to allocating exclusive rights of Artificial Intelligence outputs which don't include human creative persons separately. While allocating is possible for shareholding companies or governments, there is continuous call to develop standards for allocating which reflect both human and mechanical contributions. (Yanisky-Ravid, S. (2017).

5.4. Sufficiency of Current Intellectual Property Laws

There is another debate about whether the current intellectual property legislations protect innovations resulted from Artificial Intelligence sufficiently, or legislative reforms are needed to establish special rights for Artificial Intelligence. Some people argue that current intellectual property laws established for human innovations can't protect automatic progress of Artificial Intelligence appropriately. (Bridy, A. (2012) (Ramalho, A. (2017). New specially designed rights can encourage development in field of Artificial Intelligence directly. (Abbott, R. (2016). Suggestions vary between simple adjacent rights (Senftleben, M.et al.(2020) and comprehensive framework systems. (Boyden, B (2016).

Nevertheless, some experts consider that innovations in field of Artificial Intelligence can be motivated sufficiently through current intellectual property rights. (Samuelson, P (1985). New rights are considered danger to progress in field of Artificial Intelligence due to excessive protection.

5.5. Responsibility Frameworks of Artificial Intelligence

Additional legal challenges are represented in determining responsibility for breaching intellectual property rights or other damages resulted from relatively independent systems of Artificial Intelligence. Strict responsibility includes risks of justice absence by punishing operators of Artificial Intelligence without any wrong behavior. (Teubner, G. (2007). Frameworks based on faults face difficulties in providing evidence of negligence in Artificial Intelligence. (Guihot M., Mathew A.and Suzor N. (2017). Current laws of responsibility face difficulties due to complexity of Artificial Intelligence. (Wagner, G (2018). It is suggested to give the Artificial Intelligence a "legal personality" to allow it carrying direct responsibility (Solum, L.B. (1992), but opponents state that responsibility can only be carried logically by humans who exercise control on Artificial Intelligence. (Asaro, P.M. (2019).

New systems impose obligations on innovators to prevent damages caused by Artificial Intelligence. (European Parliament Resolution of 16 February 2017). However, there are still difficulties in doing that with semi-independent Artificial Intelligence, as principles of responsibility based on balance between justice, safety and innovation require additional development.

Briefly, allocating intellectual property rights to Artificial Intelligence outputs, updating special legislations for intellectual property rights and enforcing accountability for damages caused by Artificial Intelligence without human innovators raise complicated legal questions about rights, protection and obligations in the automatically increasing systems.

6. LEGAL AND ECONOMIC PERCEPTIONS OF INTELLECTUAL PROPERTY RIGHTS IN FIELD OF ARTIFICIAL INTELLIGENCE

Frameworks of intellectual property based on balance between protection and openness contribute in enhancing innovation, cooperation and economic growth directed by Artificial Intelligence systems. However, intellectual property systems require accurate re-measurement for the context of Artificial Intelligence. **Main points of view are related to the following**

6.1. Protecting Innovation and Creativity

Providing intellectual property rights which prevent free benefit constitute important motives to investments in developing the innovative technology of Artificial Intelligence by giving exclusive rights to use commercially protected inventions and creations.

Laws of patents, copyrights and commercial secrets allow innovators in field of Artificial Intelligence to recover costs of research, development and profits from their innovations. (Zech, H. (2015) (Weyl, E.G. and Tirole, J. (2016).

However, developing the Artificial Intelligence depends largely on access to data, search tools and main knowledge. (Branstetter, L., Drev, M. and Kwon, N. (2018). Excessive or intensive protection of intellectual property makes it difficult to access these main necessary inputs and build on them which constitute risk to obstruct the accumulative innovation in field of Artificial Intelligence. (Hilty, R.M. (2021) (Contreras, J.L. and Gilbert, R.J. (2021). It is extremely important to find appropriate balance.

Regarding creative works created by Artificial Intelligence such as Art, Music and Literature, debate still exists about necessity of intellectual property

motive in case of absence of human authors (Grimmelmann, J. (2016) (Yanisky-Ravid, S. and Liu, X. (2017), because Artificial Intelligence systems don't need motives. Designing a new type of protection with special character for creations of Artificial Intelligence may lead to enhancing investment in productive systems of Artificial Intelligence, but it may also result in excessive monopolism. (Samuelson, P. (1985) (Senftleben, M. et al. (2020). The reforms related to period and extent of protecting intellectual property and licenses, and research exceptions specially designed for Artificial Intelligence outputs could help in preventing restrictions, while they encourage innovation in field of Artificial Intelligence. (Contreras, J. (2018) (Reichman, J.H. and Uhlir, P.F. (2003).

Generally, intellectual property systems require accurate re-measurement to support innovation in field of Artificial Intelligence using suitable motives without reducing access and reuse excessively which are also considered vital for progress of Artificial Intelligence. (Krafft, P.M., Young, M., Katell, M. and Huang, K. (2020). Continuous re-evaluation is necessary in light of development of Artificial Intelligence capabilities. Designing systems of intellectual property must aim at motivating development of Artificial Intelligence with keeping space for accumulative innovation. (Benkler, Y. (2002).

6.2. Enhancing Cooperation and Partnerships

Strong frameworks of intellectual property which determine property rights allow facilitating cooperation in innovation in field of Artificial Intelligence by explaining contributions among partners. For example, patents allow the companies participating together in developing technology of Artificial Intelligence to allocate protected elements and usage rights. (Bar-Ziv, S. and Elkin-Koren, N (2001). These explanations allow specialization and exchange in cooperative projects of Artificial Intelligence. (Inkster, I. (2018).

However, dividing intellectual property rights among many manifold owners may obstruct cooperation due to high costs of related licenses and agreements. (Heller, M.A. and Eisenberg, R.S. (1998). Structural solutions like unified ownership inside a joint project (Levin, R.C., Klevorick, A.K., Nelson, R.R. and Winter, S.G. (1987) or patent groups (Layne-Farrar, A. and Padilla, A.J. (2011) could reduce invocations by unifying intellectual property rights. Unified systems of licenses could also facilitate cooperative transaction. (Contreras, J.L. (2013).

Suggested alternative models of intellectual property rights include using technology of "Blockchain" to track ownership of Artificial Intelligence system transparently (Savelyev, A. (2021), or issuing accreditation certificates representing contributions of data and code in Artificial Intelligence. (Duch-Brown, N. (2017). Appropriately organized systems of intellectual property rights which govern rights of developed joint smart technologies can minimize costs of coordination and motivate cooperation and partnerships.

6.3. Reinforcing Economic Development

Developing and investing innovations in field of Artificial Intelligence under protection of intellectual property rights give competitive advantages, which enables countries to exploit the growth resulted from productivity gains directed by Artificial Intelligence. (Cockburn, I.M., Henderson, R. and Stern, S. (2018). However, advanced capabilities in field of Artificial Intelligence are limited to relatively few numbers of global technology companies which causes great concern. (Furman, J. and Seamans, R. (2019).

The broader obstacles of economic development include high costs of owned training data related to Artificial Intelligence, infrastructure of computerization and scarcity of talents. (Cohen, J.E. (2019). General policies may allow expanding to reach the main components of Artificial Intelligence by research funding, joint data repositories, exchange of models and groups of intellectual property rights and distribute opportunities more broadly. (Stiglitz, J., Orszag, P.R. and Orszag, J.M. (2000) (Reichman, J.H., Dedeurwaerdere, T. and Uhlir, P.F. eds. (2016). Systems of allocating intellectual property rights which divide rights among many inventors and creative persons instead of giving full control to one leading entity may also contribute in spreading economic gains more comprehensively. (Samuelson, P. (2016).

In general, calibrated systems of intellectual property rights can contribute in reinforcing the appropriate distribution of main Artificial Intelligence capabilities, in addition to benefits of productivity and related revenues of investment in innovation.

7. ECONOMIC ORIENTATIONS TO MOTIVATE INNOVATIONS IN FIELD OF ARTIFICIAL INTELLIGENCE

From an economic perspective, intellectual property rights of technologies and outputs of Artificial Intelligence require a balance between innovation motives and need to spread. Main

economic considerations include

7.1. Contradiction between Innovation Motives and Spread

Strong rights of intellectual property motivate investments in developing and marketing innovative Artificial Intelligence by preventing free benefit; however, they restrict reusing the protected content which increases costs for following innovators. (Weyl, E.G. and Tirole, J. (2021) (Murray, F. and Stern, S (2007).

Economists determine an inverse relation between power of intellectual property and innovation. Weak intellectual property hinders investment due to risks of copying, while very high protection also eliminates innovation by restricting the flow of ideas. (Allison, J.R., Lemley, M.A. and Schwartz, D.L. (2014). Calibrating the extent and exceptions of intellectual property to achieve balance between motives and spread is very important for Artificial Intelligence depending largely on access to data and tools. (Furman, J. and Seamans, R. (2019) (Drexl, J. (2017). Limited and well-designed rights may be sufficient to motivate progress in field of Artificial Intelligence without need to human creativity. (Samuelson, P. (2016). Intellectual property must contribute in keeping investment with enabling access.

7.2. Role of Access to Data and Sharing

Complications of economic impacts resulted from data restrictions are very complicated matter. Data repositories store valuable groups of data, but dividing data eliminates also external advantages of open and mutual analysis. (Jones, C.I. and Tonetti, C. (2020). Policies which impose or encourage sharing data like exceptions for research or obligatory licenses help to improve economic prosperity despite concerns of competition (Ariel, I. (2001). However, making exchanges results in costs for transactions.

Well-designed combinations, Application Programming Interface (APIs), public and private partnerships may reduce complications of access to data. (Reichman, J.H. and Uhlir, P.F. (2003). Generally, economically effective legal frameworks of intellectual property rights seem to require some openness of data while keeping private intellectual property rights in order to open the way for spread and accumulative innovation (Scotchmer, S. (1991). However, details of performance remain strong challenge.

7.3. Mitigating Impacts of Negative Competition

Patents related to Artificial Intelligence may lead to producing high market power whether with wide range or low quality. (Bessen, J. and Meurer, M.J. (2014). Copyrights and trade secrets may also extend unjustifiably to include unbalanced monopolies of data. (Cohen, J.E. (2019). Such deformities in market shall obstruct innovation and raise prices for consumers.

Suggested reforms include higher standards for obtaining patents, short and unified periods for copyrights and supervising competition of intellectual property rights. (Jaffe, A.B. and Lerner, J. (2006) (Baker, J.B. (2019). Competition policy also inspects increasingly restrictions for data to reach major technology companies (Crémer, J., de Montjoye, Y.A. and Schweitzer, H (2019), so balance between exclusivity of intellectual property and competition can be achieved.

8. POLITICAL VIEWS EMERGING ABOUT INNOVATION STATUS IN FIELD OF ARTIFICIAL INTELLIGENCE

Innovations in field of Artificial Intelligence pose new challenges to frameworks of intellectual property rights. Policy makers explore new views about Innovation status in field of Artificial Intelligence effectively with achieving balance between motives in order to continue to innovate. Main emerging political views include adapting the structure of invention and ownership as well as establishing protection compatible with Artificial Intelligence capabilities.

8.1. Adapting Structure of Invention and Ownership

The main challenge is determining who can be considered as "inventor" or "author" for the intellectual property rights generated by Artificial Intelligence systems. Within frameworks of current laws, only natural persons can be considered inventors or authors. (Yanisky-Ravid, S., and Liu, X. (2017). However, Artificial Intelligence systems which have increasing capabilities raise doubts about this approach focusing on humans.

One of the political views is expanding the structure of invention to acknowledge independent systems of Artificial Intelligence as legal inventors of intellectual property rights that they generate independently similar to invention's structure of companies. (Fruehwald, E. S. (2019). Supporters of this approach emphasize that it motivates developing advanced systems of Artificial Intelligence and encourages transparency of Artificial Intelligence's role in innovation. (Grimmelmann, J. (2016). Critics protest saying that

Artificial Intelligence systems don't have the required legal personality to become inventor, and that intellectual property rights generated by Artificial Intelligence don't need any motives. (Ginsburg, J. C., and Budiardjo, L. A. (2019).

The alternative is keeping the current structure of invention and also allowing admitting contributions of Artificial Intelligence, for example "on behalf of an Artificial Intelligence system". That can help in achieving balance between transparency and legal consistency. (Shemtov, N. (2020).

Some specialists suggest the hybrid approach which differentiates between intellectual property rights generated with help of Artificial Intelligence (human inventor) and intellectual property rights generated by Artificial Intelligence (Artificial Intelligence inventor). (Shemtov, N. (2019).

It is also necessary to inspect structure of ownership as some opinions support that property rights given for intellectual property generated by Artificial Intelligence must follow the inventor, i.e. system of Artificial Intelligence shall have ownership then it shall be transferred as per virtual rules. (Fruehwald, E. S. (2019). Other opinions encourage allocating ownership to persons according to certain factors like controlling the Artificial Intelligence system, investment or execution. (Contreras, J. L. (2021.) Rights of data and access are also related to developing Artificial Intelligence systems. (Drexl, J. (2017).

In general, adapting structure of invention and ownership remain a problematic matter, but it is necessary to control logically and transparently rights and obligations of intellectual property related to innovations of Artificial Intelligence which are increasingly developed and independent. The hybrid approach may help to achieve between competing interests. (Abbott, R. (2016).

8.2. Reform of Responsibility's Frameworks

Emerging views indicate also that responsibilities related to Artificial Intelligence systems require making reforms for current frameworks of responsibility regarding the collateral damages and civil responsibility. Challenges include tracking complicated chains of reasons related to damages resulted from algorithms of Artificial Intelligence to humans or companies (Wan, W. (2021), reasonable expectations related to standards of Artificial Intelligence's behavior (Drexl, J. 2021), and partial access to mechanisms of legal procedures (Smith, B. W., & Anderson, R. (2021). So, insufficient prevention from spreading technologies of Artificial Intelligence is very dangerous. (European Parliament, & Directorate-General for Parliamentary Research).

Options treating these problems include strict systems of responsibility which reflect causality and fault burdens of damages resulted from Artificial Intelligence. (Yeung, K., & Lodge, M. (2019). It is necessary to review and evaluate risks, establish prior supervision (Hagendorff, T. (2020), provide obligatory security for general responsibility of institutions which spread technologies of Artificial Intelligence (European Parliament), establish public compensation funds to collect costs of compensatory procedures (Wan, W. (2021) and extend the limited rights of Artificial Intelligence systems, which makes them able to afford obligations and liabilities.(Agrawal, A., Gans, J. S., & Goldfarb, A (2019). But critics refuse many reforms which discourage innovation or transfer human responsibility to machines. (LoPucki, L. M (1996).

Depending on hybrid approach which combines targeted strict responsibility, obligatory security, collected compensation funds and "personality of electronic entity" allocated to different categories of Artificial Intelligence may help to achieve balance between safety, accountability and sustainable innovation. (Wan, W. (2021). However, intensive legal and technical consultations are still needed to reformulate responsibility rules of the twentieth century in order to keep up with new age and reality of Artificial Intelligence. (Wu, F. (2019).

8.3. The Interaction of Intellectual Property Policies with Global Knowledge Flows

Intellectual property (IP) policies directly influence the cross-border movement of knowledge. When policies are flexible and balanced, they promote technology transfer and international collaboration in innovation. Conversely, overly strict or uncoordinated policies may hinder knowledge flows and widen the gap between developed and developing countries. Therefore, global coordination of IP laws is essential to ensure innovation equity and equal access to opportunities.

9. CUMULATIVE INNOVATION THEORY AND ITS APPLICATION TO ARTIFICIAL INTELLIGENCE

The Cumulative Innovation Theory is a foundational framework for understanding the dynamics of technological development. It posits that innovation does not occur in isolation, but rather builds progressively on prior knowledge, ideas, and existing technologies. In the context of artificial intelligence (AI), this cumulative nature is clearly evident, as modern models and algorithms heavily

rely on large datasets, prior research, and open-source platforms.

From a legal perspective, this theory highlights the need to revisit intellectual property (IP) policies to avoid monopolizing foundational knowledge, which could hinder the development of subsequent innovations. For instance, strict legal protection of core AI algorithms may slow progress in sectors that depend on these technologies, such as healthcare, education, and cybersecurity.

Recent literature suggests that applying this theory contributes to a more flexible innovation environment by promoting open licensing, research collaboration, and policy frameworks that facilitate regulated access to knowledge. Thus, the cumulative innovation theory serves as an effective analytical tool for understanding the relationship between innovation protection, knowledge expansion, and sustainable economic growth especially within emerging economies.

9.1. Transformations of the Knowledge Economy in Recent Literature

Recent literature highlights a shift in the knowledge economy from reliance on tangible goods to a focus on intellectual capital and digital innovation. Studies emphasize the growing importance of data, human skills, and emerging technologies such as artificial intelligence in generating economic value. The literature also underscores the role of knowledge infrastructure including education, scientific research, and adaptive policy frameworks in supporting these transformations and enhancing national competitiveness. **One of the most prominent contributions**

The OECD report (2023) discusses how countries with high R&D investments are enhancing their competitiveness by integrating AI into global value chains, with recommendations to enable continuing education and training to keep pace with the new labor market.(OECD.(2023)).

10. MAIN CONCLUSIONS AND RECOMMENDATIONS

This study has analyzed many complicated matters related to role of intellectual property in developing knowledge economy within framework of legal and economic challenges of Artificial Intelligence. **Many outstanding conclusions and recommendations have been attained**

Inventions and creative works generated by Artificial Intelligence constitute major challenges to traditional concepts of allocation and human authorship which are deeply included in laws of intellectual property. Emerging political views support adapting these concepts to enhance transparency about role of Artificial Intelligence systems, like recognizing independent systems of Artificial Intelligence as being legal inventors and authors for their outputs independently. Nevertheless, power of managing intellectual property rights mustn't be taken totally from humans as human supervision is needed to monitor economic and social impacts. (Grimmelmann, J. (2016) (Samuelson, P. (2019).

Special economic rights were suggested for cognitive goods generated by Artificial Intelligence which require intensive study to estimate their costs, benefits and expected consequences before applying them. More empirical evidence must be obtained to ensure that current systems of intellectual property can't be adapted reasonably by reformulating their standards, conditions, exceptions and implementation approach compatible with Artificial Intelligence capabilities. (Hristov, K. (2017) (Mandel, G. N. (2017).

Reforms are necessary for frameworks of civil responsibility to deal with damages of emerging algorithms, but giving full artificial electronic personality to Artificial Intelligence systems remain problematic legally and ethically.

It is evident that strengthening the theoretical and practical foundation of intellectual property grounded in cumulative innovation model and the interaction of national policies with global knowledge flows- is essential for fostering sustainable innovation and knowledge-driven economic growth in emerging economies. Generally, it is recommended to follow a cautious approach based on evidence to establish policies of intellectual property related to Artificial Intelligence, and to resist pressures to make fast reforms without sufficient evaluation for technical, economic and social impacts. While it is necessary to facilitate accessing carefully to data and spreading knowledge with ensuring public interest, policies of intellectual property must continue to enhance transparency, supervision and suitable participation in benefits derived from knowledge goods in field of Artificial Intelligence. (Drexl, J. (2017) (Samuelson, P. (2019).

Also, it is recommended to develop flexible intellectual property policies that support cumulative innovation and strike a balance between rights protection and encouraging reuse and advancement in Al technologies.

11. CONCLUSION

Finally, while Artificial Intelligence provides great opportunities to knowledge economies, it creates also new tensions for intellectual property

systems depending on human innovation. Policies of intellectual property can play an important role through accurate governance which achieves balance between protection, easy access to data, responsibility, cooperation and ethics in directing progress of Artificial Intelligence towards common economic and social benefits. However, expanded legal and empirical research is still necessary about unifying systems of intellectual property with capabilities and unprecedented risks of Artificial Intelligence systems which spread increasingly and independently.

REFERENCES

Abbott, R. (2016). Everything is Obvious. UCLA L. Rev., 66, 2.

Abbott, R. (2016). I Think, Therefore I Invent: Creative Computers and the Future of Patent Law. BCL Rev., 57, 1079.

Agrawal, A., Gans, J. S., & Goldfarb, A. (2019). Artificial Intelligence: The Ambiguous Labor Market Impact of Automating Prediction. Journal of Economic Perspectives, 33(2), 31-50.

Agreement on Trade-Related Aspects of Intellectual Property Rights 1994, Art 27.1.

Allison, J. R., Lemley, M. A., & Schwartz, D. L. (2014). Understanding the Realities of Modern Patent Litigation. Tex. L. Rev., 92, 1769.

Ariel, I. (2001). Rethinking Exclusivity. University of Chicago Law Review, 71-110.

Arrow, K. (1962). Economic Welfare and the Allocation of Resources for Invention. In The Rate and Direction of Inventive Activity: Economic and Social Factors (pp. 609-626). Princeton University Press.

Asaro, P. M. (2019). AI Ethics in the Pentagon: From Principles to Practice. Global Perspectives, 1(1).

Baker, J. B. (2019). The Antitrust Paradigm: Restoring a Competitive Economy. Harvard University Press.

Band, J. (2018). The Effect of Artificial Intelligence on Rules of Evidence. Yale JL & Tech., 21, 1.

Bar-Ziv, S., & Elkin-Koren, N. (2001). Behind the Curve? Mining the Gap Between Technology and Copyright Legislation. Berkeley Tech. LJ, 15, 307.

Benkler, Y. (2002). Coase's Penguin, or, Linux and the Nature of the Firm. Yale Law Journal, (369).

Berne Convention for the Protection of Literary and Artistic Works.

Bessen, J., & Meurer, M. J. (2008). Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk. Princeton University Press.

Bessen, J., & Meurer, M. J. (2014). The Direct Costs from NPE Disputes. Cornell L. Rev., 99, 387.

Boyden, B. (2016). Emergent Works. Colum. JL & Arts, 39(2), 377-392.

Branstetter, L., Drev, M., & Kwon, N. (2018). Get With the Program: Software-Driven Innovation in Traditional Manufacturing. Management Science, 65(2), 545-564.

Branstetter, L., Fisman, R., Foley, C. F., & Saggi, K. (2011). Does Intellectual Property Rights Reform Spur Industrial Development? Journal of International Economics, 83(1), 27-36.

Bridy, A. (2012). Coding Creativity: Copyright and the Artificially Intelligent Author. Stan. Tech. L. Rev., 5, 1.

Bryson, J. J., Diamantis, M. E., & Grant, T. D. (2017). Of, For, and By the People: The Legal Lacuna of Synthetic Persons. Artificial Intelligence and Law, 25(3), 273-291.

Cockburn, I. M., Henderson, R., & Stern, S. (2018). The Impact of Artificial Intelligence on Innovation (No. w24449). National Bureau of Economic Research.

Cohen, J. E. (2019). Between Truth and Power: The Legal Constructions of Informational Capitalism. Oxford University Press.

Cohen, W. M., & Lemley, M. A. (2001). Patent Scope and Innovation in the Software Industry. Calif. L. Rev., 89, 1.

Lessig, L. (2001). Copyright's First Amendment. UCLA L. Rev., 48, 1057.

Cohen, W. M., Nelson, R. R., & Walsh, J. P. (2000). Protecting Their Intellectual Assets: Appropriability Conditions and Why US Manufacturing Firms Patent (or Not) (No. w7552). National Bureau of Economic Research.

Contreras, J. (2018). Expanding Access to Patents for COVID-19. Sci. Adv., 6(28), eabc6162.

Contreras, J. L., & Gilbert, R. J. (2021). An Antitrust Framework for False Patenting. NYU Law and Economics Research Paper, (21-07).

Contreras, J. L. (2013). Fixing FRAND: A Pseudo-Pool Approach to Standards-Based Patent Licensing. Antitrust Law Journal, 79(1), 47-97.

Contreras, J. L. (2021). Artificial Intelligence and the Dynamics of Inventorship. Utah L. Rev., 2021(4), 1039.

Crémer, J., de Montjoye, Y. A., & Schweitzer, H. (2019). Competition Policy for the Digital Era. European

Commission.
Darshana, T., & Dharani, T. (2021). Overprotection of Intellectual Property Rights Law in AI Innovations and Importance of Public Interest. Journal of Intellectual Property Rights, 26(1), 18-25.
Denicola, R. C. (2016). Ex Machina: Copyright Protection for Computer-Generated Works. Rutgers UL Rev., 69, 251.
Directive (EU) 2016/943 on the Protection of Undisclosed Know-How and Business Information.
Drexl, J. (2017). Designing Competitive Markets for Industrial Data Between Propertisation and Access. JIPITEC, 8(4), 257-315.
Drexl, J. (2021). Designing Competitive Markets for Industrial Data Between Propertisation and Access. JIPITEC: Journal of Intellectual Property, Information Technology and E-Commerce Law, 8(3).
Duch-Brown, N. (2017). The Economics of Ownership, Access and Trade in Digital Data. JRC Digital Economy Working Paper 2017-01, Institute for Prospective Technological Studies.
Eisenberg, R. S. (1996). Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research. Va. L. Rev., 82, 1663.
Elkin-Koren, N. (2020). Fair Use by Design. UCLA L. Rev., 64, 1082.
European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics, 2015/2103(INL).
European Parliament & Directorate-General for Parliamentary Research Services. (2020). A Governance Framework for Algorithmic Accountability and Transparency.
European Patent Office. (2021, December 21). Decision J 0008/20 (Designation of Inventor/DABUS). Board of Appeal, European Patent Office.
Fromer, J. C. (2009). Patent Disclosure. Iowa L. Rev., 94, 539.
Fruehwald, E. S. (2019). Copyright for Literate Robots. U. Cin. L. Rev., 87, 659.
Fruehwald, E. S. (2019). Copyright for Technological Works. Santa Clara High Tech. LJ, 36, 1.
Fruehwald, E. S. (2020). The AI Author in Copyright (and Patent) Law. SMU L. Rev. F., 73(123).
Furman, J., & Seamans, R. (2019). AI and the Economy. Innovation Policy and the Economy, 20(1), 161-191.
Gervais, D. J. (2020). The Machine as Author. Iowa Law Review, 105(2053).
Ginsburg, J. C., & Budiardjo, L. A. (2019). Authors and Machines. Berkeley Tech. LJ, 34, 343.
Grimmelmann, J. (2016). There's No Such Thing as a Computer-Authored Work And It's a Good Thing, Too. Colum. JL & Arts, 39, 403.
Guadamuz, A. (2017). Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works. IPQ, 3, 169.
Guihot, M., Matthew, A., & Suzor, N. (2017). Nudging Robots: Innovative Solutions to Regulate Artificial Intelligence. Vand. J. Ent. & Tech. L., 20, 385.
Gurry, F. (2017). Artificial Intelligence and Intellectual Property: An Interview with Francis Gurry. WIPO Magazine.
Gurry, F. (2019). WIPO-WTO Colloquium for Teachers of Intellectual Property Law 2018. WIPO.
Hagendorff, T. (2020). The Ethics of AI Ethics: An Evaluation of Guidelines. Minds and Machines, 30(1), 99-120.
Hall, M. A., & Fienberg, S. E. (2003). Privacy, Confidentiality, and Data Sharing Concerns. In Ethical and Legal Issues in Research Involving Human Participants.
Heller, M. A., & Eisenberg, R. S. (1998). Can Patents Deter Innovation? The Anticommons in Biomedical Research. Science, 280(5364), 698-701.
Hilty, R. M. (2021). Intellectual Property and Artificial Intelligence. Max Planck Institute for Innovation and Competition Research Paper, (21-10).
Hristov, K. (2017). Artificial Intelligence and the Copyright Dilemma. IDEA: IP L. Rev., 57(3), 431-453.
Infopaq International A/S v Danske Dagblades Forening (C-5/08) [2009] ECR I-06569.
Inkster, I. (2018). History of Technology Volume 31: Artificial Intelligence for Science, Engineering, and Manufacturing. Bloomsbury Publishing.
Jaffe, A. B., & Lerner, J. (2006). Innovation and Its Discontents. Capitalism and Society, 1(3).
Jones, C. I., & Tonetti, C. (2020). Nonrivalry and the Economics of Data. Econometrica, 88(9), 2819-2858.
Krafft, P. M., Young, M., Katell, M., & Huang, K. (2020). Defining AI in Policy Versus Practice. AAAI/ACM Conference on AI, Ethics, and Society, 72-78.
Landes, W. M., & Posner, R. A. (2003). The Economic Structure of Intellectual Property Law. Harvard University Press.

Layne-Farrar, A., & Padilla, A. J. (2011). Productivity and Competition Effects of IPR: Evidence Across Industries and Firms. Review of Economics and Institutions, 2(3).
Lemley, M. A. (2012). The Myth of the Sole Inventor. Mich. L. Rev., 110, 709.
Lemley, M. A. (2015). IP in a World Without Scarcity. NYU Law Review, 90(2), 460-515.
Lerner, J. (2009). The Empirical Impact of Intellectual Property Rights on Innovation: Puzzles and Clues. American Economic Review, 99(2), 343-348.
Levin, R. C., Klevorick, A. K., Nelson, R. R., & Winter, S. G. (1987). Appropriating the Returns from Industrial Research and Development. Brookings Papers on Economic Activity, 1987(3), 783-831.
LoPucki, L. M. (1996). The Death of Liability. Yale LJ, 106, 1.
Mandel, G. N. (2017). IP and Regulating New Technologies. In Intellectual Property, Innovation and the Environment (p. 191). Edward Elgar Publishing.
Margoni, T., & Perry, M. (2020). AI & IP: Ownership of AI and AI-Generated Works. CIGI Paper No. 252.
Maskus, K. E. (2000). Intellectual Property Rights in the Global Economy. Peterson Institute.
Murray, F., & Stern, S. (2007). Do Formal Intellectual Property Rights Hinder the Free Flow of Scientific Knowledge? Journal of Economic Behavior & Organization, 63(4), 648-687.
OECD. (2023). OECD Employment Outlook 2023: Artificial Intelligence and the Labor Market. OECD Publishing.
Parchomovsky, G., & Siegelman, P. (2018). Towards an Integrated Theory of IP. Va. L. Rev., 104, 1484.
Ramalho, A. (2017). Will Robots Rule the (Artistic) World? J. Internet L., 21, 12.
Ramalho, A. (2019). Patentability of AI-Generated Inventions: Is a Reform of the Patent System Needed? SSRN 3586550.
Reichman, J. H., & Uhlir, P. F. (2003). A Contractually Reconstructed Research Commons for Scientific Data in a Highly Protectionist Intellectual Property Environment. Law and Contemporary Problems, 66(1/2), 315-462.
Reichman, J. H., Dedeurwaerdere, T., & Uhlir, P. F. (2016). Governing Digitally Integrated Genetic Resources, Data, and Literature. Cambridge University Press.
Samuelson, P. (1985). Allocating Ownership Rights in Computer-Generated Works. U. Pitt. L. Rev., 47, 1185.
Samuelson, P. (2019). Unlocking the Promise of AI for US Businesses and Consumers: Principles for the US Approach to AI. J. Int'l Aff., 72, 87.
Savelyev, A. (2021). Copyright in the Blockchain Era: Promises and Challenges. Computer Law & Security Review, 40, 105432.
Schneider, P. H. (2005). International Trade, Economic Growth and Intellectual Property Rights: A Panel Data Study of Developed and Developing Countries. Journal of Development Economics, 78(2), 529-547.
Scotchmer, S. (1991). Standing on the Shoulders of Giants: Cumulative Research and the Patent Law. Journal of Economic Perspectives, 5(1), 29-41.
Scotchmer, S. (2004). Innovation and Incentives. MIT Press.
Senftleben, M. et al. (2020). Robot Creativity: An Incentive-Based Neighbouring Rights Approach.
Shemtov, N. (2019). A Study on Inventorship in Inventions Involving AI Activity. Available at SSRN 3431294.
Shemtov, N. (2020). The Inventorship Status of AI in US, EU and UK Patent Law. Queen Mary Journal of Intellectual Property, 10(3), 243-265.
Shemtov, N., & Gabison, G. (2022). The Inventive Step Requirement and the Rise of the AI Machines. QMLR, 1-21.
Shtefan, A. (2021). Creativity and Artificial Intelligence: A View from the Perspective of Copyright. JIPLP, 16(9), 720-728.
Smith, B. W., & Anderson, R. (2021). Regulating Artificial Intelligence: Proposal for a Global Solution. AI & Ethics, 1-21.
Solum, L. B. (1992). Legal Personhood for Artificial Intelligences. NCL Rev., 70, 1231.
Stiglitz, J., Orszag, P. R., & Orszag, J. M. (2000). The Role of Government in a Digital Age. Computer & Communications Industry Association.
Sweet, C. M., & Maggio, D. S. E. (2015). Do Stronger Intellectual Property Rights Increase Innovation? World Development, 66, 665-677.
Teubner, G. (2007). Rights of Non□Humans? Electronic Agents and Animals as New Actors in Politics and Law. J. L. & Soc'y, 33(4), 497-521.
Wagner, G. (2018). Robot Liability. Liability for Damages Caused by Artificial Intelligence, 7 et seq.

Wan, W. (2021). Humanizing Intellectual Property: Moving Beyond the Natural Rights Property Focus. Vand. J. Ent. & Tech. L., 24, 207.

Weyl, E. G., & Tirole, J. (2021). Market Power Screens Willingness-to-Pay. Quarterly Journal of Economics, 131(4), 1971-2003.

Wu, F. (2019). Blind Spot: The Attention Economy and the Law. Antitrust LJ, 82, 771.

Yanisky-Ravid, S. (2017). Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era. Mich. St. L. Rev., 659.

Yanisky-Ravid, S., & Liu, X. (2018). When Artificial Intelligence Systems Produce Inventions: An Alternative Model for Patent Law at the 3A Era. Cardozo L. Rev., 39, 2215.

Yeung, K., & Lodge, M. (2019). Algorithmic Regulation: A Critical Interrogation. Regulation & Governance.

Zech, H. (2015). Information as a Common Good. Max Planck Institute for Innovation and Competition Research Paper, (16-13).